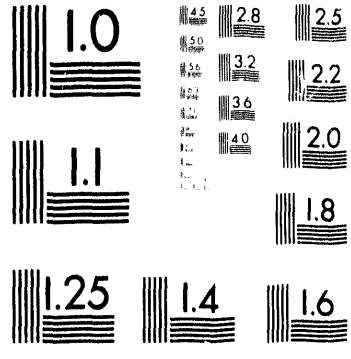
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DOE Office of Energy Research Laboratories Self-Assessment Workshop: The Nuts and Bolts of Implementation

July 27–28, 1993
Lawrence Berkeley Laboratory

Organized by:
Office of Assessment and Assurance

Lawrence Berkeley Laboratory
University of California
Berkeley, California 94720

September 1993

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Preface

Making self-assessment a "cultural norm" at the DOE Office of Energy Research (ER) laboratories has been a tremendous challenge. In an effort to provide a forum for the ER laboratories to share their self-assessment program implementation experiences, the Lawrence Berkeley Laboratory hosted a Self-Assessment Workshop: The Nuts and Bolts of Implementation, on July 27 and 28, 1993. The workshop was organized to cover such areas as:

- DOE's vision of self-assessment
- What makes a workable program
- Line management experiences
- How to identify root causes and trends
- Integrating quality assurance, conduct of operations, and self-assessment
- Going beyond environment, safety, and health

Individuals from the ER laboratories wishing to participate in the workshop were invited to speak on topics of their choice. The workshop was organized to cover general topics in morning presentations to all attendees and to cover selected topics at afternoon breakout sessions. This report summarizes the presentations and breakout discussions.

I would like to thank all of the speakers and facilitators for their contributions to the workshop. I especially would like to thank Buck Koonce, Richard Dicely, and Kathie Hardy for their help in formulating the workshop; and Mollie Field and the LBL Conference Services for organizing the workshop logistics.

Irene Kan, Workshop Chair
Office of Assessment and Assurance
Lawrence Berkeley Laboratory

September 21, 1993

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Day 1: Introduction and Keynote Speakers

Topic **Introduction to the DOE Office of Energy Research Laboratories Self-Assessment Workshop**

Workshop Chair Irene Kan, Office of Assessment and Assurance, Lawrence Berkeley Laboratory

This workshop was planned specifically to focus on how to develop and implement a workable and effective self-assessment program at the DOE research and development laboratories. The challenge for our laboratories is to demonstrate to line management that they have primary responsibility for assessing their own performance and to demonstrate to them the benefits of self-assessment. We have all heard the familiar litany of reasons why people don't want to do self-assessment. These include:

"We don't have the staff or budget."

"External auditors are already doing assessments."

"We don't have the training."

"We don't know what the requirements are."

These arguments have some merit, so telling people about the benefits of self-assessment is not enough. We need to develop programs and provide tools for our institutions that make sense to line management. We need to demonstrate to line management that nobody is more knowledgeable or better equipped to assess and correct their operations than they are. And self-assessment is one of the tools they have to exercise their line management responsibilities.

We also want to demonstrate to DOE our commitment to continuous improvement. Different parts of DOE are now promulgating assessment directives and guidance. The institutions we represent work for all the different parts of DOE. We need to figure out how to best integrate the different directives and guidance and help our DOE counterparts understand that integration is achievable and desirable.

Topic **Self-Assessment in the DOE Office of Energy Research**

Keynote Speaker Maureen Hunemuller, Office of Assessment and Support, DOE, Energy Research Headquarters

While the history of self-assessment at DOE over the last several years reads like a "bad novel," the concepts of self-assessment continue to be strongly supported by DOE, Headquarters. The requirements for self-assessment activities are clearly encompassed in DOE Order 5700.6C which addresses:

- Worker assessment (Criterion 5)
- Management assessment (Criterion 9)
- Independent assessment (Criterion 10)

In the future, DOE's approach to self-assessment will be emphasizing Total Quality Management (TQM), with more self regulation and less oversight. This approach is exemplified by:

- DOE's compliance with the Price-Anderson Act Amendments—The Office of Enforcement will never have adequate staff to ensure compliance and so will be relying on contractor self-assessments. Contractor self-assessment findings could help mitigate fines.
- DOE Orders 5000.3B and 5480.27, which cover Occurrence Reporting and Performance Indicators, two elements of a self-assessment program.
- DOE's goal to eventually participate in OSHA's Voluntary Protection Program.

In measuring the validity of self-assessment processes, DOE-ER will be looking at whether they:

- Objectively look for symptoms, precursors, and performance indicators of problems
- Identify problems in a timely manner
- Emphasize diagnosis and analysis of problems
- Include a well-defined root cause as the link between problem identification and corrective action

To integrate self-assessment into all its organizations, ER will:

- Assist in development of incentives (e.g., the OSHA Voluntary Protection Program)
- Assist in training in root cause analysis
- Provide technical assistance for self-assessment program development and evaluation of results
- Coordinate timely dissemination of lessons learned to all facilities

The importance of self-assessment is increasing. The DOE Energy Research mission is changing, just as the missions of the laboratories are changing. We need to be self-critical and commit to making changes for improvement. The emerging climate is one of constant evaluation and modification. Everybody is a key player: management, supervisors, and workers.

Topic **Self-Assessment at the DOE Field Office Level**

Keynote Speaker Martin Domagala, Assistant Manager for Energy Programs, DOE, San Francisco Field Office (SF)

The new University of California contract with the DOE for management of Los Alamos National Laboratory, Lawrence Livermore National Laboratory, and Lawrence Berkeley Laboratory now specifies criteria for contract performance in the areas of:

- Environment, safety, and health
- Property procurement and management
- Safeguards and security
- Financial management
- Human resource management

Each laboratory must now submit to the University of California (UC) self-assessments in these performance areas. UC will validate and then turn over these self-assessments to the respective DOE field offices. The DOE field office also will review and validate the self-assessments.

According to the new UC contract, these self-assessments play an important role in the management of the three laboratories:

- They have a direct impact on executive salaries (at the Associate Director level and above) at the laboratories.
- They are a means to document UC performance.
- They could eventually lead to DOE to restructuring its on-site oversight of the laboratories to avoid duplication of efforts.

It is important, therefore, that the laboratories' self-assessments are credible, identify areas of poor performance, and have good follow-up systems.

The DOE San Francisco Field Office (DOE-SF) itself is struggling with how to implement self-assessment on a day-to-day basis. Areas of focus include:

- Oversight implementation
- Occurrence reporting
- Institutional management

DOE-SF needs to be more responsive, use more business sense, and work smarter. We need to take a critical look at systems and work processes that have been in place for years. For instance, review of work-for-others activities takes many months, and salary approvals take eons. The Secretary of Energy wants to trim these times, and DOE-SF needs to involve the laboratories in the continual improvement efforts. The laboratories can help not only by reviewing their own processes, but also by looking at DOE-SF internal work flow processes and making improvement suggestions. DOE-SF plans to involve the laboratory in its self/continuous improvement and total quality efforts.

Topic **Towards an Integrated Approach to Self-Assessment**

Keynote Speaker Piermaria Oddone, Deputy Director, Lawrence Berkeley Laboratory

The Tiger Team visit of two years ago was the first time that LBL had to cope with self-assessment. It was complete chaos, a very demanding time of heightened feelings.

LBL learned a lot from that experience, but most importantly it learned that an organization needs to integrate to perform self-assessment. It needs to create a system that allows you to see things comprehensively and to act sensibly. LBL convened a Management Integration Group to try to create this system and it came up with a "Notebook" System against which assessments could be performed. A single Notebook System would enable the entire institution—including facilities, research, and administrative organizations—to be in a reasonable state of audit-readiness.

The initial, helter-skelter experience of trying to look at everything might be described as "self-assessment of the first kind." If the next, system building phase is "self-assessment of the second kind," then LBL is now entering "self-assessment of the third kind," which is tied to the principles of Total Quality Management. In this latest phase, self-assessment maps functions and processes to find out whether we're doing things in the most efficient way. Compliance is one thing, but achieving it in a rational and efficient way is another, and it is the latter goal that we're now striving for.

Topic **What Are the Necessary Elements of a Workable Self-Assessment Program?**

Speaker Irene Kan, Office of Assessment and Assurance, Lawrence Berkeley Laboratory

LBL is a multiprogram national laboratory. Its divisions have diverse missions ranging from accelerator research to structural biology and earth sciences. Within LBL, the Office of Assessment and Assurance (OAA) is responsible for developing the institution's self-assessment program.

