Chemistry Division

Integrated Safety Management

Gap Analysis

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Prepared by: Anita C. Bakke
Administrative Assistant for ESH

Fred J. Schmitz
Coordinator for ESH/QA

Brenda Grazis
Quality Assurance Representative

Seth Snyder
Manager, Research Program Administration

Approved by:
Marion C. Thurnauer
Director, Chemistry Division

Executive Summary

The overall self-assessment score is 4. Minor gaps were identified during the self-assessment process and these deficiencies are being addressed. Only minor gaps were identified in lines of responsibility, training, work scope and priorities, hazards analysis, hazards control, working within controls, and feedback. The largest gaps reported were associated with infrastructure deficiencies. Flooding after rainstorms, variations in room temperature, and control of airflow in radiological hoods are the most frequently identified problems. Highlights of Chemistry ISM practices are summarized first.

Highlights of Chemistry ISM practices

Good practices:

Chemistry developed an intranet database to serve the needs of the division staff. HR enters new division members into the database and an automatic message is sent to ESH and other division offices notifying them of the action. Planned improvements to the database include coordinating QA documentation such as the Project Review Document to the training profile to identify potential deficiencies in training requirements.

In a second use of the database, staff are able to send an email message to a range of responsibilities including ESH, Building Operations, QA, etc. The message is automatically forwarded to the correct individual without the staff member having to know the line of command. As an example, if the building manager is unavailable, the message is automatically forwarded to the assistant to the building manager. If both were unavailable, a third designated individual would turn the notification on and the message would be forwarded to them. When the building manager returns he can track all of the activities in his absence. The other offices have the same capabilities.

Chemistry requires that at the time of renewal of term positions, supervisors review the JHQ, and determine if the employee is listed on the correct safety review, PRD and SOP documents. In addition, Chemistry posted copies of PRDs in the laboratories enabling staff to refresh their knowledge.

Chemistry instituted a new practice to handle closeout of laboratories. When the division office is notified that a program will be terminated, we initiate process to ensure proper laboratory cleanup. The building manager inspects the facility and identifies chemicals, hazardous materials and other items. Chemistry operates under the guideline that the laboratory occupants possess the process knowledge required to identify and deal with the potential hazards. Based on the estimates from the building manager, the division office creates a work project with sufficient funding to restore the laboratory.

Chemistry now requires that an RWP to be prepared for all activities in the M-wing hot cell area.

Accomplishments:

Cleanup of Th228 nuclear medicine generators Chemistry shut down the production of nuclear medicine generators in the M-wing hot cell area. The production and handling of the nuclear medicine generators are considered high risk for worker exposure to radioactivity. Chemistry is transferring this activity to other DOE facilities. Daughters from the nuclear medicine generator production account for over 90% of the radon emissions from the division. Chemistry is in the process of cleaning up the facility to reduce these emissions.

Cleanup of Sr90 nuclear medicine generator hot cell Chemistry is completing cleanup of the M-wing hot cell previously used for Sr90 nuclear medicine generators. This program was shut down about 5 years ago.

Actinide facility Chemistry cleaned a laboratory in M-wing and restored inoperable radiological hoods. The laboratory will open as a DOE user facility for onsite preparation of actinide samples for research at APS.

Emergency egress from 211 The emergency egress from the basement of 211 was completed.

Radiological NMR facility Chemistry restored a laboratory in M-wing to install a nuclear magnetic resonance (NMR) spectrometer dedicated to work with radioactive samples. The preparation included the determination of ventilation requirements in the event of a magnet quench.

Cleanup of legacy lanthanide samples During the Chemical Vulnerability Assessment, Chemistry identified a large number of lanthanide samples that had been overlooked in the past. The samples were inspected by staff scientists and were claimed and entered into the CMS system. Unclaimed lanthanide samples were put into the waste management process.

Chemical Vulnerability Assessment During the assessment, all chemicals that lacked barcodes were entered into the CMS system. Chemistry does not know of any additional chemicals that are not part of the CMS.

