



Oak Ridge Associated Universities Oak Ridge Institute for Science and Education

**Report from the U.S. Department of Energy
Voluntary Protection Program
Onsite Review
April 7-17, 2008**



U.S. Department of Energy
Office of Health, Safety and Security
Office of Health and Safety
Office of Worker Safety and Health Assistance
Washington, DC 20585

Foreword

The U.S. Department of Energy (DOE) recognizes that true excellence can be encouraged and guided but not standardized. For this reason, on January 26, 1994, the Department initiated the DOE Voluntary Protection Program (VPP) to encourage and recognize excellence in occupational safety and health protection. DOE-VPP closely parallels the Occupational Safety and Health Administration (OSHA) VPP, which was established by OSHA in 1982 and has demonstrated that cooperative action among Government, industry, and labor can achieve excellence in worker health and safety. The Office of Health, Safety and Security assumed responsibility for DOE-VPP in October 2006 and has been working since that time to reinvigorate the program and increase emphasis on performance-based inspections as the basis for certification and recertification.

DOE-VPP outlines areas where DOE contractors and subcontractors can comply with DOE orders and OSHA standards while also “stretching for excellence.” DOE-VPP emphasizes systematic and creative approaches involving cooperative efforts of everyone in the contractor or subcontractor workforce at DOE sites, including contractor managers and workers.

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

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

DOE-VPP consists of three programs, which are based on, and similar to, those in OSHA’s VPP. These programs are Star, Merit, and Demonstration. The Star program is the core of DOE-VPP, and its achievement indicates truly outstanding protectors of employee safety and health. The Merit program is a steppingstone for contractors and subcontractors that have good safety and health programs but need time and DOE guidance to achieve Star status. The Demonstration program is expected to be used rarely; it exists to allow DOE to recognize achievements in unusual situations about which DOE needs to learn more before determining approval requirements for the Star program.

By approving an applicant for participation in DOE-VPP, DOE recognizes that the applicant meets, at a minimum, the basic elements of ongoing, systematic protection of employees at the site. The symbols of this recognition are DOE-provided certificates of approval and the right to fly VPP flags (e.g., VPP Star flag for sites with Star status). The participant may also choose to use the DOE-VPP logo on letterhead or on award items for employee incentive programs. Further, each approved site will have a designated DOE staff person to handle information and assistance requests from DOE contractors, and DOE will work cooperatively with the contractors to resolve health and safety problems.

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ABBREVIATIONS AND ACRONYMS

ACAP	Achievement Cash Awards Program
AIHA	American Industrial Hygiene Association
ATDD	Atmospheric Turbulence and Diffusion Division
C.F.R.	Code of Federal Regulations
DART	Days Away, Restricted, or Transferred
DOE	U.S. Department of Energy
ES&H	Environment, Safety, and Health
HF	Hydrofluoric Acid
HSS	Office of Health, Safety and Security
ISM	Integrated Safety Management
JHA	Job Hazard Analysis
MMC	Methodist Medical Center
NOAA	National Oceanic and Atmospheric Administration
NAICS	North American Industry Classification System
ORAU	Oak Ridge Associated Universities
ORISE	Oak Ridge Institute for Science and Education
ORNL	Oak Ridge National Laboratory
ORO	Oak Ridge Office
OSHA	U.S. Department of Labor's Occupational Safety and Health Administration
OSLD	Optically Stimulated Luminescent Dosimeter
PPE	Personal Protective Equipment
RMA	Radioactive Material Area
SCATS	Safety Corrective Action Tracking System
SSR	Site Safety Representative
TLD	Thermo Luminescent Dosimeter
TRC	Total Recordable Case
VPP	Voluntary Protection Program
VPPPA	Voluntary Protection Program Participants Association

EXECUTIVE SUMMARY

The Oak Ridge Institute for Science and Education (ORISE) is a U.S. Department of Energy (DOE) institute located in Oak Ridge, Tennessee. ORISE is managed for DOE by Oak Ridge Associated Universities (ORAU), a nonprofit research and training organization sponsored by more than 90 doctors of philosophy-granting universities in the United States. ORAU has approximately 500 full-time employees working at ORISE and 250 undergraduate, graduate, and post-doctoral employees working at the Oak Ridge National Laboratory. Additionally, ORAU appoints research participants to full-time positions at National Laboratories across the country. ORISE's mission is to address national needs in the (1) assessment and analysis of environmental and health effects of radiation, beryllium, and other hazardous materials; (2) development and operation of medical and national security radiation emergency management and response capabilities; and (3) management of education programs to help ensure a robust supply of scientists, engineers, and technicians to meet future science and technology needs. ORISE creates opportunities for collaboration through partnerships with other DOE facilities, other Federal Agencies, academia, and industry in a manner consistent with DOE objectives and the ORISE mission. In December 2003, ORAU was certified as a DOE Voluntary Protection Program (VPP) Star site. Per DOE-VPP requirements, the 3-year recertification review was due in 2006 but was rescheduled to April 2008. The DOE Oak Ridge Office manages the contract with ORAU for DOE's Office of Science and has oversight responsibility.

Continuation of Star status in DOE-VPP requires an onsite review by the DOE Office of Health, Safety and Security (HSS) DOE-VPP team (Team) every 3 years. The Team conducted its review April 7-17, 2008, to determine whether ORAU continues to perform at a level deserving DOE-VPP Star recognition. The review included the main campus in Oak Ridge, the south campus on the outskirts of Oak Ridge, the Atmospheric Turbulence and Diffusion Division Laboratory, and interviews with employees at a variety of remote locations. The purpose of this report is to document results of the Team review and provide the Chief HSS Officer with necessary information to make the final decision about ORAU's DOE-VPP status.

Based upon discussions and interviews with over 100 workers, supervisors, and managers, as well as extensive observation of field activities, inspection of worksites and facilities within the project scope, and review of records, the Team determined that ORAU has maintained a strong safety culture.

ORAU has effectively continued its dedication and commitment to the pursuit of safety excellence. That commitment was evident throughout the organization. ORAU has implemented and maintained several initiatives to increase employee involvement and provide effective safety training to all employees. ORAU outreach and mentoring efforts to support and encourage expansion of DOE-VPP are noteworthy. One identified issue, related to baseline exposure assessments, was adequately addressed by ORAU before the final report was issued. Consequently, the team recommends that ORAU continue as a DOE-VPP participant at the Star level.