After the chaotic self-assessment conducted in preparation for the Tiger Team visit in 1990, it was clear that a more rational approach was necessary. In 1992, OAA developed a new program based on draft DOE guidance. An OAA survey of division self-assessment coordinators revealed that a workable LBL program also would have to satisfy the following internal requirements:

- The Environment, Health and Safety Division would provide technical assistance and carry out functional appraisals, but not be responsible for Division adherence to requirements.
- Performance objectives and criteria must be uniform and applied Lab-wide.
- Program products and deliverables must be reviewed and piloted before being implemented Lab-wide.
- Self-assessment tools must be user-friendly.
- The program must be flexible enough to allow "ownership" and accommodate the diversity of the Divisions, Offices, and Departments that make up LBL.

The resulting LBL institutional program is three-tiered. Division line management performs self-appraisals. The Environment, Health and Safety Division performs functional appraisals to verify compliance. The LBL Safety Review Committee and OAA provide independent appraisals of line management and organization for environment, safety, and health (ES&H).

The LBL program has a number of features that OAA believes make it workable. For example, LBL developed performance objectives and criteria from the 1991 Tiger Team findings, previous LBL self-assessment reports, and corrective action plan milestones instead of

using those developed by the DOE The resulting performance objectives and criteria are meaningful to line management. Furthermore, the self-assessment program supports the many ES&H corrective action activities to which the Laboratory has devoted significant resources.

Self-assessment procedures are simple and presented in a readable, short manual. A template of a Division self-assessment implementation plan helped to avoid significant delay in starting up the program

The corrective action tracking database used by line management employs user-friendly software (FileMaker Pro) that runs on both PCs and Macs. Each division owns its database. Divisions are now using FileMaker Pro to create customized tracking systems and checklists.

The Environment, Health and Safety Division helped to create a master ES&H checklist file, containing 700 regulatory and LBL requirements, specifically for non-ES&H experts. Although the file is time-consuming to generate and maintain, it appears that division self-appraisal inspection teams like to use it to develop customized checklists specific to their Divisions.

LBL has the management support that is essential to overcoming resistance to participation on appraisal teams. The program also relies heavily on an administrative-type coordinator from each Division to handle the inspection logistics, manage the database, secure training, and document self-assessment activities. OAA's focus since introduction of the new program has been to provide support for these coordinators.

Finally, the LBL program does not hold division inspection teams to the same performance expectations that apply to functional appraisals performed by Environment, Health and Safety Division specialists. Division line management personnel are not expected to be ES&H experts. In the LBL program, the division self-appraisals *supplement* the functional appraisals.

Topic **A Workable Self-Assessment Program at LLNL**

Speaker Patsy Gilbert, Biology and Biotechnology Research Program, Lawrence Livermore National Laboratory

LLNL has a self-assessment policy which gives top priority to ES&H. Our policy is to develop and conduct strong self-assessment programs to enhance the quality of all activities, ensure compliance with LLNL's ES&H policy, and ensure that ES&H goals and intents are being met.

Each organization (Directorate) in LLNL conducts periodic self-assessments, documents and tracks deficiencies on the DefTrak

database, and schedules and executes corrective actions. The Assurance Review Office conducts independent reviews of assessments.

The self-assessment program at LLNL has two types of inspections—formal and informal. Formal inspections may be conducted by consultants, regulatory agencies, or a special group of safety and health specialists known as Hazards Control Team 7, which is available to all Directorates as an additional inspection resource. Each Directorate also has matrixed to it safety and health specialists from the Hazards Control Group. The frequency of formal inspections depends on the degree of hazard within a facility:

- High hazard areas are inspected annually.
- Moderate hazard areas are inspected every two years.
- Low hazard areas are inspected every three years.

The Biology and Biotechnology Research Program (BBRP), one of the Directorates in LLNL, currently is instituting a program of informal inspections to supplement formal inspections. We believe that informal inspections are key to effective self-assessment because management and staff buy into the effort and it is the only way we can find out what's really happening in our organization.

In the BBRP, informal inspections are conducted by the BBRP ES&H office. The inspections cover all of the safety and health disciplines in each facility within one quarter. They're really audits because they involve looking at procedures to see whether they're effective. We've been doing these types of informal inspections for two years.

Our next goal for the informal inspections is to create an atmosphere in which personnel want to participate. To accomplish this, the BBRP ES&H office is designing a program that will allow principal investigators to inspect their own facilities regularly (e.g., monthly or quarterly). Right now, they're only participating in the walkthroughs conducted by the safety and health specialists. We're trying to make it as simple as possible for researchers to do inspections because they are very busy. For instance, the BBRP ES&H Office is developing a computer-generated checklist. Except for the DefTrak database, which is an institutional system, Directorates such as BBRP are developing their own methods or policies for informal inspections.

In the BBRP, we have found that a workable self-assessment program requires:

- Participation of *all* levels of management, including principal investigators and supervisors.
- Realistic expectations of participants—we should not expect researchers to be safety professionals.

- Effective training of personnel on safety requirements and what they are to look for.
- Continuous communication with all people involved, particularly concerning the latest safety information.
- Consistent assessment procedures and corrective actions and policies.
- Clearly established goals: purpose, reason, something to focus on.
- Follow-up on corrective action; self-assessment is not effective unless you follow through with independent verification.

In BBRP, we're trying to go beyond compliance or just meeting the letter of the law. We're focusing on achieving a safe working environment because that's how we can lower the incidence of accidents.

Topic **Los Alamos Integrated Assessment Program**

Speaker Dennis Derkacs and Roger Kruse, Laboratory Assessment Office, Los Alamos National Laboratory

We at LANL have assessments by agencies external to the Laboratory as well as independent internal assessments by the Laboratory Assessment Office. To researchers, these assessments don't appear to be integrated, and it doesn't really matter because the oversight is burdensome. Our goal, our vision, is to develop the line management or self-assessment part of the program so that external and internal independent audits can be reduced in frequency and scope.

The LANL assessment program, which was first implemented in 1979, is evolving from a process in which line management plays a very small part to one in which their activities form the foundation of an integrated assessment program. Currently, the major activities of the LANL assessment program are the internal independent assessments. Elements of the internal independent assessment program are:

- **Policies and procedures** originating with the Laboratory Director, which specify why self-assessment is necessary.
- **Performance objectives and criteria** derived from Technical Safety Appraisals, order compliance statements, administrative requirements generated by the Laboratory ES&H organizations, and federal and state requirements.
- **Staffing and training** within the Laboratory Assessment Office and the line management self-assessments in the ES&H and assessment areas.
- **Corrective action plans.**

- **Validation and verification** of corrective actions (being performed in part by retired ES&H specialists retained as associates or consultants to LANL).
- **Tracking and trending** of findings, documented in the Division and Directorate levels and then rolled into an annual institutional self-assessment report.

Our line management self-assessment program currently is in its infancy. The Laboratory Assessment Office has developed a report format for line management to report self-assessment findings. We are using the same performance objectives and criteria as for the internal independent assessments. While ES&H specialists are available within line management organizations, training for line management on how to do assessments has not yet been developed. Line management currently is not required to use the institutional corrective action tracking systems and may not have procedures or staff to verify corrective actions.

Topic **What Are the Logistical Considerations in Planning Self-Assessment Appraisals?**

Speaker Richard Dicely, Accelerator and Fusion Research Division, Lawrence Berkeley Laboratory

The Accelerator and Fusion Research Division (AFRD) is the second largest division at LBL. It operates six diverse programs that are spread out over virtually the entire site. AFRD was a principal contributor to the chaos referred to in Piermaria Oddone's remarks earlier today.

I'd like to point out that at LBL, the Office of Assessment and Assurance has only one full-time person devoted to developing and implementing the Self-Assessment Program at the institutional level; and that the Environment, Health and Safety Division has at most a dozen specialists performing functional (internal independent) appraisals. Furthermore, with a couple of exceptions, the Divisions at LBL do not have ES&H specialists in their organization. In fact, Kathie Hardy and I are both administrative specialists who have responsibility for setting up our respective Division self-assessment programs. Therefore, at LBL, an assessment program that is well-integrated and involves Division line management is essential.

AFRD had several objectives in implementing its Division-level self-assessment program:

- Uniform implementation across all the research programs
- Collection of data that would support trending and identification of root causes

- Looking beyond occupational safety to include occupational health and environmental protection
- Making self-assessment an integral part of division operations

The institutional self-assessment performance criteria, particularly those addressing management and organizational systems for ES&H, allow for individual Division interpretation of how to meet the criteria. This flexibility was intended to accommodate the diversity of research, engineering, and facilities support and administrative work that exists at LBL.