Eichrom Industries laboratory Chemistry inspected the laboratories occupied by CRADA partner Eichrom Industries. Chemistry corrected deficiencies to maintain compliance with the CMS system and Satellite Waste Area requirements.

Intranet database Chemistry hired a student for the summer who developed a browser-based database to expedite information sharing in the division office.

Laser safety The Chemistry Laser Safety Committee has worked with the ANL Laser Safety Officer to update the ANL Laser Safety Manual.

QA for procurement Chemistry created a form to evaluate QA of capital equipment. This form must be completed prior to submitting the purchase requisition.

Radiation protection assessment Chemistry successfully completed the triennial 10 CFR 835 DOE audit. Observations and recommendations were corrected.

Nuclear criticality audit Chemistry successfully completed the nuclear criticality audit.

Training audit Chemistry successfully completed the audit of training policies.

Chemical Vulnerability Assessment Chemistry successfully completed this assessment. All deficiencies were corrected.

Environmental Vulnerability Assessment Chemistry successfully completed this assessment.

Open ESH items Chemistry corrected 136 open ESH items

Pending activities

Rabbit tube between 200 and 205. Chemistry is working with the Physical Research ALD office to remove the sample transfer system between 200 and 205. The system was abandoned many years ago and may pose a contamination hazard.

After cleanup of the various hot cells contaminated from nuclear medicine generator production, Chemistry will mothball most of the hot cell area. This will lower requirements for stack monitoring, surveying, and utilities.

Connection to central chilled water in 211 should improve temperature instabilities.

Introduction

In July 1998, Argonne National Laboratory issued a report outlining the Integrated Safety Management System (ISM). In response to this report, the Chemistry Division conducted a Gap Analysis (GA) of compliance with ISM. The goal of the GA is to identify improvements necessary to comply with the principles and functions of ISM. In the first part of the GA, a detailed survey of administrative staff and a set of scientific group leaders was conducted in an interactive setting. This survey was structured to pattern the themes, principles, and core functions of ISM. The results of the survey are summarized in this report.

In the second part of the GA, a short anonymous survey was sent to all Division staff. This questionnaire probed the areas that were identified by the detailed survey group as most significant. Approximately two thirds of the staff returned the survey. Of this group under 5% do not believe that division employees are qualified, trained, and equipped to perform work safely. About 90% of the staff gave the division an overall rating of 4 or 5 in addressing ES&H issues and in individual accountability. Almost half of the staff do not know how to implement stop work authority. This issue will be addressed during building orientation. About 10% of the staff believe that they were expected to compromise ES&H during their work. The division will continue to reinforce the importance of ES&H at all levels of work to improve staff confidence.

The most common issues identified by the staff that compromise ES&H include recurrent flooding, variations in room temperature, and response of PFS to repairing deficiencies,

The GA was scored on a scale of 1 – 5 as follows:

(1) Substantial gap, inadequate, weak
(2) Substantial gap, marginal
(3) Moderate gap
(4) Minor gaps
(5) No significant gaps

Theme 1

Principle 1: Line Management Responsibility for Safety
Principle 2: Clear Roles and Responsibilities

1.1 Supervision of ANL personnel

Score: 4

The Chemistry Division policy states that any person who directs the work of others at Argonne understands that he/she is responsible and accountable for all personnel under his/her supervision.

The division is staffed with qualified individuals in all positions. This policy ensures that all personnel are able to work safely. Training is provided for site-specific hazards as required for specific positions. Both hands-on mentoring by the supervisor and job-specific classroom training is completed to ensure that the individual is qualified to execute his/her work safely. Division management ensures that this training is complete prior to personnel being allowed to work unsupervised in a lab environment.

A Job Hazard Questionnaire (JHQ) is completed for each employee. The site-specific hazards that the individual may be exposed to are cited on the JHQ and used to determine the ES&H training required for the employee. The ANL Training Management System is used to determine and monitor all required training for each employee.

Accordingly, ES&H is integrated into the planning, design, and execution phases of work performed in the division. Safety review documents and/or some form of project review documentation are required for active R&D in the Chemistry Division.

