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Performance Analysis: Issues Tracking System Data through September 2011

C. E. Kerr, G. Holman, N. McTyer

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Disclaimer

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Contents

1.0 Executive Summary

This report presents the results from an analysis of issues and assessments in LLNL's Issues Tracking System (ITS). The analysis is conducted to identify issues that may require additional management attention and noncompliances that may not have been previously identified that meet the threshold for reporting to the DOE Noncompliance Tracking System (NTS) or to the DOE Safeguards and Security Information Management System (SSIMS).

This report includes all data in ITS through September 2011; however, the analysis in this report primarily focuses on deficiencies identified in 2011 that fall within the DOE Office of Enforcement regulated subjects.

The analysis of issues concluded that data for 16 of the 25 Office of Enforcement regulated safety/security subjects were within expected variation or there was a decreasing trend in the data. The data for eight safety subjects and one of the security subjects met a common test and were discussed further. Three of the eight safety subject met an action limit and were analyzed to resolution. An action limit was also met in one of the non-regulated subjects and this subject was analyzed further.

This analysis did not identify any programmatic (systemic) or repetitive noncompliances meeting the criteria for reporting to the DOE reporting systems nor did it identify any issues requirement additional management attention beyond what was resolved as part of this analysis.

2.0 Introduction

The DOE Office of Enforcement expects all contractors, including LLNL, to "implement comprehensive management and independent assessments that are effective in identifying deficiencies and broader problems in safety and security programs, as well as opportunities for continuous improvement within the organization." In addition, the DOE Office of Enforcement expects that "issues management databases are used to identify adverse trends, dominant problem areas, and potential repetitive events or conditions."

LLNL has an assessment program of management and independent assessments to identify deficiencies, management issues and opportunities for improvement, described in the document DES-0048, *LLNL Assessment Program*. Section 3.0 of this report discusses assessments that address the subjects regulated by DOE Rule.

LLNL has in place a process to identify, report and manage deficiencies of nuclear safety, worker safety and health (WSH), and classified information security (CIS) requirements. LLNL requires that all WSH, nuclear safety, and CIS deviations from requirements be tracked as "deficiencies" in the LLNL Issues Tracking System (ITS). Individual deficiencies are analyzed for WSH, nuclear safety, and CIS noncompliances that may meet the threshold for reporting to the DOE NTS or the SSIMS. This report presents the results of the analysis of the set of issues in the ITS.

This report meets the expectations defined by the DOE Office of Enforcement to evaluate implementation of internal processes for conducting assessments to identify noncompliances, analyzing the noncompliances found in these assessments, screening and reporting noncompliances, and evaluating the data in the ITS database to identify adverse trends, dominant problem areas, and potential repetitive events or conditions.

This performance analysis is designed to answer two questions:

1. Is LLNL assessing its programs (e.g., electrical safety program) and their state of compliance? (Section 3.0)
2. What is LLNL finding in its assessments? (Sections 4.0 through 9.0)

The results from analyzing the deficiencies are presented in accordance with the two primary NTS and SSIMS reporting thresholds:

1) WSH and nuclear safety noncompliances related to certain events or conditions and

2) WSH, nuclear safety, and CIS noncompliances that are management issues.

In addition, the report analyzes WSH noncompliances to determine if any fall under the "Other Significant Condition" threshold. This threshold applies to WSH noncompliances only.

3.0 Assessments

Assessments were evaluated to assure that LLNL is implementing comprehensive management and independent assessments that are effective in identifying deficiencies and broader problems in safety and security programs, as well as opportunities for continuous improvement within LLNL.

3.1 Assessments Conducted

The number of assessments entered in ITS increased from the fourth quarter of 2010 to the third quarter of 2011, as shown in Figure 1. During the 12-month period ending September 2011, LLNL entered 715 management observations, verifications and inspections (MOVIs), 204 management self-assessments (MSAs), 69 other internal assessments, 43 internal independent assessments (IIAs), 11 quick ITS assessments, and 10 joint functional area manger (FAM)/line assessments. During this same 12-month period, 144 external assessments, 127 events, and four other external assessments were also entered into ITS.

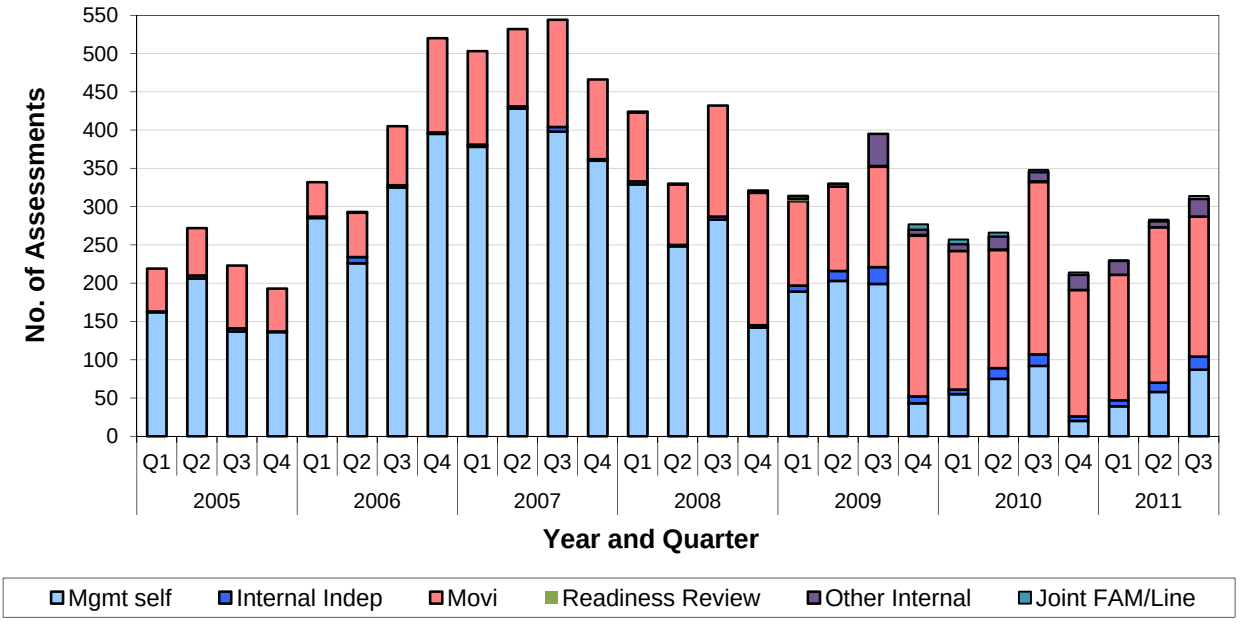


Figure 1. The number of internal assessments by type categories and quarter.

There is a common pattern in the number of internal assessments conducted since 2009; the number of internal assessments increases from the first to the third quarter of the calendar year and then decreases in the fourth quarter (Figure 1). This same pattern is

seen with MSAs and IIAs. The number of MSAs and IIAs has increased since the fourth quarter of 2010 (Figure 1).

The number of "other internal assessments" increased in 2009, 2010, and 2011 compared to previous years. The increase started in the third quarter of 2009, as shown in Figure 1. Part of this increase can be attributed to the introduction of MOVI as a new assessment type. Prior to the third quarter of 2009, MOVIs were being categorized as "management self-assessment." During the third and fourth quarters of 2009 and the first quarter of 2010, directorates were categorizing all MOVIs as "other internal assessments" or "walkthrough." After the first quarter of 2010, the assessment type MOVI, described in PRO-0053, became available as an assessment type in ITS and some of the "other internal assessments" are now categorized as MOVIs.

Approximately 98 "other internal assessments" were entered in ITS in 2010 and 2011 following the addition of MOVI as an assessment type. Some directorates are using the "other internal assessment" type to document issues they identify and analyze during the course of their work. For example, 53% of "other internal assessments" from the second, third, and fourth quarters of 2010 and the first, second, and third quarters of 2011 were events or issues analyzed by *NIF Management Reviews* owned by the NIF and Photon Science Principal Directorate.

Joint FAM/line management assessment (JFLMA) is a fairly new assessment category in ITS. The first of these assessments were completed/finalized in the fourth quarter of 2009. JFLMA is primarily a horizontal assessment in which a FAM works in coordination with line managers to perform required or risk-based assessments of functional area topics/subtopics across one or more line organization(s). These formally-reported assessments evaluate the adequacy of requirements flowdown through functional systems or programs, and the effectiveness of work processes with respect to the functional area requirements and expectations. The number of JFLMAs in 2010 and 2011 ranges from one to six completed in a given quarter.

LLNL develops the LLNL *Institutional Assessment Plan* (IAP) for each fiscal year and the IAP defines and reports on the six main types of formal assessments performed at LLNL. The development of the *LLNL Assessment Program* description (DES-0048) and the *Institutional Assessment Plan* procedure (PRO-0049), ensure that results from these assessments are entered into ITS and responses are generated.

When evaluating the number of assessments conducted each quarter using the process control chart shown in Figure 2, an action limit was met, two out of three data points in a row were below the Lower Warning Limit (the fourth quarter of 2010 and the first quarter of 2011). Section 11.0 explains the action limits related to assessment data. In the fourth quarter of 2010 and the first quarter of 2011, LLNL completed/finalized the fewest assessments since the fourth quarter of 2005.

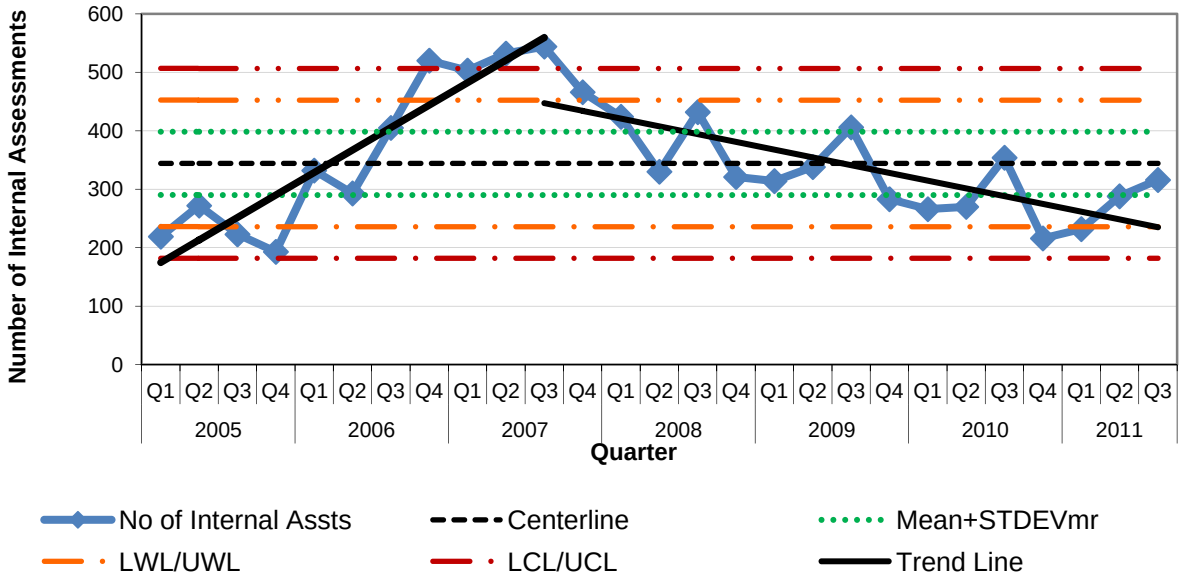


Figure 2. Frequency control chart of internal assessment data.

From the third to the fourth quarter in 2010, the number of MSAs decreased by 78% and IIAs by 60%. Since MSAs and IIAs are included in the IAP, IAP data was reviewed and it was determined that few IAP assessments were due in the fourth quarter of 2010 and the first quarter of 2011. Only 11% of assessments due in 2010 were due in the fourth quarter of 2010 and 21% of assessments due in 2011 were due in the first quarter of 2011. Most assessments are scheduled in the third quarter of the calendar year, or the fourth quarter of the fiscal year, as shown in Figure 3. Of those assessments originally due in the fourth quarter of 2010, 39% were extended and completed after the fourth quarter of 2010, with only 7% completed earlier than scheduled (Figure 3). Of those assessments originally due in the first quarter of 2011, 38% were extended and completed after the first quarter of 2011, with no assessments completed earlier than scheduled (Figure 3).

It appears that the action limit in Figure 2 was met because few IAP assessments were due in the fourth quarter of 2010 and the first quarter of 2011 and of those that were due in the fourth quarter of 2010 and first quarter of 2011, 39% and 38% respectively, were extended and completed in a later quarter.

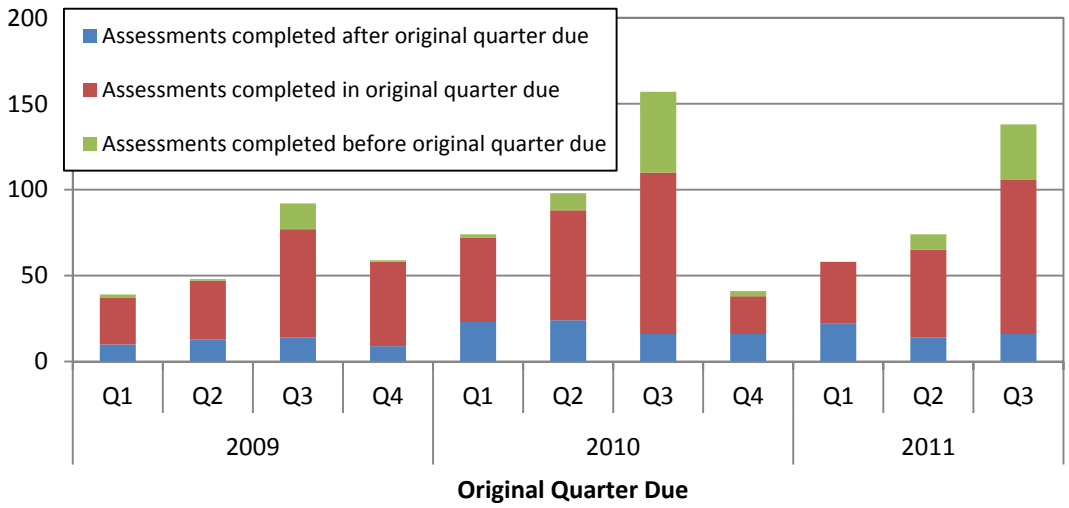


Figure 3. Assessments from the IAP by the quarter due and completed early, on-time, or late.

In reviewing all internal assessment data from 2005 through the third quarter of 2011, there appears to be a non-random pattern, an increasing trend in the number of internal assessments from the first quarter in 2005 to the third quarter in 2007, and a decreasing trend from the third quarter in 2007 to the third quarter in 2011. Testing these potential trends using simple linear regression shows both the increasing and decreasing trends are statistically significant (p-value < 0.01); they are shown in Figure 2 as two separate trend lines. The results of the statistical test support the observation that the number of assessments entered into ITS has continued to decreased since the third quarter in 2007.

The decreasing trend since 2007 can be attributed to assessment process changes and fewer unique assessments being conducted in 2009, 2010, and 2011. Following the transition to LLNS management, discussions began regarding changing the structure and processes for conducting management and independent assessments. Prior to contract transition, most assessments were conducted by the directorates, following requirements in the LLNL *ES&H Manual* that prescribe the topical areas and frequency for self-assessments, subject matter inspections, and facility inspections. This practice resulted in unique entries in ITS for each assessment at each location because each directorate scheduled its own assessments and inspections. In late 2008, LLNL assigned the Facilities and Infrastructure Directorate to manage most of the facilities and to inspect them. These centralized responsibilities have resulted in fewer assessment entries in ITS and account for current reduced entries. Also in 2008, responsibility for entering the results of self-assessments of ES&H-related functional/topical areas began to transition from the directorates to the functional area managers.

This analysis concludes that the number of internal assessments recently increased. This supports the pattern of the number of internal assessments increasing from the first to the third quarters of the year and then decreasing from the third to the fourth quarters. When evaluating the number of assessments conducted each quarter using a process control chart an action limit was met. In the fourth quarter of 2010 and the first quarter of 2011, LLNL completed/finalized the fewest assessments since the fourth quarter of 2005. It appears that the action limit was met because few IAP assessments were due in the fourth quarter of 2010 and the first quarter of 2011 and of those that were due in the fourth quarter of 2010 and first quarter of 2011, 39% and 38% respectively, were extended and completed in a later quarter.

3.2 Assessment Effectiveness at identifying Issues

As part of this analysis, issues were extracted from the LLNL ITS. The data showed 1,138 deficiencies and 1,094 observations with issue identification dates in October 2010 – September 2011 in all functional areas from all sources. Of the 1,138 deficiencies, 533 were designated as WSH and/or nuclear safety deficiency functional areas of emergency management, occupational medicine, worker safety and health, nuclear operations, packaging and transportation, and radiation protection. The safeguards and security functional area included 138 deficiencies.

The number of deficiencies and observations identified each quarter has been fairly consistent since the fourth quarter of 2010 (Figure 4). Typically more than half of deficiencies identified per quarter are categorized as WSH, nuclear safety, and/or CIS (Figure 4). The average number of issues identified per assessment completed/finalized in the last twelve months (October 2010 – September 2011) is two, and 53% of all assessments completed and entered into ITS in the last twelve months had at least one issue. One assessment completed/finalized in the last twelve months had a total of 36 issues: the *NIF 2011 Laser Operations Safety Assessment*. Although the number of deficiencies and observations identified each quarter has been fairly consistent since the fourth quarter of 2010 (Figure 4), a statistical test based on simple linear regression concludes that the number of deficiencies and observations have a statistically significant decreasing trend over time from 2008 to 2010 (p-value < 0.05).

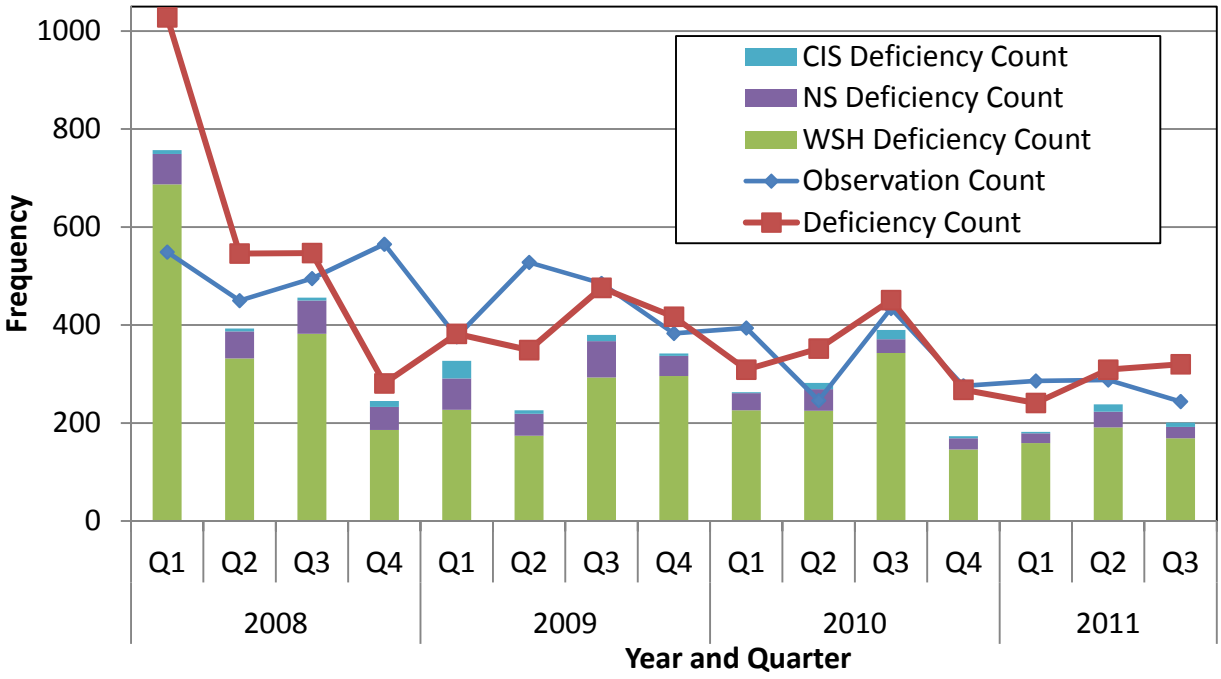


Figure 4. The number of ITS deficiencies and observations per quarter and by deficiency category (WSH, Nuclear Safety, and CIS).

There was a slight increase in the number of deficiencies identified and entered in ITS in the third quarter of 2011 compared to the previous quarter. Fifty eight percent (58%) of deficiencies identified in the last twelve months were WSH deficiencies, 9% were nuclear safety deficiencies, and 3% were CIS deficiencies.

Figure 5 displays deficiencies across all functional areas and highlights those related to nuclear safety (green), WSH (red), and CIS (orange). The most frequent functional areas with identified deficiencies are WSH, quality assurance, safeguards and security, and emergency management (Figure 5). The data also included four deficiencies identified in the last twelve months without a designated functional area, three of which are in open status. Subjects in the Office of Enforcement regulated safety and security functional areas are analyzed and the results are discussed in Sections 6.0, 7.0, and 8.0.