The challenge for AFRD was to identify meaningful Division implementation tasks/goals to meet each of the criteria. The tasks had to be measurable, relevant to the criterion, apply to Division operations, and be truly beneficial for the Division (not implemented just to satisfy a self-assessment requirement).

For example, one institutional performance criterion called for adherence to the new Laboratory Chemical Hygiene and Safety Program. We used that criterion as a catalyst to get our employees trained in chemical hygiene and safety and to make the Laboratory's new chemical inventory database into a useful tool for AFRD.

After articulating Division tasks/goals for the fiscal year in a Division self-assessment plan, we decided to pilot our plan at the Magnetic Fusion Energy Program and to obtain input from Division management before full-scale implementation. We received much valuable input on whether our procedures were workable.

To implement our final self-assessment plan, we created specialized teams with specific ES&H assignments, instead of requiring each team to be familiar with all ES&H requirements. Selected by Division management with their supervisor's concurrence, and appointed by the Division Director, team members were knowledgeable in at least one of the team's assigned ES&H areas. One member of each team was chosen for data entry skills.

Teams could report any deficiency, but were requested to focus on their assignments to avoid duplication of team efforts. The teams were not responsible for tracking or implementing corrections but could recommend corrective actions.

Team chairs scheduled any necessary training by specialists from the Environment, Health and Safety Division, scheduled inspections, conducted close-out meetings, and submitted final reports to the Division Office.

All teams were trained in the Division self-assessment plan, the self-assessment inspection philosophy (not fixing blame), how to prepare

for inspections, how to conduct inspections (including closing conferences), and what information should be placed into the corrective-action tracking database.

The teams didn't use checklists because they tended to interfere with their ability to observe deficiencies. Team members weren't expected to be ES&H experts—most things found during inspections were obvious; the Environment, Health and Safety Division concentrated on finding the more complex and subtle problems.

The most important lessons we learned were:

- We put too many deliverables (i.e., tasks and goals) in our self-assessment plan.
- Teams were not ready to make entries into the database. We found that a quality assurance review between assessment and data entry was necessary.
- Teams should be required to give a narrative summary report.
- A two-month correction cycle is not feasible.

Topic **What are the Logistical Considerations in Planning Self-Assessment Appraisals?**

Speaker Kathie Hardy, Physics Division, Lawrence Berkeley Laboratory

The Physics Division does research in high-energy particle physics, astrophysics, and applied mathematics. Unlike AFRD, we don't have accelerators or user facilities, but we do have a semiconductor facility which uses toxic gases and has a wastewater treatment unit. We operate a machine shop that also is used to train students. And we fabricate detectors and detector components using sealed sources and small lasers. We face all of the potential work hazards with the exception of biohazards.

There are several factors that helped us achieve a workable self-assessment program. We are block-funded so our investigators do not have to spend as much time as those in other Divisions looking for funding. Most important, we have management support for self-assessment. In 1990, before the Tiger Team visit, the Division Director assigned each senior scientist to an inspection team. For the recently revised institutional program at LBL, the Division Director stated in a memorandum his commitment to the principles of self-assessment, requested all staff and guests to become familiar with the ongoing Division self-assessment program, and requested that staff participate either as team members or as the inspected parties.

Our goal was to integrate self-assessment into ongoing Division activities, have a flexible structure that would survive staffing changes, and get a wide participation of nontechnical and technical staff on the appraisal teams. We chose people who had experience in the 1990 pre-Tiger Team review to chair teams; and we assigned specific areas of ES&H responsibility to each team. We decided to give the appraisal teams latitude in figuring out how to measure progress towards meeting performance criteria that addressed management and organization for ES&H. These types of performance criteria did not have associated regulatory or Laboratory requirements to comply with.

Careful and thorough preparation of the appraisal teams before embarking on appraisals was critical to achieving a streamlined process and ensuring buy-in of the researchers and staff on the teams. There was a Division-wide staff meeting to cover program goals and a meeting of all team members to cover inspection techniques and etiquette, checklists, interviews, and document reviews as appraisal methods. In addition, the Division coordinator responsible for implementing self-assessment met with each team to ensure that its mission was clear.

Where necessary, the team chair requested the assistance of a specialist from the Environment, Health and Safety Division. Teams carried chemical inventories, listings of open deficiencies, incident reports, and cheat sheets on inspection etiquette—we didn't want to be seen as unfriendly.

Each team was encouraged to generate a narrative report on their findings. The Division coordinator would use these reports to prepare a Division self-assessment report.

As a further assistance to the teams, the Physics Division instituted a help desk that coordinated technical assistance, followed up on corrective actions, and entered deficiencies into the tracking database.

We learned some lessons from our self-assessment activities:

- We need overall better appraisal methods for evaluating progress towards meeting ES&H management and organization performance criteria. Part of that involves identifying more specific Division goals and tasks.
- We need to ask for more assistance from the Environment, Health and Safety Division specialists to give our teams on-the-job training. This has the added benefit of creating a better working relationships between researchers and the specialists.
- We need to establish inspection schedules and be more firm in adhering to them.

Instituting self-assessment has brought some tangible and intangible benefits for our Division. We have raised the consciousness of our staff about the management and organizational procedures our Division has instituted to catch potential ES&H problems before they occur, as well as regulatory requirements.

We verified that our staff continues to maintain the good housekeeping practices that were initiated for the Tiger Team visit. Through participation on the appraisal teams, people are becoming better acquainted with their colleagues in the Division and learning about Division projects.

Topic **Fermilab ES&H Self-Assessment Program: Experience to Date**

Speaker A. Lincoln Read, Office of Self-Assessment, Fermi National Accelerator Laboratory

Fermilab's ES&H Self-Assessment program is designed to evaluate the ES&H activities of the Laboratory.

A useful tool that has been developed to assist in this effort is the ES&H database "ESHTRK." The database includes details of findings, corrective actions, milestones, records of completion, and close-out of corrective actions.

Divisions send reports on their ES&H self-assessment activities to the directorate. The division's self-assessment reports include specific findings and updates on corrections for findings. Appendix A, Section 4, of the Fermilab Self-Assessment Program Plan specifies what the divisions should report to the director. Divisions are to be specific about manpower and cost impacts.

Fermilab has not progressed very far in doing root cause analyses. We are trying to make this a useful activity that feeds back into day-to-day operations. One improvement to date in operations is that ES&H training is already better focused and better organized. Heightened sensitivity in this area has had a beneficial impact.

There are defects in our ES&H Self-Assessment program. For instance, it has too many layers in it. We are considering requiring divisions to look at every department once a year, with emphasis on selected ES&H topics.

Topic **How to Establish Effective Self-Assessment Performance Objectives and Criteria**

Facilitator/ Speaker Irene Kan, Office of Assessment and Assurance, Lawrence Berkeley Laboratory

Since performance objectives and criteria (POC) provide structure and focus for LBL line management to do their self-appraisals, it is important that they be meaningful to "non-experts." The ones recommended by DOE in their 1992 Draft Guidance for Self-Assessment, however, are designed for ES&H specialists, e.g., Technical Safety Appraisal POC.

LBL looked instead to the 1991 Tiger Team Assessment, the LBL Tiger Team Corrective Action Plan, external audit findings, and previous LBL self-assessment reports to develop POC that were specific to Laboratory operations. Since audit findings were driven by regulatory and/or DOE requirements, the LBL POC can be traced back to requirements as well.

LBL developed over 50 self-assessment performance criteria for FY 93 (contained in Appendix A of the *LBL Self-Assessment Manual).* The Director's Action Committee reviews and approves the POC annually. The approved list of POC reflects areas that need to be targeted for line management attention.

The POC structure of the LBL Self-Assessment Program is flexible. The self-assessment program can be expanded to include new areas of improvement by articulating new performance objectives and/or new performance criteria (subject to approval by the Director's Action Committee). Performance criteria may be "retired" if self-assessment findings indicate that the desired procedures/actions have become part of normal work routines.

We've got two general categories of POC: (1) ES&H management and organization and (2) ES&H compliance. To help line management determine whether they are meeting the compliance-based performance criteria, LBL developed a master requirements checklist of 700 items. An example of POC and checklist questions for hazardous waste management was distributed to the session attendees.