1.2 Directing and hosting non-ANL and temporary personnel

Score: 4

The supervisor prepares a JHQ for long-term visitors, guests, and students in the same manner as prepared for regular staff. The questionnaire is processed in the Training Management System and training requirements are generated for these temporary staff as for regular staff. All visitors

and students are required to complete training in a timely fashion. In regard to training and other ES&H requirements, temporary staff are treated as regular staff.

Every collaborator and outside service contractor must complete building-specific training provided by the Chemistry Division ES&H office. Site-specific training is provided to these short-time visitors based on the site-specific hazard to which they will be exposed during their collaboration.

There is a gap potential in the area of short-term visitors and service contractors. There is a particular concern that workers from Plant Facility Services (PFS) lack training to meet the requirements of some site-specific hazards, (e.g., work done in radiation areas). The other potential gap may occur when a lack of communication occurs between supervisors and division management. The division will take measures to review and minimize these gaps.

1.3 Assignment of responsibilities of supporting line management

Score: 4

The Chemistry Division director has appointed qualified individuals to coordinate implementation of the ANL- and division-level ES&H program. These individuals serve as the primary point of contact with the ES&H Division, EMO, and other ANL organizations specific to the case. The division has individuals who overlap on several key positions within this ES&H structure. These individuals are also positioned on each of the division safety committees to ensure communication with staff on site-specific issues.

1.4 Responsibilities of all division personnel

Score 5

Chemistry Division policies clearly state that all individuals working in the division are responsible for conducting their work in a safe manner, following established ES&H procedures and requirements. Safety manuals are in place to provide additional direction on site-specific hazards within the division. Conformance to these policies and procedures are considered part of each employee's annual performance review. The staff feels that individual responsibility is well integrated into division culture.

Theme 2

Principle 3: Competence Commensurate with Responsibility

2.1 Training, education, and capabilities

Score: 4

A "Physical/Function Requirements/Work Environment Form" is completed for all new hires and transfers into the division.

A JHQ is completed for each employee and updated when a change in the employee's responsibilities occurs. Training is provided for site-specific hazards as required for specific positions. Both hands-on mentoring by the supervisor and job-specific classroom training is completed. When appropriate, work restrictions are imposed until site-specific training is completed and the division line management is satisfied with the worker's competence. The staff impression is that compliance with training requirements remains high.

2.2 Human resources policies and procedures

Score: 4

Position descriptions in the division define general roles and responsibilities for ES&H performance. ES&H performance is documented in each employee's annual performance appraisal.

Systematically considering the proficiency and performance in the ES&H area as it pertains to the processes for the procurement of services, hiring, assignment of responsibility, promotion, discipline, and continued employment are part of a new program that the division will fully support.

Theme 3

Core Function: Define the Scope of Work
Principle 4: Balance Priorities

3.1 Initiation of programs, projects, facility operation, tasks, and activities

Score: 4

The Chemistry Division utilizes FWPs, WFO, LDRDs, service requests, and WPAs to define the scope of work. A mechanism is in place for identification of hazards, and is addressed as required for each site-specific hazard for all work conducted.

A gap was found in the area of service requests, purchase orders, and WPAs. The division is aware of this gap and is in the process of addressing the measure.

3.2 Ongoing definition of priorities

Score: 4

Supervisors and line managers understand that ES&H considerations are the first priority. The division has clearly identified policies and procedures for maintaining compliance with ES&H measures. A safety committee is in place for each identified site-specific hazard within the division. An oversight committee, comprised of the chair from each committee manages these

committees. An annual review of charters and current topic discussions are presented to ensure direction and facilitation of issues in a timely manner.

The division utilizes the services of PFS for all ES&H infrastructure needs. The maintenance group assigned to buildings 200 and 211, PFS Engineering, Crafts, and any other group are contacted as needed.

Theme 4

Core Function 4: Analyze the Hazards

4.1 Initiation and continuation of programs, projects, operations, tasks, and activities

Score: 4

The Chemistry Division does not have nuclear facility.

