Independent Oversight Review of the Argonne National Laboratory Alpha-Gamma Hot Cell Facility Readiness Assessment (Implementation Verification Review Sections)

November 2011

Office of Safety and Emergency Management Evaluations
Office of Enforcement and Oversight
Office of Health, Safety and Security
U.S. Department of Energy

Table of Contents

Acronyms

AGHCF	Alpha-Gamma Hot Cell Facility
ANL	Argonne National Laboratory
ASO	Argonne Site Office
BIO	Basis for Interim Operation
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
ES&H	Environment, Safety, and Health
FPE	Fire Protection Engineer
FR	Facility Representative
HEPA	High Efficiency Particulate Air
HSS	Office of Health, Safety and Security
IVR	Implementation Verification Review
LCO	Limiting Condition for Operation
MSA	Management Self-Assessment
NFPA	National Fire Protection Association
NNSA	National Nuclear Security Administration
NRTL	Nationally Recognized Testing Laboratory
NOD	Nuclear Operations Deactivation Program
OJT	On-the-Job Training
RA	Readiness Assessment
SAC	Specific Administrative Control
SC	Office of Science
SCMS	SCience Management System
SSC	Structures, Systems, and Components
TSR	Technical Safety Requirement
WIPP	Waste Isolation Pilot Project

Independent Oversight Review of the
Argonne National Laboratory
Alpha-Gamma Hot Cell Facility Readiness Assessment
(Implementation Verification Review Sections)

1.0 PURPOSE

This report documents the review of the Alpha-Gamma Hot Cell Facility (AGHCF) readiness assessment (RA) by the Office of Enforcement and Oversight (Independent Oversight), within the Office of Health, Safety and Security (HSS). The review was performed by the HSS Office of Safety and Emergency Management Evaluations. The assessment was conducted within the broader context of an ongoing program of assessments of the execution of implementation verification reviews (IVRs) at U.S. Department of Energy (DOE) sites with hazard category 1, 2, and 3 facilities. The overall objectives of the IVR assessments include verification that contractors and site offices have procedures and processes for scheduling and conducting IVR activities in place and have developed and implemented appropriate methods for performing implementation verifications. The objective of this review was to verify the effectiveness of the contractor's and site office's readiness assessment processes for implementing a new set of safety basis hazard controls at the AGHCF.

2.0 SCOPE

Independent Oversight conducted a tailored review of the RA at the AGHCF focusing on implementation of a new basis for interim operation (BIO) and associated technical safety requirements (TSRs). The AGHCF is located at the Argonne National Laboratory (ANL), which is operated for DOE by UChicago Argonne LLC. The DOE Office of Science (SC) provides oversight of the design and operation of its nuclear facilities at ANL through the Argonne Site Office (ASO).

Independent Oversight activities included shadowing or observing ANL and ASO personnel during the AGHCF RA, reviewing documentation of readiness activities completed by ANL in preparation for the readiness review, and conducting an independent review of the safety basis controls. The scope of the assessment activities included verification that ANL and ASO have:

- Established procedures and processes for scheduling and conducting the readiness assessment
- Developed and implemented appropriate methods for performing readiness reviews and/or implementing verifications
- Effectively verified incorporation of the safety basis controls into implementing procedures and work control documents
- Adequately implemented the facility training and qualification program associated with the revised safety basis controls.

In addition to shadowing activities, Independent Oversight also independently evaluated the implementation of safety basis controls to verify that the implementation and RA processes were effective.

3.0 BACKGROUND

10 CFR 830.201, *Performance of Work*, requires the operating contractors for hazard category 1, 2, and 3 facilities to perform work in accordance with the safety basis, specifically with respect to the hazard

controls that ensure adequate protection of workers, the public, and the environment. In addition, 10 CFR 830, Subpart A, *Quality Assurance Requirements*, establishes requirements for conducting activities that may affect safety at these facilities, including performing work in accordance with the hazard controls, using approved instructions or procedures, conducting tests and inspections of items and processes, and implementing independent assessments to measure the adequacy of work performance.

In February 2008, the Defense Nuclear Facilities Safety Board asked DOE to evaluate the need to conduct "independent validations on a recurring basis" to ensure that facility equipment, procedures, and personnel training related to safety basis controls have not degraded over time. In response, DOE conducted an evaluation, concluding that the existing requirements for implementation of safety controls and DOE policy for oversight of the implementation of nuclear safety requirements were appropriate. The evaluation also concluded that DOE did not explicitly require its facilities to validate safety basis controls, so DOE committed to develop guidance on the validation of safety controls and to add that guidance to DOE standards.

A DOE working group developed a "best practices guide" for the independent validation of safety basis controls. In November 2010, the resulting guidance for performing IVRs was incorporated into DOE Guide 423.1-1A, *Implementation Guide for Use in Developing Technical Safety Requirements*, Appendix D, *Performance of Implementation Verification Reviews (IVRs) of Safety Basis Controls*.

4.0 RESULTS

The scope of the review was translated into six objectives, which are identified and discussed below.

Objective 1: Processes have been established to provide assurance that safety basis hazard controls are maintained and that hazard control changes are correctly implemented.

Under this objective, Independent Oversight reviewed the SC and ANL processes for implementing changes in the facility safety basis hazard controls to verify that an IVR or similar process (graded to the evaluated significance of the changes) is conducted. Independent Oversight also examined whether the processes and procedures include an appropriate level of planning and formality and whether SC oversight processes provide information to confirm the efficacy of contractor processes.

Within SC, the implementation of new or revised safety basis hazard controls is governed by the RA process established in the SCience Management System (SCMS). Under the Facility Safety Authorization subject area, three procedures provide an adequate foundation for the SC program. The first, Procedure 5, *Verifying Readiness for Startup and Restart of Nuclear Facilities*, defines startup to include the initiation of new controls in the safety basis and requires that startups involving controls that were not previously credited in the safety basis be evaluated for implementation of an RA. Procedure 6, *Evaluating and Approving Startup Notification Reports*, requires an evaluation of changes to the facility, activities, or processes to determine whether an RA is required. Factors to be included in this evaluation include previous implementation of an IVR per DOE Guide 423.1-1, *Implementation Guide for Use in Developing Technical Safety Requirements*; new active safety significant controls or new SACs; and new safety management programs. The third procedure, Procedure 7, *Evaluating and Conducting Readiness Assessments*, provides requirements for both the contractor and SC staff for implementing the RA process.

The SC process for conducting RAs is, for the most part, adequately delineated in some detail in Procedure 7, which includes instructions for the conduct of RAs led by either contractor or DOE personnel. For a contractor-led RA, such as that at AGHCF, the instructions provide for DOE oversight

of the RA to ensure that it includes, for example, an appropriately graded plan of action. DOE oversight should also ensure that the plan of action includes assignment of a qualified team leader and team members, justification for exclusion of any core requirements in DOE Order 425.1D, appropriate scope for the facility conditions, and adequate prerequisites for starting the RA. The procedure also requires that the contractor RA team develop an implementation plan to document the review approaches and evaluation criteria. Site office oversight of the process is documented by review (and sometimes approval) of the plan of action and implementation plan. The procedure also contains requirements for oversight to ensure the adequacy of the contractor RA, though it does not require a written plan for conducting the oversight or documenting the oversight activities.

ANL Nuclear Operations Deactivation Program (NOD) procedure NOD-QA-903, *Startup and Restart of Nuclear Facilities*, provides appropriate instructions for the processes ANL uses to start new activities or restart existing activities within a nuclear facility. It includes methods for screening activities to determine whether a readiness review is required and for executing those readiness reviews that are needed. Roles and responsibilities for the process are clearly delineated. Screening involves completion of a detailed evaluation form that elicits answers to a series of questions, including a basis for the recorded response, that lead to the determination of whether an operational readiness review or RA is required. This form includes questions regarding the implementation of DOE-approved TSR changes and the SCMS screening factors, all of which lead to performance of an RA.