LBL has not yet developed fully satisfactory performance indicators for its self-assessment program. Counting the number of deficiencies or percent deficiencies corrected does not necessarily reflect ES&H performance and, moreover, is too subject to manipulation.

Speaker Joe Goodson, Office of Technical Performance, Continuous Electron Beam Accelerator Facility

At present, self-assessments are conducted, almost exclusively, to determine conformance to prescribed standards. As a result, little useful information is provided regarding actual performance when conformance alone provides the criteria. *Meaningful* performance indicators are needed to provide actual performance information.

Meaningful performance indicators should address whether the mission is being accomplished and whether the product or service is improving. Performance indicators should also provide feedback in a timely manner, be meaningful to managers and workers, not dwell on trivia, and be usable for trends. Examples of meaningful performance indicators are miles per gallon, miles per hour, BTU produced per ton of fuel, percentage of corrective actions taken without problem recurrence, and percentage of planned items accomplished.

Examples of performance indicators that are not necessarily useful or meaningful are numbers of individual occurrence reports, inspection reports, nonconformances, or audit findings. It is necessary to obtain and monitor these data and to identify the nature and types of recurring nonconformances. However, these data provide only negative information and are of little value for making management decisions or improving mission performance.

Efforts must be expended to place the negative indicators in their place and establish performance measures that more accurately display the successful accomplishment of the Laboratory mission.

Speaker Gary Winner, ESH/QA Oversight, Argonne National Laboratory

The formal self-assessment program at Argonne is in its fourth year. Since Argonne is a multipurpose laboratory with diverse missions and facilities, the Associate Laboratory Directors are fairly autonomous in implementing their respective programs (including tracking systems) following broadly stated institutional parameters.

Argonne currently is in the process of developing site-specific performance objectives and criteria (POC), many of which address ES&H. Their objective is to make the criteria user-friendly to the non-ES&H specialists who will be performing the self-assessments.

Argonne has found that the bottoms-up approach works better, i.e., that the self-assessments are better if performed at the Division level rather

than at the institutional level. Argonne is small enough so that Division management can identify problems and trends effectively.

Discussion

It was noted that the lack of uniformity in how the various DOE energy research laboratories select performance objectives, criteria, and indicators parallels a similar lack of uniformity in the way DOE defines self-assessment terminology and procedures. This makes it rather difficult to design a program. For instance, what is a finding, what is a deficiency, when is it appropriate to do root cause analysis, and what findings should be rolled up? It was noted that the different types of DOE protocol using different terminology is a source of confusion.

At Sandia National Laboratories, Livermore, the self-assessment program has gone ahead to define terms and procedures. Sandia-Livermore performs site-wide assessments for which teams are made up of ES&H specialists accompanied by line employees. Teams focus on one of two areas—environmental and safety/health.

At Sandia-Livermore, inspection teams identify and write up deficiencies. A group of the same types of deficiencies becomes a finding. Only ES&H specialists can make findings. Sandia-Livermore *only tracks findings*. Deficiencies are followed through closure at the department level by documenting them on forms which are sent to department managers.

A discussion followed as to what tracking and trending really mean. It was noted that a sophisticated or formalized tracking system is important or worthwhile only when you want to show that the *absence* of deficiencies indicates that the situation is satisfactory. In such instances, trending can be useful.

Trending self-assessment findings/deficiencies is a big problem because it is so labor intensive and can be a waste of limited resources. It was recommended that trending be used sparingly, i.e., only on metrics that would actually go into making management decisions.

Finally, root cause analysis in the self-assessment context may be meaningful only when performed on trends and not on individual nonconformance situations.

Topic **Identifying and Overcoming the Roadblocks to a Workable Self-Assessment Program**

Facilitator Richard McClure, Facilities Department, Lawrence Berkeley Laboratory

Speaker Pauline Fong, Physics Division, Lawrence Berkeley Laboratory

The Physics Division places primary responsibility for maintaining a safe work environment on the principal investigator and uses a team approach to validate that offices and laboratories are indeed safe to

work in. The teams consist of non-ES&H specialists such as myself, the Physics Division Administrator, physicists, and engineers. Our inspection approach is to first review the self-assessment performance criteria, the ES&H requirements, and information provided to us by the team leader on the operations we will be inspecting. During the inspections, we look for atypical or non-compliance practices and conditions; and we discuss these practices and conditions with the researcher. The teams and the Division staff view these discussions as opportunities to become better informed about the researchers' work and to identify any problems confronting researchers as they attempt to comply with ES&H regulations. The Physics Division teams understand that their assessments are supplemented by those of specialists from the LBL Environment, Health and Safety Division and that the Division teams are not expected to be "experts."

Speaker Mary Hall Ross, Environment, Safety and Health Division, Stanford Linear Accelerator Center

The SLAC self-assessment program relies on management-level "coordinators" in each division to involve the line organizations in the assessments and to work closely with the ES&H professionals in the conduct of the surveys and development of corrective action plans. The ES&H Division at SLAC tracks the major corrective actions. I have developed a matrix of roadblocks to program implementation and possible methods of overcoming each of the roadblocks.

One roadblock is the perception that self-assessment is a non-value-added DOE requirement to be resisted. The reality is that self-assessment is a good management tool. To overcome this roadblock, I would emphasize that self-assessment is a means to take measurements; and these measurements enable an organizational unit to continuously refine its product or processes.

Another roadblock is the perception that self-assessment is the dispatching of hastily assembled and inadequately trained non-ES&H experts to find thousands of items that need fixing. This perception stems from the pre-Tiger Team experience of most labs. The reality is that line organizations must be involved because it's their performance that's being assessed; and that self-assessment can and should be looking at management and organizational (programmatic) issues, not just the non-compliance problems. To overcome this roadblock, I would minimize the emphasis on performing new walkthroughs and focus on identifying the programmatic issues underlying the findings identified in past walkthroughs.

The last roadblock I perceive is the perception that self-assessment is very bureaucratic. The reality is that everyone does some form of self-assessment anyway; and if not, they should be. A self-assessment

program merely ensures that it is done systematically and is documented in a way that supports continuous improvement. To overcome this roadblock, provide useful tools to make the "work" of self-assessment easier, i.e., through checklists and databases that balance consistency, flexibility, and relevance.

Discussion

A discussion ensued almost from the outset of the session that confirmed SLAC's matrix and identified a number of other potential roadblocks.

Who is the "self" in self-assessment?

A significant amount of the group discussion was devoted to this question/roadblock, i.e., should the ES&H specialists play the primary role in self-assessment or should the research community (line management). The ES&H specialists have the expertise and can identify problems and corrective actions quickly; moreover, researchers would be less inconvenienced if specialists performed the assessments. Researchers are best informed on the actual risks, however, because they work with hazards on a day-to-day basis. Researchers are knowledgeable of the hazards, many of the regulatory requirements, and probably feasible corrective actions.

Proponents of greater researcher involvement in self-assessment indicated that this has resulted in improved communications between line management and the ES&H function at their laboratory.

Another view was that both the ES&H specialist and the researcher play equally important roles in self-assessment. Proponents of this view advocated the need for effective communication between the ES&H professionals and the research community.

Should self-assessment be compliance- or performance-oriented?

Should limited resources be devoted towards ensuring compliance or towards achieving a certain level of ES&H performance in the research community. Proponents of each approach related how that approach was more cost-effective. There was general agreement that the research community should be involved in improving ES&H performance. How best to gain the support and cooperation of the research community in improving performance continues to be problematic.

How to prioritize self-assessment focus

Much discussion was devoted to prioritizing compliance efforts in view of the multitude of regulations and orders. This is complicated by the sheer volume of regulations and orders, their inconsistencies and complexities, and the limited staff resources to interpret requirements and support line management.

Summing up

The DOE ER laboratories are overcoming implementation roadblocks in different ways, as evidenced by the approaches described in this breakout session. This workshop provided an opportunity for professionals with responsibility for implementing self-assessment to engage in active discussion, learn from each other, and to identify ways to overcome roadblocks.

In view of the different missions and organizational structures of the DOE ER laboratories, a single "best" approach for implementing self-assessment is probably not feasible and not productive for DOE to pursue.

Topic **Logistical Considerations in Planning Self-Appraisals**

Facilitator Richard Dicely, Accelerator and Fusion Research Division, Lawrence Berkeley Laboratory

Speaker Jim Loud, Laboratory Assessment Office, Los Alamos National Laboratory

LANL's internal independent assessments are all-encompassing and last two to three weeks. Appraisal teams are composed of specialists drawn from a pool of employees in my department, staff borrowed from other LANL organizations, or contractors. The number of appraisers is dependent upon the scope of the inspection and the length of time allotted to accomplish it. The present plan calls for an internal independent assessment appraisal of all LANL facilities to be accomplished on a seven-year cycle, with high-hazard operations being inspected on a more frequent basis.