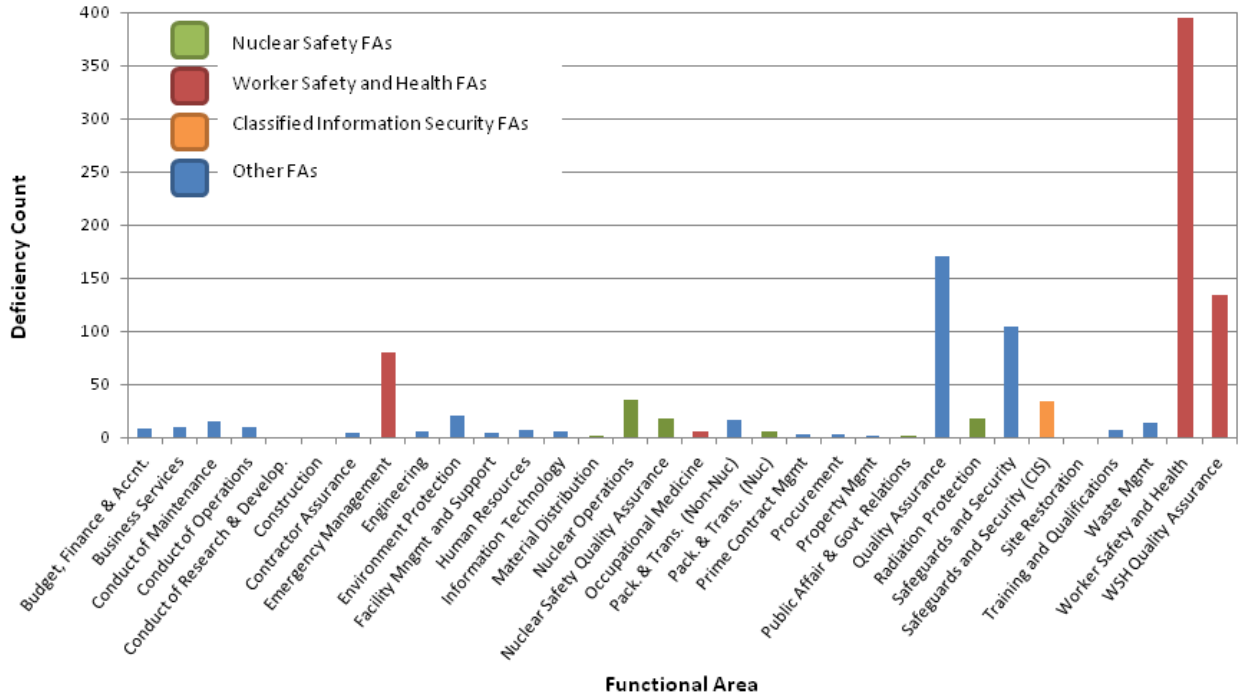


Figure 5. Number of deficiencies identified in October 2010 – September 2011 per functional area.

Formal internal sources of WSH and nuclear safety deficiencies are IIAs and JFLMAs. Figure 6 displays the number of IIAs and JFLMAs performed from 2009 to 2011 (as of October 1, 2011). For the most recent three years, (2009, 2010 and 2011) no IIAs or JFLMAs have been conducted in occupational medicine, one of the six regulated functional areas. During the same time period; however, seven external assessments, four MSAs, two MOVIs, and one other internal assessment have been conducted. So far in 2011, IIAs and/or JFLMAs were conducted in all of the regulated functional areas except for occupational medicine.

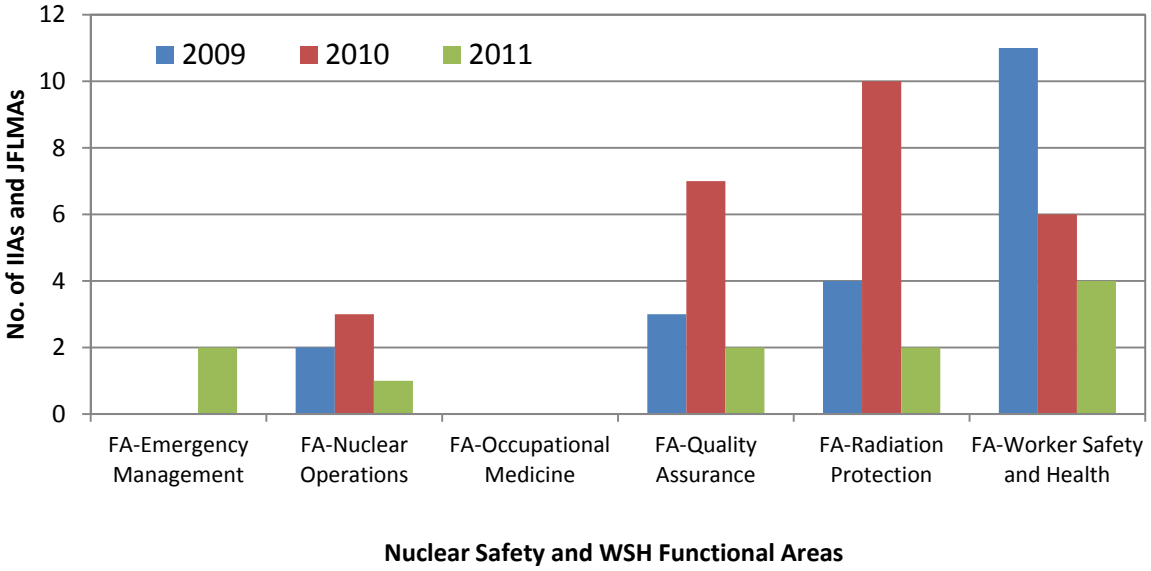


Figure 6. Number of IIAs and JFLMAs of regulated functional areas.

This analysis concludes that the number of deficiencies and observations identified each quarter has been fairly consistent since the fourth quarter of 2010. Typically more than half of deficiencies identified per quarter are categorized as WSH, nuclear safety, and/or CIS. So far in 2011, IIAs and JFLMAs were conducted in all of the regulated functional areas except for occupational medicine, where the assessments have been primarily external assessments or MSAs.

4.0 Issues Evaluated for Reporting to NTS

Issues from assessments, occurrences, and analysis reports are evaluated as the reports are distributed to determine whether NTS-reportable deficiencies are being identified. In 2011, 70 reports were prepared and made available and 190 issues were evaluated for noncompliance reporting. Figure 7 shows the number of reports completed each month and subject to independent evaluation for noncompliance reporting, and the number of issues to be evaluated each month. As of January 2012, 12 reports are pending a documented noncompliance evaluation, as shown in red in Figure 7. These reports have been evaluated, but the documentation of the evaluation is pending entry into ITS.

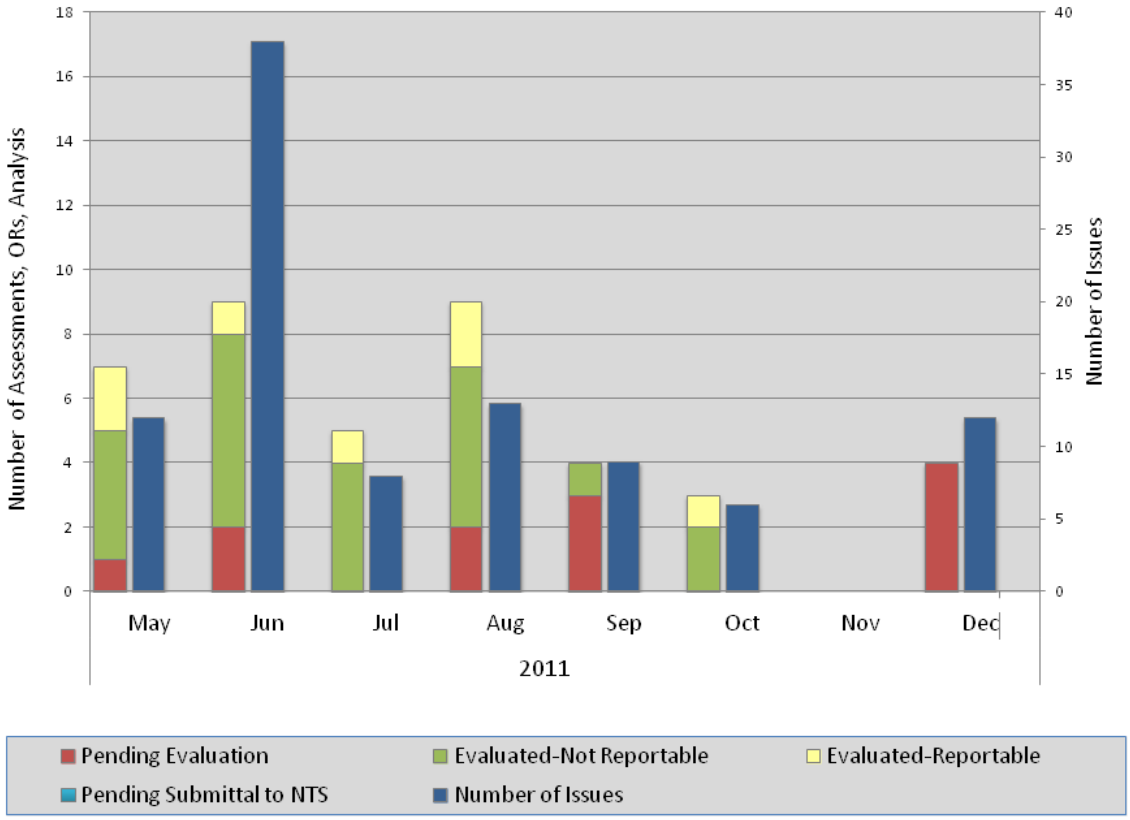


Figure 7. Assessments, final occurrence reports and analysis reports issued each month and their evaluation status.

In the third quarter of 2011, the most recent quarter analyzed, 53% of deficiencies entered into ITS were marked as WSH site-reportable deficiencies, 7% of deficiencies were marked as nuclear safety site-reportable deficiencies, and 3% were marked as CIS site-reportable deficiencies, all percentages are decreases from the previous quarter, as shown in Table 1.

Table 1. ITS deficiencies entered, site-reported and NTS-reported noncompliances.

Year	Qrt	Obs. in ITS	Defs. in ITS	WSH Site Reported Noncompliances (NCs)	WSH NCs Reported to NTS	NS Site Reported NCs	NS NCs Reported to NTS	CIS Site Reported NCs
2009	Q1	376	382	227 (59%)	5 (2%)	64 (17%)	1 (2%)	36 (9%)
	Q2	528	349	174 (50%)	2 (1%)	45 (13%)	1 (2%)	7 (2%)
	Q3	485	476	293 (62%)	6 (2%)	74 (16%)	4 (5%)	13 (3%)
	Q4	383	417	296 (71%)	2 (<1%)	41 (10%)	2 (5%)	5 (1%)
2010	Q1	394	309	226 (73%)	6 (3%)	35 (11%)	0 (0%)	2 (<1%)
	Q2	246	352	225 (64%)	4 (2%)	44 (13%)	4 (9%)	13 (4%)
	Q3	434	451	343 (76%)	5 (1%)	28 (6%)	1 (4%)	19 (4%)
	Q4	276	268	146 (54%)	3 (2%)	23 (9%)	1 (4%)	4 (1%)
2011	Q1	286	241	159 (66%)	3 (2%)	20 (8%)	1 (5%)	3 (1%)
	Q2	288	309	191 (62%)	4 (2%)	32 (10%)	3 (9%)	15 (5%)
	Q3	244	320	169 (53%)	3 (2%)	23 (7%)	2 (9%)	9 (3%)

Note: The data in columns 6 and 8 include “combination reports” (i.e., NUC/WSH noncompliance reports as both a report for nuclear safety and a report for WSH).

Five (3%) of the WSH and nuclear safety site-reportable deficiencies were reported to the DOE NTS in the third quarter of 2011. This percent of site-reportable deficiencies reported to the DOE NTS is fairly consistent with the second quarter of 2011. No comparison was made between site reported and SSIMS reported noncompliances.

This review found that there was a recent decrease in the percent of issues identified as site reported WSH, nuclear safety, and CIS deficiencies and that NTS reporting is consistent with previous quarters.

5.0 Noncompliances Related to Events or Conditions

DOE expects that noncompliances associated with certain Occurrence Reporting and Processing System (ORPS) reporting criteria be reported to the Noncompliance Tracking System (NTS), regardless of the severity of the noncompliance. LLNL uses the NTS reporting thresholds specified in the DOE *Enforcement Process Overview*, Appendices A and B, and described in DES-0083, *Regulatory Compliance Assurance Program for DOE Safety and Security Requirements*.

Occurrences are promptly reviewed for NTS-reportable worker safety and health (WSH) and nuclear safety noncompliances as they are reported into the ORPS. The initial review is based on the description of the occurrence; however, after the occurrence is further characterized and analyzed for causes, additional information may be available that identifies noncompliances that should be reported. The Contractor Assurance Office works with the directorate point of contacts to make this determination.

5.1 Worker Safety and Health Results

LLNL submitted 66 occurrence reports to ORPS from October 2010 to September 2011. Thirteen occurrences submitted to ORPS were assigned a reporting criterion that satisfied the DOE Office of Enforcement WSH criteria for mandatory reporting to the DOE NTS. Each occurrence was evaluated for possible noncompliances; seven were identified to have deficiencies reportable to the DOE NTS. All were WSH noncompliance(s) associated with the occurrence:

1. NTS-LSO-LLNL-LLNL-2011-0001, *Unqualified Workers Performed an Improper Lifting Operation with a Shop Crane that had not been Certified*
2. NTS-LSO-LLNL-LLNL-2011-0005, *ACGIH Noise Limit Thresholds Exceeded when Performing Routine Rigging Activities Over an 8-Hour Time Period*
3. NTS-LSO-LLNL-LLNL-2011-0009, *Insufficient Stairwell Illumination*
4. NTS-LSO-LLNL-LLNL-2011-0011, *Work Control Procedure did not Include Proper Controls to Protect the Worker*
5. NTS-LSO-LLNL-LLNL-2011-0012, *Personnel Noise Exposure Limit Exceeded during Weapons Qualifications*
6. NTS-LSO-LLNL-LLNL-2011-0014, *Repetitive instances of incorrect or incomplete implementation of the LLNL Lockout/Tagout process*
7. NTS-LSO-LLNL-LLNL-2012-0001, *10 CFR 851 noncompliances associated with the LLNL MWP vehicle system*

The remaining six of these 13 occurrences were determined for the following reasons to not constitute noncompliances with DOE WSH requirements and/or did not warrant a

noncompliance report to the DOE NTS. The noncompliance evaluation for the following six occurrences is documented in the LLNL ITS.

1. NA-LSO--LLNL-LLNL-2011-0002, *Worker Sustains Broken Rib After Fall From Bicycle Near Building 482,* did not constitute a noncompliance with DOE WSH requirements, neither NTS-reportable nor site-reportable only. Based on a review of the path taken by the bicyclist, the riding path was determined to be free from obstructions.
2. NA-LSO--LLNL-LLNL-2011-0003, *Security Worker Receives Minor Electrical Shock In Building OS651N,* did not constitute a reportable WSH noncompliance. A noncompliance was identified, but it was not related to the electrical shock, but another observation made when analyzing the shock. The noncompliance was site-reported in the LLNL ITS.
3. NA-LSO--LLNL-LLNL-2011-0007, *Worker Sustains Fractured Ankle After Stepping Off Curb in Parking Lot Z-3S,* did not constitute a noncompliance with DOE WSH requirements, neither NTS-reportable nor site-reportable only. The identified cause is not a WSH noncompliance.
4. NA-LSO--LLNL-LLNL-2011-0024, *Custodian Fractures Wrist During Floor Maintenance Activities in Building 131,* did not constitute an NTS-reportable WSH noncompliance. The cause was identified as, management oversight did not ensure that all needed (not documented) controls were in place prior to the start of work. This is a noncompliance with an internal procedure and the procedure is not driven by a DOE requirement/regulation. An Integration Work Sheet does exist for custodian activities, but a task related to floor stripping was not listed. Therefore, specific hazards related to floor stripping were not analyzed or controlled. This noncompliance was site-reported-only and will be tracked to completion in the LLNL ITS.
5. NA-LSO--LLNL-LLNL-2011-0045, *Insect Bite Results in Employee Hospital Stay Exceeding 48-Hours,* did not constitute a noncompliance with DOE WSH requirements, neither NTS-reportable nor site-reportable only. The causal analysis determined that the dispensing of the antibiotic to the patient was reasonable and consistent with medical practice.
6. NA-LSO--LLNL-LLNL-2011-0046, *Minor Shock During Precision Machining Work,* did not constitute a noncompliance with DOE WSH requirements, neither NTS-reportable nor site-reportable only. The cause of the shock was a breakdown of motor insulation and ungrounded motor housing. An Authority Having Jurisdiction (AHJ) inspection was not required for the legacy piece of equipment associated with this occurrence and the lack of an AHJ inspection is not a WSH noncompliance with either the LLNL ES&H Manual, 10 CFR 1910, or NFPA 70E. Also, because the unit runs on 24VDC, implementation of the LOTO process was not required.

5.2 Nuclear Safety Results

LLNL submitted 66 occurrence reports to ORPS from October 2010 to September 2011. Fifteen occurrences submitted to ORPS were assigned a reporting criterion that satisfied the DOE Office of Enforcement nuclear safety criteria for mandatory reporting to the DOE NTS. Each occurrence was evaluated for possible noncompliances; six were identified to have a nuclear safety noncompliance(s) associated with the occurrence, and the following noncompliance reports have been submitted to the NTS:

1. NTS-LSO-LLNL-LLNL-2011-0004, *Noncompliance with B331 Documented Safety Analysis Hazard Control*
2. NTS-LSO-LLNL-LLNL-2011-0007, *Noncompliance with Tritium Facility Safety Basis Requirements*
3. NTS-LSO-LLNL-LLNL-2011-0008, *Noncompliance with Institutional Requirements for Movement of Radiological Material at LLNL Site 300*
4. NTS-LSO-LLNL-LLNL-2011-0010, *Noncompliance with Nuclear Safety Basis Requirements Rule*
5. NTS-LSO-LLNL-LLNL-2011-0013, *Inadequate DSA Hazard Analysis for RHWM Waste Storage Facilities*
6. NTS-LSO-LLNL-LLNL-2011-0015, *Noncompliance with DOE Nuclear Safety Requirements for Waste Storage Facilities DSA Hazard Analysis*

The remaining nine of these 15 occurrences were determined for the following reasons to not constitute noncompliances with DOE nuclear safety requirements and therefore did not warrant an NTS report.

1. NA-LSO--LLNL-LLNL-2010-0056, *Degradation of the Building 332 Safety Significant Emergency Battery Lighting System - November Test*, reported that during the performance of a scheduled surveillance of the Building 332 Emergency Battery Lighting System, one of the Emergency Battery Lights failed to illuminate as required by the surveillance procedure. The deficiency did not constitute a noncompliance with DOE nuclear safety requirements because (1) the degraded condition was discovered by LLNL personnel during a routine scheduled surveillance being performed in accordance with facility procedures and under an approved facility Work Permit, (2) upon the identification of the failed surveillance and in accordance with facility procedures, the Facility Operators entered into a Limiting Condition for Operation (LCO) for the affected Radioactive Materials Area Laboratory, and (3) as allowed by the approved facility work permit, the electrician immediately replaced the failed bulb in the affected unit, retested the unit, and it was returned to operation. At that time the facility exited the LCO.
2. NA-LSO--LLNL-LLNL-2010-0058, *Failed Surveillance of a Safety Class Pressure Regulator on the Fire Suppression System*, reported a defective regulator that

controls output pressure from the Building 332 nitrogen skid to the Building 332 Fire Suppression System firewater tanks. This occurrence did not constitute a noncompliance with DOE nuclear safety requirements, neither NTS-reportable nor site-reportable only, because (1) the defective component was found during a routine scheduled surveillance conducted in accordance with facility procedures; (2) the defective component did not degrade the ability of the Fire Suppression System to accomplish its designated safety function, i.e., three other systems were available to assure adequate water pressure for fire suppression purposes; and (3) the response by Building 332 operations personnel to the discovered condition followed facility procedures in that when the unit failed the surveillance, the Facility Operators entered into an LCO for the affected area, and the system was retested and returned to operation within the scheduled maintenance window.

3. NA-LSO--LLNL-LLNL-2011-0004, *Degradation of the B332 Safety Significant Emergency Battery Lighting System - Annual Test Performed as a Post Test*, reported that during a scheduled monthly surveillance of the B332 Emergency Battery Lighting System, one unit did not operate for a full 90 minutes as required by the surveillance procedure. When the unit was tested, the lights on the unit failed to illuminate, indicating a failed battery. The deficiency did not constitute a noncompliance with DOE nuclear safety requirements because (1) the as-found discrepant condition was discovered by LLNL personnel during a routine scheduled surveillance being performed in accordance with facility procedures, and (2) the response by Building 332 operations personnel to the discovered condition followed facility procedures. When the unit failed the surveillance, the facility was already in a LCO for the affected area due to the maintenance activity. The LCO allows three days for the system to be returned to operation prior to requiring a change in Mode (in this case the facility was already in STANDBY mode). The electrician repaired the unit under an approved facility Work Permit and successfully re-tested the unit to assure satisfactory operation.
4. NA-LSO--LLNL-LLNL-2011-0012, *Degradation of the Safety Significant Emergency Battery Lighting System – March Test*, reported that during the performance of a scheduled surveillance of the Building 332 Emergency Battery Lighting System, one of the Emergency Battery Lights failed to illuminate as required by the surveillance procedure. The deficiency did not constitute a noncompliance with DOE nuclear safety requirements because (1) the degraded condition was discovered by LLNL personnel during a routine scheduled surveillance being performed in accordance with facility procedures and under an approved facility Work Permit, (2) upon the identification of the failed surveillance and in accordance with facility procedures, the Facility Operators entered into a LCO for the affected Radioactive Materials Area Laboratory, and (3) as allowed by the approved facility work permit, the electrician immediately replaced the failed

bulb in the affected unit, retested the unit, and it was returned to operation. At that time the facility exited the LCO.