The ANL startup and restart procedure also provides sufficient detailed instructions for planning and conducting the RA, including instructions and guidance for developing a plan of action and implementation plan. The plan of action identifies the scope and depth of the review, which is graded to correspond to the level of risk associated with the activity being evaluated. The RA team then develops the implementation plan to define the review activities in sufficient detail to ensure that both the breadth and depth of the review satisfy the plan of action. Preparation activities at the facility include completing a management self-assessment (MSA) before issuing a "readiness to proceed" memorandum. By procedure, once the facility is ready, the RA team conducts the assessment following the procedural instructions and the approach documented in the implementation plan. Individual assessment activities are documented on an appraisal record form, and any identified deficiencies are recorded on a deficiency record form. Issues are identified as findings or observations; findings are further categorized as either pre-start or post-start.

Objective 2: The contractor and site office have developed and implemented appropriate methods for performing IVRs or similar reviews.

Independent Oversight reviewed the ANL and ASO verification methods used to evaluate the implementation of hazard controls related to the new BIO and TSRs at AGHCF, as executed through the RA process. Independent Oversight examined the implementation plan and criteria review and approaches used to conduct the assessment and observed the performance of the RA. The RA team's final report has been issued, and it documents the team's findings and observations.

ANL appropriately determined that an RA was required to evaluate its readiness to implement the safety basis hazard controls identified in revision 2 to the BIO and revision 3a to the TSRs. Following the procedures discussed above, the facility prepared and executed a *Readiness Assessment Plan for the Alpha Gamma Hot Cell Facility Documented Safety Analysis and Technical Safety Requirements Documents Implementation* (NOD-303-00-01). The plan of action appropriately outlines the scope and breadth of the RA, proposes the team leader, establishes the prerequisites, and designates the approval authority. The plan identifies the new limiting conditions for operation (LCOs) and SACs that are within the scope of the review and discusses the approach to reviewing the safety management programs, recognizing that the facility is currently operational. The plan provides a detailed discussion of the

breadth of the RA, addressing which core requirements will be included and explaining the scope of the review or justifying the omission of any core requirements. The plan of action also provides tables listing implementing procedures for each of the TSR surveillance requirements (core requirement 8), modifications to the facility to implement the new safety basis (core requirement 9), and operating procedures to implement the safety basis (core requirement 10). The plan of action was reviewed by ASO.

Following the ANL process, the RA team prepared, and the team leader approved, an RA implementation plan. The plan follows the plan of action in identifying the scope and breadth of the RA, including the core requirements to be reviewed. The scope of the RA implementation plan included the following functional areas: safety basis, training and personnel readiness, conduct of operations, fire protection, radiological protection, and maintenance. The implementation plan describes the depth of the assessment, with detailed discussions of each objective (cross-referenced to the core requirements) and the underlying criteria and approaches for evaluating the six functional areas. The approaches include document reviews, interviews, and performance demonstrations. Overall, the criteria review and approaches are adequate to complete the intended evaluation, although identifying the performance demonstrations in the safety basis functional area could have improved planning of the activities during the review week. The implementation plan also includes the assessment forms and deficiency forms that the team used to document its review. The results of the review were published in a final report.

The RA team, consisting of six subject matter experts and a team leader, conducted the RA during the week of August 15, 2011. The schedule included an in-brief, facility tour, evolutions, interviews, and document reviews. Initially, the scheduled evolutions included performance of the facility daily rounds, checks of the continuous air monitors (daily, weekly, and monthly), a three-part demonstration of fuel examination waste packaging, and a tabletop discussion (covering upset conditions). Following review of the procedure and record files, the RA team expanded the scope of the evolutions to include additional activities, such as the monthly suppression system water supply isolation valve lineup, criticality liquid moderator limits verification, oxygen analyzer calibration and testing, and calibration of the gamma area detectors. The RA team members also interviewed the AGHCF managers and operators and reviewed documentation (proof files), which included completed procedures, data sheets for completed surveillance tests, and training files.

After completing the review activities, the RA team conducted a formal outbrief on Tuesday August 23, 2011. During the out-brief, the team indicated that the assessment resulted in the identification of 3 findings and 23 observations. The three findings, all pre-start, identified shortcomings in explicitly implementing the restriction on the addition of new material to the facility, establishing a formal process for changing the designation of the clean transfer area during operations, and demonstrating proficiency in performing surveillance procedures.

The AGHCF RA was the sixth RA conducted by the Nuclear Operations Deactivation Program (NOD). For this RA, ASO provided comments on the core contractor readiness documents, including the RA plan of action, implementation plan, and startup plan. ASO also provided knowledgeable and qualified nuclear Facility Representatives (FRs) to oversee the performance of both the MSA and the RA. The ASO FRs observed nearly all the activities and interviews conducted during the AGHCF RA. The ASO procedure does not require a plan for FR oversight, and the FRs did not develop one. During interviews, the FRs stated that the AGHCF has an experienced staff; has been given the necessary resources to meet the implementation requirements of a nuclear facility; and has good conduct-of-operations implementation, written procedures, safety basis, and training. They also stated that the implementation of the TSRs at AGHCF is good and that the RA team performed an adequate review to verify implementation of the TSRs. The FRs did not identify any gaps or weak areas in the implementation of the AGHCF TSRs and/or areas missed by the AGHCF RA team. The FRs noted that the RA was broader

than just verifying BIO TSR implementation and that, in their opinion, this extra RA scope was not needed. The FRs were not required to, and did not, formally document the results of their review of the RA. (See opportunity for improvement **L3-1**.)

Objective 3: Contractor IVRs or similar reviews and site office oversight activities are sufficient to verify that safety basis hazard controls have been effectively incorporated into implementing administrative and operating procedures and work control documents.

For this objective, Independent Oversight reviewed the facility's operating procedures to determine whether they adequately implement the hazard controls and maintain operation of the facility within the established safety basis. An administrative process for scheduling and performing required surveillance tests and inspections was verified to be in place. Facility processes to evaluate test and inspection results and take appropriate actions when necessary were also reviewed. Operating procedures that contain safety basis hazard controls were reviewed to verify that they adequately implement hazard controls, and operating evolutions were observed to verify that the procedures can be executed as written.

The facility has a documented TSR implementation matrix to verify that all surveillances are incorporated into operating procedures. Procedures have been formally reviewed and approved by the facility manager. In most cases, the facility has completed major revisions of the operating and surveillance procedures. The procedures for the TSR surveillances were mostly adequately written (see further discussion below), and in most procedures the acceptance criteria were clearly presented.

A number of TSR surveillances and safety significant equipment operability checks are fulfilled via the procedure for "round tours of the AGHCF" and the accompanying Daily Round Log Sheet. The Daily Round Log Sheet was revised recently to address comments from the MSA and include additional documentation, such as verifying the operation of each high gamma detector, the condition of each shielding window, and the ventilation exhaust system differential pressures (identified by the complete gauge identification number).

Although the revised log sheet is better than the previous version, two weaknesses were identified during the review. First, the daily round log sheet has an annotation that states "[SR] identifies a check that satisfies a Surveillance Requirement specified in the Technical Safety Requirements;" however, the Daily Round Log Sheet (NOD-AGHCF-SR-100) also annotates review criteria (typically more conservative to trigger early action) with an "[SR]." For example, the Daily Round Log Sheet entry for the liquid nitrogen level is listed as "Tank 3, main tank, greater than or equal to 150 in. WC [SR]." This is actually a review criterion (reorder level) from which the facility manager takes action, not an acceptance criterion related to the TSR; the TSR specifies a 2-day supply of liquid nitrogen that is calculated (NOD-2010-026) to correspond to a level greater than 50 inches water column. The review criterion at a tank level of 150 inches water column provides 7 days of abnormal high usage and thus allows a reasonable time to take action before entry into the LCO, but it may be confused with a TSR requirement because of the "[SR]" notation. (See opportunity for improvement **L3-2**.)