The accelerator facility operates with DOE concurrence and both accelerators have a SAD. Documentation for a Conduct of Operations was completed several years ago. Individual safety documents are updated on an ongoing basis as experiments or operations change. The Conduct of Operations will be updated when major changes in accelerator operations occur.

Division-specific processes are defined, and documents are in place for providing guidance on policy and procedure. Site-specific safety committees are in place to specifically review radiological and accelerator experiments. These reviews include new or significantly modified equipment and projects. These committees are augmented as needed by ad hoc committees called by the division director to engage in specific reviews.

A safety committee is in place for each site-specific hazard within the division. An oversight committee, comprised of each chair of the various committees, manages the committees. Committees are also in place for specific hazards such as lasers, X-ray diffraction, and ALARA. In most cases, these hazard-specific committees conduct an annual documented hands-on review for each individual program.

Activities limited to office environments are addressed and reviewed on an individual basis.

All ongoing projects, programs, and activities have received the appropriate level of environmental evaluation, in accordance with ANL procedures.

4.2 Ongoing hazard analysis

Score: 4

The division Safety Inspection committee provides a semiannual analysis of hazards of the facility. This committee is comprised of division personnel and the Industrial Safety Specialist

from ES&H-IH. The documents, which define hazards within the division and its facilities, are in place and updated as needed, but at least annually.

A gap appears in the review of requisitions. At this time these items are not reviewed by anyone other than the individual staff who places the requisition. The division is aware of this gap and is in the process of incorporating quality assessment in the procurement procedures.

Theme 5

Core Function 3: Develop and Implement Hazard Controls
Principle 5: Identification of ES&H Standards and Requirements
Principal 6: Hazard Controls Tailored to Work Being Performed

5.1 Tier 2 standards and requirements

Score: 5

The division director, line supervisors, managers, and employees are aware of and comply with the ANL ES&H program policy, directives, and procedures manuals that are applicable to our organization. The division has administrative staff in place to address and provide guidance on all ES&H matters and to communicate those to division management.

5.2 Tier 3 standards and requirements: division-level

Score: 3

The division maintains the following division-level documents. These documents are distributed to all appropriate personnel within the division.

- Conduct of Operations
- Quality Assurance Plan – currently being updated
- Safety Charters for each division safety committee
- Area Emergency Response Plan
- Chemical Hygiene Plan– just updated
- Conduct of Operations Hazard Assessment
- Procedures for lock-out/tag-out of equipment/systems that have two or more independent sources of energy
- Procedures for experimental safety review
- Procedures and schedules for facility inspections and self-assessments

We have several documents that need updating. Shortage of manpower and a balancing of workloads need to be addressed to provide a timely turn around of these documents. The division is aware of this gap and is in the process of addressing the issue. Staff have good knowledge of these documents as they pertain to their own work. The division is aware that staff understanding of documentation unrelated to individual responsibilities needs to be improved.

5.2 Tier 3 standards and requirements: project/program/task-level

Score: 4

Controls are established in the division to address the ES&H evaluation of projects, programs, and activities as defined in both the ANL- and division-level standards. Controls for each site-specific hazard are presented in manual form with document guidelines for preparing necessary documentation of the hazard.

Increased and timely implementation of documentation will close this gap. The division is aware of this gap and is in the process of addressing the issue.

Theme 6

Core Function 4: Perform Work within Controls
Principle 7: Operations Authorization

Score: 5

The Chemistry Division provides formal operations for all site-specific hazards under its control. Division managers authorize new and modified activities with consideration of the availability of the necessary expertise, equipment, and facilities. The acceptability of risk may depend on the available expertise, experience, facilities, regulatory implications, public perception, and other factors.

The principle site-specific hazards in the division and/or building are radiation, radioactive materials, special materials, high-pressure, X-rays, lasers, and a full range of varying degrees of chemical hazards. Division management has instituted and maintains a system of safety committees to address these hazards. The committees consist of experts in the field from within the division as well as personnel from outside the division to provide a broad view of each issue.