I prepared an extensive binder for each appraisal team member. Contents include definition of the appraisers' responsibility in the inspection, open items from previous appraisals, hazardous materials inventories as needed, recent occurrence reports, facility information, and any other documentation pertinent to the area being inspected.

My philosophy is: "If you aren't prepared, you don't look professional. If you don't look professional, you can't conduct as good an appraisal." This is true both of the appraisal team and the operation being appraised.

Prior to the appraisal, I send an announcement letter to the head of the area being appraised and set up an appointment for a pre-entrance meeting with a point-of-contact assigned by the area head. Because of the diversity of the operations being inspected, I assign to the head of the area being appraised responsibility for keeping the appraisal teams out of trouble in the areas of hazards and classification.

The internal independent assessments at LANL are designed to be performance-based and not just exercises in finding variances from requirements or regulations. The appraisals concentrate on identified problems, and appraisers schedule time to watch people work so they can learn more about operations in the area being appraised. These appraisals are more operational than management oriented. In the LANL environment, assessors perform root cause analyses.

Comment Jay Ackerman, Assurance Review Office, Lawrence Livermore National Laboratory

How valid are root cause analyses performed by appraisers who have a rather limited knowledge of the area being appraised?

Comment Larry Kimmel, Pacific Northwest Laboratory

At PNL, management of the program being appraised does the causal analysis.

Comment Dennis Derkacs, Laboratory Assessment Office, Los Alamos National Laboratory

Los Alamos is trying to institute line management self-assessment. After the line management program is established, the role of internal independent assessments is validation of line management plans, verification that the line management teams are performing satisfactorily, and assurance of institutional consistency.

Speaker Jose Alonso, Accelerator and Fusion Research Division, Lawrence Berkeley Laboratory

As Chair of the Management and Organization Self-appraisal Team at AFRD, I send a letter to the head of each program being appraised to identify the scope of the appraisal, establish schedules, and request that pertinent information be made available.

Appraisals take approximately 3 to 4 hours of each of the five team members' time. I spend another 12 hours or so compiling their reports into a final report that is sent to the Division Office for review before being presented to the program head during the close-out interview. The Division Director holds program heads responsible for ES&H management and organization issues in their performance evaluations. The self-assessment report becomes a key ingredient in the Division Director's analysis.

As opposed to OSHA-type inspections, the management and organization team concentrates on trends and findings that reflect attitude and commitment. Reports and specific findings attempt to address problems constructively.

Comment Larry Kimmel

Would you do self-assessments of your organization if you were not required to do so?

Response Definitely. In our Division, self-assessment is viewed as an ongoing process for continuous improvement.

Summary Presentations by representatives of three different Laboratories and general discussion among the attendees led to a few general observations:

Line Management vs. Independent Appraisal A self-assessment program is incomplete without both line management appraisal and independent appraisal components. DOE places too much emphasis on the independent aspect. A clear definition of "independent" is needed, i.e., are functional appraisals by laboratory personnel considered independent?

Cascade of Independence We need to demonstrate to DOE, through successful laboratory self-assessment programs, that we can assess our own performance. Hopefully, this will lead to a "cascade of independence" where DOE appraises laboratory programs, reducing site inspections and audits, and laboratories assess Divisions' programs.

Suggestions to Get Self-Appraisals Started At laboratories where independent appraisals have been the rule, line management appraisals could be a precursor to more extensive independent appraisal. However, line management could then end up considering self-assessment not as on ongoing activity but only as a "get ready" exercise.

In "ratcheted" implementation, appraisal teams get acquainted in the first year and explain the purpose of their inspections and the associated regulations or requirements. The comfort level of appraiser and appraised would thereby be increased. Full implementation would be in the second or third year. The City of Berkeley is using this approach successfully in its environmental inspections.

Direction from DOE With the rescinding of SEN 6E, self-assessment is a bit of an orphan. Some thought now would be a good time for ER-8 to disseminate *broad* guidelines for self-assessment, using criteria 5, 9, and 10 from DOE Order 5700.6C. Others thought that ER-8 might not be the correct organization since DOE, Defense Programs, is also heavily involved in its laboratories' operations. It was felt that any guidance offered must be quite general to obtain a "cascade of independence."

Dirty Laundry Syndrome Generally, DOE and its laboratories need to rid themselves of the image that sharing failures or experiences is equivalent to hanging out our dirty laundry, and meet more frequently for discussions and workshops dealing with how to make things better.

Topic **Using Specialists**

Speaker Keith Gershon, Environment, Health and Safety Division, Lawrence Berkeley Laboratory

The LBL Environment, Health, and Safety Division specialists play a limited but important role in helping line management to assess their own performance in ES&H areas. The ES&H specialists are available to accompany inspection teams for on-site training, but not as formal members of teams. This is to avoid conflict with their performance of independent assessments (termed functional appraisals) and to promote line management responsibility for the self-assessments. It's important, however, that a self-assessment program does not expect line management to become ES&H "experts." This expectation would not be not achievable realistically, particularly in an area such as electrical safety.

In electrical safety, the codes and regulations are broadly written and not easy for lay persons to interpret, particularly in a research and development environment. The ES&H specialists therefore need to establish a good working relationship with the line management inspection teams to provide responsive consultative assistance on code interpretation and to verify that corrective actions are appropriate.

Checklists for the line management inspection teams are extremely useful as inspection aids, although they are not substitutes for specialist assistance. The speaker recommends that institutions develop their own checklists to ensure relevancy to their operations. Commercial products are virtually useless because they often just repeat poorly written regulations. Checklists for non-specialists should not contain questions requiring inspections that require special skills or knowledge, because people could be hurt!

Topic **Lessons Learned from an Operator's Point of View**

Speaker Don Williams, Accelerator and Fusion Research Division, Lawrence Berkeley Laboratory

I'm with the Magnetic Fusion Energy Program in the Accelerator and Fusion Research Division (AFRD). This program develops plasma sources and accelerators. It's been in existence for about 40 years and

consists of 40 staff persons. Potential occupational hazards include high voltage, flammable gases, lasers, chemicals, and ionizing radiation. As an Operations Supervisor for the Magnetic Fusion Energy Program, I set aside at least one half-day per week for self-assessment-related work. This includes monitoring the database for new deficiencies, reviewing and prioritizing open corrective actions, and assigning responsibilities for corrective actions.

The AFRD self-assessment program is functional and probably beneficial in the long run. However, the program implementation needs improvement:

- Avoid false starts. Test procedures in small pilot efforts.
- Avoid or minimize circulating draft procedures unless they are going to be finalized in a timely manner; draft procedures sometimes are taken as final ones when there are implementation delays.
- If technical specialists are being offered as resources to inspection teams, ensure that they are familiar with the procedures and truly are available.
- Start the program slowly by making the first inspections advisory in nature.
- Don't overload the "system" with too many inspection teams.
- Initially, teams should be small, knowledgeable, and focus on major or systemic problems.
- Encourage self-assessment as an ongoing process instead of a formal inspection process.
- Recognize and address the situation where inspection teams may be penalized for being too conscientious in finding and documenting deficiencies.
- The institution should correct institutional deficiencies as quickly as it expects individual Divisions and Departments to correct programmatic (non-institutional) deficiencies.
- Encourage feedback from line management.
- Provide only relevant training by specialists or professionals.

Topic **The Principal Investigator's Perspective**

Speaker James Bartholomew, Structural Biology Division, Lawrence Berkeley Laboratory

[Editor's Note: Dr. Bartholomew conducts research on the molecular biology of cell cycle regulation. He also is responsible for implementing the Structural Biology self-assessment program.]

In the old days, the attitude in our Division was that the experiment had to get done—let's do what we need to do to be sure the experiment is a success. Safety was an issue, but the scientists felt that they were in the best position to know what precautions were necessary, and there was no one telling them they were wrong. This attitude persists today and is driven by the very competitive nature of science both from the funding end and by the personal recognition gained from scientific success. Scientists will do what they can to make their work safer, but their prime concern is pushing their research forward.

In the past, because the founder of our Division won the Nobel Prize for his work here, the Division was given a lot of freedom to branch out into new areas. Before the Tiger Team and because of all these different research fields, our lab had one of the largest inventories of chemicals on campus. Even though we are all chemists of one sort or another, nobody knew for sure the environmental or safety aspects of many of these exotic chemicals. Our approach was that if we felt a chemical was hazardous based on its chemical structure, we treated it with concern. We did not have a list of chemicals classified by hazard to dictate our procedures.