The second weakness noted in the Daily Round Log Sheet is that it was not reviewed by a second person, such as the chief technician, following the opening rounds; a second check was not completed until the closing rounds had been conducted and recorded. The facility relies on the technician to identify a nonconformance or adverse trend and promptly notify the chief technician or facility manager, but this practice has the potential weakness that if a nonconforming condition is overlooked in the opening rounds, it could remain undetected while operations continue until the end of the day. (See opportunity for improvement **L3-3**.)

AGHCF has a defined process for scheduling and implementing surveillance tests. Surveillance procedures are approved by the facility manager prior to use. Surveillances are scheduled via computer and authorized at the Plan of the Day meeting, as described in the AGHCF Conduct of Operations Manual. During interviews, personnel demonstrated adequate knowledge of the work and authorization processes associated with scheduling surveillance tests and performing operations.

Operations and surveillance procedures are clearly written and appropriately direct the technician to take action, including prompt notification of managers, when acceptance criteria are not met. In addition, all surveillance procedures require that the completed data sheet be reviewed by the facility manager before the procedure is considered complete. The procedures assign additional follow-up actions to the facility manager for any unmet acceptance criteria or abnormal readings observed during surveillances. In many cases, the acceptance criteria are written on the data sheets, but they are often not adjacent to the spot where the reading is recorded; as a result, technicians and reviewers need to refer to the procedure to compare the results to the acceptance criteria.

When a technician or facility reviewer identifies a condition outside of the TSR acceptance criteria, the facility manager is notified and reviews the LCO required actions, which are not listed in the procedures. However, the facility has developed a matrix that readily links the TSR surveillance, frequency, implementing procedure, and applicable LCO. This is an acceptable approach, and no discrepancies were noted between the TSR and the implementing procedures.

Along with the RA team, Independent Oversight observed the Plan of the Day and the Plan of the Week meetings conducted by facility management. The Plan of the Day meeting was well-directed by the Operations Superintendent and addressed the operating mode, inoperable system(s), listed project work, work plans, and scheduled training. All ANL nuclear facility managers participated in the Plan of the Week meeting. Each meeting commences with a brief discussion of a safety-related topic (called a Safety Share), which is rotated among the managers. Details of the progress of the current week and tasks that are scheduled for the next week are reviewed. Topics of discussion included errors discovered during a recent audit of radiation work permits and a lesson learned from the AGHCF RA.

During the Plan of the Week meeting, the AGHCF facility manager described an abnormal valve lineup that was identified during the facility tour conducted with the RA team; a normally closed valve on the exhaust system was discovered in the open position. Although the valve did not affect system operability, the observation demonstrated a process weakness and led to an investigation. One of the corrective actions completed soon after the discovery was to perform the AGHCF valve/switch lineup verification for the main hot cell exhaust system. During the lineup, another valve, which was required to be shut, was found to be open and was corrected. The fact-finding report determined that the procedure for testing the high efficiency particulate air (HEPA) filter did not identify steps to restore the system after the test in May 2011. The facility manager stated that the facility is evaluating the establishment of an annual valve lineup checklist (see further discussion of independent verification under Objective 4).

The RA team and Independent Oversight observed performance of a portion of the operating procedures regarding fuel examination waste packaging. This ongoing operation had been performed over the past several months in accordance with the current safety basis. A pre-job brief for the RA team was conducted as part of the observed evolutions. There was good communication and interaction between the load manager (job supervisor) and the workers. Actions to be taken in case of an alarm or notification to evacuate were discussed before the task began. The briefing also addressed what could go wrong, such as the discovery of fines and determination of when fines are acceptable in the packaging.

To follow the fuel examination waste packaging procedure, the load manager must exit the primary control procedure, enter other procedures, and then return to the main procedure. It was clear that the

load manager did not review all the prerequisites for these subordinate procedures prior to entry. Facility personnel stated that they are very familiar with the procedures and the prerequisites that apply to the actions associated with that procedure. Relying solely on individuals' knowledge reduces the assurance that all prerequisites are verified prior to entry into a procedure. In the instances observed, the work steps were adequately conducted in accordance with the procedure.

The operating mode and equipment status for the AGHCF, signed and dated by the facility manager, was posted across from the first floor south entrance to the facility as described in the facility's Conduct of Operations Manual. At the time of the review, the backup power system, which is not considered safety significant under the new BIO and TSRs, was inoperable. During walkthroughs and discussions, operations personnel demonstrated they were aware of the backup power system status.

Independent Oversight reviewed selected administrative controls to verify their implementation. The TSR requirement for use of an "approved container" (which is identified as a design feature for the facility) specifies that transuranic waste containers must be fitted with a vent that meets the Waste Isolation Pilot Plant (WIPP) acceptance criteria. NOD-AGHCF-OPS-303, *30-Gallon Remote Handled Transuranic Waste Drum Assembly*, appropriately contains the initial inspection, installation controls, and final inspection as required by the WIPP acceptance criteria. Manufacturer's instructions for installation of the container filter are incorporated in the procedure. The correct torque value (120 inch-pounds) from the vendor's installation instructions is also incorporated in the procedure; however, the torque tolerance of ±24 inch-pounds was not included in the procedure. A sample of waste container filter installation forms was reviewed, and in each case a torque value of was recorded within tolerance as 120 inch-pounds.

In the TSR Administrative Controls, Section 5.6.2.12 identifies "ignition control for controlling ignition sources inside the AGHCF" as a key element in the institutional safety provisions. For new equipment, the facility follows the applicable section of the ANL Environment, Safety, & Health (ES&H) Manual (Section 9.3, Electrical Systems and Equipment) regarding electrical equipment inspections and Section 11.4 (Open Flame and Portable Spark-Producing Operations) regarding control of hot work. Before any work is performed in the AGHCF, the facility prepares a work control document that describes the scope of the work, identifies and evaluates the hazards, and establishes controls. The preparer collaborates with the appropriate subject matter experts to perform the job hazard analysis and is supported by a subject matter expert who reviews the work for proper hazard controls.

Two pieces of non-Nationally Recognized Testing Laboratory (NRTL) duplex-junction box extension cord equipment were observed in Area 1 and Area 3 of the AGHCF. These have been used in the hot cell for many years, since before the non-NRTL program was established. The cognizant electrical system engineer (a division electrical equipment inspector) performed a limited inspection and partially completed the Non-NRTL/Modified NRTL Listed Electrical Equipment form (ANL-678C), but no approval sticker was applied to the equipment. The electrical engineer concluded that from an electrical safety standpoint, the temporary power tap equipment within the cell is acceptable for continued use and that equipment installed inside the hot cell may need to be considered exempt due to the extraordinary radiological conditions. The evaluation also concluded that if the hazards associated with continued use of this equipment are much greater than the extraordinary radiological hazards, additional inspections should be planned.

During the review, Independent Oversight noted that a panel was not labeled in accordance with ANL Environment, Safety, & Health (ES&H) Manual Chapter 9 Electrical Safety Program, Section 9.1 General Electrical Safety: FMS must affix arc flash hazard labels at switchboards, disconnects, panelboards, industrial control panels, meter socket enclosures, and motor control centers indicating the calculated hazard level and appropriate PPE to be worn when conducting energized electrical work associated with

the equipment. One 208/120V panelboard did not have the NFPA label that lists the personal protective equipment requirements for operating breakers inside the cabinet. Facility personnel said that this cabinet had been missed when labels were applied, and two adjacent 110V cabinets did have NFPA labels. There are higher voltage (480V) disconnect switches within the AGHCF, one of them next to the F-110 entrance, that also lack a posting for required protective equipment. The division electrical subject matter expert described ANL's work process for identifying the proper electrical protection equipment for operating electrical switches and disconnects for which arc flash calculations have not been performed and the labeling on the device posted. As required by the facility procedures, unlabeled panels require a work package to be developed prior to performing work. However, ANL's written instructions for the process did not ensure complete labeling. (See opportunity for improvement **L3-4**.)