5. NA-LSO--LLNL-LLNL-2011-0014, *Degradation of a B331 Safety Significant Increment Fire Barrier*, reported the discovery of a degraded safety-significant fire barrier in the Building 331 Radioactive Materials Area (RMA), specifically that the door did not latch as required to maintain its fire rating. The discrepant condition did not constitute a noncompliance with DOE nuclear safety requirements because the response by Building 331 operations personnel followed facility procedures. Upon discovery of the degraded condition, the facility entered into the LCO for the fire barrier, which requires that the combined inventory of increments 1 and 2 be less than the DOE-STD-1097 Hazard Category 2 threshold. No additional actions were required as the inventory was already below the threshold
6. NA-LSO--LLNL-LLNL-2011-0031, *Glovebox Window Cracked in Building 332*, reported the discovery of a crack in a window of a glovebox located in a Building 332 Radioactive Materials Area laboratory. The causal analysis determined that the component degradation was caused by a worker inadvertently bumping the window during a normal glovebox operation being performed in accordance with facility process and procedures. The window remained intact and despite its degraded condition was still able to perform its designated safety function, i.e., there was no release of radioactive material from the glovebox. Consequently, the discovered condition did not constitute a noncompliance with DOE nuclear safety requirements.
7. NA-LSO--LLNL-LLNL-2011-0036, *Degradation Of The Building 332 Safety Significant Emergency Battery Lighting System - July Test*, reported a failed surveillance of the Building 332 Emergency Battery Lighting System similar to those reported in NA-LSO—LLNL-LLNL-2010-0056 and in NA-LSO—LLNL-LLNL-2011-0012. This occurrence did not constitute a noncompliance with DOE nuclear safety requirements for the same reasons the earlier occurrences did not. Note that the end-of-life failure of the Emergency Battery Lighting System batteries was first identified as an issue in June 2010 and that subsequent similar failures were anticipated. The facility has for some time been in the process of replacing the batteries and bulbs in all of the Emergency Battery Lighting System units. Because these end-of-life failures have been anticipated and are being addressed, the multiple occurrences of these failures do not constitute a repetitive failure.
8. NA-LSO--LLNL-LLNL-2011-0041, *Degraded Safety Significant Compressed Air Panel in Building 332*, reported the discovery during a routine unscheduled system check that the safety-significant compressed air bottle supplying the compressed air panel servicing one of the Building 332 Increment 3 glovebox exhaust fans was at its low pressure limit of 1000 psig. In accordance with facility procedures,

the facility entered a LCO and the compressed air bottle was replaced. After the replacement, the surveillance was successfully completed and the exhaust fan was returned to operational status. Because the compressed air panels are a backup to the house-supplied compressed air system and the laboratory compressed air system, both of which remained operable, a failure of the compressed air panels would not have prevented the Increment 3 glovebox exhaust system from performing its designated safety function. Consequently, the discovered condition did not constitute a noncompliance with DOE nuclear safety requirements.

9. NA-LSO--LLNL-LLNL-2011-0044, *Loss of Facility Power to Increment 3 in Building 332*, reported a loss of power to Building 332 Increment 3 when a normal electric power supply breaker inadvertently opened. The circuit breaker that opened is not itself a safety-class or safety-significant component. When the breaker opened, the appropriate safety-class emergency diesel generator started and the associated safety-class automatic transfer switch activated as designed to restore power to Increment 3. All Building 332 safety systems operated as designed during the momentary interruption of Increment 3 power. No adverse conditions or other equipment problems resulted from the event. Building 332 Increment 1 was unaffected and continued to be supplied by the normal electric power system. All responses by personnel to the loss of power were performed in accordance with facility procedures. Consequently, the reported loss of power did not constitute a noncompliance with DOE nuclear safety requirements.

6.0 Worker Safety and Health Management Issues

Worker safety and health (WSH) includes programs in chronic beryllium disease prevention, biological safety, electrical safety, emergency preparedness, explosive safety, fire safety, integrated safety management, occupational medicine, and other safety and health subjects. Data from 2005 through the third quarter in 2011 were extracted from ITS in October 2011 using the ITS Basic Issue Report.

As discussed in the sections below, the analysis for WSH identified three WSH subjects with a point above the UCL (an action limit) and five WSH subjects with increased issues in the third quarter of 2011. Three WSH subjects were identified in previous analyses as needing follow-up analysis: biological safety, emergency program, and integrated safety management system.

6.1 Chronic Beryllium Disease Prevention Program (CBDPP)

The visual analysis step warranted further analysis of the deficiencies identified in ITS and categorized as beryllium safety. Therefore, this safety subject was analyzed using a control chart. An action limit was met in the control chart analysis, a point above the UCL in the fourth quarter of 2010, as shown in Figure 8. Therefore, this safety subject was analyzed further to resolution.

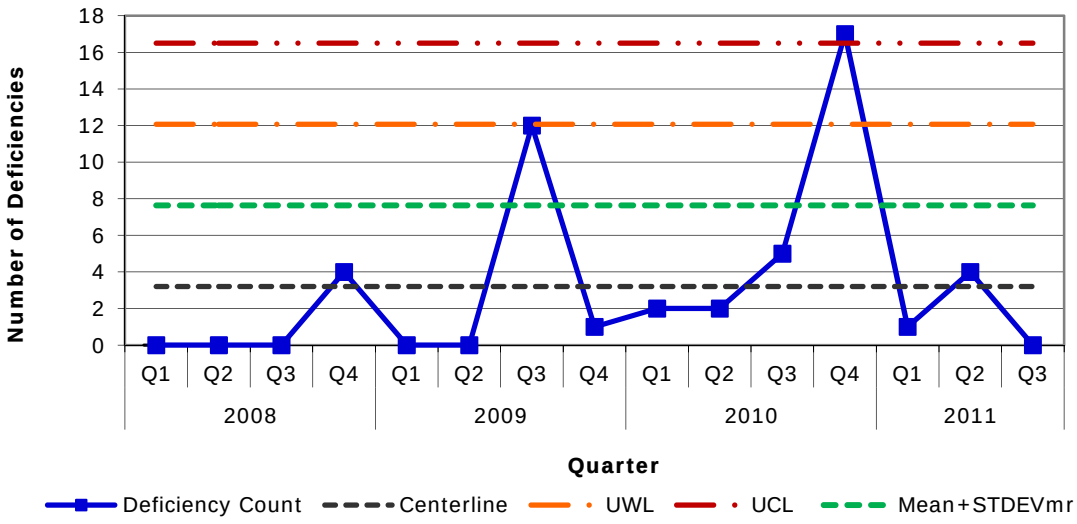


Figure 8. Frequency control chart of beryllium safety deficiencies.

During the third quarter in 2011, the most recent quarter of data analyzed, there were no beryllium deficiencies identified.

Seventeen beryllium deficiencies were identified in the fourth quarter of 2010, causing a point to be above the UCL. Fifteen of the 17 beryllium deficiencies were from the Office of Enforcement's investigation of deficiencies with the LLNL CBDPP. Although the identification date of the 15 deficiencies is listed in ITS as 2010, these deficiencies were identified during an onsite investigation led by the DOE Office of Enforcement in 2009. The 15 deficiencies span across many aspects of the LLNL CBDPP. LLNL has reported a number of beryllium related noncompliances to the DOE NTS; two of the noncompliances reported to NTS are considered programmatic and are in open status, *The Implementation of the CBDPP is Inadequate – Uncontrolled Be Work Performed* [NTS-2008-0005] and *The NNSA Independent Review of the CBDPP stated that the LLNL CBDPP did not Adequately Address Certain Requirements of 10 CFR 850* [NTS-2008-0020].

An effectiveness review of the actions taken to resolve 44 issues identified in the LLNL CBDPP was conducted between March 14 and March 25, 2011. The results of the review indicate that the Laboratory has made significant improvements in achieving the objectives of 10 CFR 850. Several elements of the 10 CFR 850 were determined to be effectively implemented and approximately 70% of the issues evaluated during the review were determined to be effectively resolved. Because LLNL has made significant improvements in the LLNL CBDPP and two NTS reports related to the LLNL CBDPP are open in NTS, a new NTS report is not warranted.

In summary, the deficiencies identified in the beryllium safety subject met an action limit. Further analysis concludes that these deficiencies do not represent a new programmatic (systemic) or repetitive noncompliance reportable to DOE. Although a common test was met, deficiencies within this safety subject were analyzed to resolution. Therefore, this safety subject will not automatically be analyzed using a control chart in future analyses.

☐ Significant, Systemic or Repetitive ☒ Meets Common Tests ☐ Within Expected Variation ☐ Downward Trend

6.2 Biological Safety

The visual analysis step did not warrant further analysis of deficiencies identified in ITS as biological safety; however, the previous analysis report concluded that this safety subject needed continued analysis due to a point above the UWL in the third quarter of 2010. Therefore, this safety subject was analyzed using a control chart. Figure 9 shows that no common tests were recently met and this safety subject was not discussed further.

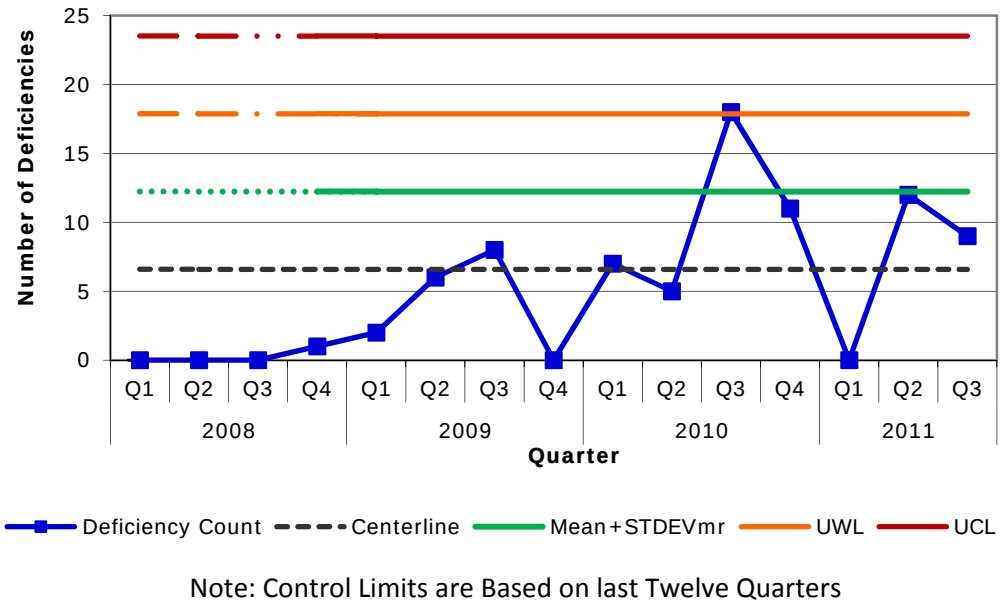


Figure 9. Frequency control chart of biological safety data.

In summary, biological safety deficiencies do not represent a programmatic (systemic) or repetitive noncompliance reportable to DOE because no common tests were recently met. The recent data for this safety subject is considered to be within expected variation.

☐ Significant, Systemic or Repetitive ☐ Meets Common Tests ☒ Within Expected Variation ☐ Downward Trend

6.3 Electrical Safety

The visual analysis step did not warrant further analysis of deficiencies identified in ITS as electrical safety. Therefore, this safety subject was not discussed or analyzed further.

6.4 Emergency Program

The visual analysis step did not warrant further analysis of deficiencies identified in ITS and categorized as emergency program; however, this safety subject was determined to need continued analysis in the last performance analysis due to a point above the UWL and at the UCL in the second quarter of 2010. Therefore, this safety subject was analyzed using a control chart. In this analysis, the point in the second quarter of 2010 is now above the UCL (Figure 10). The 16 deficiencies in the second quarter of 2010 that caused the point to be above the UCL were discussed in the previous analysis report, *Performance Analysis: Issues Tracking System Data through December 2010.* Recently, there was an increase in emergency management deficiencies from the first to the third quarter in 2011, a common test (Figure 10). This safety subject was discussed further.

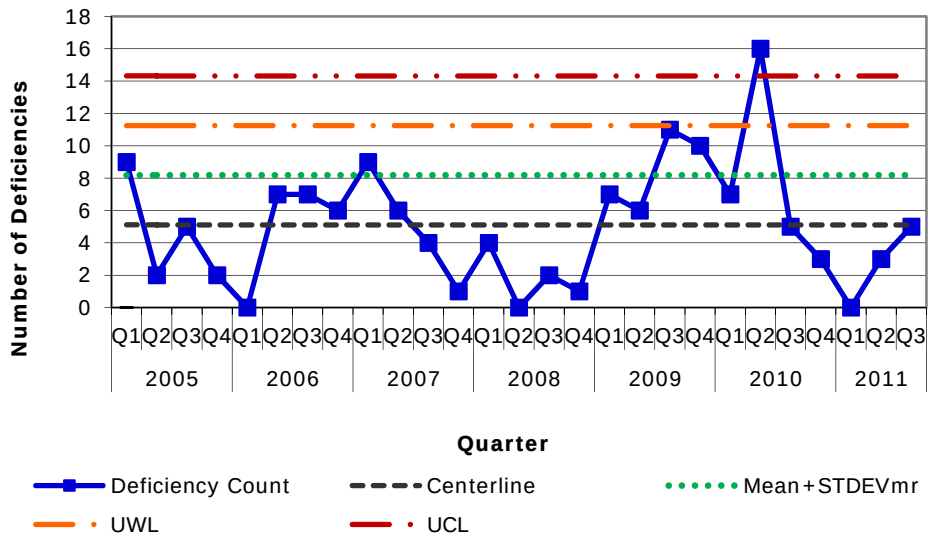


Figure 10. Frequency control chart of emergency program deficiencies.

During the third quarter of 2011, the most recent quarter of data analyzed, five emergency program deficiencies were identified, as shown in Figure 10. Four of the five deficiencies were from the *FY11 Annual Full-Participation Emergency Exercise* joint FAM/Line management assessment and the other deficiency was from the switchgear failure event in Building U424.

So far in 2011, there were a total of eight deficiencies identified; five of the eight were from the *FY11 Annual Full-Participation Emergency Exercise,* two from the *Bi-Annual Safety Officer Inspection,* and one from the switchgear failure event in U424. The purpose of the *FY11 Annual Full-Participation Emergency Exercise*, as stated in the *Exercise After Action Report* was "to test and/or validate the effectiveness of the facility level response capabilities at Building 153 and the site's emergency response organization (ERO) performance in accordance with the LLNL emergency plan and applicable procedures

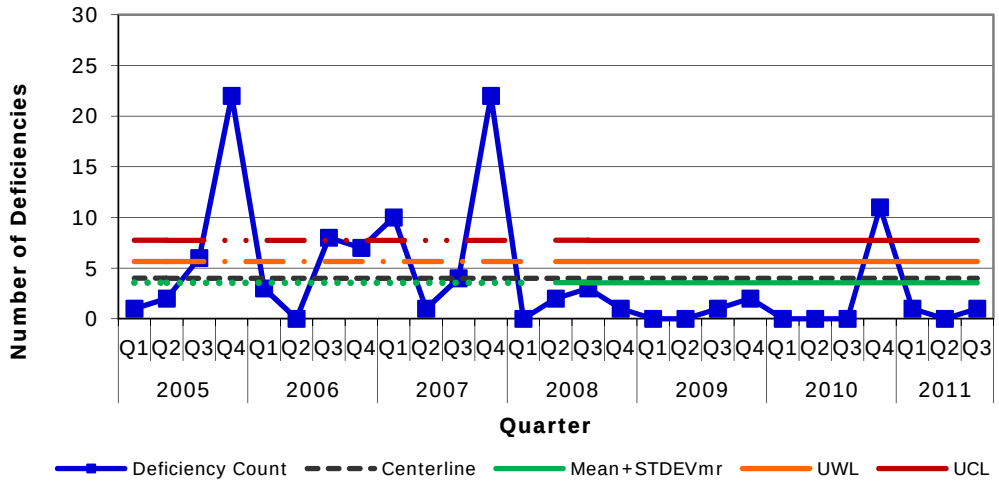
as required by the Department of Energy Order 151.1C, Comprehensive Emergency Management System, and it associated guides." A total of 166 objectives were evaluated during this exercise; LLNL met 84% of the objectives, did not meet 5% of the objectives, and did not observe 11% of the objectives. The deficiencies from the emergency exercise were categorized within one compliance code, "Procedures addressing the use of communications systems for general emergency notifications or normal operations were not followed." The outcome of the FY11 exercise is similar to the FY10 exercise where 83% of the objectives were met and 9% were not met. Based on the compliance code categorization of the deficiencies, it does not appear that the FY10 deficiencies were found during the FY11 exercise. Since LLNL met 84% of the objectives, and none of the FY10 deficiencies were found during the FY11 exercise, deficiencies in this safety subject do not need further discussion.

In summary, emergency program deficiencies met a common test, but do not represent a programmatic (systemic) or repetitive noncompliance reportable to DOE. This safety subject will be analyzed in future analyses because a common test was met.

☐ Significant, Systemic or Repetitive ☒ Meets Common Tests ☐ Within Expected Variation ☐ Downward Trend

6.5 Explosive Safety

The visual analysis step warranted further analysis of the deficiencies identified in ITS and categorized as explosive safety. Therefore, this safety subject was analyzed using a control chart. An action limit was met in the control chart analysis, a point above the UCL in the fourth quarter of 2010, as shown in Figure 11. Therefore, this safety subject was analyzed further to resolution.



Note: Control Limits are Based on last Fifteen Quarters

Figure 11. Frequency control chart of explosive safety deficiencies.

During the third quarter of 2011, the most recent quarter of data analyzed, one explosive safety deficiency was identified from an MSA on work control in the Weapons and Complex Integration Directorate.

In the fourth quarter of 2010, 11 deficiencies were identified causing a point to be above the UCL. Nine of the 11 deficiencies were from a joint FAM/line assessment, *Explosive Operations Compliance*, and two deficiencies were reported to the DOE NTS in the report, *Eight Instances of Department of Transportation Hazard Class 1.4 Explosives Received by an LLNL Facility not authorized to Receive this Type of Shipment.*

The nine deficiencies from the *Explosive Operations Compliance* assessment were categorized as three different sub-topics and seven different compliance codes. The assessment report states, "On the whole, explosive operations at LLNL are being conducted in a safe manner and are in compliance with the DOE Explosives Safety Manual (ESM). There are activity specific areas for improvement and these are detailed in the recommendations identified in Section 3 of this report which for the most part are limit to specific operations." The assessment report does detail three areas of concern that exist over multiple areas of the Laboratory. Two of the areas of concern are observations, and one a deficiency; these areas are summarized below:

- (Observation) In 2006, the original Process Hazard Analyses (PrHAs) for Site 300 Chemistry and Process Areas were replaced by the safety analysis within the Safety Basis Document prepared under ES&H Manual Document 3.1. In 2007, HEAF and the Site 300 Firing Areas went the opposite direction breaking out their PrHAs from the safety analysis in the previous Safety Analysis Reports as separate, standalone analysis appended to the Document 3.1 Safety Basis Documents only for ease of reference. Now that the ES&H Manual Document 3.1 concern is only safety impacts to co-located workers and the public, this type of integration in the two analyses (Safety Basis and PrHA) and their review process is much harder to do. It is possible the checklist found in the screening document portion of the Safety Basis Document could be used to meet the Chapter II, Section 1.7 requirements but the instructions contained in Document 3.1 for use of the screening document could cause the checklist to be used in manner that is exclusive of worker safety aspects.
- (Observation) The numbers and types of operating procedures across explosives facilities and activities are varied and authorizing organizations appear not to have a consistent framework for when to require an operating procedure or what content to include. Some documents that could be consider operating procedures for explosives activities at HEAF and Site 300, did not have evidence of a safety organization review.
- (Deficiency) Since the time of the original qualification of the Faraday Cage lightning protection systems, there has been no inspection of these systems as required per Chapter X, Section 3.2.2 of the DOE Explosive Safety Manual (ESM).