Consistent with the standard for Star status that managers and workers are dedicated to and effectively pursuing excellence in safety performance, the Team identified a number of opportunities for improvement. Listed in Table 1, these opportunities for improvement require

no formal corrective action plan, but they should be considered and addressed by ORAU in conjunction with its ongoing efforts for continuous improvement.

**TABLE 1
 OPPORTUNITIES FOR IMPROVEMENT**

Opportunities for Improvement	Page
<p>ORAU should consider attending or hosting a Dupont safety training session in the Oak Ridge area to help its workforce and other employers in the area understand and develop an interdependent safety culture.</p>	<p>6</p>
<p>ORAU should consider establishing a recognition program in addition to its existing awards program to acknowledge more common safety improvements and behaviors on a regular basis, as well as including workers outside the safety committee.</p>	<p>7</p>
<p>ORAU should consider sending personnel from outside the environment, safety, and health organization to the VPPPA regional and national conferences to identify new ideas and approaches to continue fostering critical assessments.</p>	<p>7</p>
<p>ORAU should revise its Job Hazard Analysis procedure and form to include more detailed analysis of hazards (quantity, volume, exposure limits, etc.) and ensure that the analysis clearly demonstrates the adequacy of the selected control set.</p>	<p>15</p>

I. INTRODUCTION

The U.S. Department of Energy (DOE) Voluntary Protection Program (VPP) onsite review of the Oak Ridge Associated Universities (ORAU) at the Oak Ridge Institute for Science and Education (ORISE) was conducted April 7-17, 2008.

ORISE is a DOE institute located in Oak Ridge, Tennessee. ORISE is managed for DOE by ORAU, a nonprofit research and training organization sponsored by more than 90 doctors of philosophy-granting universities in the United States. ORAU has approximately 500 full-time employees working at ORISE and 250 undergraduate, graduate, and post-doctoral employees working as research participants at the Oak Ridge National Laboratory (ORNL). Additionally, ORAU appoints research participants to full-time positions at National Laboratories across the country. ORISE's mission is to address national needs in the (1) assessment and analysis of the environmental and health effects of radiation, beryllium, and other hazardous materials; (2) development and operation of medical and national security radiation emergency management and response capabilities; and (3) management of education programs to help ensure a robust supply of scientists, engineers, and technicians to meet future science and technology needs. ORISE creates opportunities for collaboration through partnerships with other DOE facilities, other Federal Agencies, academia, and industry in a manner consistent with DOE objectives and the ORISE mission. In December 2003, ORAU was certified as a DOE-VPP Star site. Per DOE-VPP requirements, the 3-year recertification review was due in 2006 but was rescheduled to April 2008. The DOE Oak Ridge Office (ORO) manages the contract with ORAU for DOE's Office of Science and has oversight responsibility.

Located in Oak Ridge, Tennessee, ORISE has consolidated into two campuses. The main campus consists primarily of office space. The south campus, located off Bear Creek Road near ORNL, has office and laboratory space. Three primary laboratories are located at the south campus: beryllium laboratory; biodosimetry cytogenetics laboratory; and radiochemistry laboratory. Additionally, ORISE Atmospheric Turbulence and Diffusion Division (ATDD) works closely with the National Oceanic and Atmospheric Administration (NOAA) to manage the ATDD Laboratory in Oak Ridge. Its mission is to perform research directed toward issues of national and global importance in the areas of air quality, contaminant dispersion, and climate. Finally, ORAU has personnel located around the country performing contract work to universities, commercial industry, and other Government Agencies.

Recognition in DOE-VPP requires an onsite review by the Office of Health, Safety and Security (HSS) DOE-VPP team (Team) to determine whether the applicant is performing at a level deserving DOE-VPP Star recognition. The Team evaluated ORAU safety programs against the provisions of DOE-VPP. During the site visit, the Team observed activities, evaluated relevant safety documents and procedures, and conducted interviews to assess the strength and effectiveness of ORAU's health and safety programs.

During the review, the Team had contact with approximately 100 personnel, including students and managers and laboratory, maintenance, and office personnel. Activities included observation of preventive and corrective maintenance activities, student safety briefings, walkdowns of shop areas, inspection of teaching laboratories, review of documents (such as

procedures and job hazard analyses (JHA)), and both formal and informal interviews with workers and managers. Hazards encountered by workers are generally low, consisting primarily of standard office hazards (e.g., ergonomic hazards, office equipment, parking lots), as well as hazards associated with analytical laboratory work. Additionally, some workers are exposed to other environmental hazards associated with field work, such as insects, poisonous plants, and potential radiological and chemical exposures associated with cleanup sites.

II. INJURY INCIDENCE/LOST WORKDAYS CASE RATE

The Team conducted a review of the Occupational Safety and Health Administration (OSHA) 300 logs. The tables below summarize OSHA reportable data both for ORAU employees and for subcontractors supporting ORAU.

INJURY INCIDENCE / LOST WORKDAYS CASE RATE

Injury Incidence / Lost Workdays Case Rate (ORAU employees only)					
Calendar Year	Hours Worked	Total Recordable Cases	Total Recordable Case Incidence Rate	DART* Cases	DART Case Rate
2005	1,628,506	5	0.61	2	0.25
2006	1,569,144	6	0.76	0	0.00
2007	1,280,441	6	0.94	0	0.00
3-Year Total	4,478,091	17	0.76	2	0.09
Injury Incidence / Lost Workdays Case Rate (subcontractors only)					
Calendar Year	Hours Worked	Total Recordable Cases	Total Recordable Case Incidence Rate	DART Cases	DART Case Rate
2005	16,240	0	0.00	0	0.00
2006	27,432	0	0.00	0	0.00
2007	6,417	0	0.00	0	0.00
3-Year Total	50,089	0	0.00	0	0.00
Injury Incidence / Lost Workdays Case Rate (including subcontractors)					
Calendar Year	Hours Worked	Total Recordable Cases	Total Recordable Case Incidence Rate	DART Cases	DART Case Rate
2005	1,644,746	5	0.61	2	0.24
2006	1,596,576	6	0.75	0	0.00
2007	1,286,858	6	0.93	0	0.00
3-Year Total	4,528,180	17	0.75	2	0.09
Bureau of Labor Statistics (BLS-2006) average for North American Industry Classification System (NAICS) Code [541990 All other professional, scientific, and technical services]			Total cases published	Data not published	Total cases 1

*Days Away, Restricted, or Transferred (DART)

Conclusion

Data for the Total Recordable Case (TRC) incident rate for NAICS Code 541990, “All other professional, scientific, and technical services,” was not published in 2006. NAICS code 541990 is a subset of code 5419, “Other professional, scientific, and technical services.” Therefore, the Team used the 5419 code for comparison. The TRC incident rate for that code is 4.6. The ORAU 3-year average incident rates for both TRC and DART are well below the industry averages and meet the requirements for DOE-VPP participation at the Star level. Analysis of the data over 3 years indicates that injuries to students working at ORNL are one of the leading causes. In many cases, students at ORNL perform work in laboratories that they may not have performed in a few years and in which they may not be proficient (e.g., preparing laboratory glassware). ORAU is working to identify ways to improve student awareness and attention to laboratory safety practices, including basic laboratory safety training for all new students prior to assignment at ORNL.