Objective 4: Contractor IVR or similar processes and site office oversight activities are sufficient to verify that safety SSCs and design features are installed, inspected, and maintained as described in the safety basis documentation.

Independent Oversight reviewed the physical changes associated with the safety basis change to verify operability in accordance with the design basis. Safety basis (TSR) defined surveillance tests and inspections necessary to ensure continued operability of the safety SSCs and design features were assessed to determine whether they are executable, adequately performed, and appropriately documented. The review included verification that acceptance criteria are consistent with the safety basis and are adequately documented in approved instructions. Independent Oversight also verified that contractor procedures and processes ensure that surveillance test and inspection results are appropriately evaluated and that corrective actions are identified, as necessary, and completed in a timely manner.

AGHCF modifications to support implementation of the revised TSRs include upgrades of the facility's fire barriers (to meet the two-hour fire barrier rating), installation of some new pressure and differential pressure gauges, relocation of two smoke detectors (to correct deficiencies identified in the fire hazards analysis), and installation of anchoring for some equipment (to address the natural phenomena hazards evaluation). Independent Oversight reviewed a sample of the completed work control documents.

The fire upgrade project was well-organized, and work processes were adequate to ensure that each penetration was inspected and sealed as necessary. The accompanying drawings provide sufficient detail for the installers to apply the appropriate seal, and stickers placed next to the penetration provide proof that the work was completed to specification. All installers were appropriately qualified. Relocation of the smoke detectors was also appropriately controlled, as evidenced by the monitoring of the panel during work and completion of fire patrols while the detectors were inoperable. The completed work control package contains evidence of an adequate post-modification test, and the facility completed a minor readiness assessment to assure that the project was completed correctly. Modifications to install anchor bolts were also well documented; these work packages do not indicate the torque applied to the bolts during installation, but the responsible engineer worked closely with the mechanics and provided evidence that the bolts were installed to specification. Overall, the team found that facility processes were adequate to demonstrate operability after the modifications, although adding appropriate quality control hold points would improve the work control documents involving safety significant systems and components.

Independent Oversight observed the evolutions conducted by the RA team and conducted walkthroughs of a few additional surveillance procedures to verify that surveillance, test, and inspection procedures for active safety systems are readily executable and were adequately performed and documented. Team members also reviewed the implementing procedures and documentation of the completed surveillances. The sample included surveillance procedures for most of the safety significant systems in the facility, including continuous air monitors, the high-gamma alarm system, fire protection systems, exhaust

ventilation, and the nitrogen inerting system.

The AGHCF has developed and implemented surveillance procedures to address the tests specified in the TSRs. Each of the procedures has been revised or rewritten to implement the new requirements. The revised procedures provide evidence of the significant changes and improvements that were made to implement the new TSRs. The surveillance procedures provide a mostly solid foundation for executing the surveillance tests, are written clearly, and provide a uniform layout and approach that supports repeatable execution. These procedures include standard sections that identify responsibilities, acceptance criteria, precautions and limitations, prerequisites, and work process steps, which are well written and provide a step-by-step approach for a trained individual to follow.

AGHCF personnel document the completion of surveillance tests by recording the data and subsequent review processes on data sheets that in most cases (except for standard calibration data sheets) directly support the surveillance test. In general, the data sheets record important steps in the procedure (noting the step and action) and document either the observed data or whether the observed condition was acceptable or unacceptable. Important steps are initialed by the worker completing the action, and the completed data sheets are signed by the workers performing the tasks. In some cases, the data sheets receive an additional technical review. All completed data sheets are reviewed and accepted by the facility manager (or his designee).

At the time of the RA, most of the surveillance procedures had been completed satisfactorily. Two procedures were scheduled for performance immediately upon facility startup for the new TSRs, and one procedure (for inspection of sprinkler heads) would not be needed until a sprinkler head required replacement. Both of the procedures scheduled for performance during startup were demonstrated by walkthrough during the RA.

Observation of the evolutions, walkthroughs conducted during and after the RA, and review of the documentation provided by the facility provided evidence that the surveillance, test, and inspection procedures are (for the most part) executable, have been adequately performed and documented, and demonstrate operability per the TSRs.

However, a number of weaknesses in the technical content of the procedures affect their ability to provide evidence of continuing operability of the safety significant systems. The following are some additional examples from Independent Oversight, beyond those reported by the RA team that support a separate finding from Independent Oversight: (See finding **L2-1**.)

- The functional test of the intelligent continuous air monitors omits testing of the fault conditions, establishes a 4-minute time limit for a level 3 alarm (high alpha) that should alarm within 15 seconds, and tests only the level 1 alarm for the beta channels (which is not addressed in the facility's abnormal operating procedure).
- The monthly functional test of the high-gamma alarms does not distinguish between the safety related alarm functions and the time-delay relays used to activate the general facility and fire department alarms.
- The oxygen monitoring calibration and test procedure may not be sufficient to ensure that operators will be warned of a low flow condition affecting the operability of a monitor.
- The quarterly fire suppression system main drain test records the static and residual riser pressures but does not record the time to return to static pressure after closing the main drain valve, as recommended in the Annex of NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, 2008 Edition, Section A.13.2.5, for trending to identify potential flow blockages.
- The procedure for semi-annual check of the Area 1, 3, and 6 differential pressure gauges does not

incorporate the correct sequence for adjusting zero and span, if required.
- The monthly standby exhaust fan test does not indicate the acceptance criteria for the static duct pressure necessary to ensure system operability (on the standby fan).
- The capacity test for the fire detection and alarm batteries does not specifically address a measurement method that ensures the batteries interconnections are tested to verify their conductance is acceptable.

In addition to the above, the RA team observed that (due to the installation of backflow preventers in the system inlets to the building) there is no way to reliably validate fire suppression system riser pressure during the three-month periods between the quarterly main drain tests. Independent Oversight noted that this limitation is not clearly described in the BIO or addressed in the TSRs and that additional methods may be necessary, to verify operability of the fire suppression system more frequently. Also, although AGHCF has implemented a monthly fire suppression valve lineup (with independent verification), the procedure does not include verification of the positions of the post indicating valves located on the main building feeds directly outside the buildings. In addition, AGHCF does not have a memorandum of understanding with the owners of the water supply and fire systems to facilitate communications regarding the operating status of these systems. For example, AGHCF may not be notified when the post indicating valves operate (to initiate performance of a main drain test following valve operation) or informed of the status of the water supply system when it is out of normal operation. (See finding **L2-1**.)

AGHCF has also developed implementing procedures to verify the continued ability of its design features to meet their intended functions. The facility credits the hot cell structure, facility boundary, and fire barrier penetrations as design features and has prepared a procedure for annual detailed inspections of these structures. The procedure is detailed enough to support the review, includes appropriate acceptance criteria, and provides for a high level of documentation of the results.

Independent Oversight noted three opportunities to improve the AGHCF surveillance procedures. First, some procedures do not include independent verification in the recovery steps of the procedure. For example, the monthly standby exhaust fan test does not independently verify that the fan control switch is returned to the AUTO position after the test. Similarly, the oxygen monitor calibration and test procedure does not verify valve positions and sample flow after the test, and the differential pressure sensor zero and span procedure does not verify that the test valves are repositioned to normal. (See also the discussion of the investigation of valve mispositioning under Objective 3 above.) (See opportunity for improvement **L3-5**.)