The Faraday Case lightning deficiency was evaluated to see if it met the NTS reporting threshold as a WSH "Other Significant Condition." It is noted in ITS that, "The history of the Faraday Cage lightning protection system implementation at Site 300 includes some very conscious management decision to fund the initial certification tests of buildings. The two and five-year inspections on Faraday Cage lightning protection systems at some Site 300 buildings have not been completed because across Site 300 the Faraday Cage lightning protection system has not been activated. Most explosive operating facilities were modified to meet Faraday Cage-like protection requirements but additional risk analysis and changing requirements made Faraday Cage-like protection unnecessary. Per the Explosives Safety SME, the facilities could still be considered in compliance when the exceptions to lightning protection provided in Chapter X, Section 4 of the DOE ESM and the Site 300 lightning warning system procedures are considered. The DOE Explosives Safety Committee has taken up a discussion as to whether to replace Chapter X of the DOE ESM with the NFPA 780 standard so the requirements on this subject may be changing." The assessment report also states that, "Despite the observation that the inspections are not being done, the facilities can still be considered in compliance when the exceptions to lightning protection provided in Chapter X, Section 4 of the DOE ESM and the Site 300 lightning warning system procedures are considered. Chapter X, Section 4 has been used by

HEAF to justify not having a lightning protection system." Based on the information provided by Site 300 management, the Faraday Cage lightning protection system has not been activated across Site 300 and in some cases it is considered unnecessary, this deficiency does not meet the WSH "Other Significant Condition" reporting threshold for reporting to the DOE NTS.

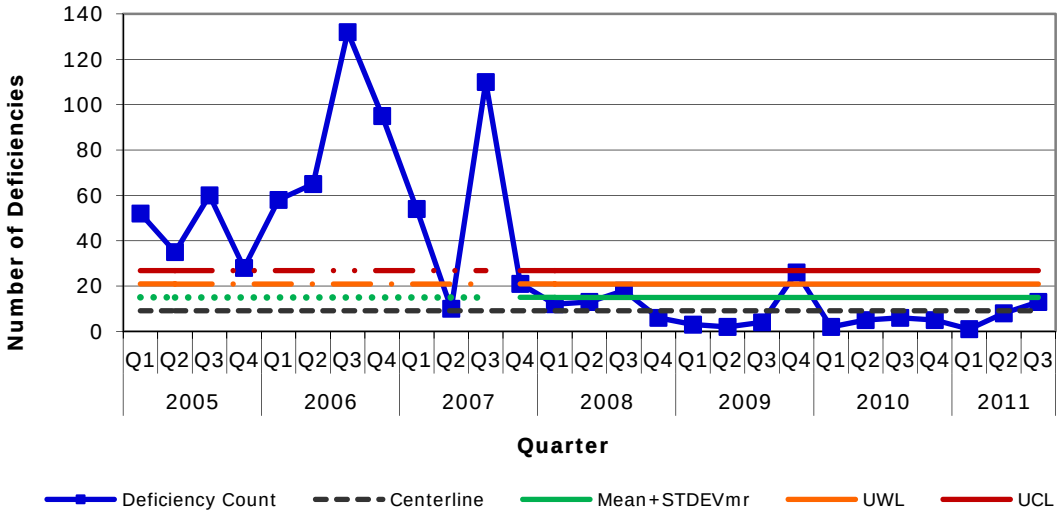
The other deficiencies from the *Explosive Operations Compliance* assessment were reviewed for more significant, repetitive, or systemic noncompliances. Based on the overall conclusion made by the assessors, the deficiencies from this assessment do not meet any NTS reporting threshold.

In summary, explosive safety deficiencies caused an action limit to be met. This was mainly due to deficiencies identified in the *Explosive Operations Compliance* assessment. Further analysis of these deficiencies and the assessment report concludes that these deficiencies do not represent a programmatic (systemic), significant, or repetitive noncompliance reportable to DOE. Although a common test was met, deficiencies within this safety subject were analyzed to resolution. Therefore, this safety subject will not automatically be analyzed using a control chart in future analyses.

☐ Significant, Systemic or Repetitive ☒ Meets Common Tests ☐ Within Expected Variation ☐ Downward Trend

6.6 Fire Safety

The visual analysis step warranted further analysis of deficiencies identified in ITS as fire safety, specifically related to fire suppression. Therefore, this safety subject was analyzed using a control chart (Figure 12). Based on the control chart analysis, there was an increase in fire suppression deficiencies from the first to the third quarter in 2011, a common test. Therefore, this safety subject was discussed further.



Note: Control Limits are Based on last Sixteen Quarters

Figure 12. Frequency control chart of fire suppression deficiencies.

During the third quarter in 2011, the most recent quarter of data analyzed, there were 13 fire suppression deficiencies identified from a number of different assessment owned by five different directorates. Ten of the 13 assessments were categorized as either a 2011 Q1 fire protection assessment, facility walkthrough, or a NIF annual walkabout.

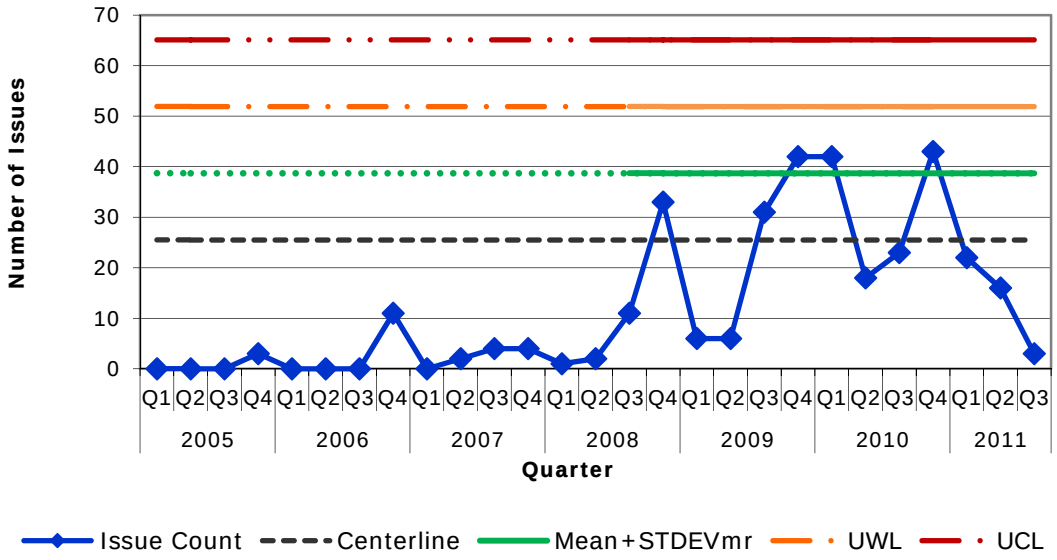
During the second quarter of 2011, four of the eight deficiencies were from a self assessment of security office facilities.

In summary, recent data within the fire suppression subject met a common test. These deficiencies do not represent a systemic or repetitive noncompliance reportable to DOE, but this safety subject will be analyzed in future analyses to determine if fire suppression deficiencies continue to increase.

☐ Significant, Systemic or Repetitive ☒ Meets Common Tests ☐ Within Expected Variation ☐ Downward Trend

6.7 Integrated Safety Management System (ISMS)

The visual analysis step did not warrant further analysis of deficiencies identified in ITS as ISMS; however, this safety subject was determined to need continued analysis due to consecutive increases in ISMS issues from the second to the fourth quarter in 2010. Therefore, issues within this safety subject were analyzed using a control chart. No common test was recently met in the control chart analysis (Figure 13). The number of ISMS issues has been decreasing since the fourth quarter of 2010. Therefore, this safety subject is not discussed further.



Note: Control Limits are Based on last Thirteen Quarters

Figure 13. Frequency control chart of ISMS issues.

In summary, no common test was recently met in the control chart analysis and the number of ISMS issues has been decreasing since the fourth quarter of 2010. Therefore, the issues identified in the ISMS subject are within expected variation, and no issues within this safety subject are reportable to the DOE Office of Enforcement as either repetitive or systemic.

☐ Significant, Systemic or Repetitive ☐ Meets Common Tests ☒ Within Expected Variation ☐ Downward Trend

6.8 Occupational Medicine

The visual analysis step did not warrant further analysis of deficiencies identified in ITS and categorized as occupational medicine. Therefore, this safety subject is not discussed or analyzed further in this report.

6.9 Other Industrial Hygiene

The visual analysis step warranted further analysis of deficiencies identified in ITS and categorized as the industrial hygiene topic, specifically those categorized as respiratory protection. Sanitation deficiencies were determined to need continued analysis due to a point above the UWL in January 2010. Therefore, both respiratory protection and sanitations deficiencies were analyzed using control charts.

Respiratory Protection

The control chart analysis (Figure 14) for respiratory protection deficiencies shows a point above the UWL in February 2011 and an increase in the deficiency rate in the most recent month analyzed; both are common tests. Therefore, this safety subject was discussed further.

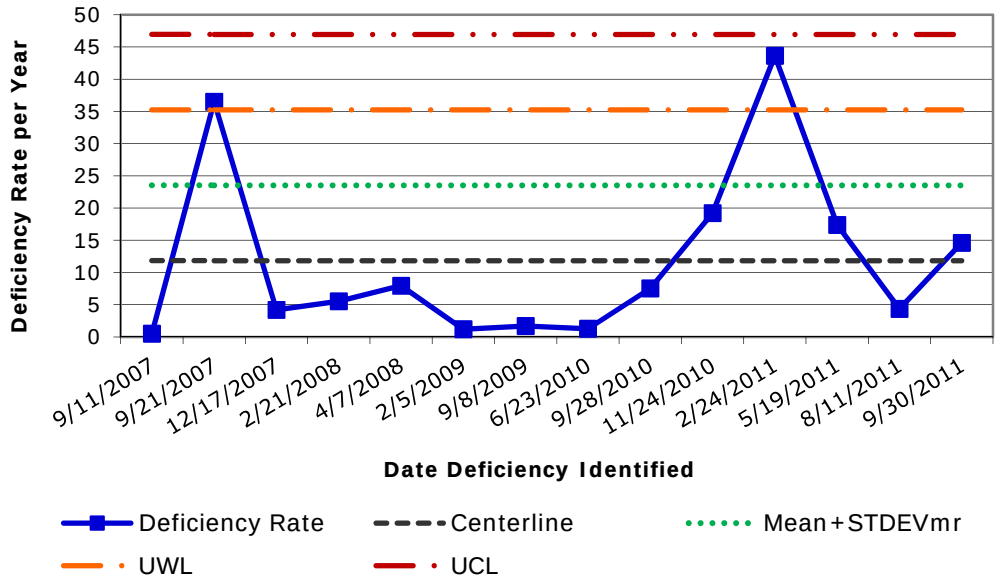


Figure 14. Deficiency rate per year control chart of respiratory protection deficiencies.

During the third quarter in 2011, the most recent quarter of data analyzed, two respiratory protection deficiencies were identified.

In 2011, 15 respiratory protection deficiencies were identified. Eleven of the 15 deficiencies identified in 2011 were from the management observation, verification and inspection (MOVI), *Storage and Maintenance of Respirators in Field Locations*. Seven of the

11 deficiencies were related to the improper storage of respirators in different facilities and rooms. This MOVI listed three different issue identification dates for the 11 issues. Figure 14 was revised to show all 11 issues identified on the same date, since they were from the same source. The 11 issues were found during an extent of condition review that was performed in response to an NTS reported noncompliance with the LLNL Respirator Protection Program [NTS-LSO-LLNL-LLNL-2011-0003]. In February 2011, LLNL reported to the DOE NTS that "Although a documented process exists to comply with OSHA 1910.134(I), Respirator Protection Program Evaluation, a sample assessed by the Livermore Site Office provided evidence that this process is not being properly implemented in accordance with 1910.134(I)." The extent of condition review in response to this reported noncompliance aligned with the Livermore Site Office's reported deficiency related to the respirator evaluation program. The 11 issues found during the extent of condition review support the programmatic noncompliance that was already reported to the DOE NTS. Therefore, a new noncompliance report is not warranted.

In summary, recent respiratory protection data met a common test in the control chart, but the issues that caused a point to be above the UWL support an existing noncompliance that was reported to the DOE NTS in February 2011. Therefore, no new issues within this safety subject are reportable to the DOE Office of Enforcement as either repetitive or systemic.

Sanitation

The control chart analysis (Figure 15) shows a point in February 2011 above the UWL, a common test. Therefore, this safety subject was discussed further.

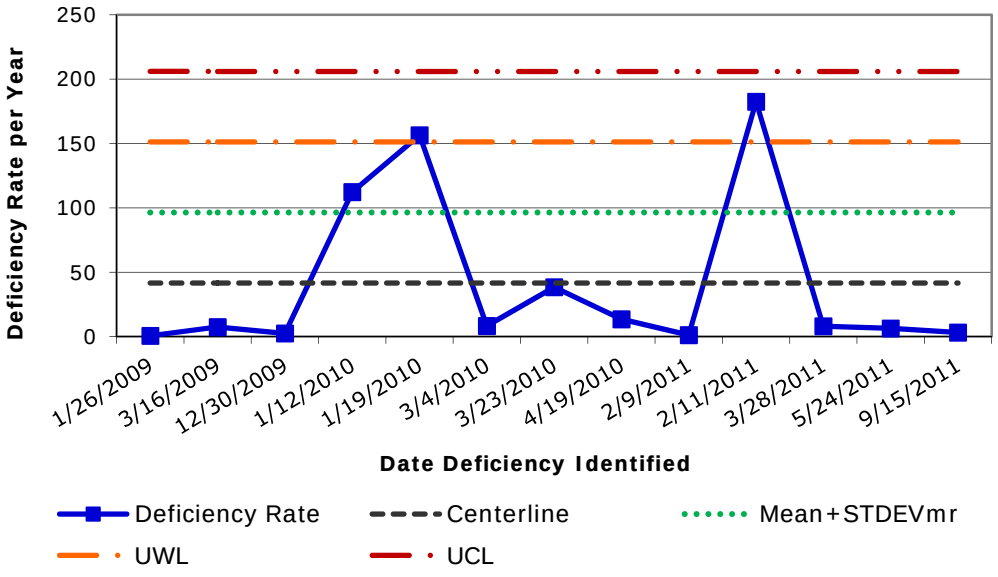


Figure 15. Deficiency rate per year control chart of sanitation deficiencies.

During the third quarter in 2011, the most recent quarter of data analyzed, five deficiencies were identified. Three of the five issues were from industrial hygiene periodic baseline surveys. Two deficiencies were identified within two days of each other, causing a point to be above the UWL in February 2011. The two deficiencies were unrelated. One deficiency was due to the lack of signage on a new deli refrigerator and the other deficiency was related to safety signage communicating a high noise area when equipment is in operation. After a review of the five issues identified in 2011, it appears that at least three of the issues should not have been categorized as sanitation deficiencies, including the deficiency identified on February 11, 2011 (Figure 15). This would have caused the point above the UWL to be below the UWL.

The control chart analysis for sanitation deficiencies concludes that a common test was recently met, but the deficiency that caused a point to be above the UWL should not have been categorized in the sanitation topic, along with at least two other deficiencies categorized as sanitation. Therefore, no new issues within this safety subject are reportable to the DOE Office of Enforcement as either repetitive or systemic.

In summary, issues identified in the industrial hygiene safety subject met a common test, specifically related to respiratory protection and sanitation deficiencies. Further analysis concludes that these deficiencies do not represent a programmatic (systemic) or repetitive noncompliance reportable to DOE. The respiratory protection safety subject will continue to be analyzed in future analyses.

☐ Significant, Systemic or Repetitive ☒ Meets Common Tests ☐ Within Expected Variation ☐ Downward Trend

6.10 Other Industrial Safety

The visual analysis step did not warrant further analysis of deficiencies identified in ITS as industrial safety. Therefore, this safety subject is not discussed or analyzed further in this report.

6.11 WSH Quality Assurance

The visual analysis step warranted further analysis of deficiencies identified in ITS and categorized as WSH quality assurance (QA). Therefore, this safety subject was analyzed using a control chart (Figure 16). The control chart analysis shows a point above the UCL in the third quarter of 2010, an action limit; this safety subject was analyzed to resolution.

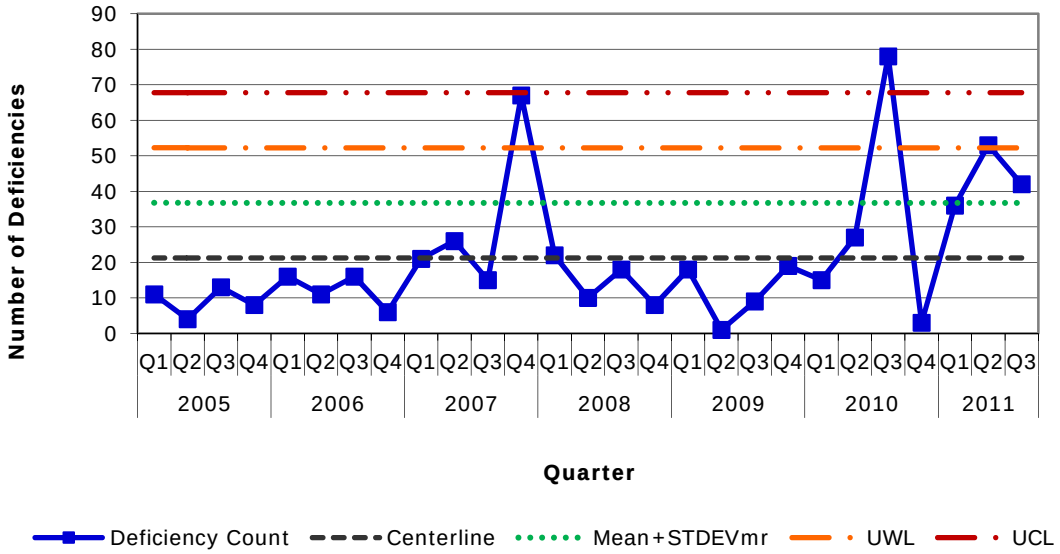


Figure 16. Frequency control chart of WSH quality assurance deficiencies.

During the third quarter in 2011, the most recent quarter of data analyzed, 42 WSH QA deficiencies were identified, a decrease from the previous quarter. The majority of WSH QA deficiencies identified in the third quarter of 2011 were categorized as Management/Personnel Training and Qualification (55%), and Performance/Work Processes (38%).

In the third quarter of 2010, the quarter with a point above the UCL, 73% of WSH QA deficiencies were categorized as Management/Personnel Training and Qualification. The Management/Personnel Training and Qualification topic was analyzed using a control chart.

Management/Personnel Training and Qualification

The control chart analysis (Figure 17) shows two points above the UCL, an action limit. Therefore, this safety subject was analyzed to resolution.

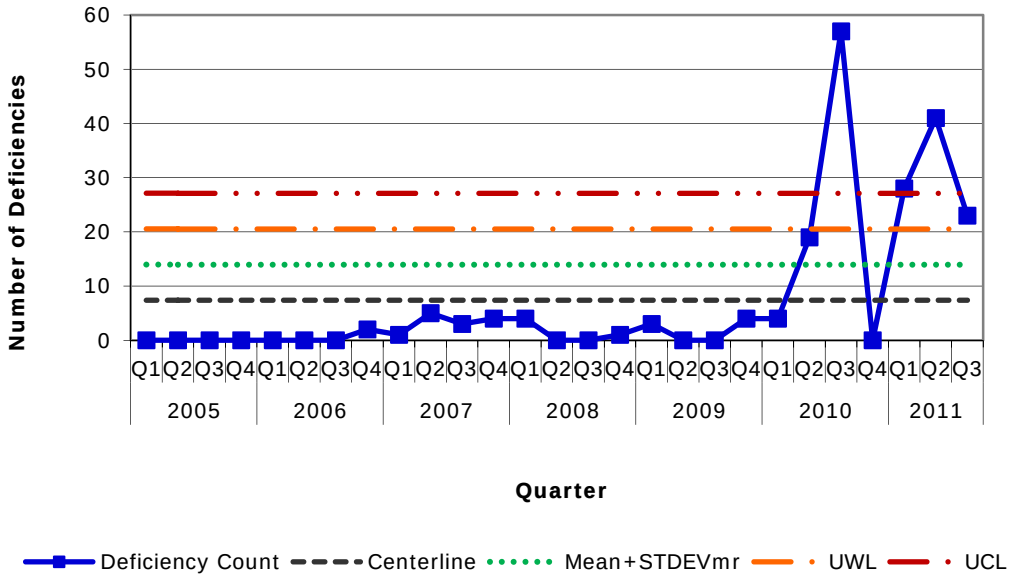


Figure 17. Frequency control chart of WSH quality assurance criterion 2 (Management/Personnel Training and Qualification) deficiencies.

A point is above the UCL in the third quarter of 2010 and the second quarter of 2011.

In the third quarter of 2010, the majority of identified deficiencies were from three sources, an ES&H assessment titled, *Activity-Level Training Compliance*, IWS training verifications of the S or Z program, and S program management walkthroughs of IWSs. The Global Security (GS) Directorate owns 66% of WSH training and qualification deficiencies identified in the third quarter of 2010.

In the second quarter of 2011, the majority of identified deficiencies were from two sources, IWS training verifications of various programs and S and N program management walkthroughs. All deficiencies identified in the second quarter of 2011 are owned by the GS Directorate.

The GS Directorate has been performing IWS training verifications or IWS training related assessments since 2007, but it appears that prior to 2010 the GS Directorate was not marking the WSH question in ITS as "yes." Therefore, this control chart cannot be used to determine if a systemic or programmatic WSH training and qualification noncompliance exists because the control chart does not accurately reflect the number of WSH training and qualification deficiencies prior to 2010. Section 9.5 will analyze training and qualification deficiencies across multiple functional areas.