III. MANAGEMENT LEADERSHIP

Management leadership is a key element of obtaining and sustaining an effective safety culture. The contractor must demonstrate senior-level management commitment to occupational safety and health, in general, and to meeting the requirements of DOE-VPP. Management systems for comprehensive planning must address health and safety requirements and initiatives. As with any other management system, authority and responsibility for employee health and safety must be integrated with the management system of the organization and must involve employees at all levels of the organization. Elements of that management system must include clearly communicated policies and goals, clear definition and appropriate assignment of responsibility and authority, adequate resources, and accountability for both managers and workers. Finally, managers must be visible, accessible, and credible to employees.

Based on interviews with senior managers and feedback from employees during this assessment, ORAU has demonstrated exemplary support for safety at ORISE. From the ORISE Director down through the executive leadership team, managers were unanimous in their belief that all accidents are preventable. Further, the executive leadership team has not just voiced support for safety excellence expected of a DOE-VPP Star participant, but they demonstrate by example their expectations that safety issues are to be aggressively identified and resolved. Senior managers provided several examples where they had specifically identified safety issues and ensured that resources were made available to get the problem fixed. For example, one of the program directors has a clear view of the parking lot from his office. From this vantage point, he identified two specific concerns. First, a large berm in the center of the parking lot stood between employees arriving for work and the main entrance to the building, so workers regularly climbed over the berm to get to the front door. The program director submitted this concern to the facility maintenance organization. Rather than simply telling workers not to cross the berm, the height of the berm was reduced, and a sidewalk was put into the center to make access safer and easier. This director's second concern was that the parking lot was constantly wet due to inadequate drainage, posing a potential ice problem during the winter months. Twice the facilities maintenance organization attempted (unsuccessfully) to fix the problem. The director continued to raise the issue until a solution was implemented that prevented the parking lot from becoming an ice hazard in winter.

ORAU managers at ORISE have adopted the DuPont safety culture model for the "path to zero." This model is based on DuPont's experience with encouraging an interdependent safety culture in which all personnel are involved in helping to ensure each other's safety. The ORISE Director has used this model to gauge organizational progress, as well as the executive leadership team's perceptions of improving safety culture. Inherent in the use of this model is the concept that progress toward the interdependent safety culture builds on each of the previous improvements and that without continuous management attention, it is easy for the culture to degrade. Consequently, managers at all levels are appropriately focused on continuous improvement in safety.

Responsibility for safety is distributed throughout the organization. Individual responsibilities for all workers are defined in ORAU Policy and Procedure ESH-100, which addresses the implementation of integrated safety management (ISM). There is a Director of Environment,

Safety, and Health (ES&H) who is responsible for safety and health policy, as well as specific programmatic roles, such as implementation of the Worker Safety and Health Plan required by title 10, Code of Federal Regulations, part 851 (10 C.F.R. 851). There is an ES&H staff that is responsible for industrial hygiene, emergency management, and environmental management. This staff is also responsible for establishing and maintaining the baseline hazards assessment. The Team identified one area where improvement was required related to the baseline hazards assessment. Although the industrial hygienist had informally evaluated the chemical hazards associated with the laboratories run by ORAU, that evaluation was not systematically documented and captured in a baseline, and no sampling had been performed in the laboratories since 2002. When this condition was identified to ORAU managers, they committed resources (both financial and personnel) to ensure that the baseline was adequately established before the publication of this report. Managers' willingness to quickly and correctly address this potential noncompliance with 10 C.F.R. 851 was exemplary, and it indicates their commitment to their workers' safety.

One of the challenges of maintaining Star status is keeping safety program efforts timely and interesting. In an established safety culture, there can be a tendency just to keep doing the same things, usually with decreasing effectiveness. During interviews, it was apparent that ORAU managers at ORISE are receptive to new ideas and new approaches. The desire to increase worker safety awareness and experience through creative methods was evident in such examples as the 2006 electrical safety training program called "Bob and Fred's Electrical Adventure" and the 2007 introduction of the "Dirty Dozen" – the 12 most common hazards encountered by office workers in the Business Operations support group.

Although ORAU managers at ORISE have adopted the DuPont safety culture model, they have not participated in any of the DuPont safety training opportunities. DuPont offers a number of safety products that could be useful to ORAU in identifying new approaches or previously unidentified safety issues, as well as helping the workforce fully understand the interdependent safety culture. As a potential program improvement, ORAU should consider sending workers to DuPont safety training classes or hosting DuPont safety training in the Oak Ridge area as an outreach and mentoring opportunity for other organizations.

Opportunity for Improvement: ORAU should consider attending or hosting a DuPont safety training session in the Oak Ridge area to help their workforce and other employers in the area understand and develop an interdependent safety culture.

Awards and incentives are available for safety improvements. ORAU has two primary award systems that are used to encourage employee participation. The Achievement Cash Awards Program (ACAP) provides cash awards to individuals for innovative ideas and program improvements that may include safety. The Vippy Awards for Continuous Improvement, or "Vippies," are given specifically for safety improvements, and awardees are presented with an engraved cup. In both cases, workers are nominated by others for the awards, and all nominees are considered, with only some workers actually receiving an award. Additionally, the Vippy awards have typically been awarded to site safety representatives or other safety committee members and have not been used optimally to encourage others to increase participation in safety

awareness programs. ORAU does not have any smaller recognition tools to recognize workers for more common or frequent safety behavior improvements. When asked about these, all the managers agreed that some form of smaller, more frequent recognition to encourage and acknowledge the everyday safety improvements could be of significant value to ORAU.