Second, although some procedures contain warnings that the facility must enter an LCO for operation prior to executing a step, other procedures (such as the differential pressure sensor zero and span procedure and the oxygen monitor calibration procedure) that may render a system inoperable do not contain a similar warning or action to ensure continued operability when instruments are removed from service while executing the procedure. In addition, even though the surveillance procedures clearly state the acceptance criteria (most of which are conservatively set) and the actions for the facility manager to take when the criteria are not met, they do not contain explicit instructions to evaluate system operability and/or enter the LCO Action Statement when an acceptance criterion is not met during a surveillance. (See opportunity for improvement **L3-6**.)

Finally, when the fire protection engineer (FPE) performed a portion of the AGHCF fire suppression system visual inspection for the RA team, the FPE was unsure of the scope of the inspection (that is, whether to inspect the sprinkler heads in the basement) and contacted the facility manager for clarification. The facility manager informed the FPE that the inspection was limited to the AGHCF systems; however, this information was contrary to Step 2 of the procedure, which states "inspect, from floor level, all sprinkler equipment and piping located in the rooms listed in NOD-AGHCF-DS-237."

Notwithstanding the ambiguity in instructions, the FPE inspected all equipment in the room. (See opportunity for improvement **L3-7**.)

Objective 5: Contractor IVR or similar processes and site office oversight activities are sufficient to verify that SACs are implemented and adequately meet the functional requirements and expectations of the safety basis.

Independent Oversight verified that SAC implementing procedures have been prepared, reviewed, and approved to implement the functional requirements identified in the safety basis. The review team examined these procedures to determine whether they demonstrate that the SACs can accomplish their safety functions and continue to meet applicable SAC requirements and performance criteria. Independent Oversight also observed performance of one of the SAC implementing procedures during the RA.

Surveillance procedures for verifying compliance with the SACs, including radioactive material inventory, fissile material inventory control, and liquid moderator inventory control, have been developed and approved. As discussed below, some potential improvements in the performance of the liquid moderator inventory procedure were identified.

Both the RA team and Independent Oversight observed the performance of NOD-AGHCF-SR-120, *Criticality Liquid Moderator Verification*. Per new TSR 4.7.1.1, this surveillance, which verifies that the inventory of hydrogenous liquids in the hot cells is within limits, will be required monthly. The TSR moderator limits of 3 liters in Area 1 and 3 liters in Area 3 are based on the current nuclear criticality safety evaluation. Before performing the procedure for the RA team, the technician reviewed the prerequisites and proceeded to Area 1. The technician recorded the amount of liquid moderator from the posted data sheet, noted the polyethylene bottles with liquid at work station 1 and estimated the liquid volume, inspected the other Area 1 windows, found no additional liquids, and correctly concluded that the acceptance criterion for Area 1 was met. In Area 3, the technician recorded the volume from the posted data sheet and inspected all the windows in the area. However, the technician was unable to find the bottle(s) listed on the inventory and assumed that the bottle(s) with the posted volume of liquid were still in Area 3. No additional bottles containing liquid were found, and the technician concluded that the acceptance criterion was met. The technician did not make a notation that the expected bottles of liquid were not observed in Area 3. Without the notation, the reviewing facility manager was not informed that the liquid on the current posted data sheet was not observed. The facility manager signed the surveillance as showing that the acceptance criteria were met. The technician's inability to locate the bottles listed on the running inventory or to note that the expected condition was not observed is not in accordance with good operating practices. (See opportunity for improvement **L3-7**.)

Also, the steps of the surveillance procedure do not ensure that the technician will fulfill the TSR requirement. The procedure directs the technician to "inspect the Area 3 through the windows, checking for the presence of hydrogenous liquids not listed on the NOD-AGHCF-DS-049." In performing this surveillance for the RA team, the technician recorded the expected volume as required by the procedural steps, but did not find the expected volume in the hot cell. Since the technician did not find the expected (posted) liquid volume, the total amount of liquid moderator in Area 3 was not verified and the TSR surveillance requirement was not satisfied. **(**See finding **L2-1)**

The radioactive material inventory and fissionable material inventory procedure correctly lists the TSR limits. During the RA team's observation of fuel examination waste packaging, the facility manager, fissile material handler, and material balance area custodian performed the procedure correctly and demonstrated good communication protocols. In all areas, the radioactive material inventory recorded on the data sheets was determined to be within the TSR values. Follow-up questioning revealed that facility

personnel are knowledgeable of which Area 2 storage hole locations on the data sheet are the 4-inch and the 6-inch holes; however, the data sheet does not clearly delineate the locations. (See opportunity for improvement **L3-8**.)

Objective 6: Contractor IVR or similar processes and site office oversight activities are sufficient to verify that the training and qualification program ensures that personnel working at the facility are adequately prepared to implement and maintain the safety basis hazard controls.

Independent Oversight verified that training has been performed and documented in accordance with the latest revision of the facility safety basis and the implementing work instructions. Training documents and records were reviewed to determine the adequacy of the training to prepare personnel to perform their assigned tasks.

Contractor personnel working at the facility are adequately trained and qualified to implement and maintain the safety basis hazard controls, and site office personnel are sufficiently trained and knowledgeable to provide oversight of safety basis hazard control implementation. A formal training and qualification program has been established, documented, and implemented for ANL personnel conducting a range of implementing tasks for safety basis hazard controls at the facility. An institutional program at AGHCF clearly defines the NOD training and qualification program. It is established in documents, including the *Nuclear Operations Deactivation Program Training Program Manual and Training Implementation Matrix*, NOD-MAN-300, and NOD Policy and Procedures Manual NOD-QA-201, *Qualification Standard*.

Independent Oversight reviewed the completed qualification cards for the AGHCF core team and found that the AGHCF facility manager had established and assigned the appropriate qualifications to himself and the staff members. Training and qualification tasks were complete, and the needed personnel qualifications to support AGHCF were clearly documented in supporting qualification cards, as required by NOD procedures. The qualified positions included, for example, the AGHCF fissionable material handlers and supervisors, facility manager, assistant facility manager, project operations manager, project operations supervisor, operators/technicians, and safety basis analyst.

During interviews and field activities conducted during the RA, AGHCF core team members demonstrated that they had retained and understood the information presented in the various training courses and were directly applying the acquired knowledge and skills in the performance of their assigned tasks. The activities included performing surveillance procedures while being closely observed by the RA team and Independent Oversight. Interviews with the core team that showed they were technically knowledgeable of the details of the various safety systems and were confident in the correctness of their responses. In general, the core team demonstrated a solid understanding of the requirements of nuclear safety and principles of conduct of operations and exhibited this knowledge during performance of assigned tasks in the AGHCF.

The AGHCF training and qualification program is based on an appropriate level of analysis for each position responsible for a safety basis hazard control-related activity or task. The AGHCF facility manager, staff members, and training coordinator reviewed the changes shown in the AGHCF BIO and determined the needed training and qualification tasks. Training goals were formalized and approved in the AGHCF BIO Implementation Training Matrix and a training plan for BIO Implementation (NOD-307-00-00). These training documents identify the training needs for the revised emergency, maintenance, and operations procedures; surveillances tests; safety basis training; and on-the-job training (OJT) for a subset of procedures. For example, OJT training needs were identified for procedures and tasks associated with normal operations, response to abnormal conditions or emergencies, and surveillance tests. Independent Oversight found that the AGHCF BIO Implementation Training Matrix

was appropriate to address the AGHCF training needs and support implementation of the AGHCF BIO.