In summary, the control chart analysis for WSH QA deficiencies shows that an action limit was met, a point above the UCL. The majority of the WSH QA deficiencies in the quarter with the point above the UCL were categorized as Management/Personnel Training and Qualification. The Management/Personnel Training and Qualification topic was analyzed using a control chart and an action limit was met, two points above the UCL. However, this control chart is not representative of WSH training and qualification deficiencies because the WSH ITS question was not being selected as "yes" prior to 2010 by the organization that uses the QA training and qualification topic the most. Section 9.5 will analyze training and qualification deficiencies from multiple functional areas. Therefore, it was determined that WSH QA deficiencies do not represent a programmatic (systemic), significant, or repetitive noncompliance reportable to DOE. Although a common test was met, deficiencies within this safety subject were analyzed to resolution. Therefore, this safety subject will not automatically be analyzed using a control chart in future analyses.

☐ Significant, Systemic or Repetitive ☒ Meets Common Tests ☐ Within Expected Variation ☐ Downward Trend

6.12 "Other Significant Condition" Noncompliances

The WSH "Other Significant Condition" NTS reporting threshold is defined as "a condition or hazard that has the potential to cause death or serious physical harm (injury or illness)." This reporting threshold would include, at a minimum, significant noncompliances with high relative risk, as defined in DES-0083. These deficiencies are identified in ITS as having an issue significance of one, but could also be an issue with an issue significance of two.

Two methods were used to review ITS data for deficiencies that may meet the "Other Significant Condition" NTS reporting threshold:

1. A review of all issue significant one and two deficiencies with identification dates starting in June 2010 through September 2011
2. A review of all deficiencies with compliance codes that suggests an issue significance of one, but the significance was downgraded

There were no issue significant one deficiencies identified between June 2010 and September 2011. There were 23 issue significant two deficiencies identified between June 2010 and September 2011; 13 of the 23 were reported to the DOE NTS. Of the remaining 10, seven are from security incidents or classified information security noncompliances reported to the DOE SSIMS, and two are non-WSH deficiencies. The remaining issue significance level two deficiency was found during a facility walkthrough with the following description, "A control module for an obsolete machine tool was discovered in a locked, unused room. The module appears to be unused and is sealed in plastic material. The module has two capacitors that are not grounded (they are wired into the control module)." This issue was discussed with the

electrical safety subject matter expert. Because controls were in place to prevent an exposure, the module was sealed, unused and was in a locked, access-controlled room, this deficiency does not meet the NTS reporting threshold as an "Other Significant Condition."

There was one deficiency assigned a compliance code with a suggested issue significance of one since the second quarter of 2010, but downgraded to another issue significance. This issue was already reported to the DOE NTS, *Repetitive noncompliances with confined space rescue and emergency services requirements* [NTS-LSO-LLNL-LLNL-2011-0016].

Based on a review of deficiency descriptions by the Performance Analysis and Reporting Section of the Contractor Assurance Office and the electrical safety subject matter expert when appropriate, it was determined that the issue significant two deficiency does not have the potential to cause death or serious physical harm because of the controls in place, and the one deficiency downgraded from a suggested issue significance one was downgraded appropriately from an issue significance one deficiency to another, more appropriate significance. Therefore, no deficiencies reviewed as potential "Other Significant Conditions" were found to meet the WSH threshold for reporting to the DOE NTS.

7.0 Nuclear Safety Management Issues

Nuclear safety includes safety programs in nuclear operations (criticality safety, safety basis, and system engineering), nuclear packaging and transportation, quality assurance, and radiation protection. Data from 2005 through September 2011 were extracted from the Issues Tracking System (ITS) in October 2011 using the ITS Basic Issue Report. One nuclear safety subject, radiation protection, was identified in the previous analysis as needing follow-up analysis. Based on the frequency of deficiencies by functional area in the most recent quarters, all four nuclear-related functional areas were analyzed using control charts.

As discussed in the sections below, the analysis for nuclear safety deficiencies identified two subjects with increased deficiencies or deficiency rates in this quarter.

7.1 Nuclear Operations

The visual analysis step warranted further analysis using a control chart of deficiencies identified in ITS and categorized as the nuclear operations functional area. Therefore, this safety subjects was analyzed using control charts.

There is a point above the Upper Warning Limit (UWL) in Figure 18, which is a common test. There is also a statistically significant increase in nuclear operations deficiencies from 2005 to the third quarter in 2011 (p-value < 0.05). This functional area is discussed further.

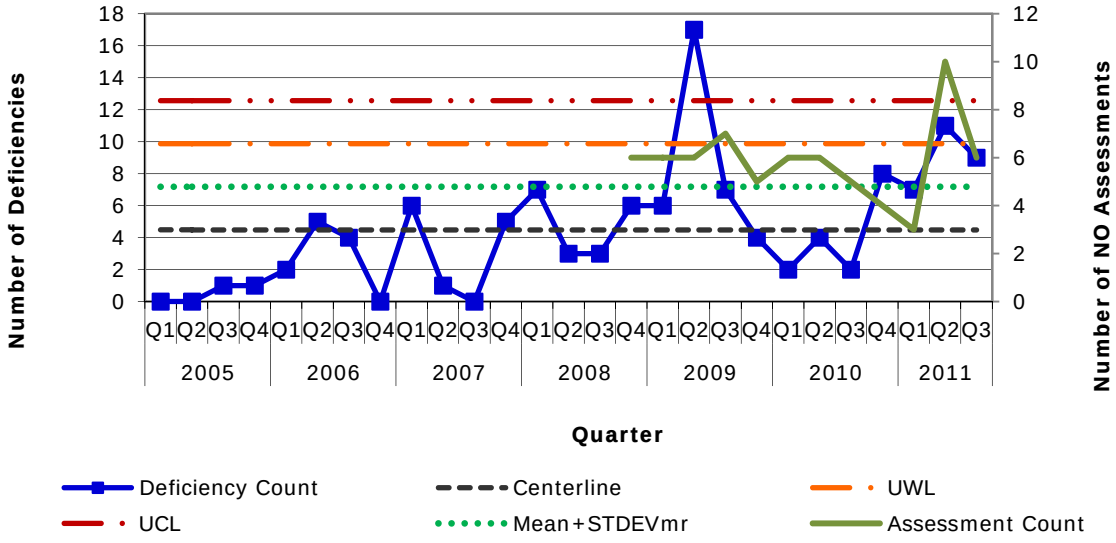


Figure 18. Frequency control chart of nuclear operations data.

During the third quarter of 2011, the most recent quarter of data analyzed, nine nuclear operation deficiencies were identified, as shown in Figure 18. All nine of these deficiencies were associated with occurrence reports and categorized as the safety basis,

analysis, design, and documentation topic. Two of the nine deficiencies listed in ITS were titled "Report Response Elements," and should have been correctly categorized in ITS as observations rather than as deficiencies.

Overall, during the period 2005 through the third quarter of 2011, there is a statistically significant increasing trend in nuclear operations deficiencies, observations, and the total issue count (all p-values <0.05). During the period 2008 through the third quarter in 2011, there has been an increase in occurrences related to nuclear operations, namely:

- 5 reports in 2008
- 5 reports in 2009
- 10 reports in 2010
- 20 reports in 2011

The 2010 – 2011 occurrence reports were reviewed to determine if a specific cause could be found for this increase and to determine if any of these occurrences and associated noncompliances represented a programmatic or repetitive issue. This review produced the following results:

- During 2010, three occurrences were reported for the discovery during routine scheduled surveillances of degradation of the Building 332 safety-significant Emergency Battery Lighting System (NA-LSO—LLNL-LLNL-2010-0027, 2010-0045, and 2010-0056). An additional three occurrences of the same condition, also discovered during routine scheduled surveillances, were reported during 2011 (NA-LSO—LLNL-LLNL-2011-0004, 2011-0012, and 2011-0036). Although these six reports may at first appear to be a repetitive issue, the discovered condition is a known end-of-life equipment failure issue for which Nuclear Materials Technology Program (NMTP) has identified and is implementing a process to fundamentally resolve. As discussed in Section 5 of this report, in each of the six cases (1) the degraded condition was discovered by LLNL personnel during a routine scheduled surveillance being performed in accordance with facility procedures and under an approved facility Work Permit, (2) upon the identification of the failed surveillance and in accordance with facility procedures, the Facility Operators entered into a Limiting Condition for Operation (LCO) for the affected Radioactive Materials Area Laboratory, and (3) as allowed by the approved facility work permit, the electrician immediately replaced the failed bulb in the affected unit, retested the unit, and it was returned to operation. At that time the facility exited the LCO. Consequently, these occurrences each constituted a required report of a discovered discrepant condition, and did not represent a deficiency in nuclear facility operations, either individually or as an adverse trend.
- During the period 2010 through the third quarter of 2011, LLNL reported three occurrences (NA-LSO—LLNL-LLNL-2010-0015, 2011-0015, and 2011-0055) related to security-related discrepant conditions that constituted positive

Unreviewed Safety Questions (USQs), i.e., that fell outside the safety bases of LLNL Superblock nuclear facilities. In all three cases, the reported conditions related to operation by Laboratory Security of the Mobile Weapons Platform (MWP) that were determined by NMTP management to constitute positive USQs. These occurrences each constituted a required report by nuclear facility management of a discovered discrepant condition that was *not* of nuclear operations origin. Consequently, these occurrences did not represent a deficiency in nuclear facility operations, either individually or as an adverse trend.

- During the reporting period, NMTP reported three occurrences related to estimation of worker doses from radiological waste material. Two of these reports (NA-LSO—LLNL-LLNL-2011-0022 and 2011-0034) related to selection of solubility scenarios assumed in the calculation of doses from potential spills of plutonium chloride (PuCl) in Building 332 and in RHWM waste storage facilities, respectively. The Building 332 condition was determined to be a negative USQ determination owing to the small amounts of PuCl in Building 332 (i.e., not due to the selection of solubility factor), the RHWM condition was determined to be a positive USQ (i.e., actual inadequacy in the safety analysis) because the RHWM waste storage facilities Documented Safety Analysis (DSA) did not consider PuCl spills in *any* amount. The third report (NA-LSO—LLNL-LLNL-2011-0039) reported a positive USQ related to selection of Pu-239 equivalent-curie values in the RHWM waste storage facilities DSA and Technical Safety Requirements (TSRs). Although topically similar, the circumstances of these three occurrences are sufficiently different individually that they do not appear to constitute a repetitive or systemic deficiency. In accordance with the criteria of the DOE Enforcement Process Overview, the two RHWM occurrences were reported to the DOE Noncompliance Tracking System in submittals NA—LSO-LLNL-LLNL-2011-0013 and 2011-0015, respectively.

Note that if we remove the occurrences related to the known Building 332 end-of-life condition and the occurrences related to the MWP conditions (none of which are indicative of nuclear operations deficiencies, either individually or collectively), the 2010 and 2011 occurrence report totals drop to six and 15, respectively, and thereby reduce the apparent increases over the 2008 and 2009 values.

One of the nuclear operation subjects revealed the need for control chart analysis, the safety basis, analysis, design, and documentation topic. This subject was analyzed further.

Safety Basis, Analysis, Design, and Documentation

There were a total of 27 nuclear operation deficiencies in 2011, 25 of which were categorized as safety basis analysis, design and documentation. Twenty of the 25 safety basis analysis, design and documentation deficiencies in 2011 were from occurrences.

- Three in the first quarter of 2011
- Eight in the second quarter of 2011
- Nine in the third quarter of 2011

The control chart analysis shows a point above the UWL in Figure 19, a common test. Therefore, this subject was discussed further.

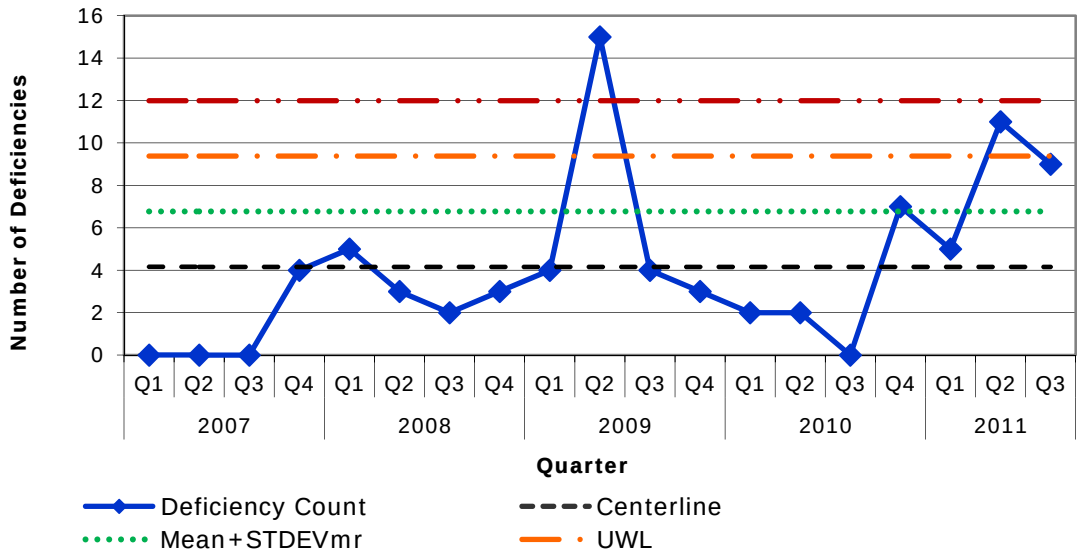


Figure 19. Frequency control chart of safety basis, analysis, design, and documentation data.

During the third quarter of 2011, the most recent quarter of data analyzed, nine safety basis, analysis, design, and documentation deficiencies were identified, as shown in Figure 19. All nine of these deficiencies were associated with occurrences and were categorized as three different subtopics: hazard categorization and accident analysis; safety analysis reports; and technical safety requirements. Two of the nine deficiencies listed in ITS were "Required Response Elements," for the respective occurrence reports and should have been categorized as observations rather than deficiencies.

A total of 25 safety basis deficiencies (issues) were reported in 2011, seven of which were occurrence report issues, "Required Response Elements" incorrectly categorized as deficiencies. Of these 25 safety basis deficiencies, 20 are captured by the following 11 occurrence reports (number of associated issues indicated by "n=" in the report title; titles with an "*" indicate reports for which the "Required Response Element" issue was incorrectly categorized in ITS as a deficiency rather than as an observation):

- NA—LSO-LLNL-LLNL-2010-65, *PISA: Discrepant as Found Condition in B331 - Standby Power Not Provided to Room CAM* (Determination of a negative USQ).* This occurrence reported the discovery that a room Continuous Air Monitor (CAM) in Building 331 was not connected to a standby power supply as described in the

facility Documented Safety Analysis. The CAM was *not* a credited safety system in the DSA and the PISA was determined to be a negative USQ. The CAM configuration was modified to be consistent with the DSA.

- NA—LSO-LLNL-LLNL-2011-0010, *TSR Violation: Radioactive Materials Operations Conducted In Building 331 When Facility Was In Warm Standby Mode*.* This occurrence reported the failure of a Building 331 worker to follow an administrative control prohibiting work when the facility is in "Standby" mode.

- NA—LSO-LLNL-LLNL-2011-0018 (n=2), *Discrepant as Found Condition in Building 331 Tritium Stack Monitor Air Flow Path*"* This occurrence reported the discovery of an as-found condition (PISA) that the stack monitor air flow path did not match DSA description. The PISA was determined to be a negative USQ, the air flow path in the stack monitor (not a credited safety system in the DSA) was modified to match the DSA description.

- NA—LSO-LLNL-LLNL-2011-0021 (n=2), *TSR Violation: Inadequate Implementation of a TSR Specific Administrative Control*.* This occurrence reported the inadequate implementation of a Technical Safety Requirement (TSR) in Building 331 that all facility areas be included in evaluations of combustible loading.

- NA—LSO-LLNL-LLNL-2011-0023 (n=3), *PISA: Mobile Weapons Platform Firing Circuit Failure Mode*.* This occurrence reported the discovery by the LLNL Security Organization of a previously unknown and unanalyzed firing mode for the Mobile Weapons Platform (MWP), which was determined to be a positive USQ. See the discussion above in Section 7.1 regarding nuclear safety "deficiencies" associated with this and related Security Organization operations involving the Mobile Weapons Platform.

- NA—LSO-LLNL-LLNL-2011-0031 (n=2), *Cracked Glovebox Window in Building 332*.* This occurrence reported the discovery of a glovebox window that cracked when accidentally bumped by a worker. The window was removed and replaced in accordance with facility procedures after an evaluation was performed of the window material in use**.** This occurrence can be considered a routine "find and fix" situation that although categorized as a deficiency in ITS, is not necessarily indicative of an actual deficiency in nuclear operations**.**

- NA—LSO-LLNL-LLNL-2011-0034, *Potential Inadequacy in the Safety Analysis: Waste Storage Facilities Solubility Scenarios Involving Plutonium Chloride.* This occurrence reported the discovery that the RHWM Waste Storage Facilities Documented Safety Analysis did not explicitly evaluate the potential contribution of spilling *any* amount (i.e., a non-zero amount) of plutonium chloride in a highly soluble form applicable to ICRP 72 absorption Type M. This PISA was subsequently determined to be a

positive USQ, which was reported to the DOE Noncompliance Tracking System. See the above discussion in Section 7.1 of this and related occurrence reports NA—LSO-LLNL-LLNL-2011-0022 and 2011-0039.

- NA—LSO-LLNL-LLNL-2011-0036, *Degradation of the Building 332 Safety Significant Emergency Battery Lighting System - July 2011 Test*. This occurrence reported the anticipated end-of-life failure of aging components in a safety-significant system discovered by a routine scheduled surveillance. The defective component replaced per facility procedures, NMTP has identified and is implementing a process to fundamentally resolve this issue. See the above discussion in Section 7.1 regarding this and other related occurrence reports for other instances of anticipated failures in the same system.

- NA—LSO-LLNL-LLNL-2011-0038, *Discrepant As Found Condition in Building 331 - Fire Suppression System Gauge Not Installed*. This occurrence reported the discovery that one of two inlet water pressure gauges were not installed as required by NFPA 13. The as-found condition (PISA) was determined to a negative USQ and a second gauge was installed as required.

- NA—LSO-LLNL-LLNL-2011-0039 (n=2), *PISA: Inconsistent Method Used to Determine Pu-239 Equivalent Curie (PE-Ci) Values in the Waste Storage Facility DSA/TSR*. See the above discussion in Section 7.1 of this and related occurrence reports NA—LSO-LLNL-LLNL-2011-0022 and 2011-0034.

- NA—LSO-LLNL-LLNL-2011-0041 (n=2), *Degraded Safety Significant Compressed Air Panel in Building 332*. This occurrence reported a degraded component discovered during routine scheduled surveillance and replaced in accordance with facility procedures. This occurrence can be considered a routine "find and fix" situation that although categorized as a deficiency in ITS, is not necessarily indicative of an actual deficiency in nuclear operations.

Figure 20 below presents the control chart for safety basis deficiencies, excluding those "Required Response Element" deficiencies that should have been categorized in ITS as observations. A common test was still met: recent consecutive increases in the deficiencies identified by quarter; however, by excluding the incorrectly categorized "Required Response Elements" issues, a point is no longer above the UWL.

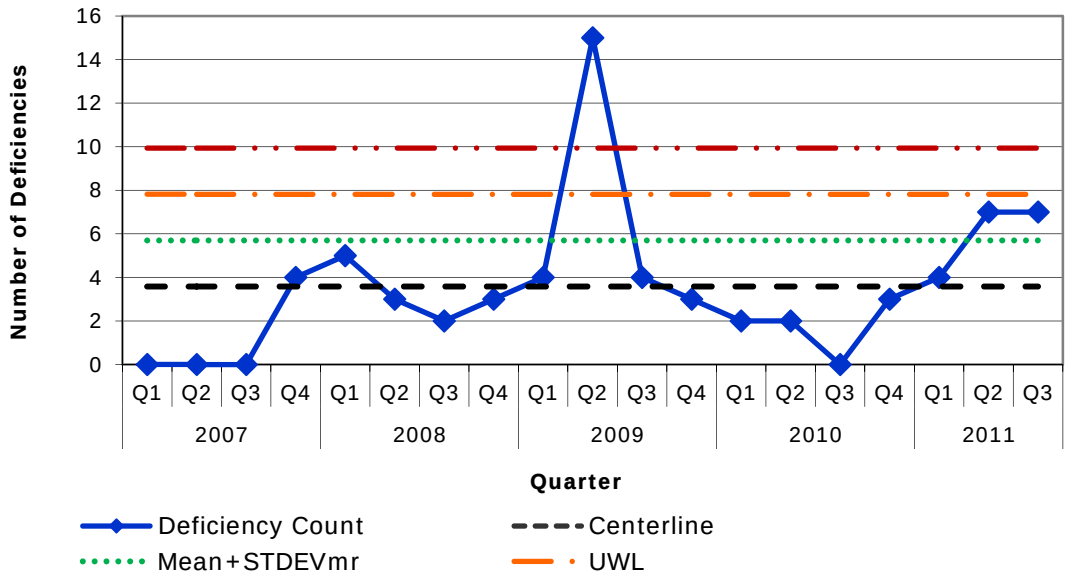


Figure 20. Frequency control chart of safety basis, analysis, design, and documentation data excluding incorrectly categorized deficiencies.