Opportunity for Improvement: ORAU should consider establishing a recognition program in addition to its existing awards program to acknowledge more common safety improvements and behaviors on a regular basis, as well as including workers outside the safety committee.

Another excellent source of program improvement ideas is the regional and national Voluntary Protection Program Participants Association (VPPPA) regional and national conferences. ORAU has sent representatives to these conferences in the past, but those representatives typically come from the ES&H or Occupational Health organizations. Experience at other DOE sites has shown these conferences to be an excellent forum for fostering new ideas, and ORAU could derive significant benefit by sending other people in addition to ES&H staff to these conferences.

Opportunity for Improvement: ORAU should consider sending personnel from outside the ES&H and Occupational Health organizations to the VPPPA regional and national conferences to identify new ideas and approaches to continue fostering critical assessments.

Resources to improve safety and health at ORISE have not been a limiting factor for program improvement, with the possible exception of industrial hygiene staff. Currently, only one individual is responsible for the ORAU industrial hygiene program. This individual has other assignments and responsibilities that only allow about ¼ full-time to be dedicated to industrial hygiene. As previously discussed, this limitation may have contributed to the deficiencies noted in the baseline hazards assessment. ORAU has mechanisms in place to gain access to additional expertise when needed, and there was discussion by the ES&H manager regarding how to gain access to additional expertise. Regarding other resources, a common theme in management interviews was that no safety improvement went unfunded. ORAU has done a commendable job in ensuring that resources are available to address outstanding safety issues without compromising the service request process by clogging the system with “safety problems” that are not actually related to safety.

ORAU managers have established specific safety goals consistent with the expectations of the DOE Office of Science. ORAU has not focused on achieving that goal, but rather on the necessary actions to actually achieve zero accidents and injuries. Consequently, ORAU managers are not managing based on the accident and injury statistics, but are using those statistics to determine the effectiveness of their safety emphasis. Additionally, ORAU managers are working to identify leading indicators of safety. A good practice that ORAU has implemented is workers’ reporting of “close calls.” These are minor incidents that do not rise to the level of reporting for a “near-miss,” but may indicate unsafe behaviors or conditions. By tracking close calls, managers can identify trends before accident and injury statistics rise.

The final area where ORAU managers have demonstrated leadership is their support of outreach and mentoring activities. The ORO Manager has established expansion of DOE-VPP in the Oak Ridge area as a priority. ORAU has been an effective partner in that effort by mentoring several organizations, including the EnergX Transuranic Waste Processing Center, Wackenhut-Oak Ridge, Pro-2-Serve, and the Toxic Substances Control Act Incinerator facility operated by Shaw Environmental. ORAU also supports the Energy Technology and Environmental Business Association, which also partners with ORO in promoting excellence in safety and environmental management.

Conclusion

ORAU managers effectively support and lead the workforce in improving the safety culture. Necessary resources are provided, and workers are rewarded for pursuit of safety excellence. Managers are quick and persistent in ensuring that safety concerns are addressed in a timely manner. They are clearly committed to the continuous improvement and excellence that are hallmarks of continued DOE-VPP participation at the Star level.

IV. EMPLOYEE INVOLVEMENT

Employees at all levels must continue to be involved in the structure and operation of the safety and health program and in decisions that affect employee health and safety. Employee participation is in addition to the individual right to notify appropriate managers of hazardous conditions and practices. Field observations and interviews indicate that ORAU workers remain committed to their personal safety, as well as the safety of their coworkers and visitors.

The Team observed that a very strong safety culture continues to exist at ORAU. ORAU employees feel completely empowered and are provided opportunities to participate in safety and health programs and activities. During interviews, several employees mentioned the opportunities to participate in multiple wellness activities conducted throughout the year by the Occupational Health group. These activities include brown bag lunches, guest speakers, Newline articles and audio clips, blood pressure screenings, and the annual Health and Safety Fair. Employees can also participate in ad hoc committees, the Diversity Council, and the Employee's Club. Additionally, all interviewed employees were fully aware of how to get ES&H information from the Safety 1st Web site that serves as a primary means of safety communications throughout ORAU. Some Radiation Emergency Assistance Center/Training Site employees mentioned that their workload and schedule constraints prevent them from becoming more involved in some activities. Several employees noted that having the opportunity to participate in these activities/programs also helps foster the "close-knit family" work environment that encourages them to look out for each other even beyond work.

The Team observed that across the board (with one exception, discussed in the following two paragraphs), employees were very knowledgeable of their responsibilities and rights in regard to safety. Employees stated that they were aware of their stop-work authority and responsibilities with respect to maintaining a culture of safety excellence and continuous improvement. All interviewed employees felt that they could exercise their stop-work authority without retribution if they encountered a potentially unsafe or hazardous condition. Employees interviewed in remote locations in Washington, DC, and New Mexico also shared the same level of awareness of the ORAU safety program. Employees also stated that ORAU was a very safe place to work and that they would recommend, and have recommended, ORAU as a place of employment to friends and family because of the safety culture.

A major function of ORISE is the placement of research participants (undergraduate, graduate, PhD candidates, and post-doctoral students) in laboratory positions around the country where they can contribute to existing research efforts in the continuance of their own work. In a large number of cases, these students are actually employees of ORAU. Approximately 250 people in this category work at ORNL. These students work under ORNL policies and procedures and are assigned to an ORNL "mentor" who is responsible for supervising them in the performance of their work. While ORAU has little control over their day-to-day actions, the students are required to complete initial and annual employee training. Unfortunately, given the students' irregular contact with ORAU, they have not been effectively included in the ORAU safety culture, and they appear to be somewhat disengaged from the safety and health programs within ORAU. During the interview process, the Team found most of them were unfamiliar with VPP and were unaware of the activities available for their participation. Understandably, due to

geographic separation and the contractual uniqueness of the program, it has been a challenge for ORAU to fully engage these students in VPP and safety and health activities.

ORAU could reasonably determine that because those students work in ORNL spaces with ORNL supervisors, they are not a part of the ORAU VPP effort. However, when this situation was discussed with the ORISE Director, he clearly felt that would be the wrong approach. Instead, ORAU intends to find ways to improve communication and contact with its students and better integrate them into the VPP culture. Although the task will be difficult, ORAU managers clearly expressed the opinion that this was the right approach.