As discussed above, the AGHCF facility manager also established and assigned appropriate personnel qualification requirements to support nuclear operations at the AGHCF, which the facility manager and staff members completed. Independent Oversight found that the AGHCF had established an adequate training plan for BIO implementation (NOD-307-00-00), and specifically that it adequately determined the training needs for the AGHCF core team of personnel to obtain the knowledge and skills required to support tasks associated with the implementation of the AGHCF BIO, TSR, safety evaluation report, and other supporting documents. The resulting training program included safety basis training, training on new and revised procedures, OJT, tabletop exercises, and dry runs.

AGHCF training and practical exercises were appropriately scheduled and conducted, with consideration of the difficulty, importance, and frequency of performance of tasks related to safety basis hazard controls. The AGHCF staff followed the detailed training goals defined in the AGHCF BIO Implementation Training Matrix and accomplished the training on a timely basis to support an MSA and Laboratory RA. Independent Oversight found that appropriate OJT was performed to support the training needs. For example, OJT was conducted on procedures NOD-AGHCF-SR-100, *Round Tours of the AGHCF*; NOD-AGJCF-EMER-203, *Emergency Response for Loss of AGHCF Ventilation*; NOD-AGHCF-SR-117, *AGHCF Fire Suppression System Water Supply Isolation Valve*; NOD-AGHCF-SR-118, *Verification of Maximum Pressure Drop Across HEPAs*; and NOD-AGHCF-SR-120, *AGHCF Criticality Liquid Moderator Limits Verification*.

AGHCF training focused directly on the latest revision of the AGHCF safety basis and its implementing work instructions, as defined in the AGHCF BIO and TSRs. Independent Oversight found that completed records for this training adequately demonstrated that the needed training was performed as required.

Site office personnel providing oversight of the implementation of safety basis hazards controls have appropriate training and qualification and are sufficiently knowledgeable of the current safety basis of the facility and the hazard controls to be implemented. The ASO assigned two qualified FRs to provide oversight of the contractor RA. One of those FRs is the primary FR for the AGHCF, has been assigned to this facility for several years, and was directly involved in the safety basis review for the AGHCF. Independent Oversight found the primary FR for the AGHCF to be appropriately qualified and knowledgeable of the facility to perform a review of the implementation of safety basis hazard controls. The ASO FRs observed several activities and interviews during the AGHCF RA.

5.0 CONCLUSIONS

On the whole, the RA team adequately verified that the hazard controls required by the new AGHCF BIO and revised TSRs can be effectively implemented, and the RA team clearly identified deficiencies requiring correction. The AGHCF RA was conducted by a qualified team and performed with sufficient rigor and technical inquisitiveness. The RA team executed the implementation plan and observed a sufficient number of evolutions as part of their assessment. Further, ASO and ANL have appropriate procedures in place to identify the need for and to conduct RAs to verify implementation of new or revised safety basis hazard controls. These procedures were adequately demonstrated in planning and conducting the AGHCF RA.

The AGHCF was well prepared to implement the new TSRs, as evidenced by the significant effort to implement appropriate facility modifications, write or revise operating and surveillance procedures, and train the staff. Nonetheless, Independent Oversight identified some additional specific weaknesses in the procedures that should be addressed. Overall, ANL demonstrated a solid approach to developing and

implementing the new safety basis hazard controls and should be ready to implement the new TSRs upon completion of the corrective actions for the RA team's pre-start findings.

6.0 FINDINGS AND OPPORTUNITIES FOR IMPROVEMENT

During the review, Independent Oversight identified several issues, most of them representing opportunities for improvement. These issues are characterized in accordance with the SCMS procedure for issues management and are annotated in the report by level and number (for example, L2-1). The SCMS issues management process identifies a Level 2 Finding as an "issue that represents a nonconformance and/or deviation with implementation of a requirement" and a Level 3 Finding as an "issue where it is recognized that improvements can be gained in process, performance, or efficiency already established for meeting a requirement." Level 3 Findings closely approximate opportunities for improvement, which according to Independent Oversight protocols "are suggestions offered by the Independent Oversight appraisal team that may assist line management in identifying options and potential solutions to various issues identified during the conduct of the appraisal." The finding and opportunities for improvement are summarized below and are provided to ASO for evaluation and follow-up in accordance with SC procedures and processes.

Independent Oversight identified one Level 2 finding that encompasses a number of technical issues in the AGHCF surveillance procedures. The identified technical issues may assist the facility in evaluating corrective actions for the finding.

L2-1: Some AGHCF surveillance procedures action steps were absent, lacked clarity and/or were technically inaccurate.

During the review, Independent Oversight also identified a number of opportunities for improvement in the implementation of the safety basis controls. As with Level 3 Findings, opportunities for improvement are not mandatory and do not require formal resolution by management through the corrective action process.

L3-1: ASO Facility Representatives should consider routinely documenting their significant oversight activities even if the ASO processes do not require a formal oversight report.

L3-2: To distinguish between review criteria and TSR acceptance criteria in facility procedures, consider using different annotations for the two types of criteria; for example, identify nitrogen tank level of 150 inches water column as a review criterion and 50 inches water column as the TSR acceptance criterion.

L3-3: Consider adding a chief technician's review after the opening performance of the Daily Round Log Sheet to provide a second check of facility conditions early in the operating day.

L3-4: Until the calculations are complete and appropriate protective equipment is identified for operating all the breakers and disconnects in the facility, consider establishing additional controls, such as a standing order, and training to ensure that the proper hazard evaluation is completed before operating these devices.

L3-5: To ensure that systems and components are returned to an operating lineup following testing, review the surveillance procedure restoration steps and identify a means of verifying operability, such as independent verification of valve or switch lineup or observation of system indicators.

L3-6: During review and revision of the surveillance procedures, consider adding warnings to enter the LCO when necessary to ensure that the facility is in the correct mode during the test and adding instructions to the facility manager to review and enter, if required, the LCO when acceptance criteria are not met.

L3-7: Facility management should consider holding a "tailgate" session to discuss procedural compliance and the process by which procedure changes are authorized. The tailgate session could also discuss management's expectation for personnel to record any unanticipated conditions on the surveillance data sheets.

L3-8: The facility should consider clearly noting which Area 2 storage holes are 4-inch and 6-inch on the radioactive material and fissionable material inventory sheet.

7.0 ITEMS FOR FOLLOW-UP

Independent Oversight will follow up on the closure of corrective actions developed to address the findings identified during the ANL RA, including actions for Finding L2-1 in this report.

Appendix A
Supplemental Information

Dates of Review

Onsite Review: August 15-24, 2011

Office of Health, Safety and Security Management

Glenn S. Podonsky, Chief Health, Safety and Security Officer
William A. Eckroade, Principal Deputy Chief for Mission Support Operations
John S. Boulden III, Director, Office of Enforcement and Oversight
Thomas R. Staker, Deputy Director for Oversight
William Miller, Deputy Director, Office of Safety and Emergency Management Evaluations

Quality Review Board

William Eckroade
John Boulden
Thomas Staker
William Miller
Michael Kilpatrick
George Armstrong
Robert Nelson
Thomas Davis

Independent Oversight Site Lead for ANL

Joseph Drago

Independent Oversight Reviewers

William Miller – Team Lead
Joseph Drago
David Odland

Appendix B
Documents Reviewed, Evolutions, and Interviews

Documents Reviewed:

- NOD-AGHCF-NSB-202, *Technical Safety Requirements for the Building 212 Alpha Gamma Hot Cell Facility*, Rev. 3a, April 2011
- NOD-AGHCF-NSB-201, *Basis For Interim Operations for the Building 212 Alpha Gamma Hot Cell Facility*, Rev. 2, April 2010
- Safety Evaluation Report for Building 212 Alpha Gamma Hot Cell Facility, Rev. 1, March 2011
- SCMS, Facility Safety Authorization, Procedure 5, *Verifying Readiness for Startup and Restart of Nuclear Facilities*, Rev. 3.0, 6/21/11
- SCMS, Facility Safety Authorization, Procedure 6, *Evaluating and Approving Startup Notification Reports*, Rev. 3.0, 6/21/11
- SCMS, Facility Safety Authorization, Procedure 7, *Evaluating and Conducting Readiness Assessments*, Rev. 3.0, 6/21/11
- NOD-QA-903, *Startup and Restart of Nuclear Facilities*, Rev. 8, 8/11/11
- NOD-303-00-01, *Readiness Assessment Plan for the Alpha Gamma Hot Cell Facility Documented Safety Analysis and Technical Safety Requirements Documents Implementation*, Rev. 1, 7/25/11
- NOD-291-00-00, *Alpha Gamma Hot Cell Facility (AGHCF) Readiness Assessment Implementation Plan*, Rev. 1, 7/1/11
- NOD-288-00-00, *Memorandum of Understanding Regarding AGHCF Fire Barriers*, Rev. 0, 4/20/11
- Fact-Finding Report: AGHCF Ventilation Valve Found Out of Position on August 15, 2011
- NOD-AGHCF-MAINT-107, *Maintenance Implementation Plan (MIP) for Alpha Gamma Hot Cell Facility*, (Under Review)
- ANL ES&H Manual, Section 9.3, Electrical Systems and Equipment
- ANL ES&H Manual, Section 11.4, Open Flame and Portable Spark-Producing Operations
- ANL ES&H Manual, Section 9.1, General Electrical Safety
- Memorandum from Daniel J. Evans, PE to D. Carlson, Subject: *Non-Nationally Recognized Testing Laboratory (Non-NRTL) Remote Power Tap Equipment Fabricated and Wired by ANL Personnel, and Used Within the Shielded Volume of the AGHCF*, August 30, 2011
- NOD-FY11-MA-025, Contractor Readiness Assessment: Relocation of Smoke Detectors in 212 AGHCF Readiness Review Checklist, Rev. 0, 6/6/11
- NOD-056-00-03, *Fire Hazards Analysis*, Rev. 3, 4/14/11
- NOD-300-00-02, *AGHCF Surveillance Requirements Procedure Implementation Matrix*, Rev. 2, 8/5/11
- NOD-DS-128-00, *Defining Location for Continuous Air Monitoring Equipment*, 7/14/11
- NOD-AGHCF-DS-250, *Fire Door Inspection and Test (per SR-501)*, 7/22/11
- NOD-CALC-2010-026, *Calculations to Validate that the AGHCF Nitrogen Supply Meets the Day 2 Reserve TSR Requirement for the AGHCF*, Rev. 0, 12/21/10
- NOD-CALC-2011-014, *Building 212 Alpha Gamma Hot Cell Facility (AGHCF) Main Fire Alarm Control Panel (FACP) Battery Capacity Calculation*, Rev. 0, 7/15/11
- NOD-CACL-2011-015, *Building 212 Fire Alarm Battery Capacity Calculation*, Rev. 0, 7/15/11
- NOD-300-00-01, *212 AGHCF Technical Safety Requirement Implementation Matrix*, Rev. 1, 7/8/11
- NOD-305-00-00, *AGHCF Natural Phenomenon Hazards Survey*, Rev. 0, 7/15/11

- Technical Note 2010-005, *Methods for Determining Alarm Set Points for Continuous Air Monitors (CAMS)*, Rev. 0, 8/12/10

Procedures:

- HPP-6.8 Health Physics Procedure 6.8, *Canberra's Intelligent Alpha and Beta Continuous in Air Monitor iCAM*, Rev. 6, 2/9/11
- NOD-AGHCF-SR-100, *Round Tours of the AGHCF*, Rev. 7
- NOD-AGHCF-SR-105, *Testing the AGHCF Peripheral High-Gamma Alarm System*, Rev. 2, 2/14/11
- NOD-AGHCF-SR-400, *Calibration of the AGHCF Gamma Area Detectors*, Rev. 2, 7/29/11
- NOD-AGHCF-SR-116, *AGHCF Radioactive Material Inventory*, Rev. 0, 7/11/11
- NOD-AGHCF-SR-203, *AGHCF Fire Detection and Alarm System Test and Visual Inspection*, Rev. 1, 7/8/11
- NOD-AGHCF-SR-117, *AGHCF Fire Suppression System Water Supply Isolation Valve Visual Inspection*, Rev. 0, 5/2/11
- NOD-AGHCF-SR-502, *AGHCF Fire Protection Systems Visual Inspection*, Rev. 0, 5/9/11
- NOD-AGHCF-SR-206, *AGHCF Main Drain Test*, Rev; 3, 3/28/11
- NOD-AGHCF-SR-204, *AGHCF Inspector's Test/Water flow Alarm Test*, Rev. 3, 3/14/11
- NOD-AGHCF-SR-119, *AGHCF Sprinkler Head Pre-installation Verification*, Rev. 0
- NOD-AGHCF-SR-200, *Emergency Powered Standby Exhaust Fan Start Test*, Rev. 4, 3/7/11
- NOD-AGHCF-SR-106, *Zero and Span the Pressure Sensors in Area 1, 3 and 6 for the Differential Pressure Sensing and Recording System*, Rev. 3, 2/28/11
- NOD-AGHCF-SR-600, *Calibrating the Pressure Chart Recorder*, Rev. 2, 3/28/11
- NOD-AGHCF-SR-300, *Final Stage In-Place HEPA Filter Testing*, Rev. 2
- NOD-AGHCF-SR-118, *Verification of Maximum Pressure Drop Across HEPAS*, Rev. 0, 6/6/11
- NOD-AGHCF-SR-102, *Calibration and Testing of the Oxygen Analyzer for Areas 1 and 3*, Rev. 3
- NOD-AGHCF-SR-120, *AGHCF Criticality Liquid Moderator Limits Verification*, Rev. 0
- NOD-AGHCF-SR-501, *Inspect Hot Cell Structure and Facility Boundary Structure and Fire Barriers*, Rev. 0, 7/21/11
- NOD-AGHCF-OPS-303, *30-gallon Remote Handled Transuranic Waste Drum Assembly*, Rev. 6, 5/31/11
- NOD-AGHCF-OPS-313, *Low Level Waste Packaging*, Rev. 0, 6/20/11
- NOD-AGHCF-OPS-109, *AGHCF Criticality Control*, Rev. 2, 6/13/11
- NOD-AGHCF-OPS-200, *Activating the Hot Cell Exhaust Feature of the Auxiliary Exhaust System*, Rev. 1, 7/5/11
- NOD-AGHCF-OPS-201, *Operation of Shield Doors*, Rev. 1, 6/20/11
- NOD-AGHCF-OPS-206, *AGHCF Operational Parameter Monitoring and Alarm Response*, Rev. 2
- NOD-AGHCF-OPS-209, *Operating and Surveying Main Exhaust System Filtration Equipment*, Rev. 0, 5/31/11
- NOD-AGHCF-OPS-303, *30-gallon Remote Handled Transuranic Waste Drum Assembly*, Rev. 6, 5/31/11
- NOD-AGHCF-OPS-312, *Processing Radioactive Waste Can and Drum Information*, Rev. 1, 5/2/11
- NOD-AGHCF-OPS-402, *Conduct of Operations Implementing Procedure for AGHCF*, Rev. 2,
- NOD-AGHCF-OPS-502, *Compensatory Actions for Disabling the High-Gamma Alarm System*, Rev. 0, 7/18/11
- NOD-AGHCF-OPS-600 - *AGHCF Combustible Material Control and Inspection*, Rev. 1, 7/25/11
- NOD-OPS-601 - *Fire Patrol and Fire Watch*, Rev. 2, 3/15/11
- NOD-AGHCF-EMER-101, *Initial Response to AGHCF Alarms*, Rev. 1, 6/13/11