The active safety program came into the lab about 15 years ago when experimentation on viruses began. Everyone felt that since viruses could replicate, we'd better be sure our safety program to prevent accidental exposure was a good one. A divisional safety committee composed of scientists from each research group was established, and we did inspections of our own facilities. Everybody bought into this approach because they had respect for the judgment of their peers and they were concerned about safety. The approach was not a checklist approach to inspections, but rather everyone was looking for things that did not seem safe from their perspective.

The feeling behind these original self-inspections was much different from the feeling today because self-inspections now seem to be driven externally (by the institution and DOE). Today's inspections seem more concerned with code enforcement and are separated from the scientific aspects of the experiments. It is quite conceivable that an experiment could be set up which satisfies all the code requirements, but is still not safe.

With the realization that self-assessment is being driven externally comes a change in attitude toward us, the inspectors. Before, when the program was internally driven, the inspectors were peers offering a fresh perspective on the procedures and set-ups being used for an experiment. Now our fellow scientists see us as representing those who establish the codes and DOE orders rather than as peers. After a while, we lose our credibility in our original profession.

Scientists are going along with self-assessment in the hope that eventually we will satisfy all the code requirements and things will quiet down so they will not have to spend so much time on the self-inspection process.

What bothers the scientist is that in the self-assessment process, he or she is spending so much time on things that do not further his or her scientific effort. DOE does not recognize a strong individual safety program within a research group by making funding for the program more secure or more plentiful. Instead the emphasis is on the negative—if you do not have a safe program you could lose your funding. In reality DOE funding is still based on scientific output not on the safety aspects of your program. The attitude of the scientist will not change until it is clear that the rewards for a strong safety program are as great as the rewards for a strong research effort.

Topic **Los Alamos Integrated Self-Assessment**

Speaker Fred Beckman, Laboratory Assessment Office, Los Alamos National Laboratory

The Los Alamos self- assessment process consists of the following elements:

- Facility and line management self-assessment
- DOE orders compliance self-assessment
- University of California contract self-assessment
- S/RIDS self-assessment

The basis of the self-assessment process is Total Quality Management and Continuous Quality Improvement, through which you measure whether you are doing what you are supposed to do.

Compliance activity involved line-by-line compliance with about 100 DOE orders, equally divided between safeguards and security for the Defense Nuclear Safety Board, which is a big part of our world. While DOE sees compliance as a binary process—you are either in compliance or not—the reality is that compliance is a partial percentage.

It is the contractor's responsibility to assess and identify the standards for the facility. In this way you finally establish a standard to which a building must conform so that you don't face constant reassessment.

The assessment cycle at LANL has come full circle, from self-assessment and validation in 1979, to independent assessments in 1983, to independent self-assessment in 1991, back to self-assessment and independent validation in 1994.

The 1991 self-assessment was a rather disassociated process. A few months before the Tiger Team came, we carried out a database rollup of everything that was wrong. Through their review of the result, the associate directors found that things were actually a lot worse. The best self-assessment, then, was this one done by the senior management group.

We developed a self-assessment process for the Tiger Team based on objectives and criteria arrived at by the TSA team, with the addition of some lab-wide requirements from line management.

Self-assessment was carried out at the group level, and this turned out to be a good idea. These group assessments were, in turn, summarized for the divisions, directors, and laboratory. As a result, we identified basically the same things that the Tiger Team identified. But sooner or later you need to stop identifying and start fixing.

With unintegrated self-assessment you are working to DOE standards with no metrics and no performance standards. We're trying to fix the process so that the line manager doesn't have to look at DOE requirements. To do this we need an interpretive process, including an on-line query capability for managers. Buy-in by DOE is a necessary part of this.

If you don't know what is right or what should be done, then you don't know what is wrong. Tracking and trending statistical tools and a meaningful database are essential. We use a sampling approach to the assessment process. We train people to do the appropriate kind of sampling. A feel for the proper level of confidence is important in sampling The purpose of the database is to communicate requirements. The requirements then need to be distilled down to something that is meaningful.

Self-assessment also is based on LANL requirements. It is necessary to distill DOE rules through the process of establishing a requirements database, so that a number of DOE requirements have been interpreted for the purposes of self-assessment, but are not linked to DOE orders. Instead we ask questions such as "do you have, for instance, asbestos or plutonium." The investigator never sees the actual requirements that he answers yes or no to.

The next task is to establish a responsible person to provide input—someone who is responsible for interpretation and implementation of orders for a particular facility. Our Offices of Primary Responsibility are going to be responsible as of October 1 for tracking deficiencies, identifying DOE requirements, determining what the requirements mean for the facility, and implementing the requirements. At present

there are about 15,000 requirements in the database. These are global requirements to comply with various ES&H codes.

Topic **Considering Malcolm Baldrige Award Scoring Scale as a Self-Assessment Template**

Speaker Joe Goodson, Office of Technical Performance, Continuous Electron Beam Accelerator Facility

The prevailing mode of self-assessment is conformance-driven, responding to regulations, statutes, and directives, such as conduct of operations. Conformance-driven self-assessment gives you a historical view—yesterday's news—and is driven by external forces rather than customers or performance. It lacks meaningful performance measures. It is too subjective for use in obtaining continuous improvement.

As an alternative, the Malcolm Baldrige approach can be adapted to provide a system which balances conformance (20%) and performance (80%) and measures accomplishment of mission objectives. You can develop a scoring system that is sensitive to customers, both DOE and users, and generates meaningful performance indicators, including metrics that quantify contributions to the laboratory mission, real-time on-line measurements for management course corrections, and data for use in management decisions. In addition, the adapted Malcolm Baldrige system complements best management practices and capitalizes on the window of opportunity provided by the Secretary of Energy, who is encouraging the use of Total Quality Management principles in DOE.

The manager uses the adapted Malcolm Baldrige Award scoring system to assess his or her operation. Assessment categories, items, and activities are evaluated according to the maturity and effectiveness of their design, implementation, and results. Scoring is performed on a scale of 0 to 100 percent, in multiples of 10. The scoring is based on three factors—design, implementation, and results.

- Design refers to the appropriateness and effectiveness of methods the laboratory uses to achieve expectations.
- Implementation involves the extent to which design methods have been applied to processes, activities, products, and services.
- Results are the data that indicate level of performance, rate of improvement, or degree of continuous improvement.

Use of pro-active methods and performance indicators that provide the positive side of the picture are essential if assessment activities are to add value to the operation of a facility.

Topic **Going Beyond Environment, Safety, and Health Assessments to Achieve Continuous Improvement**

Speaker Jon Stanley, Office of Assessment and Assurance, Lawrence Berkeley Laboratory

There is an opportunity for self-assessment programs to empower organizations and to facilitate continuous improvement in all areas of performance expectations. Continuous improvement means focusing on customer expectations, involving everyone in meeting performance expectations, being accountable, and measuring achievement of objectives.

LBL has developed and is implementing an Operating and Assurance Program that is designed to help LBL operations achieve performance expectations following the Plan, Do, Check, and Act principles of Total Quality Management.

The Operating and Assurance Program is implemented through a system of Notebooks, a concept that is already familiar to researchers at LBL. The Notebook system helps the organizational entities in LBL fulfill the Plan and Do functions.

- Function Notebooks are developed for Division offices or support organizations that are funded from overhead, scientific burden, or recharge and are quality-assurance-oriented.
- Facility Notebooks contain information on conduct of operations and maintenance management for research buildings or laboratories.
- Project Notebooks contain information on quality assurance and maintenance management for a group of personnel and equipment that are dedicated to a specific research or construction project.

Independent assessments of line management and line management self-assessments against Notebooks and other sources of performance expectations fulfill the Check and Act functions.

The Operating and Assurance Program integrates the requirements of DOE Order 5700.6C, Quality Assurance; DOE Order 5480.19, Conduct of Operations; and DOE Order 4330.4A, Maintenance Management. It also provides a method for grading the application of DOE requirements according to risk.

LBL is going beyond environment, safety, and health assessments to measure its performance. The driver is the new University of California/DOE Contract, which is requiring that LBL perform self-assessment in such areas as finance, human resources, purchasing, safeguard and security, and property management, as well as in ES&H. Performance objectives, performance criteria, and performance

measures are being established in each of these functional areas. The new UC/DOE contract now requires more structured evaluations and reporting and, in particular, credible self-assessments that provide an institutional perspective and ensure that root causes are being identified and corrected.