In summary, with or without the incorrectly categorized "Required Response Element" issues, the process control chart indicates an increase in nuclear operations deficiencies over time, which is a common test. Eliminating deficiencies (1) associated with the Building 332 Emergency Battery Lighting System end-of-life issue (which arguably does not constitute a "deficiency" in nuclear operations), (2) associated with the Mobile Weapons Platform (deficiencies that are arguably more a failure by the Security Organization to recognize issues with the MWP and MWP operations than they are "nuclear operations" deficiencies), and (3) associated with "find and fix" situations (which are arguably not indicative of nuclear operations problems) would further reduce the 2011 count of deficiencies that *are* indicative of nuclear operations problems. Further analysis determined that a programmatic or repetitive noncompliances does not exist; however, this functional area will continue to be analyzed in future performance analyses because a common test was met.

It is also important to recognize the relatively high number of false deficiencies that resulted during the reporting period from incorrect categorization of the "Required Response Elements" issue for occurrence reports (7 false "deficiencies" out of 20 total related to occurrences). Personnel entering occurrence reports into the ITS need to be aware that incorrect categorization of the "Required Response Elements" issue can

adversely increase the deficiency count and thereby inadvertently create the appearance of negative nuclear operations performance where none exists.

☐ Significant, Systemic or Repetitive ☒ Meets Common Tests ☐ Within Expected Variation ☐ Downward Trend

7.2 Packaging and Transportation (Nuclear)

The visual analysis step warranted further analysis of deficiencies identified in ITS and categorized as nuclear packaging and transportation (P&T), specifically the on-site nuclear subject. Therefore, this safety subject was analyzed using a control chart.

The control chart analysis (see Figure 21) indicated two consecutive increases in the rate of P&T of on-site nuclear material deficiencies, which is a common test. Therefore, this safety subject is discussed further.

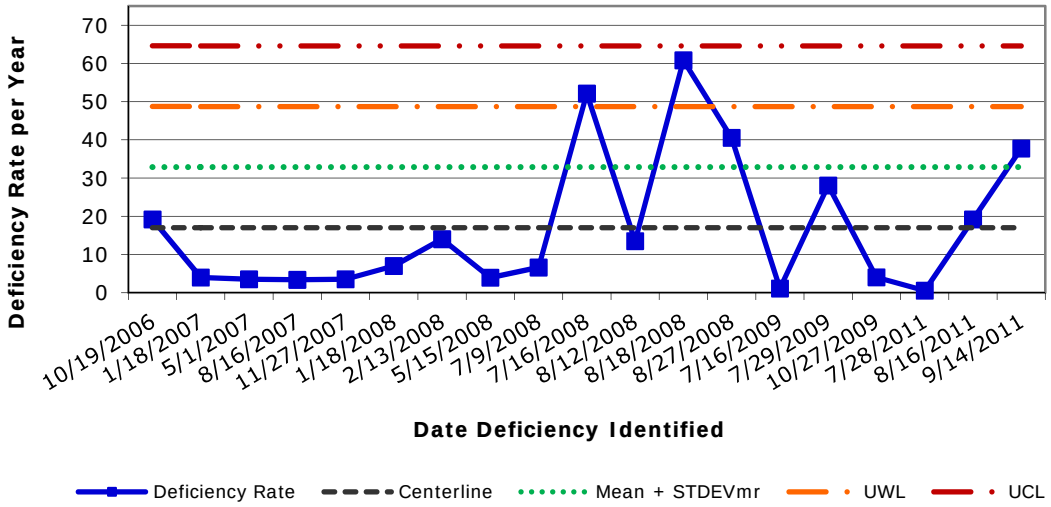


Figure 21. Deficiency rate control chart of packaging and transportation of on-site nuclear data.

During the third quarter of 2011, the most recent quarter of data analyzed, there were five deficiencies associated with the P&T of on-site nuclear material. The most recent prior P&T deficiencies were one each in 2009 and 2008. Although no action limits were exceeded, the five deficiencies in 2011 caused an increase in the deficiency rate, a common test warranting further discussion.

The five deficiencies identified in 2011 are associated with the following two ITS entries:

- Occurrence report NA-LSO—LLNL-LLNL-2011-0042, *Material Not Properly Packaged for Storage in Building 332*, which reported a management concern related to discovery of a bulging storage can in a Building 332 storage vault. This assessment included two issues, both categorized as deficiencies, "Required Response Elements," (i.e., for the occurrence report), and "Fissile Material Handler did not follow the procedure," i.e., a procedure requiring calcining of the stored materials prior to their placement in the subject can.

- *LLNL Packaging and Transportation Program Assessment*, which documents the results of an external assessment of the LLNL Packaging & Transportation Safety (PATS) Program performed July 19-21, 2011, by the NNSA Livermore Site Office (LSO). The final report was received by LLNL and entered into ITS in September 2011. This assessment includes three deficiencies corresponding to the two weaknesses and one observation identified by the LSO assessment team.

Closer examination of these results reveals that the two deficiencies associated with occurrence report NA-LSO—LLNL-LLNL-2011-0042 have been inappropriately assigned in ITS to the P&T functional area. While at first it may appear that the reported event (a bulging storage can discovered in Building 332) relates to packaging, the issue, "Fissile Material Handler did not follow the procedure," falls more appropriately under the Conduct of Operations functional area. This categorization is in fact consistent with the "FA - Conduct of Operations" actually assigned to the assessment. The issue, "Required Response Elements," is incorrectly categorized in ITS as a deficiency when it should be an observation and should be removed from the 2011 deficiency count altogether.

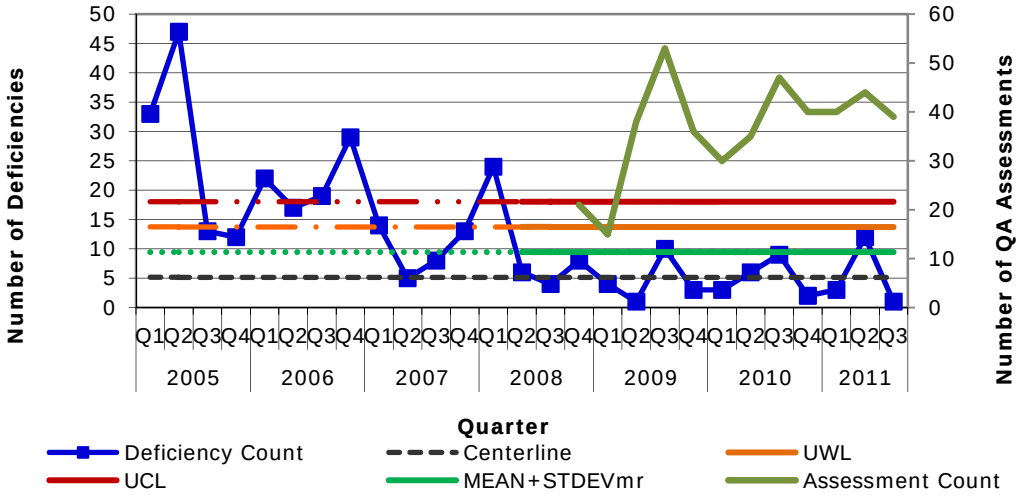
While this still leaves three P&T deficiencies in 2011, all three are associated with the same LSO assessment performed in July 2011, the final report for which was received by LLNL and entered into ITS in September 2011.

In summary, there was a recent increase in the rate of P&T on-site nuclear material deficiencies, a common test. Further analysis concludes that two of the five deficiencies identified in 2011 were either incorrectly categorized in the P&T functional area or the deficiency should have been categorized as an observation. It was determined that recent P&T deficiencies do not represent a programmatic (systemic) or repetitive noncompliance reportable to DOE. Because a common test was met (recent consecutive increase in the deficiency rate), this safety subject will continue to be analyzed in future performance analyses.

☐ Significant, Systemic or Repetitive ☒ Meets Common Tests ☐ Within Expected Variation ☐ Downward Trend

7.3 Quality Assurance (Nuclear)

The visual analysis step did not warrant further analysis using a control chart of deficiencies identified in ITS as related to nuclear safety (i.e., by a "Yes" answer to the nuclear safety question at the issue level) and assigned the Quality Assurance (QA) functional area; however, all nuclear safety functional areas are analyzed using control charts regardless of the visual analysis step. None of the common tests were met in the control chart analysis related to nuclear safety QA deficiencies. As discussed in previous performance analyses, there is a statistically significant decreasing trend in nuclear-safety-related QA deficiencies from the first quarter in 2005 to the third quarter in 2011 (p-value < 0.01), as shown in Figure 22. On average, with every increase in time (quarter), the number of nuclear safety-related QA deficiencies decreases by one, which is consistent with the previous analysis. The decreasing trend in nuclear-safety-related QA deficiencies can be attributed to the introduction of more binning options in ITS for nuclear safety noncompliances. Additional safety basis compliance codes were introduced in January 2008, and additional functional areas were introduced in October 2008. Also, because ITS allows the selection of only one compliance code for each deficiency, the Performance Analysis and Reporting Section (PARS) of the Contractor Assurance Office encourages users to select the appropriate safety area (or best-fit compliance code) first when binning deficiencies. For example, if a nuclear safety deficiency would fit better in the radiation protection functional area compared to the QA functional area (because the radiation protection functional area offers more specifics related to the noncompliant condition), then PARS prefers it be categorized as radiation protection and not QA. It is therefore not surprising that the number of nuclear-safety-related deficiencies identified as QA has decreased over time.



Note: Control Limits are based on the last 15 quarters

Figure 22. Frequency control chart of nuclear safety quality assurance data.

During the third quarter of 2011, the most recent quarter of data analyzed, one deficiency from an occurrence, was categorized as a nuclear safety QA deficiency, as shown in Figure 22.

Since 2005, there have been 3,731 deficiencies categorized as QA, with 328 (9%) related to nuclear safety based on answers to the nuclear safety question in ITS. This percentage is consistent with the results from the last four previous performance analyses. The majority of nuclear-safety-related QA deficiencies since 2005 fall within two of the ten criteria of the QA Order (DOE O 414.1) and the QA Rule (10 CFR 830, Subpart A): 46% in Criterion 4 (Management/Documents and Records) and 20% in Criterion 2 (Management/Personnel Training and Qualification).

This functional area will not be discussed further because none of the common tests were recently met, even with adjusting the limits on Figure 22. The current performance analysis identified no nuclear safety QA programmatic or repetitive noncompliances warranting a report to the DOE Noncompliance Tracking System.

☐ Significant, Systemic or Repetitive ☐ Meets Common Tests ☒ Within Expected Variation ☒ Downward Trend

7.4 Radiation Protection

The visual analysis step did not warrant further analysis of deficiencies identified in ITS and categorized as radiation protection; however, all nuclear safety functional areas are analyzed using control charts regardless of the visual analysis step. There was an increase in radiation protection deficiencies in the most recent quarter analyzed, a common test (Figure 23). Therefore, this safety subject is discussed further.

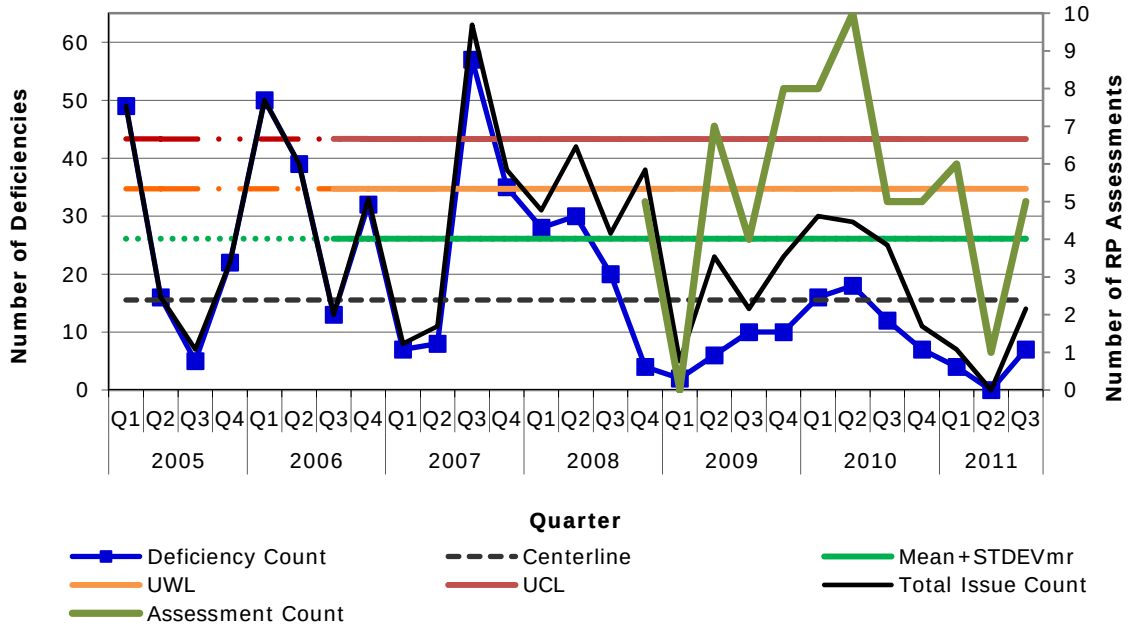


Figure 23. Frequency control chart of radiation protection data.

During the third quarter of 2011, the most recent quarter of data analyzed, there were seven radiation protection deficiencies identified. These deficiencies came from three sources:

- A Joint FAM/Line Management Self-Assessment (JFLMA) of the NIF principal directorate radiation protection program, performed in fulfillment of the requirement in 10 CFR 835.102 that institutional radiation protection programs be assessed triennially (ITS 31169). This assessment concluded generally that the NIF radiation protection program was compliant with applicable contractual and regulatory requirements. The assessment identified three deficiencies related to specific aspects of work control and to handling of radioactive materials.

- A JFLMA of the LLNL Internal Dosimetry Program similarly performed in fulfillment of 10 CFR 835.102 requirements (ITS 32445). This assessment concluded generally that the Internal Dosimetry Program was compliant with applicable contractual and regulatory requirements. The assessment identified three deficiencies related to specific and unrelated aspects of document management and implementation.

- A deficiency in quality control practices associated with the NIF Liquid Scintillation Counter, reported as a Weakness by NNSA-LSO in its July 2011 Periodic Issues Report (ITS 32899.5).

Further analysis concludes that these deficiencies do not represent a programmatic (systemic) or repetitive noncompliance reportable to DOE. Because a common test was met (an increase in deficiencies in the most recent quarter of data analyzed), this safety subject will continue to be analyzed in future performance analyses.

☐ Significant, Systemic or Repetitive ☒ Meets Common Tests ☐ Within Expected Variation ☐ Downward Trend

8.0 Classified Information Security Management Issues

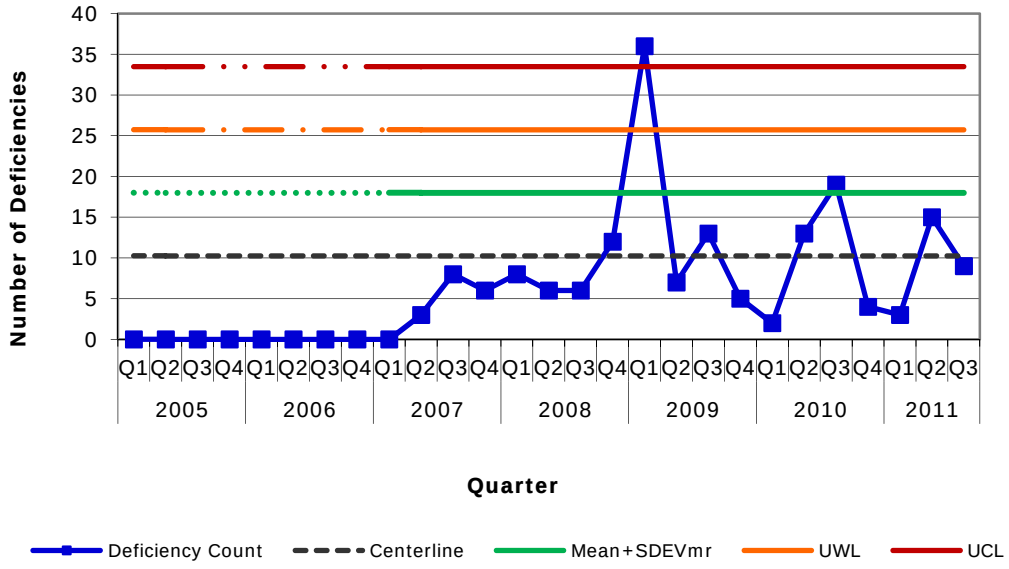
Classified information security deficiencies within the Safeguards and Security functional area in the Issues Tracking System (ITS) are analyzed to identify programmatic/systemic or repetitive issues that may require additional management attention.

Issues within the Safeguards and Security functional area are categorized into one of nine topics when they are entered in the Issues Tracking System (ITS). The topics are program management and support, protective force, physical protection, information protection, cyber security, personnel security, unclassified visits and assignments, nuclear materials control and accountability, and identifying classified information. These topics are further categorized into subtopics. Deficiencies related to classified information security are required to have the CIS question marked "Yes" at the issue level in ITS.

Data from 2007 through the third quarter of 2011 were extracted from ITS in October 2011 using the ITS Basic Issue Report. Issues identified by security incidents are reflected in the ITS data from February 2010.

All issues were initially analyzed using a three-step process, as described in Section 11.0, Method for Analyzing for Assessments and Issues. The first step, the visual analysis step warranted further analysis of the classified information security deficiencies in the Safeguards and Security functional area. The cyber security topic was analyzed using a control chart; a common test was met. In previous analyses, the information protection topic was identified as requiring continued analysis. Therefore, the information protection topic was analyzed using a control chart; no common tests were met. Additionally, observations within the Safeguards and Security functional area entered between 2007 and 2011 were analyzed using a control chart.

The control chart of CIS deficiencies shows an increase in CIS deficiencies from the first to the second quarters of 2011, as shown in Figure 24.

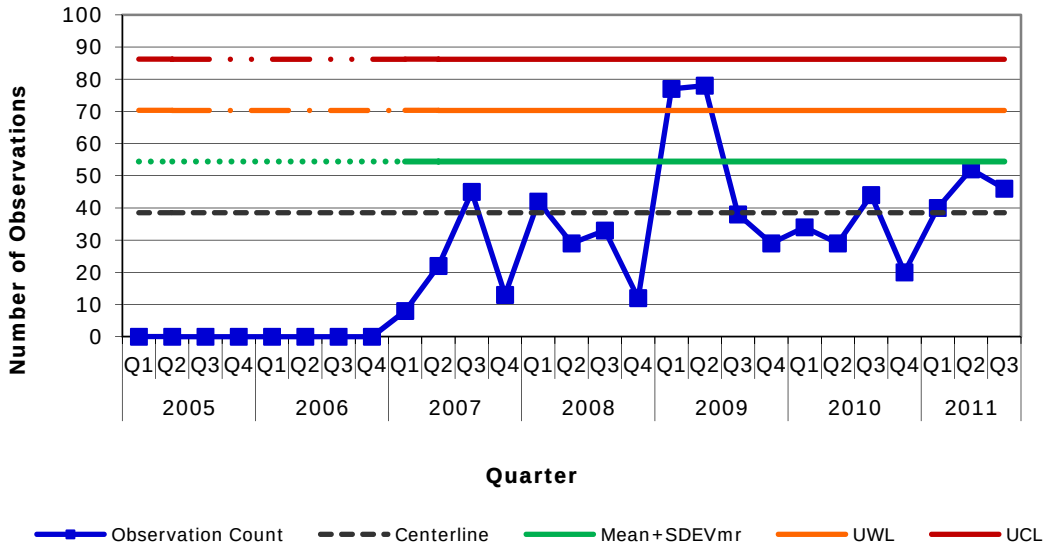


Note: Control Limits are based on data since Q1 2007

Figure 24. Frequency control chart of safeguards and security (CIS) deficiencies.

In the second quarter of 2011, 15 CIS deficiencies were identified in ITS compared to three CIS deficiencies in the first quarter of 2011, thus a common test was met, an increase in deficiencies from the first to the second quarter. The majority of the second quarter deficiencies fell under two topics, cyber security and information protection. These safeguards and security topics are discussed further in sections 8.1 and 8.3.

In the third quarter of 2011, the most recent quarter of data analyzed, nine CIS deficiencies were identified: five cyber security deficiencies, three information protection deficiencies, and one identifying classified information deficiency. The nine deficiencies did not meet an action limit or a common test and were not analyzed further.



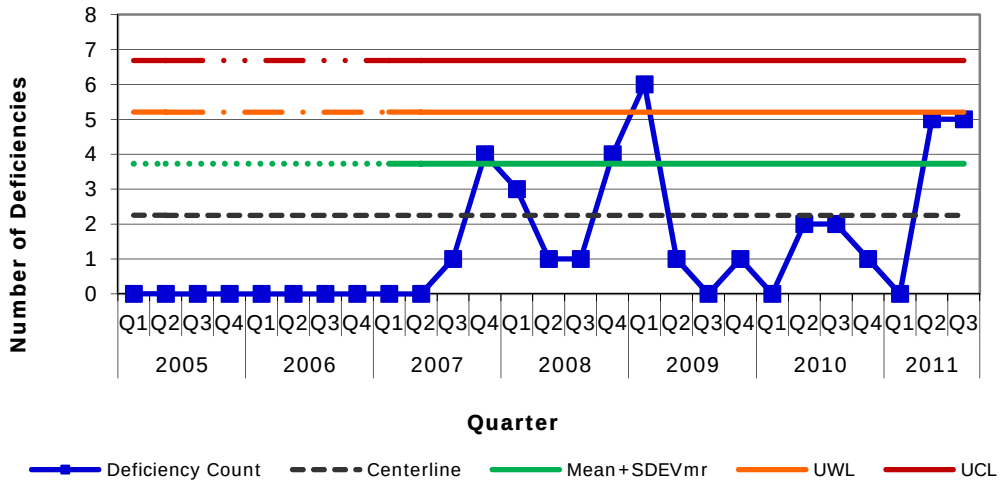
Note: Control Limits are Based on data since Q1 2007

Figure 25. Frequency control chart of safeguards and security observations.