- NOD-AGHCF-EMER-301, *High-Gamma Alarm Response*, Rev. 3, 7/18/11
- NOD-AGHCF-DS-0035, *AGHCF Daily Round Log Sheet*, Rev. 9
- ANL-395, *Calibration Data Sheet (including instructions)*, 1/26/09

Training:

- AGHCF BIO Implementation Training Matrix, 7/20/11
- NOD-307-00-00, AGHCF Training Plan for BIO Implementation, Rev. 0, 6/21/11
- NODAGHCFBFR001, NOD-AGHCF-EMER-101, Initial Response to AGHCF Alarms
- NODAGHCFBFR002, NOD-AGHCF-EMER-200, Emergency Response to an In-cell Fire
- NODAGHCFBFR003, NOD-AGHCF-EMER-201, Emergency Response to NPH Events
- NODAGHCFBFR004, NOD-AGHCF-EMER-203, Emergency Response for Loss of AGHCF
- NODAGHCFBFR005, NOD-AGHCF-EMERG-300, Positioning the AGHCF Movable Gamma Shield
- NODAGHCFBFR006, NOD-AGHCF-EMERG-301, High Gamma Alarm Response
- NODAGHCFBFR007, NOD-AGHCF-EMER-400, Switching the AGHCF Nitrogen Supply from the Main Tank to an Alternate Supply
- NODAGHCFBFR008, NOD-AGHCF-SR-102, Calibration and Testing of the Oxygen Analyzer for Area 1 and 3, and Maintenance procedures/data sheet
- NODAGHCFBFR010, NOD-AGHFC-OPS-100, Tamper Indicating Devise Seal Application and Removal, and NOD-AGHFCF-DS-256, Material Tracking Form for non-AGSC Storage Containers
- NODAGHCFBFR011, NOD-AGHCF-OPS-109, AGHCF Criticality Control
- NODAGHCFBFR011, NOD-AGHCF-SR-120, AGHCF Criticality Liquid Moderator Limits Verification
- NODAGHCFBFR012, NOD-AGHCF-OPS-117, Repackaging Fuel Examination Waste into Shielded Containers
- NODAGHCFBFR013, NOD-AGHCF-OPS-200, Activating the Hot Cell Exhaust Feature of the Auxiliary Exhaust System
- NODAGHCFBFR015, NOD-AGHCF-OPS-206, AGHCF Operational Parameter Monitoring and Alarm Response
- NODAGHCFBFR016, NOD-AGHCF-OPS-209, Operating and Surveying Main Exhaust System Filtration Equipment
- NODAGHCFBFR017, NOD-AGHCF-OPS-502, Compensatory Actions for Disabling High Gamma Alarm System
- NODAGHCFBFR022, NOD-AGHCF-OPS-402, Conduct of Operations Implementing Procedure for Alpha Gamma Hot Cell Facility
- NODAGHCFBFR024, NOD-AGHCF-OPS-600, AGHCF Combustible Material Control and Inspection
- NODAGHCFBFR025, NOD-AGHCF-SR-100, Round Tours of the AGHCF
- NODAGHCFBFR026, NOD-AGHCF-SR-105, Testing the AGHCF Peripheral High-Gamma Alarm System
- NODAGHCFBFR027, NOD-AGHCF-SR-106, Zero and Span the Pressure Sensors in Area 1,3 and 6 for the Differential Pressure Sensing and Recording System
- NODAGHCFBFR028, NOD-AGHCF-SR-116, AGHCF Radioactive Material Inventory
- NODAGHCFBFR029, NOD-AGHCF-SR-117, AGHCF Fire Suppression System Water Supply Isolation Valve Visual Inspection
- NODAGHCFBFR030, NOD-AGHCF-SR-118, ACHCF HEPA Differential Pressure Check
- NODAGHCFBFR030, NOD-AGHCF-SR-502, AGHCF Fire Suppression System Visual
- NODAGHCFBFR031, NOD-AGHCF-SR-119, AGHCF Sprinkler Head Pre-Installation Verification

- NODAGHCFBFR032, NOD-AGHCF-SR-200, Emergency Powered Standby Exhaust Fan Start Test
- NODAGHCFBFR032, NOD-AGHCF-SR-206, AGHCF Main Drain Test
- NODAGHCFBFR032, NOD-AGHCF-SR-400, Calibration of the AGHCF Gamma Area Radiation Detectors
- NODAGHCFBFR032, NOD-AGHCF-SR-203, AGHCF Fire Detection and Alarm System Test and Visual Inspection
- NODAGHCFBFR032, NOD-AGHCF-SR-300, Final Stage In-Place HEPA Filter Testing
- NODAGHCFBFR035, NOD-AGHCF-SR-501, Inspection of AGHCF Structures and Fire Barriers, Including Fire Doors and Dampers

Work Control Documents:

- WCD-10-AGHCF-055, Fire Barrier Upgrade Project, Rev. 0, 1/27/10
- WCD-11-AGHCF-002, Install Pressure Gauges in the A-EXH-F2, -F4, -F6, -F7, -F9, -F10, and –F15 Systems, Rev. 0, 1/19/11
- WCD-11-AGHCF-003, Relocation of Smoke Detectors in 212 AGHCF, Rev. 0, 4/7/11
- WCD-11-AGHCF-027, Anchor the Charcoal Filter Housing (NPHE), Rev. 0, 4/26/11
- WCD-11-AGCHF-032, Anchor O2 Analyzer Cabinets in F-110 to Floor (NPHE), Rev. 0, 4/26/11

Evolutions:

- Daily Round Tours (twice)
- Plan of the Day - August 17, 2011
- Plan of the Week August – August 18, 2011
- Fuel Examination Waste Repackaging (NOD-AGHCF-OPS-117)
  - AGHCF Radioactive Material Inventory Control (NOD-AGHCF-SR-116)
  - Criticality Control (NOD-AGHCF-OPS-109)
  - Tamper Indicating Device Seal Application and Removal (NOD-AGHCF-OPS-100)
  - Movement of Materials Through the Alpha Barrier and Gloveboxes, Including Glove and Pouch Changes (NOD-AGHCF-OPS-105)
  - Operation of Shield Doors (NOD-AGHCF-OPS-201)
- AGHCF Criticality Liquid Moderator Limits Verification (NOD-AGHCF-SR-120)
- AGHCF Fire Suppression System Visual Inspection Fire (NOD-AGHCF-SR-502)
- Daily, Weekly and Monthly Continuous Air Monitor Checks
- Fire Suppression System Supply Isolation Valve Visual Inspection
- Calibration and Testing of the Oxygen Analyzer for Areas 1 and 3 (Walkthrough)
- Testing the AGHCF Peripheral High Gamma Alarm System (Walkthrough)
- Zero and Span of the Differential Pressure Sensors (Tabletop walkthrough)
- Calibration of the Gamma Area Detectors

Interviews:

- AGHCF Facility Manager
- AGHCF Assistant Facility Manager
- AGHCF Operations Manager
- AGHCF Operations Superintendent
- AGHCF Chief Technician/Hot Cell Operator

- AGHCF Hot Cell Operators
- Cognizant Systems Engineer Group Lead
- NOD Material Control and Accountability Representative
- Division Electrical Equipment Inspector
- Fire Protection Engineer
- Fire Protection Engineer/Inspectors
- Nuclear Safety Basis Analysts
- Health Physics Instrument Technicians
- Training Coordinator
- Unreviewed Safety Question Screener
- ASO Facility Representatives
- ASO Environment, Safety and Health Director
- Health Physicist
- Chief Health Physics Technician
- Acting Radiation Safety Officer
- Structural Engineer
- Electrical Engineer