Each building or program has a Site Safety Representative (SSR) who represents his/her group on the Safety Council, which meets monthly to address ES&H issues. The Safety Council is responsible for planning, implementation, assessment activities, tracking safety performance, and recognizing safety excellence throughout the organization. SSRs who receive additional training serve as a conduit for addressing safety concerns between employees and the council. However, all interviewed employees expressed complete trust in bringing safety concerns to their managers without fear of reprisal. Many employees were able to provide examples of recent safety issues raised to their managers that were addressed and corrected immediately.

Although employees feel fully engaged in safety and health programs, there appears to be a limited number of avenues for involvement and for immediate recognition. Some employees suggested that more frequent rotation of SSRs within an organizational group would help improve participation in some aspects of the safety program. Additionally, most SSRs have not had the opportunity to participate in regional and/or national VPPPA conferences. Best practices and lessons learned are shared at these conferences, and attendees are encouraged to take them back to their individual worksites for utilization. These conferences also provide a good means of developing a network of contacts of safety and health experts across the industry.

ORAU has two employee recognition programs, the Vippy award and the ACAP award. Both award programs are well-known and liked by employees; however, both programs involve a decisionmaking process that can take up to several weeks before the award is presented to the employee. Employees expressed a desire for a timelier award program (on-the-spot recognition was specifically mentioned), preferably one that involves recognition in front of their peers.

The Vippy award, named after the ORAU Safety mascot, is viewed very positively by employees. On inspection of the log books, however, it appears that these awards are frequently presented to many of the same individuals over time, and many of the award recipients are also SSRs. Thus, the selection process appears to limit the number and variety of employees who are recognized within the company. It is recommended that this award be utilized more broadly in recognizing individuals and teams across the organization.

Employees are actively involved in facility walkdowns and drills. Documentation for these walkdowns has been less than thorough in the past, but the Team recognizes that documentation quality was a self-identified problem and that corrective actions have been implemented. Continued attention to this corrective action to ensure effectiveness is highly recommended.

Conclusion

ORAU has a positive safety culture that allows employees to participate in the safety program and help resolve safety issues when they can. Multiple mechanisms are available for employee participation. ORAU could benefit from providing broader recognition for safety improvements and increasing employee opportunities to attend offsite safety conferences and participate in other DOE-VPP onsite assessments. Additionally, ORAU can have a long-term positive impact well beyond ORISE by more effectively involving the students who work in laboratories at ORNL.

V. WORKSITE ANALYSIS

Management of health and safety programs must begin with a thorough understanding of all hazards that might be encountered during the course of work and the ability to recognize and correct new hazards. There must be a systematic approach to identifying and analyzing all hazards encountered during the course of work, and the results of the analysis must be used in subsequent work planning efforts. Effective safety programs also integrate feedback from workers regarding additional hazards that are encountered, including a system to ensure that new or newly recognized hazards are properly addressed. Successful worksite analysis also involves implementing preventive and/or mitigative measures during work planning to anticipate and minimize the impact of such hazards.

ORISE is generally a low hazard operation with mostly small quantity laboratory analysis conducted in controlled environments. There are three small laboratory business units that comprise ORISE: beryllium laboratory; radiochemistry laboratory; and cytogenetic laboratory. The ORAU Independent Verification Sampling Group also conducts verification and validation of cleanup efforts at sites across the country. Customers at cleanup sites include DOE, the Nuclear Regulatory Commission, State Agencies, and private industry. ORAU personnel are well trained and knowledgeable of the processes, protocols, and hazards with which they work. The procedures utilized are well defined and for the most part contain the appropriate controls and warnings.

ORAU has an approved ISM system that defines how ORAU implements its safety management system. A significant aspect of this system is the JHA process, defined in the ORAU Health and Safety Manual. This process provides a means of identifying and analyzing hazards associated with specific activities and involves identifying discrete work steps, the existing or potential hazards associated with those steps, and the applicable controls. JHAs are reviewed by subject matter experts and by the employees performing the work. Subject matter experts are on staff to provide professional guidance for work activities conducted by the business units. In most cases, references and material safety data sheet information are readily available to professionals and staff.

The Independent Environmental Assessment and Verification Group conducts many offsite activities. For the most part, these activities are performed at sites where the cleanup activities are completed and the expected hazards are low. In some cases, however, some latent hazards remain, and a special Health and Safety Plan is prepared for the project. One such plan was prepared for the verification activities at the Curtis Bay Depot near Baltimore, Maryland. In that case, there was a potential for field workers to encounter unexploded ordnance. The plan demonstrated comprehensive planning for the anticipated hazards. As a high-level planning document, it discusses the requirements for hazard identification in detail so that a more detailed work document could be developed using ORAU institutional processes. A review of the supporting procedures for use confirmed that detailed procedures were, indeed, in place to support verification and validation efforts.

The Team found that existing JHAs generally contained very little documented analysis of the hazards (e.g., quantity of chemical used, available air volume that the chemical may be dispersed in, appropriated exposure limits). In many cases, the hazard was simply identified as

“chemicals.” The lack of detail is probably encouraged by the structure of the JHA form. The form provides specific areas to describe the work step, identify the hazard, and then identify the control. There is no specific block or area on the form to describe the analysis of the hazard.

Another general observation was that nonspecific terms are used in the “control” section of JHA. In many cases, the controls are identified as “proper” or “appropriate,” such as proper personal protective equipment (PPE), appropriate gloves, or appropriate precautions. This lack of specificity in controls may be driven by the lack of documented or specific analysis, and the use of general terms leads to workers deciding what is “proper” or “appropriate” at the time of work. Without the supporting analysis, they may not select the correct control. For example, the standard glove adopted for use in the laboratories is a 5.9 mil (.0059 inch) thick nitrile surgical glove. While these gloves are adequate for most of the chemicals used in the laboratory, there may be chemicals in the laboratory for which nitrile gloves are not appropriate. The laboratory has a small quantity of 49 percent hydrofluoric acid (HF). JHA did not analyze penetration data for the glove for HF exposure, and OSHA specifically recommends not using nitrile gloves for protection against HF. Although the gloves do provide some protection, a small drop of HF on the glove could penetrate the glove and cause damage before a worker is aware that the acid has been spilled. Laboratory workers indicated that if they saw a spill on their gloves, they would remove the gloves immediately and replace them, but that precaution is not included in JHA.

In one case observed by the Team, an activity had not been thoroughly analyzed and a potential hazard had been introduced without proper controls. Equipment in a teaching laboratory located in the SC-1 Building required periodic refilling of liquid nitrogen. The liquid nitrogen was stored in a Dewar in the hallway of the laboratory at the bottom of an exit stairwell. The storage location was convenient, but in the event of a fire, the Dewar would vent more nitrogen, possibly causing personnel to pass through an area of higher hazard to exit the building.