A review of Safeguards and Security observations identified in ITS revealed that 691 observations were entered between the first quarter of 2007 and the third quarter of 2011 (Figure 25). CIS deficiencies entered during the same period totaled 177. Since the beginning of 2009, there have been more Safeguards and Security observations identified than CIS deficiencies in each quarter. In order to determine if the Safeguards and Security observations were being correctly categorized as observations, a 5% (n=25) random sample of observations identified between 2009 and 2011 were reviewed. Twenty management self assessments, one external assessment and four management observations, verifications, and inspections were included in the random sample. The review revealed that overall, the observations have been categorized correctly; less than 10% of the sampled observations should have been categorized as deficiencies. Changing these observations to deficiencies would not change the results of the analysis discussed in Section 8.

8.1 Cyber Security

The visual analysis step warranted further analysis of deficiencies identified in ITS and categorized as cyber security. Therefore, this security subject was analyzed using a control chart. A common test was met, an increase in deficiencies from the first to the second quarter of 2011. Further, two consecutive points were very close to the UWL (Figure 26). This safeguards and security topic was discussed further.



Note: Control limits are based on data since Q1 2007

Figure 26. Frequency control chart of CIS cyber security deficiencies.

In the second and third quarters of 2011, a total of 10 CIS deficiencies were identified. Five of the 10 cyber security deficiencies were from two different external assessments conducted by NNSA's Livermore Site Office (LSO) and DOE's Office of Health, Safety and Security (HSS). The assessments evaluated LLNL's classified cyber security program. In May 2011, four cyber security deficiencies were issued as findings by LSO and were related to the implementation of NNSA Policy Letters NAP 14.1-C, *NNSA Baseline Cyber Security Program*, NAP 14.2-C, *NNSA Certification and Accreditation (C&A) Process for Information Systems*, and NAP 70.4, *Information Security*. In August 2011, HSS reviewed the cyber security program and identified a concern. This concern did not result in a finding; however, the Cyber Security Program tracked the concern in ITS as an access control deficiency.

In the second and third quarters of 2011, 40% of the cyber security deficiencies were identified by security incidents. The Security Incidents Reporting Office generally uses one assessment per fiscal year for all security incidents. Each security incident is identified as an issue and assigned to the appropriate directorate who manages the issue to closure. The Physical and Life Sciences Directorate (PLS) owned one cyber security incident, the Weapons and Complex Integration (WCI) Directorate owned one

and the Global Security (GS) Directorate owned two incidents. Two of the cyber security incidents were related to computer hard drives and resulted in a review and subsequent identification and reporting of a repetitive CIS noncompliance to the DOE NTS. This CIS noncompliance was identified as a cyber security deficiency in the third quarter of 2011.

A review of a random sample of observations in the Safeguards and Security functional area revealed that 29% of the observations were identified as cyber security. The analysis of these observations determined that the cyber security observations were appropriately categorized.

In summary, the analysis of cyber security deficiencies determined that cyber security deficiencies do not represent a systemic or repetitive noncompliance reportable to DOE at this time; however, this safeguards and security topic meets a common test and will continue to be analyzed using control charts in future performance analyses.

☐ Significant, Systemic or Repetitive ☒ Meets Common Tests ☐ Within Expected Variation ☐ Downward Trend

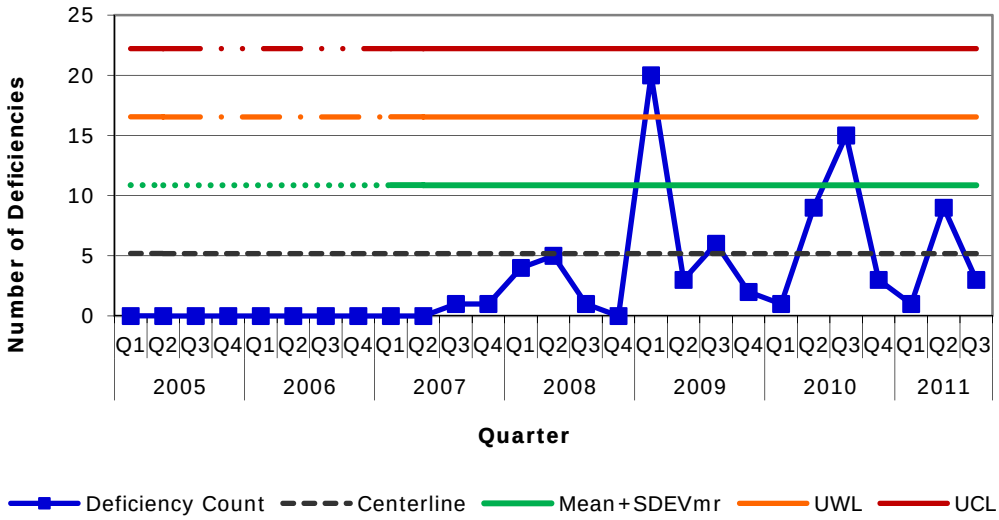
8.2 Identifying Classified Information

The visual analysis step did not warrant further analysis of deficiencies categorized as identifying classified information. Therefore, the deficiencies were not analyzed further. However, the observations reviewed in the random sample revealed that the one classified information observation was correctly categorized. Upon further review of the issue, an additional observation within the same assessment was evaluated and determined to be incorrectly categorized. This observation should have been identified as a CIS deficiency.

Changing the identifying classified information observation to a deficiency would not change the results of Section 8.2.

8.3 Information Protection

The visual analysis step did not warrant further analysis of CIS information protection deficiencies identified in 2011; however, the performance analysis conducted in July 2010 determined that this safeguards and security topic required continued analysis due to a point above the UWL in the third quarter of 2010. Therefore, this topic was analyzed using a control chart (Figure 27). No recent common tests were met and this safeguards and security topic was not discussed further.



Note: Control limits are based on data since Q1 2007

Figure 27. Frequency control chart of CIS information protection deficiencies.

In summary, the analysis of information protection deficiencies concludes that the deficiencies do not represent a systemic or repetitive noncompliance and the deficiencies are within expected variation. Also, the observations reviewed in information protection revealed that the observations were appropriately categorized.

☐ Significant, Systemic or Repetitive ☐ Meets Common Tests ☒ Within Expected Variation ☐ Downward Trend

8.4 Nuclear Materials Control & Accountability

The visual analysis step did not warrant further analysis using a control chart of nuclear materials control and accountability deficiencies. Therefore, this safeguards and security topic is not discussed or analyzed further.

8.5 Personnel Security Program

The visual analysis step did not warrant further analysis using a control chart of personnel security program deficiencies. Therefore, the deficiencies are not analyzed further. An observation, reviewed in the random sample, categorized under the subtopic "control of classified visits" was evaluated and determined to have been incorrectly categorized. According to DOE M 470.4-1, "line management must establish local procedures for the control of classified visits" and the procedures must ensure certain actions including the four items listed as observations in the management self assessment report. The observation has been corrected and these items have subsequently been documented, according to the assessment report, "the SO website and Classified Incoming/Outgoing Visits Deskbook was appropriately updated to reflect the above listed DOE requirements."

Changing the classified visits observation to a deficiency would not change the results of Section 8.5.

8.6 Physical Protection

The visual analysis step did not warrant further analysis using a control chart of deficiencies categorized as physical protection. Therefore, this safeguards and security topic is not discussed or analyzed further.

8.7 Program Management and Support

The visual analysis step did not warrant further analysis of deficiencies categorized as program management and support. Therefore, this safeguards and security topic as not discussed or analyzed further.

8.8 Protective Force

The visual analysis step did not warrant further analysis using a control chart of deficiencies categorized as protective force. Therefore, the deficiencies under this safeguards and security topic were not analyzed further. However, the observations reviewed in the random sample indicated that one of the protective force observations was incorrectly identified as an observation. Further review indicated that the assessment report correctly identified the issue as a deficiency. The lead assessor confirmed that the observation was mistakenly categorized in ITS.

The change from a protective force observation categorized to a deficiency would not change the results of Section 8.8.

8.9 Unclassified Visits & Assignments By Foreign Nationals

The visual analysis step did not warrant further analysis of deficiencies categorized as unclassified visits and assignments by foreign nationals. Therefore, this safeguards and security topic is not discussed or analyzed further.

9.0 Other Functional Areas

This section reviews deficiencies from other functional areas not regulated by the DOE Office of Enforcement and not analyzed in sections 6.0, 7.0, and 8.0.

As discussed in the sections below, the analysis for other functional areas showed one functional area with a point above the UCL (an action limit) and four functional areas with increased issues in the third quarter of 2011.

9.1 Environment

The visual analysis step did not warrant further analysis using a control chart of deficiencies categorized as environmental protection; however, this functional area is analyzed using a control chart regardless of the visual analysis step.

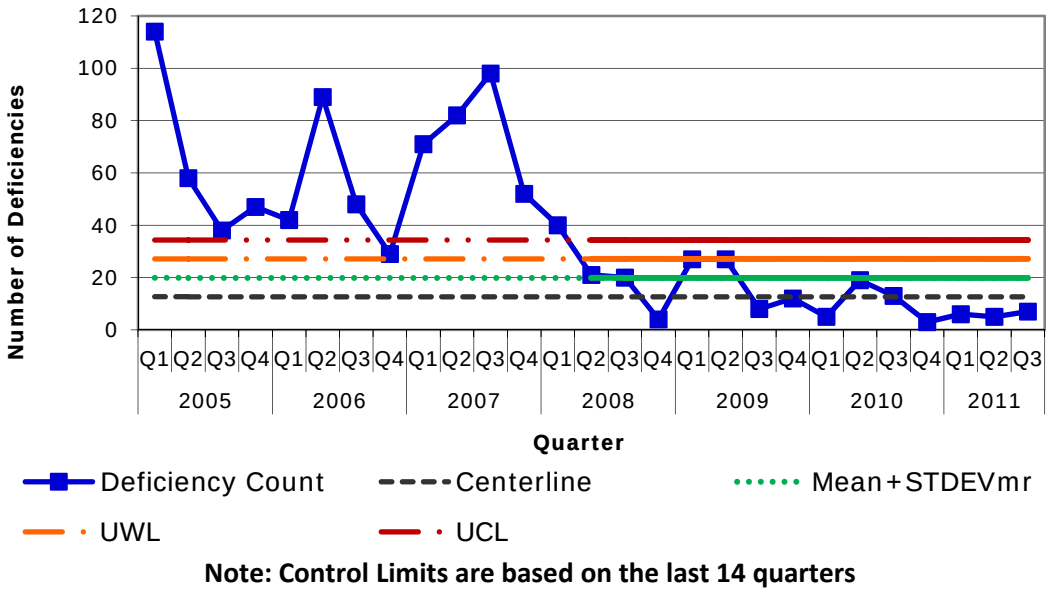


Figure 28. Frequency control chart of environmental deficiencies.

The control chart analysis shows a slight increase in deficiencies categorized in the environment functional area from the second to the third quarter in 2011 (Figure 28).

The seven deficiencies identified in the third quarter of 2011 were from three different assessments. Four of the seven were from a walkthrough of Temporary building 4297.

The control chart analysis concludes that a common test was met, a recent increase in deficiencies. Therefore, this functional area will be analyzed in future performance analyses.

☐ Significant, Systemic or Repetitive ☒ Meets Common Tests ☐ Within Expected Variation ☐ Downward Trend

9.2 Facility Management and Support Systems

The visual analysis step did not warrant further analysis using a control chart of deficiencies categorized as facility management and support systems; however, this functional area is analyzed using a control chart regardless of the visual analysis step.

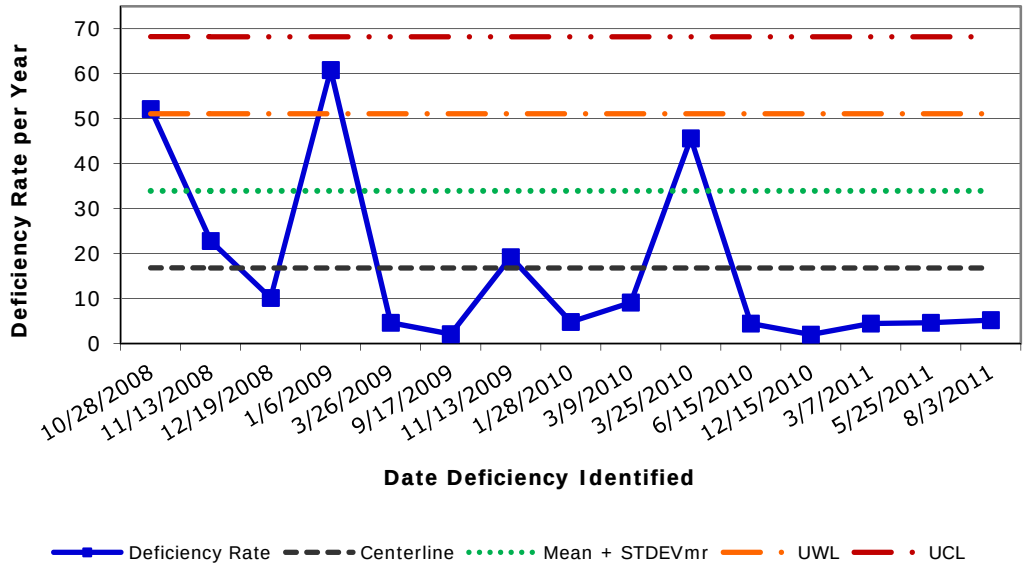


Figure 29. Deficiency rate per year control chart of facility management deficiencies.

The control chart analysis shows a slight increase in the deficiency rate of deficiencies categorized in the facility management functional area from May to August 2011 (Figure 29). There was one deficiency identified in both May and August 2011. There were less days between the deficiencies identified in May and August 2011 (70 days) than between March and May 2011 (79 days), the reason the deficiency rate increased in August 2011.

The control chart analysis concludes that a common test was met, a recent increase in deficiencies. Therefore, this functional area will be analyzed in future performance analyses.

☐ Significant, Systemic or Repetitive ☒ Meets Common Tests ☐ Within Expected Variation ☐ Downward Trend

9.3 Packaging and Transportation

The visual analysis step warranted further analysis using a control chart of deficiencies categorized as packaging and transportation. The control chart analysis shows a point above the UCL in the second quarter of 2010 due to 25 deficiencies identified in one quarter (Figure 30). This functional area was analyzed further.

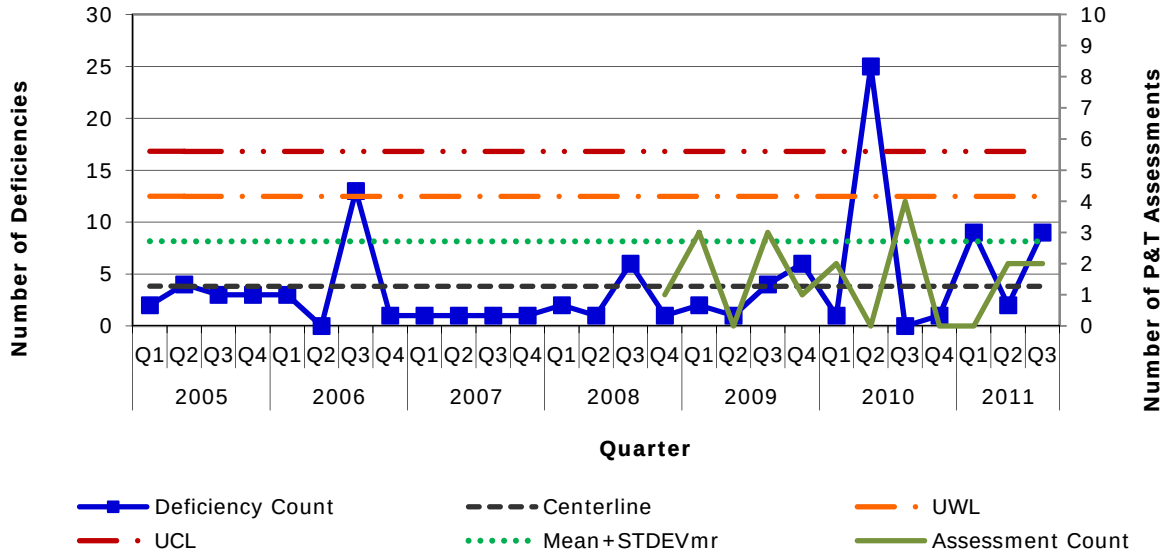


Figure 30. Frequency control chart of packaging and transportation deficiencies.

All of the 25 deficiencies identified in the second quarter of 2010 were categorized as packaging related deficiencies owned by the Operations and Business Directorate, with 24 of the 25 issues from the *FY-10 Packaging and Transportation (P&T) Safety Receipt Inspection*. Twenty one of the 24 deficiencies from the *FY-10 P&T Safety Receipt Inspection* were described as problems with the scribe marks on a particular model of shipping container. Seven of the 21 drums also had a problem with the secondary container vessel making contact with the shielding lid. However, approximately 19 of the 24 deficiencies from the *FY-10 P&T Safety Receipt Inspection* are not deficiencies that LLNL caused, the drums were shipped to LLNL with existing deficiencies and the LLNL Packaging and Transportation Safety (PATS) quality assurance inspections are effective in finding issues with containers/drums that are received by LLNL. An LLNL owned deficiency would be if LLNL was not finding these issues through our inspection process.

The majority of P&T deficiencies since 2005 were categorized as packaging deficiencies (93%) with 52% categorized as on-site non-nuclear and 47% categorized as on-site nuclear. Of the 47% categorized as on-site nuclear deficiencies, only 16% were marked as nuclear safety noncompliances. More recent P&T deficiencies were reviewed from ITS and it was discovered that there has been a shift in how P&T deficiencies were categorized. Historical data shows that 49 deficiencies were categorized as on-site nuclear (column 1, Table 2), but a more recent review shows that those deficiencies categorized as on-site nuclear were re-categorized as non-nuclear (column 2, Table 2).

Table 2. Packaging and Transportation Deficiencies by Topic

Deficiency Topic	Deficiency Frequency - data pulled in late 2011	Deficiency Frequency - data pulled in May 2012	Correct Deficiency Frequency based on SME Review
Off-Site Non-Nuclear	2	36	36
Off-Site Nuclear	1	1	9
On-Site Non-Nuclear	49	57	34
On-Site Nuclear	49	15	30

It is suspected that the reason for the shift in P&T deficiencies from a nuclear to non-nuclear topic is because deficiencies categorized as the on-site nuclear topic prior to 2012 had associated compliance codes that contradicted the topic categorization (Table 3). Thirty three on-site nuclear deficiencies had a compliance code that related to non-nuclear packaging. It is suspected that this was fixed so that the deficiencies assigned to a compliance code had the correct topic/subtopic assigned. The concern is whether the deficiencies were re-categorized from the nuclear topic to the non-nuclear topic correctly. P&T deficiencies were reviewed by the Nuclear Operations' Assurance Manager (AM) and it was determined that the deficiencies categorized as off-site non-nuclear were re-categorized correctly (row 1, columns 2 and 3, Table 2). Some of the on-site non-nuclear deficiencies from column 2 in Table 2 were determined to not have been re-categorized correctly and should have been categorized in one of the nuclear topics. Table 2 shows that the correct categorization of P&T deficiencies includes more nuclear deficiencies than the May 2012 data showed. During the AM review, the AM also ensured that those deficiencies categorized as either on-site or off-site nuclear have the nuclear safety question marked as "yes" in ITS.