The self-assessment process can be an effective means to empower an organization and to facilitate continuous improvement in all areas (not just environment, safety, and health). It is one way to communicate performance expectations and to measure performance.

Topic **Corrective Action Tracking Database**

Speakers Larry Kimmel and Mark Dillner, Pacific Northwest Laboratory

Prior to the Tiger Team visit to Pacific Northwest Laboratory (PNL), each environment, safety, and health discipline maintained its own tracking system to follow corrective actions. They each tracked actions, but none tracked the deficiencies requiring the actions or the inspections that identified the conditions. Furthermore, most systems deleted the corrective actions upon completion, thus there was no basis for trending. The tracking systems (pre-Tiger Team) were not consistent in identifying fields, so there was no basis for rolling up findings among the various ES&H disciplines.

PNL has developed a test bed using Fox Pro for a second-generation corrective-action tracking system that is multiuser and server-based. It tracks relationally linked inspections, conditions, and actions; has consistent definitions and conventions; and is accessible by a small user group.

The future direction for corrective action tracking at PNL is to:

- Develop the Lab-wide system based on prototype lessons learned.
- Model business processes.
- Create graphics/report formats already familiar to PNL users.
- Document results of assessments by oversight organizations.
- Use electronic mail to automatically notify appropriate staff of appropriate actions.
- Support Lab-wide roll-ups for self-assessment and trending.

Topic **How to Integrate Quality Assurance, Conduct of Operations, and Maintenance Management into the Self-Assessment Process**

Facilitator/ Speaker Peter Fraser, Office of Assessment and Assurance, Lawrence Berkeley Laboratory

The process of interpreting, integrating, and implementing the requirements of DOE orders on quality assurance, conduct of operations, and maintenance management resulted in a single requirements document for LBL, the Operating and Assurance Program (OAP). The implementation of the OAP requirements is accomplished through the LBL Notebook System in which LBL functional and operational units develop Notebooks that contain information on critical operations and procedures. After completion of its Notebook, a unit may assess itself against what has been documented there and be assured that all applicable requirements from the three orders are addressed. The "most important" compliance items should be identified first, through the graded approach, so that compliance is achieved in order of descending risk. Hence, the LBL Notebooks include, as an integral step, the identification and prioritization of the unit's critical activities.

Discussion Is this approach workable considering that no institutional management systems (e.g., calibration requirements) are imposed through the Notebooks?

Response The Operating and Assurance Program is the basis for development of an LBL Directorate Function Notebook, which would include institutional implementing procedures for items such as document control, measuring and test equipment, calibration, and others.

Speaker Jim Boyce, Office of Accelerator Development, Continuous Electron Beam Accelerator Facility

The basic approach for integrating the spirit and intent of the three orders is best illustrated in the process CEBAF used for establishing Accelerator Readiness:

- Develop a concept map of the process. (For Accelerator Readiness, the concept map is a readiness tree that illustrates the relationships of facility systems, the highest level of which are equipment, personnel, and procedures. For an operational facility, the process

is similar, but the concept map may take a different form or emphasis depending on the facility.)

- Determine the measurement criteria.
- Perform self-assessment.
- Conduct an independent peer review of the process.
- Resolve and bring to closure prioritized findings.

Critical to the success of this effort is the teamwork of knowledgeable staff using a graded approach (by prioritizing the levels of emphasis) in developing a site-specific program. This means that while the framework can be suggested by standards, guidelines, upper management, etc., the specifics of each step of the program should be tailored by the people who have a thorough knowledge of:

- Their own systems.
- How their systems support the mission of the facility as a whole.

Discussion

The discussion phase of the session focused on each represented facility's approach toward the subject orders. All, except for CEBAF, LBL, and Sandia-Livermore, are not integrating the three orders in their implementation efforts. These efforts are summarized below:

Sandia-Livermore has combined the quality assurance and conduct-of-operations requirements into 61 requirements categories, by incorporating conduct-of-operations items into the corresponding element(s) of the 10 quality assurance criteria (DOE Order 5700.6C). They have grouped like facilities and like projects, and are reviewing the 61 items for applicability against these groupings. After applicability is determined, documentation will be developed to show which existing institutional procedures satisfy the requirements. When existing procedures do not fulfill the requirements, new procedures will be developed. Maintenance management requirements are assigned to the maintenance organization.

Oak Ridge National Laboratory has dismantled its existing quality assurance program and implementing procedures, and reformatted them into an institutional system more closely in line with the DOE 5700.6C criteria. An applicability matrix for conduct-of-operations requirements has been completed, and some further conduct-of-operations plans are under development. The maintenance management order is being evaluated. The Y-12 facility is providing some lessons-learned input to these processes.

Lawrence Livermore National Laboratory has assigned quality assurance and maintenance management to their quality assurance and maintenance organizations. Evaluation of conduct-of-operations requirements is just beginning.

The Pacific Northwest Laboratory has assigned maintenance management responsibility to its maintenance organization, and completed a CO applicability matrix only. The applicability of the quality assurance requirements is being discussed with DOE-Richland Field Office.

The Stanford Linear Accelerator Center has elected to treat the requirements of each order separately.

Los Alamos National Laboratory has assigned responsibility for each of the three orders to separate offices or groups.

There was much discussion on what would and would not "work" as each facility continues its attempts to first implement and then assess performance against the requirements. Consensus was reached, however, on a key conclusion: assessment of a facility must be performed by DOE against the facility's plan/program *as approved by DOE*. That is, the facility must be able to consider the approved plan or program to be the facility-specific guidance on implementation of the order it is intended to address. When such plans receive DOE approval, the facility must be assured that the DOE considers the plan (when fully implemented) to represent full compliance with the order's requirements for that facility.

Topic **How to Do Meaningful Trending and Root Cause Analyses for Self-Assessment**

Facilitator Stan Love, Sandia National Laboratories, Albuquerque

Speaker Dennis Johnson, Sandia National Laboratories, Albuquerque

Sandia-Albuquerque developed a root cause analysis process specifically to meet certain criteria:

- To help in developing corrective actions.
- To be usable for a wide range of events and conditions.
- To require minimum training.
- To be usable for trend analysis.

None of the traditional root cause analysis, i.e., barrier analysis, change analysis, MORT, or cause-and-effect diagramming techniques, met *all* of the criteria.

At Sandia-Albuquerque, the root cause analysis process is used for all reportable occurrences, selected internal and independent ES&H appraisals, and selected deficiencies or events resulting in injuries. A root cause analysis team led by a qualified root cause analyst implements the process. A key feature of the Sandia-Albuquerque

technique is building a timeline of major events in each of three stages of the event or condition being analyzed:

- In control
- Out of control
- Back in control.

Another feature is identifying systemic factors. The process recognizes that there is a hierarchy of systemic factors: management (top of hierarchy), design, equipment/materials, procedures, training, operations, and external factors (bottom). The Sandia-Albuquerque root cause analysis process involves asking questions about the systemic factors from the bottom up to identify problems and from the top down to develop corrective actions.

Identification of root cause is only one phase of Sandia-Albuquerque's root cause analysis technique. Developing corrective actions, informing the parties involved, and following up are also critical and are required to complete the process.

Speaker Stan Love, Sandia National Laboratories, Albuquerque

Developing performance indicators requires a systematic stepping through a number of tasks:

- Determine the customer requirements: List the customers and products for each customer and then rank order the list.
- Define the process: Identify the key performance monitor points so that feedback can lead to corrective (management) actions.
- Identify the key activities and products.
- Find performance indicator owners: Owners are responsible for finding data sources, collecting and analyzing the data, reporting, and taking corrective actions.
- Define the performance goals and metrics: Good performance indicators relate directly to the performance goal, are practical and easily understood, are measurable, and can be benchmarked.
- Collect and analyze the data.
- Adjust or modify the process if necessary.

At Sandia-Albuquerque, the application of root cause analysis procedures and the timely completion of corrective actions has resulted in the mitigation of root causes and a growing number of lessons learned.

Discussion

There is some perception that the root of most problems are individual acts. It is therefore important that root cause analysis does *not* place blame—unless the act is willful. There is also some concern that technical personnel think that procedural root cause analysis is a waste of time. Fortunately, many recognize and appreciate the logic and usefulness of formalized root cause analysis.