In another example, a JHA used by the Independent Environmental Assessment and Verification group identifies the use of chain saws, mowers, and trimmers to prepare a site for sampling and monitoring. The “hazards” section identifies the potential for fuel fires while using these tools. There is no analysis of how those fires could be started, and the “control” section does not contain any specific instructions or precautions for preventing fuel fires and controlling ignition sources.

All chemical analyses in the laboratories are conducted in fume hoods. The laboratory follows the 1989 American Conference of Governmental Industrial Hygienists standard for laboratory hoods and establishes a minimum face velocity for the hoods in accordance with that standard. None of the JHAs associated with laboratory procedures contain an analysis of the loss of ventilation to the fume hood. The standard practice described by all workers was that in the event of a loss of fume hood air flow they would terminate the work, place the area in a safe condition by closing the fume hood, and then evacuate the area in an orderly manner. This practice is not documented in JHA. Without the appropriate analysis, it is left to the worker at the time of the failure to determine the safe condition, and the worker may or may not make the correct assumptions.

At the time of the onsite assessment, laboratory hazards had been informally analyzed by the industrial hygienist. However, those analyses had not been adequately documented or recorded

with a technical basis to establish a reliable baseline hazards assessment in accordance with 10 C.F.R. 851, the associated guides (DOE Guide 440.1-3 and DOE Guide 440.1-8), and the American Industrial Hygiene Association (AIHA) Strategy for Assessing and Managing Occupational Exposures. Specifically, baseline exposure assessments had not been documented for all work areas. The industrial hygiene staff was familiar with the hazards in all work areas, but did not have a documented assessment for each area. Areas of more significant potential hazards had formal documentation, such as JHAs and some exposure sampling results, but areas with lesser hazards had no written documentation (qualitative or quantitative) as required by 10 C.F.R. 851.21.

ORAU does not have a documented sampling strategy to identify health hazards and assess employee exposure (including the duration, route, and frequency of exposure and the number of exposed employees). Exposure samples are collected infrequently, and no resampling frequency has been established. A risk evaluation tool was used that gave a recommended frequency for revisiting an area, but ORAU has not translated that recommendation into a scheduled plan for reevaluating specific areas. A sampling strategy that meets the 10 C.F.R. 851.21 requirement for “recognized exposure assessment and testing methodologies” has not been developed.

Two monitoring samples from a laboratory were reviewed. These samples were taken in 2002. One indicated a low exposure, and the other indicated a high exposure (above the OSHA permissible exposure limit). The description of what had occurred during the sampling period was inadequate to explain why the two samples had such different results. Exposure sampling paperwork included only a basic explanation of activity during the sampling period; this information was inadequate to explain an unusually low or high sampling result. No additional samples had been taken to discount the unusually high sample result.

ORAU was unable to locate the documented exposure records during this onsite assessment, leaving only the undocumented results in an electronic database. The staff noted that all paper exposure records may have been misplaced during a previous move. Thus, recordkeeping requirements of 10 C.F.R. 851.26 are not being met.

While attempting to look at employee air sampling and exposure records, industrial hygiene staff discovered that electronic records were not accessible. These records appear to have been inaccessible since a computer change several months ago.

The Team believes that these conditions might represent a specific noncompliance with an established regulation or standard, but that the nature of noncompliance is such that the condition can be corrected within 90 days. Consequently, and in accordance with DOE-VPP documents, ORAU and the Team agreed to the following actions, which were completed before the final team recommendation was published:

- ORAU developed and approved an exposure assessment procedure that follows the AIHA strategy;
- ORAU reviewed chemicals in use in laboratories using that procedure;
- For chemicals that may exceed an established percentage of the occupational exposure limit, ORAU conducted confirmatory sampling;

- For any identified sampling requirements that could not be met within the 90-day timeframe, ORAU established a plan and schedule to complete those samples within 6 months;
- ORAU gained access to additional industrial hygienists or technicians, as necessary, to establish and maintain the resultant baseline hazards assessment;
- ORAU searched for the missing sampling records and either located the records or reconstructed the records from data provided by the laboratories conducting the sample analysis;
- ORAU established a system to maintain and protect exposure assessment and monitoring records in accordance with 10 C.F.R. 851; and
- ORAU reviewed this condition and discussed it with the Director, Office of Worker Safety and Health Enforcement, and determined that the issue did not need to be reported through the Noncompliance Tracking System.

Workers, supervisors, and managers at ORISE used JHA as a work document. That is, they expect JHA to be used by the worker during the conduct of work. By ORAU procedure, JHA is required to be incorporated into the work document or procedure. Typically, JHA is referenced by the procedure, and the user turns to JHA for specific controls or information. Experience throughout DOE has consistently shown that when activity hazard analyses, such as the ORAU JHA are properly detailed and documented, they make poor work documents. Conversely, activity hazard analyses that are designed as effective work documents usually do not contain sufficient details to perform effective hazard analyses. The objective of the ISM process should be to ensure that the results of the hazard analysis are a clearly defined set of controls for the analyzed hazards. Those controls should then be implemented through work procedures, work instructions, work orders, or worker training, as appropriate. As implemented, the ORAU JHA process does not capture the analysis that demonstrates that the identified controls are appropriate.

Opportunity for Improvement: ORAU should revise its JHA procedure and form to include more detailed analysis of hazards (quantity, volume, exposure limits, etc.) and ensure that the analysis clearly demonstrates the adequacy of the selected control set.

The ORAU Health and Safety Manual contains a safety inspection procedure that establishes criteria and periodicity for walkthrough safety inspections. Typically, in the first month of the quarter, SSR performs a walkthrough safety inspection. Inspections by the ES&H Director, emergency management specialist, and other ES&H staff are conducted in the second month of the quarter. Inspections by the ES&H industrial hygiene officer and the radiation safety officer are scheduled during the third month of the quarter. Additionally, employees are encouraged to evaluate their workspaces continually. The Safety Corrective Action Tracking System (SCATS) database contains examples of employee identification of hazards and corrective actions. Periodic surveys for radioactive material are performed in accordance with requirements of 10 C.F.R. 835, the ORAU radiation protection program, and the Radiation Protection Manual.