Proposals for new initiatives or the continuance of programs in areas of the facility that are not cost effective or balanced with the direction of the division may be measured by an ad hoc committee appointed by the division director.

One such instance can be cited with regard to the closing of the nuclear medicine generator activity in the hot-cell facility of the division. An ad hoc committee was convened to review the need for the activity. Additional reviews and monitoring provided validation to discontinue the activity within the division.

The division works with, and relies on, the expertise of its staff and the various specialty groups within the ES&H Division in assessing the risks associated with various activities and in determining the controls needed to ensure that risks are minimized. The division funds the services of the Health Physics (HP) group, the Laser Safety Officer, the Industrial Hygiene (IH) group, and the Environmental Management Operations (EMO) Division.

Theme 7

Core Function 5: Feedback, and Improvement

7.1 Observations in the workplace

Score: 5

The division performs facility and work-site inspections in conformance with Chapter 1-3 of the ES&H manual. Inspections by management, the ESH Coordinator, and the Safety Inspection Committee consist of formal documented and informal workplace reviews. Inspections are performed on a scheduled basis to include all areas occupied by the division in both building 200 and building 211. These inspections are performed and documented on at least a quarterly basis.

The ES&H Coordinator makes weekly and often daily rounds of the building noting adherence to policy and practices. These inspections include observations of conditions as well as behaviors and practices. Immediate feedback is given to the personnel in the inspected areas.

7.2 Evaluation and analysis of incidents and near misses

Score: 5

Building deficiencies are reported to PFS. PFS is responsible for correcting the deficiencies. Chemistry monitors progress of PFS work. Incidents are discussed at the safety-committee level and action plans are implemented with the authorization of the division director.

7.3 Hazard- and process-specific monitoring and surveillance

Score: 5

Several specific inspections and/or tests are conducted by or for the division on a regular basis. The division conforms to DOE and ANL policies and procedures in the following ways:

- Radiation safety interlock systems are tested semiannually at both the accelerator and the cobalt facility. The results of these checks are maintained in the facility files.

- Sealed radioactive sources are leak-checked as specified in the ANL ES&H Manual, Chapter 5-20. Records of the leak checks are sent to the ANL Sealed Sources Inventory Database Site Coordinator. The division Sealed Source Coordinator maintains copies.

- The HP group as a service to the division performs workplace surveys for radiological contamination. Records of the surveys are sent monthly to the division's ES&H office for information and monitoring.

- All sealed sources are inventoried as directed in the ANL ES&H Manual. Records of the inventories are sent to the ANL Sealed Sources Inventory Database Site Coordinator. The division Sealed Source Coordinator maintains copies.

- Non-radiological safety interlock systems have not been routinely checked on a formal basis in the division. This situation is being corrected. An inventory of such systems will be made and a schedule for testing them created by the end of 1998.

- Laser safety interlock systems are tested regularly by the laser users.

- Laser safety eyewear is tested annually by the laser custodians.

- Laser facilities and their documentation are reviewed annually by the Laser Safety Officer and members of the divisional Laser Safety Committee.

- Eyewash stations are inspected and tested weekly. Eyewash stations are no longer needed at several locations within the division, due to changing uses of the areas. Those stations are no longer being tested, and work requests have been submitted to PFS to remove them. Until they are removed, covers will be placed over the stations, and signs attached noting that the eyewashes are no longer in service.

- Egress routes are checked and documented monthly.

- The status of lock-out/tag-out stations are verified monthly.

- The division requires all portable power tools to be tested annually. The formality of this testing needs to be improved. The division will ensure that all such testing is completed and recorded by the end of 1998.

- All ground-fault interrupters (GFCIs) are tested annually.

- All laboratory hoods are tested annually by the PFS Division. The results of these inspections are posted on the individual hoods.

- In-place HEPA filters are tested annually, as prescribed in the ANL-E ES&H Manual, Chapter 10-14. The PFS Division conducts the tests.

- PFS Division personnel test emergency lighting systems monthly.