APPENDIX

LIST OF PARTICIPANTS

DOE-ER Self Assessment Workshop

July 27-28, 1993

David Abrahams
Sandia National Laboratories
P. O. Box 969
Mail Stop 8609
Livermore, CA 94551
(510) 294-3191
(510) 294-3140

Jay Ackerman
Lawrence Livermore National Lab.
L-309
7000 East Avenue
Livermore, CA 94550
(510) 422-6005
(510) 422-3442

Carol T. Alonso
Lawrence Livermore National Lab.
P. O. Bos 808
Mail Stop I-1
Livermore, CA 94550
(510) 422-4776
(510) 423-2224

Wes Asher
Stanford Linear Accelerator Ctr.
P. O. Box 4349
Stanford, CA 94309
(415) 926-2178

Teresa Baer
Oak Ridge National Laboratory
Martin Marietta Energy Systems, Inc.
P. O. Box 2008
Mail Stop 6051
Oak Ridge, TN 37831
(615) 574-6296
(615) 241-3336

Fred Beckmann
Los Alamos National Laboratory
LAO-2, G783
Los Alamos, NM 87545
(505) 665-2376

Walter Bird
Argonne National Laboratory
ESH-201
9700 So. Cass Avenue
Argonne, IL 60439
(908) 252-7932
(908) 252-5778

James R. Boyce
CEBAF
MS-12A
12000 Jefferson Avenue
Newport News, VA 23606
(804) 249-7513
(804) 249-7363

Leland Byers
Sandia National Laboratories
P. O. Box 5800
Department 7001
Albuquerque, NM 87185-5800
(505) 845-8206
(505) 844-9728

Dick Corallo
Lawrence Livermore National Lab.
L-309
7000 East Avenue
Livermore, CA 94550
(510) 422-6422
(510) 422-3442

Marc S. Costantino
Lawrence Livermore National Lab.
P. O. Box 808, MS L-353
Livermore, CA 94550
(510) 422-6923
(510) 423-7040

Rita Cummings
Lawrence Berkeley Laboratory
Mail Stop Donner
1 Cyclotron Road
Berkeley, CA 94720
(510) 486-4644
(510) 486-4750

Janice V. Dabney
Stanford Linear Accelerator Center
P. O. Box 4349, Mail Stop 15
Stanford, CA 94309
(415) 926-3603
(415) 926-4999

Phillip Dean
Biology & Biotechnology Res. Prog.
Lawrence Livermore National Lab.
P. O. Box 808, L-452
Livermore, CA 94551-9900
(510) 422-6293
(510) 423-3110

Dennis Derkacs
Los Alamos National Laboratory
LAO-2, G783
Los Alamos, NM 87545
(505) 667-7061
(505) 665-8420

Mark Dillner
Pacific Northwest Laboratory
1 Battelle Blvd.
Richland, WA 99352
(509) 375-6763

Lorraine Eldridge
Lawrence Livermore National Lab.
P. O. Box 808, L-353
Livermore, CA 94551
(510) 423-4784
(510) 423-7040

A. Lee Frahm
Lawrence Livermore National Lab.
L-353
7000 East Avenue
Livermore, CA 94550
(510) 423-5433
(510) 423-7040

Jeffrey W. Freeman
Lawrence Livermore National Lab.
P. O. Box 808, L-503
Livermore, CA 94550
(510) 422-3149
(510) 423-0423

Patsy Gilbert
Lawrence Livermore National Lab.
P. O. Box 808, L-452
Livermore, CA 94551-9900
(510) 423-3162
(510) 423-3110

Nathan L. Golden
Sandia National Laboratories
P. O. Box 5800
Department 7001
Albuquerque, NM 87185
(505) 845-9737
(505) 844-9728

Ray Goluba
Lawrence Livermore National Lab.
P. O. Box 808
Livermore, CA 94550
(510) 422-1664
(510) 423-8847

Joe B. Goodson
CEBAF
12000 Jefferson Avenue
Newport News, VA 23606
(804) 249-7664
(804) 249-7363

Miriam Hall
Office of the President
University of California, Berkeley
Laboratory Administration
300 Lakeside Drive, 7th Floor
Oakland, CA 94612-3550
(510) 987-0783
(510) 839-3831

Howard Hatayama
Office of the President
University of California, Berkeley
Laboratory Administration
300 Lakeside Drive, 7th Floor
Oakland, CA 94612-3550
(510) 987-0801
(510) 839-3831

T. Hikido
Battelle, Pacific Northwest Lab.
P. O. Box 999
Richland, WA 99352

Maureen Hunemuller
U.S. Department of Energy
Off. of Assess. & Systems, ER-8
Mail Stop G-236
Washington, D.C. 20585
(301) 903-7371
(301) 903-7047

Thomas G. Innes
Lawrence Livermore National Lab.
P. O. Box 808
Livermore, CA 94550
(510) 424-3320
(510) 422-2403

Dennis R. Johnson
Sandia National Laboratories
P. O. Box 5800
Department 7001
Albuquerque, NM 87185
(505) 844-7802
(505) 844-1550

Leonard Jones
NREL
1617 N. Cole Blvd.
Golden, CO 80401
(303) 231-1804
(303) 231-1155

Larry Kimmel
Pacific Northwest Laboratory
1 Battelle Blvd.
Richland, WA 99352
(509) 376-3969

Betsy C. King
Battelle
Battelle, Pacific Northwest Lab.
P. O. Box 999
Mail Stop P7-72
Richland, WA 99352
(509) 376-9267
(509) 376-1729

Roger Kruse
Los Alamos National Laboratory
LAO-2, G783
Los Alamos, NM 87545
(505) 665-8414

Jim Loud
Los Alamos National Laboratory
LAO-2, G783
Los Alamos, NM 87545
(505) 665-8719

Stan Love
Sandia National Laboratories
P. O. Box 5800
Albuquerque, NM 87185
(505) 844-4810
(505) 844-9728

Dianne Morris
Stanford Linear Accelerator Ctr.
P. O. Box 4349
Mail Stop 23
Stanford, CA 94309
(415) 926-4307
(415) 926-2407

John R. Palmer
Lawrence Livermore National Lab.
7000 East Avenue, L-430
Livermore, CA 94550
(510) 422-9933
(510) 423-4062

Vangie Peterson
Lawrence Berkeley Laboratory
Calvin Lab.
1 Cyclotron Road
Berkeley, CA 94720
(510) 486-4348
(510) 486-6059

Don Putz
Sandia National Laboratories
P. O. Box 969
Livermore, CA 94551
(510) 294-3206
(510) 294-3140

A. L. Read
Fermi National Accelerator Lab.
P. O. Box 500, MS-323
Batavia, IL 60510
(708) 840-4274
(708) 840-4552

Robert Reese
Sandia National Laboratories
Department 7001
Albuquerque, NM 87185-5800
(505) 844-1272
(505) 844-9728

Mary Hall Ross
Stanford Linear Accelerator Center
P. O. Box 4349
Stanford, CA 94309
(415) 926-4776
(415) 926-3030

Norma Scarlett
Office of the President
University of California, Berkeley
Laboratory Administration
300 Lakeside Drive, 7th Floor
Oakland, CA 94612-3550
(510) 987-0794
(510) 839-3831

Robert Schumacher
Lawrence Livermore National Lab.
7000 East Avenue, L-650
Livermore, CA 94550
(510) 422-9262
(510) 422-3301

Paul Stephens
Stanford Linear Accelerator Ctr.
P. O. Box 4349
Mail Stop 12
Stanford, CA 94309
(415) 926-3818
(415) 926-2407

Robert Van Ness
Office of the President
University of California, Berkeley
Laboratory Administration
300 Lakeside Drive, 7th Floor
Oakland, CA 94612-3550
(510) 987-0798
(510) 839-3831

William Vance
Lawrence Livermore National Lab.
P. O. Box 808, L-038
Livermore, CA 94550
(510) 422-0705
(510) 423-5029

Judy Wackerly
Sandia National Laboratories
P. O. Box 969
Mail Stop 8609
Livermore, CA 94551
(510) 294-2954
(510) 294-3140

Tom E. Wessels
Ames Laboratory
111 MD
Ames, IA 50011-3020
(515) 294-4965
(515) 294-7112

Gary L. Winner
Argonne National Laboratory
9700 South Cass Avenue
Argonne, IL 60439
(708) 252-5991
(708) 252-5965

Patricia Wurster
Stanford Linear Accelerator Ctr.
P. O. Box 4349
Mail Stop 90
Stanford, CA 94309
(415) 926-3507
(415) 926-2407

DATE FILMED

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