ORAU performs data collection and trending for a number of areas. Typical areas trended are recordable injuries, first aid cases, dose distribution over the working population, and contamination events. For areas that are tracked but are not driven by requirements, ORAU

Employee Concerns personnel collect data derived from SCATS, Close Calls, and Near-Misses databases and trend that information into various categories. For example, recordable cases are broken into types and locations. The results of this type of trending revealed that over 4 years, 48 percent of injuries were extremity (hand). Also, the location trending indicated that 30 percent of recordable cases occurred inside ORISE facilities. As a result of this information, the safety manager recognized the need to address the potential for injuries in administrative and laboratory areas, as well as the typical occupational hazards encountered in higher-hazard activities. To ORAU's credit, management extended the JHA process to address administrative workspaces to ensure that all hazards in the workspace are appropriately identified and controlled.

Individuals are encouraged to identify hazards and be part of the solution. Through safety walkdowns, individual contributions, programmatic surveys, and teaming for solutions, employees are included in the ownership of safety. The Team approached several managers at the south campus with suggestions that were welcomed. Other Team members, through discussions across the ORISE complex, confirmed that openness to suggestions was consistent across the workforce.

SCATS is a tracking system that captures employee input for safety and improvement issues. The system rates the hazard, categorizes the hazard, and documents the corrective actions. Over 90 percent of all entries into the system were corrected in a very expeditious fashion, normally on the same day. Employees can call directly or email requests for corrective actions that are entered into the tracking system. For example, on June 13, 2006, an employee identified chairs blocking the emergency exit in a conference room. The situation was corrected that day, and a sign was posted not to block the emergency exit.

The ORAU Health and Safety Manual contains the procedure and process for reporting on-the-job injuries and near misses. Within the procedure is the accident investigation form for managers to document the facts associated with accidents or events. While on site, the Team observed the ES&H organization documenting a personnel injury that occurred when a recently installed step failed under the weight of an employee. The investigation and documentation are approximately 70 to 80 percent complete. Lessons-learned documentation and an evaluation of repair acceptance testing need to be completed.

Conclusion

Hazards at ORISE facilities are generally low and well understood by the workers. As a result, workers and managers alike have become accustomed to less rigorous analyses for those hazards. For the vast majority of work performed by ORAU, this process is more than adequate. The analyses are not documented, and in a few cases the lack of analysis led to inadequate control selection. Baseline exposure assessments were not adequately recorded, but that condition was corrected before this report was issued.

VI. HAZARD PREVENTION AND CONTROL

Once hazards have been identified and analyzed, they must be eliminated (by substitution or changing work methods) or addressed by the implementation of effective controls (engineered controls, administrative controls, and/or PPE). Equipment maintenance, PPE, processes to ensure compliance with requirements, and emergency preparedness must also be implemented where necessary. Safety rules and work procedures must be developed, communicated, and understood by supervisors and employees and followed by everyone in the workplace to prevent mishaps or control their frequency and/or severity.

ORAU employs engineering controls, specifically fume and chemical hoods, as the primary method to limit employee exposure to laboratory hazards. With one exception, the laboratory areas observed by the Team use appropriate engineered controls to minimize potential employee exposures. In situations where engineering controls are ineffective for eliminating or controlling all the hazards, the use of PPE is required. Engineered controls are also utilized in the various workshops and print shops. For example, the carpenters' workshop in the south campus has vacuum trunk lines configured with the shop equipment to minimize exposure to nuisance dust, and appropriate guards are in place on the equipment as required. In the ORAU print shop, a vapor hood system was installed and vented to the outside to minimize workers' exposure to the multitude of chemicals utilized in their processes.

As discussed in Section V Worksite Analysis, some weaknesses in the JHA process resulted in inadequacies related to appropriate controls being implemented in all situations. While the weaknesses are not substantial enough to raise significant concern, it is important to identify some of those weaknesses so that necessary improvements are made to the JHA process. Some other examples of inadequate controls not previously discussed are:

- A training room contained a hood with radioactive material, but there was no clearly defined Radioactive Material Area (RMA) boundary. Students were permitted to eat and drink inside the training room, which could have been considered within the RMA. The radiation safety officer posted the training room as an RMA when this was pointed out by the Team.
- A JHA written for elevated work on an NOAA portable weather tower failed to identify the need for fall protection harnesses.

Where analyzed hazards indicate the need for PPE, PPE is required to protect personnel against those hazards at ORISE. Personnel were observed wearing gloves, face shields, laboratory coats, booties, substantial footwear, hearing protection, or other protective equipment during the performance of their daily duties. These hazards typically consist of, but are not limited to, hazardous chemicals, small quantities of radioactive material, heated surfaces, noise, energized circuitry, sharp implements, cryogenic materials, and pinch points. Other than the previously identified problems, the work activities observed by the Team were performed in accordance with PPE requirements established by baseline analysis or by job-specific JHAs.

ORAU has a radiation protection program that complies with the requirements of 10 C.F.R. 835. The Team's walkdowns of laboratory spaces revealed well-understood, low-level radiological

hazards and sufficient controls for activities. All personnel who are expected to potentially encounter or access radiological areas or materials are monitored for exposure through the site dosimetry program. As a best practice, ORAU has adopted the use of optically stimulated luminescent dosimeters (OSLD) rather than the more common thermoluminescent dosimeters (TLD). TLDs are typically only sensitive to exposures greater than 10 mrem, and any recorded exposure less than 10 mrem is reduced to 0. At ORISE the OSLDs are accurate for exposures in the 1 mrem range and are consequently better for measuring the low-level exposures normally encountered at ORISE.

Methodist Medical Center (MMC) Healthworks provides all medical services for ORAU, including acting as the medical director, providing medical surveillance, maintaining medical records, and providing medical evaluation and other medical-related activities. The medical director is physically located at MMC in Oak Ridge, but two registered nurses are located onsite and are routinely available for staff assistance or consultation.

Workers with potential exposure or minor injury/illness are evaluated either by the onsite occupational nurses or by MMC. Emergency medical response service is provided by ORNL or the city of Oak Ridge, as necessary, and serious cases can be transported directly to MMC.

Another good practice adopted at ORISE is that workers are encouraged to use onsite medical expertise for nonoccupational health concerns. Referred to as the “worried-well,” workers who might otherwise miss work to see their regular physician can visit with ORAU medical personnel. This practice has shown other unexpected benefits. ORAU is self-insured for its health insurance. By making the onsite occupational medical staff available for nonwork related concerns, ORAU has leveraged its medical resources and significantly reduced its health insurance costs. This has been translated into reduced health-insurance premiums for workers participating in the ORAU health insurance plan and increased worker satisfaction with the health insurance program.