- The division completed its triennial assessment for conformance with the ANL Radiological Protection Program in 1998.

- The Laboratory Accelerator Safety Review Committee assesses the accelerator safety programs in the division.

- The division Safety Coordinating Committee assesses the division's process for experiment safety review, and makes recommendations to the division director.

- The division Training Coordinator monitors the training performance regularly. Supervisors are provided with training profiles on a regular basis.

- The division maintains Chemical Hygiene and Quality Assurance plans. However, these plans have not been reviewed during the past year. They will be reviewed and approved by the end of this year

- The division has conducted an aggressive chemical inventory review in the past year, resulting in the disposal or reuse of a large quantity of unused chemicals.

- The division conforms to ANL environmental policies and procedures.

7.4 Dissemination of information

Score: 4

Information is disseminated to division staff by several means. The ES&H coordinator and the building manager update division management on ongoing activities on a weekly basis and as needed on issues that require immediate attention. Updates are provided to group leaders at monthly meetings. Group leaders disseminate information at group meetings and in informal settings.

All new staff are provided a building orientation that outlines general policy and specific safety requirements. Staff members are provided with an updated building facility manual on a periodic basis.

Staff are informed of ongoing and new ES&H matters by memos and electronic mail. Safety matters that require immediate attention are broadcast over the PA system and are posted at all building entranceways.

Safety deficiencies identified by site inspectors are reported to the building manager. Staff also report deficiencies directly to the building manager. The building manager provides this information to the supervisor of the area.

In general, division staff are satisfied with the dissemination of information. Staff has expressed interest in a web-based presentation of ES&H and training information. The division has developed an intranet database to inform division staff of ongoing activities. Currently the database is under testing by the division administrative staff. The database will be opened to all staff after bugs are corrected. The division is aware that long-term success of the web-based database will require expertise of a dedicated web-based programmer.

Training Addendum

Staff training is a critical component of the Integrated Safety Management System. The Chemistry Division continuously monitors three aspects of training: overall training compliance, site-specific or on-the-job training (OJT), and training requirements of non-resident or short-term associates.

Training compliance

Maintaining current compliance with staff training is an on going process. Although the division goal is 100 % training compliance, we typically operate at about 95 – 98% compliance. The TMS representative reminds staff and supervisors of pending training requirements and automatically enrolls the staff member in the required courses. Some staff members miss training or retraining due to schedule conflicts. The TMS representative, and in repeat cases, division management remind the staff member and his or her supervisor of the importance of participation in the training process. The division does not know of any staff member who has failed to comply with training requirements after being reminded. The TMS representative informs the ESH Training Group when the division expects groups of new or returning associates in order to facilitate course availability.

With assistance from APS web programmers, the division is attempting to make training profiles available on our intranet database. This level of information will allow staff members and supervisors to plan for upcoming training. Direct access to training profiles will also minimize the division overhead associated with the TMS representative continuously checking all of the training profiles.

Site-specific and on-the-job training

The division maintains a documentation process for new staff members that verify supervisor interaction on site-specific issues, such as lasers, radiation, organic solvents, and chemical/gases. The new staff member is provided safety and procedure documentation on the specific project that he or she will be undertaking. Copies of the documentation are maintained in the QA office and at the work site.

Division policy states that new staff members are escorted until preliminary training, such as site-wide ES&H orientation and building orientation is completed. The supervisor or his or her designate provide on-the-job training to the new staff members. The supervisor monitors progress and determines the time when the new staff member is able to work independently. Supervisors are reminded of their line management responsibility for the safety of their staff.

Non-resident associates

The division has many non-resident associates who collaborate with the scientific staff but who are infrequently present at Argonne. Prior to the return of the associate, the supervisor advises the TMS representative, so that training scheduling can be arranged. If required training courses are not available during the associate’s stay, the supervisor assumes the active role as escort until training requirements are met.

At the time of appointment renewals for non-resident associates, the division requests justification for continuation of the active status for the associate. If the associate does not perform laboratory work during his or her stay, the division requests that the non-resident associate be classified as an office worker.