Site emergency preparedness activities, including site-wide alarm tests are conducted per DOE’s emergency preparedness program. Fire and police protection are provided by the City of Oak Ridge. Drills that are conducted include evacuation, shelter-in-place, or personal injury scenarios. A unique practice adopted by ORAU includes the conduct of one-on-one emergency training and testing with ORAU emergency management staff. Every 3 years each staff member is interviewed, and their knowledge of the appropriate emergency response to potential situations is reviewed. During the assessment, the Team had the opportunity to observe the site response to a tornado watch. ORAU emergency personnel kept employees informed frequently via e-mail during the evening commute time.

ORAU has on-staff safety professionals who provide expertise in industrial safety, industrial hygiene, and radiation protection, and safety professionals who provide assistance and review when required. Qualified and experienced craftsmen also assist in oversight of subcontracted workers when their particular expertise is applicable. For example, one of the facility maintenance craftsmen had more than 15 years experience as a rigger for the Navy prior to being hired by ORAU. This worker typically is assigned as project lead for oversight of subcontracted

hoisting and rigging activities and provides his insights and experience during the Health and Safety Plan reviews with the safety professionals.

The ORAU facility maintenance staff provides maintenance services to the ORISE complex. A significant portion of the complex is a typical office space setting, and the maintenance activities are routine and generally low hazard. When higher-hazard activities are expected, facility maintenance develops a Health and Safety Plan for the activity or subcontracts the activity to an outside contractor with the appropriate expertise. When work is subcontracted out, a Health and Safety Plan is prepared by the subcontractor and reviewed, approved, and overseen by the designated ORAU project manager.

Conclusion

Hazards at ORISE are well controlled. Workers use the appropriate range of engineered controls, administrative controls, and PPE to minimize their exposure to hazards. A few cases were identified where adequate controls were not documented. Observation of work activities demonstrated safe conduct of work and good awareness by the workers. The ORAU medical program is a good example of optimum use of resources.

VII. SAFETY AND HEALTH TRAINING

Training is necessary to implement management's commitment to prevent exposure to hazards. Managers, supervisors, and employees must know and understand the policies, rules, and procedures established to prevent exposure to hazards. Managers, supervisors, and employees must understand their safety and health responsibilities and know how to effectively carry them out.

The safety and health training processes used by ORAU continue to be structured and implemented according to ISM core functions and guiding principles. These processes adequately train workers, supervisors, and managers in recognizing hazards and performing their work safely. Employees who were interviewed during this review, as well as observations made by the Team, confirmed that these processes are used and understood by ORAU employees throughout the organization. The onsite review clearly showed that ORAU has effectively developed, communicated, implemented, and self-assessed processes to continue to meet the tenet of safety and health training.

ORAU has processes in place that formally define the required training and assure completion for employees, supervisors, and managers/directors. All ORAU employees receive training commensurate with their job descriptions, responsibilities, and authorities. Additionally, the Team noted that employees in the facility maintenance department have been trained in a variety of areas based on the work they do and the experiences they bring from previous employment. All employees have online access to their training records and can review upcoming training requirements.

Most hazard recognition training for ORAU employees is focused on the office environment. Training for employees in hazard recognition begins with the general employee safety training at hire and continues with updates on selected topics at least annually for all employees. Nonoffice employees, such as maintenance workers, laboratory staff, and students, receive additional training based on their work responsibilities/duties. The Team observed ORAU staff providing laboratory safety training to visiting students as part of a safety brief prior to conducting exercises in the laboratory. The Team found that the information was thorough and adequately addressed the potential hazards, as well as the processes and procedures that would be followed should an accident occur.

Most training at ORISE continues to be computer-based. Interviews with employees demonstrated that the training is comprehensive and user-friendly and is appropriately developed for the multigenerational audience/workforce. Interviewed employees expressed appreciation for the computer-based training, and most noted that the training has been effective due in part to the training department's ability to produce training modules that are both informative and entertaining. For example, a number of employees had very favorable remarks about the 2006 electrical safety training module, "Bob & Fred's Electric Adventure." Although this training video is almost 2 years old, it has had a lasting impact on how employees view the message and how it was delivered. Additionally, ORAU received an award from the Public Relations Society of America for creative delivery for this training video.

During this review, employees also had very favorable remarks about additional training they are provided. In 2007 the Business Operations group introduced its “Dirty Dozen of Workplace Hazards” campaign, which addresses the 12 most frequently mentioned safety hazards found in the workplace. These hazards are incrementally highlighted each month. Additionally, ORAU began developing the online “Safety Minute” audio and text clips that highlight a variety of hazards. Interviewed employees felt that these “tips,” although not formal training, help them maintain a high level of awareness of potential hazards that they may encounter at work or at home. Some interviewed employees also felt the ORAU safety calendar, which highlights the art of the children of ORAU workers, helps them extend the safety message beyond the workplace into their homes and communities.

Across the board, the employees interviewed indicated that they receive a high level of safety training and know that their managers fully support requests for additional training. Interviewed employees demonstrated thorough knowledge of who their safety representatives were and were also well versed in emergency drill procedures. Through training and enforcement, employees are aware of workplace hazards and the safe work procedures they need to follow to protect themselves.

Conclusion

ORAU continues to provide employees at all levels, and within all disciplines, training that adequately addresses hazards they may be exposed to in their respective work environments. Overall, the ORAU training department provides a solid foundation for maintaining the safe working environment that exists and continues to meet the requirements of the safety and health training tenet.

VIII. CONCLUSIONS

In the 5 years since its certification as a DOE-VPP Star site, ORAU has effectively continued its dedication and commitment to the pursuit of safety excellence. That commitment was evident throughout the organization. Although most hazards encountered by workers are considered low, ORAU needs to ensure that its hazard analysis processes, including the baseline exposure assessments, are sufficiently robust to address the few cases of more significant hazards that may be encountered. ORAU has implemented and maintained several initiatives to increase employee involvement and provide effective safety training to all employees. ORAU outreach and mentoring efforts to support and encourage expansion of DOE-VPP are noteworthy. Consequently, the Team recommends that ORAU continue as a DOE-VPP participant at the Star level.

APPENDIX A

Onsite VPP Audit Team Roster

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