Table 3. P&T On-Site Nuclear Deficiencies by Compliance Code

Compliance Code	Frequency of On-site Nuclear topic deficiencies from data pulled in late 2011
PT-FS-NP.01 (off-site nuclear packaging)	7
PT-FS-PP.01 (off-site non-nuclear packaging)	31
PT-FS-TT.01 (off-site non-nuclear transportation)	2
PT-OS-OP.01 (on-site nuclear packaging)	6
PT-OS-OT.01 (on-site nuclear transportation)	1
Missing	2

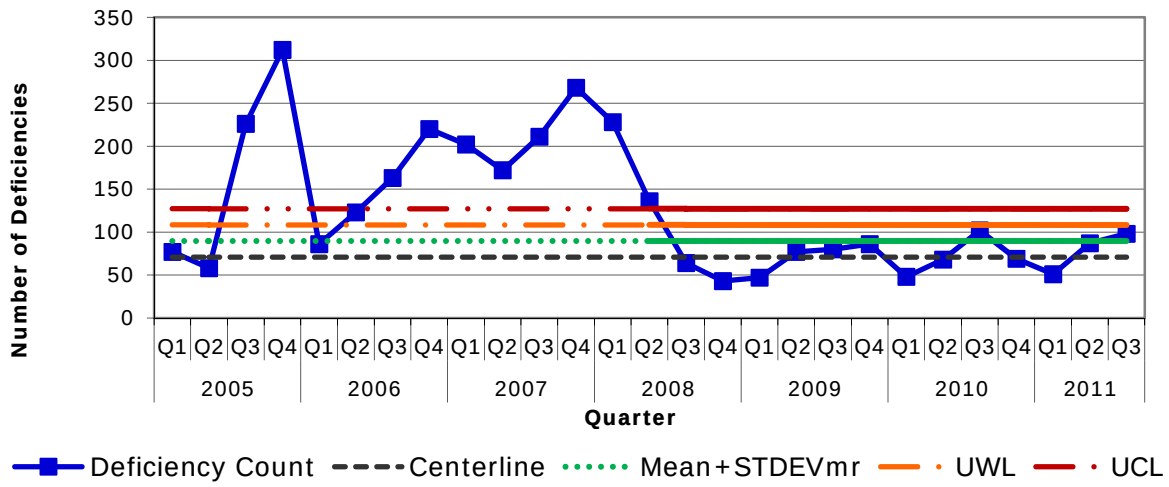
Further analysis concludes that an action limit was met in the control chart analysis for P&T deficiencies; however, most of the deficiencies that led to the point above the UCL are not LLNL owned deficiencies, but were identified by the LLNL PATS quality assurance inspection process. Therefore, an issue requiring additional management attention beyond the attention provided by the AM does not exist.

There was also a shift in the way P&T deficiencies were categorized from 2011 to 2012. Many of the P&T deficiencies categorized as on-site nuclear were changed to be non-nuclear in late 2011. It was determined by the AM for Nuclear Operations that some of the changes are acceptable. Some of the off-site non-nuclear deficiencies were determined by the AM to be nuclear and were re-categorized as nuclear in ITS. The AM also ensured that those deficiencies categorized as nuclear have the nuclear safety questions marked as "yes" in ITS. Due the recent changes made to P&T deficiencies, deficiencies in this functional area will be analyzed in future performance analyses.

☐ Significant, Systemic or Repetitive ☒ Meets Common Tests ☐ Within Expected Variation ☐ Downward Trend

9.4 Quality Assurance (Non-Nuclear)

The visual analysis step did not warrant further analysis using a control chart of deficiencies categorized as non-nuclear quality assurance (QA); however, this functional area is analyzed using a control chart regardless of the visual analysis step. The control chart analysis shows an increase in non-nuclear QA deficiencies from the first to the third quarter of 2011 (Figure 31). This functional area was discussed further.



Note: Control Limits are based on the last 14 quarters

Figure 31. Frequency control chart of non-nuclear QA deficiencies.

During the third quarter of 2011, the most recent quarter analyzed, 98 non-nuclear QA deficiencies were identified. Fifty one percent (51%) of the 98 deficiencies are owned by the NIF and Photon Sciences Directorate with the majority of deficiencies identified from NIF walkabouts related to an Integration Work Sheet (IWS) (n=28) or NIF management reviews (n=14). Forty percent (40%) of the 98 non-nuclear QA deficiencies identified in the third quarter of 2011 are owned by the Global Security Directorate and are either from IWS training and verification of a program (n=25) or program management walkthroughs (n=14). Sixty two percent (62%) of the 98 deficiencies were categorized as, "Failure to train or qualify personnel to perform their assigned work (initial or continuing training/qualification) (QA Criterion 2 - Management/Personnel Training and Qualification)." Deficiencies within this compliance code were included in the analysis in Section 9.5.

In summary, non-nuclear QA deficiencies met a common test, a recent increase in deficiencies. Therefore, deficiencies in this functional area will be analyzed in future performance analyses.

☐ Significant, Systemic or Repetitive ☒ Meets Common Tests ☐ Within Expected Variation ☐ Downward Trend

9.5 Training and Qualification

Training and qualification deficiencies can be categorized under the training and qualification functional area and under certain topics, subtopics and compliance codes. This analysis includes training and qualification data from a collection of training related functional areas, topics, subtopics and compliance codes from across seven different functional areas, emergency management, nuclear operations, QA, radiation protection, safeguards and security, training, and worker safety and health. Environmental topics, subtopics, and compliance codes were included, but there were no environmental training and qualification deficiencies categorized in the included topics, subtopics, and compliance codes. The majority (91%) of training and qualification deficiencies are from the QA functional area.

The visual analysis step did not warrant further analysis using a control chart of deficiencies categorized as training and qualification; however, training and qualification deficiencies are analyzed using a control chart regardless of the visual analysis step. In the control chart there appears to be an increasing trend from the beginning of 2009 to the third quarter in 2011 (Figure 32). Although the sample size is small, linear regression was used to test the trend. There is no statistically significant increasing trend in training and qualification deficiencies since the beginning of 2009 (p-value > 0.05). Although no common tests were met, other sections in this report referred to this section for further discussion.

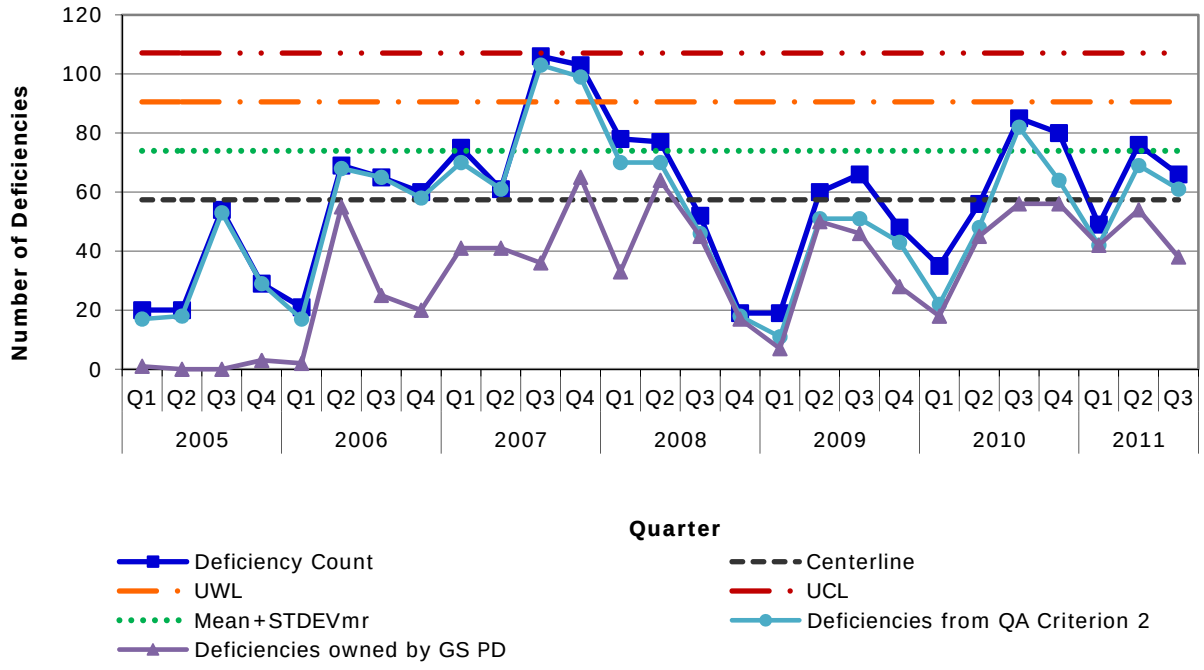


Figure 32. Frequency control chart of training deficiencies across multiple functional areas.

Figure 32 shows that most of the training and qualification deficiencies are categorized in the QA functional area under criterion 2, management/personnel training and qualification. Figure 32 also shows that many of the training and qualification deficiencies are owned by the Global Security (GS) Directorate (69% for years 2008 – 2011).

In the third quarter of 2011, the most recent quarter of data analyzed, 95% of the deficiencies identified are owned by either the GS Directorate or the NIF and Photon Sciences (N&PS) Directorate. Ninety four percent (94%) of the deficiencies identified in the third quarter of 2011 were categorized within the QA functional area with 98% categorized in the following compliance code, "Failure to train or qualify personnel to perform their assigned work." Seventeen of the 25 N&PS owned deficiencies are from NIF annual walkabouts and 25 of the 38 GS owned deficiencies are from IWS training/verification of a specific program.

In summary, training and qualification deficiencies did not meet a common test, but other sections in this report referred to this section for further discussion. This functional area will be analyzed in future performance analyses to determine if what appeared to be a potential increasing trend does turn into a statistically significant increasing trend.

☐ Significant, Systemic or Repetitive ☐ Meets Common Tests ☒ Within Expected Variation ☐ Downward Trend

10.0 Conclusion

ITS issues identified in FY11, were analyzed focusing on identifying issues that may require additional management attention and noncompliances that meet the threshold for reporting to the DOE NTS or to the DOE SSIMS.

The analysis concluded that data for 15 of the 25 Office of Enforcement regulated safety and security subjects were within expected variation or there was a decreasing trend. These subjects are shown in green in Table 4. The data for 10 of the 25 safety and security subjects, shown in yellow in Table 4, met a common test. Data for seven of the 10 regulated safety and security subjects that met a common test were discussed in this analysis and will be monitored over future quarters. Data for three of the 10 regulated safety and security subjects met an action limit, either a point above the Upper Control Limit (UCL) or two points above the Upper Warning Limit (UWL). Data within these three subjects were analyzed further to resolution in this analysis to determine if a repetitive or programmatic (i.e., systemic) noncompliance exists that warrants a noncompliance report to DOE.

Table 4. Summary of safety and security subjects regulated by the DOE Office of Enforcement.

Worker Safety and Health Management Issues	
	Beryllium
	Biological Safety
	Electrical Safety
	Emergency Program
	Explosive Safety
	Fire Safety
	Integrated Safety Management System (ISMS)
	Occupational Medicine
	Other Industrial Hygiene
	Other Industrial Safety
	WSH Quality Assurance
	Other Significant Condition Noncompliances
Nuclear Safety Management Issues	
	Nuclear Operations
	Packaging and Transportation (Nuclear)
	Quality Assurance (Nuclear)
	Radiation Protection
Classified Information Security Management Issues	
	Cyber Security
	Identifying Classified Information
	Information Protection
	Nuclear Materials Control & Accountability

	Personnel Security Program
	Physical Protection
	Program Management and Support
	Protective Force
	Unclassified Visits & Assignments By Foreign Nationals

Legend	
	Data within this subject was within expected variation or there was a decreasing trend in the data
	Data within this subject met a common test and will be analyzed further
	Data within this subject represents a significant, systemic, or repetitive noncompliance reportable to DOE based on the results of the analysis

The three Office of Enforcement regulated safety subjects with data meeting an action limit in the control chart analysis were, the Chronic Beryllium Disease Prevention Program (CBDPP), explosive safety, and worker safety and health (WSH) quality assurance (QA). The analysis also found that data within the packaging and transportation subject met an action limit in the control chart analysis, a subject that is partially regulated by the Office Nuclear Safety Enforcement.

The majority of the CBDPP related deficiencies that caused a point to be above the UCL were from the Office of Enforcement's investigation of deficiencies with the LLNL CBDPP and span across many aspects of the LLNL CBDPP. An effectiveness review conducted between in March 2011 indicated that the Laboratory has made significant improvements in achieving the objectives of 10 CFR 850. Because LLNL has made significant improvements in the LLNL CBDPP and two programmatic NTS reports related to the LLNL CBDPP are still open in NTS, a new NTS report is not warranted.

The majority of the explosive safety related deficiencies that caused a point to be above the UCL were from a joint FAM/line assessment titled, *Explosive Operations Compliance*. The assessment report states, "On the whole, explosive operations at LLNL are being conducted in a safe manner and are in compliance with the DOE Explosives Safety Manual (ESM)….." One of the deficiencies, a lack of inspection on Faraday Cage lightning protection systems, was evaluated as a WSH "Other Significant Condition" and was determined not to meet the reporting threshold. Based on the conclusion from the assessment report and the noncompliance evaluation performed for the deficiency related to the Faraday Cage lighting protection systems, explosive safety deficiencies were not considered to be significant, programmatic (i.e., systemic), or repetitive and a report to the NTS is not warranted.

The majority of WSH QA deficiencies that caused a point to be above the UCL were categorized as training and qualification. However, the WSH training and qualification control chart is not representative of WSH training and qualification deficiencies in prior years because the WSH Issues Tracking System (ITS) question was not consistently selected as "yes" prior to 2010. Therefore, at this time, WSH QA deficiencies do not represent a programmatic (i.e., systemic), significant, or repetitive noncompliance reportable to DOE.

All packaging and transportation deficiencies that caused a point to be above the UCL were from the Operations and Business Directorate owned *FY-10 Packaging and Transportation (P&T) Safety Receipt Inspection*. However, most of the deficiencies that led to the point above the UCL are not LLNL caused deficiencies, but were identified during LLNL Packaging and Transportation Safety quality assurance receipt inspections. Therefore, a programmatic (i.e., systemic) or repetitive noncompliance does not exist and a report to the DOE NTS is not warranted.

The analysis identified seven regulated safety and security subjects and one partially-regulated safety subject that will be monitored over future quarters:

- Cyber Security (Section 8.1)
- Emergency Program (Section 6.4)
- Fire Safety (Section 6.6)
- Other Industrial Hygiene (Section 6.9)
- Nuclear Operations (Section 7.1)
- Packaging and Transportation – Nuclear (Section 7.2)
- Packaging and Transportation (partially regulated) (Section 9.3)
- Radiation Protection (Section 7.4)

No issues were determined to meet the WSH "Other Significant Condition" threshold for reporting to the DOE NTS. There were no issue significance one deficiencies identified in ITS between June 2010 and September 2011 and the issue significance two deficiency evaluated had controls in place to prevent it from having the potential to cause death or serious physical harm. There was one WSH related deficiency entered in ITS between June 2010 and September 2011 that was downgraded from a suggested issue significance of one to a lower issue significance. This deficiency was determined to have been downgraded appropriately and does not to meet the WSH threshold for reporting to DOE.

11.0 Methods

11.1 Method for Analyzing Assessments

Internal assessments at LLNL include Internal Independent Assessments (IIAs) chartered by the Director's Office; management self-assessments chartered by either the functional area managers, the principal associate director, or the associate director; and management observations, verifications, and inspections (MOVIs). DOE and regulatory agencies conduct external assessments. The results of internal and external assessments are entered into the LLNL Issues Tracking System (ITS). In addition, deficiencies, observations, and corrective actions identified during the analysis of events (e.g., illnesses/injuries and occurrences) are also entered into ITS.

Data on assessments conducted from 2005 through 2010 was extracted in February 2011 using the ITS Mega Report; duplicate values were deleted. The ITS Mega Report includes all assessments performed, whether or not the assessment resulted in an issue (i.e., deficiency or observation). The ITS allows the user to categorize assessments by type. For this analysis, the ITS assessment types were binned into the following nine assessing categories:

- "Event" includes assessment types event-illness/injury case analysis report, event-occurrence event-below occurrence reporting process system (ORPS) (site) reportable and security incident.
- "External" includes assessment types external-Livermore site office (LSO) monthly assessment or periodic issues reports, external-LSO surveillance and external-other.
- "Internal Independent" includes assessment types internal independent, independent audit and oversight department audit, and LLNL parent org functional management assessment.
- "Joint FAM/Line" includes assessment type joint FAM/Line.
- "Management Self" includes assessment type management self.
- "MOVI" includes assessment types management observation, verification or inspection.
- "Other External" includes the combination of assessment type other and assessments performed by external assessors.
- "Other Internal" includes the combination of assessment type other and assessments performed by internal assessors.
- "Quick ITS" includes assessment type quick ITS.
- "Readiness Review" includes assessment type readiness review.

The data was reviewed to determine if the frequency or categories of assessments (above) changed comparing recently collected data to data collected since 2005. Process control charts for individual measurements were produced to look at variations of internal assessment data. The process control chart can be considered a way of

performing a statistical test to determine whether the process under study is in a state of control. One control chart was used to analyze variation within internal assessment data, referred to as a frequency control chart. The frequency control chart in this case plots the internal assessment frequency over time (i.e., quarters).

The control chart provides a means to evaluate and compare the number of assessments over time to the following seven key elements:

1. Centerline: the average number of assessments over the time period (mean)
2. One standard deviation: one times the average moving range divided by a constant with value 1.128 above the mean
3. One standard deviation: one times the average moving range divided by a constant with value 1.128 below the mean
4. Upper Warning Limit (UWL): two times the average moving range divided by a constant with value 1.128 above the mean
5. Upper Control Limit (UCL): three times the average moving range divided by a constant with value 1.128 above the mean
6. Lower Warning Limit (LWL): two times the average moving range divided by a constant with value 1.128 below the mean
7. Lower Control Limit (LCL): three times the average moving range divided by a constant with value 1.128 below the mean

The key element, the UCL, is a common calculation for control charts. Ideally, the majority of data would lie within the UCL and the LCL.

The moving range is defined as $|x_i-x_{i-1}|$, where x is the number of internal assessments for a specific quarter. The moving range can also be defined as the absolute difference between two successive data points, in this case quarterly assessment counts. The constant discussed above, referred to as d_2 in the *Introduction to Statistical Quality Control* (Montgomery, 1997) is defined as the mean of the distribution of the relative range and is used in calculating the estimate of the standard deviation, which is defined as the average moving range divided by this constant (d_2). The value of d_2 ranges anywhere from 1.128 to 3.931, depending on how many observations are in each sample. The moving range is used instead of the range because each data point in the control charts used in this analysis is based on individual counts and not a sample average. Because the moving range is calculated using two successive data points, our value of n is two (n=2). Therefore, the value of d_2 is defined as 1.128 in Table VI in the *Introduction to Statistical Quality Control*.

We look within the process control charts for special causes of variation, which can be found by using common tests. The common tests (below) are called action limits, as listed in the *Introduction to Statistical Quality Control*:

1. One data point falling above the UCL or below the LCL

2. Two (or three) out of three points in a row are more than the UWL from the mean or are less than the LWL from the mean in the same direction
3. Four out of five points in a row are more than one standard deviation from the mean in the same direction
4. Eight consecutive points plot on one side of the centerline

Theoretically, if a process is "in-control" then none of the data points meet the requirements of an action limit. If an action limit is met, the assessment data is analyzed further.

11.2 Method for Analyzing for Management Issues

Management issue noncompliances are defined as repetitive noncompliances, programmatic (i.e., systemic) issues, and intentional violations or misrepresentations. One goal of analyzing Issues Tracking System (ITS) data is to look for a possible programmatic noncompliance by reviewing deficiencies within the same safety or security subject. Second, the analysis may identify a previously overlooked repetition of the same type of deficiency. A programmatic problem generally involves some weakness in administrative or management controls or their implementation, to such a degree that a broader management or process control problem exists. A repetitive problem is generally two or more different events that involve substantially similar conditions, locations, equipment, or individuals. Repetitive problems tend to be narrower in scope than programmatic problems. The ITS issue analysis included a three-step process of 1) looking at the data as a whole to identify visual variations; 2) performing statistical tests of the sets of data gleaned from the first step; and 3) evaluating the sets of data gleaned from the second step by reviewing the context of the noncompliances, such as discovery method, location in terms of facility, the compliance code, and the description of the noncompliance.

The process for analyzing ITS data was to first, visually review the deficiencies by quarter, looking for groupings with large numbers of deficiencies, observed changes in the number of deficiencies, or other observations that look different from what is expected. Then, if the numbers appeared to be of interest, create a process control chart for individual measurements for the safety subjects within the functional areas related to worker safety and health (WSH) and nuclear safety and the security subjects within the safeguards and security functional area. The control charts utilize the "Individual-X/MR" method, described in Introduction to Statistical Quality Control.
A process control chart can be considered a way of performing a statistical test to determine whether the process is in a state of control. Frequency control charts were used to look at variations of issues within safety and security subjects. These control charts plot the deficiency frequency and sometimes the observation frequency per quarter along with the number of assessments within a quarter for a particular safety or security subject. The number of assessments, which in previous analyses was included

in the control chart, is not plotted prior to the fourth quarter of 2008 because the functional area for assessments became a required field in ITS as of the fourth quarter of 2008.
Along with the frequency of deficiencies, these control charts consist of four key elements:

- Centerline: the average number of deficiencies over the time period (mean)
- One Standard Deviation: one times the average moving range divided by a constant with value 1.128 above the mean
- Upper warning limit (UWL): two times the average moving range divided by a constant with value 1.128 above the mean
- Upper Control-limit (UCL): three times the average moving range divided by a constant with value 1.128 above the mean

Two other key elements, which are typically part of a process control chart, are not shown in the control charts in this analysis. These two elements are the Lower Warning Limit (LWL) and the Lower Control Limit (LCL). The LWL is two times the average moving range divided by a constant with value 1.128 below the mean. The LCL is three times the average moving range divided by a constant with value 1.128 below the mean. These elements have not been incorporated in the control charts because the number of deficiencies per quarter cannot be below one or zero, and in many cases the LWL and LCL would have been below one or zero had it been incorporated in the control charts.

The key element, the UCL, is a common calculation for control charts. Ideally, the majority of data would lie within the UCL and the LCL.
The moving range is defined as $|x_i - x_{i-1}|$, where x is the number of deficiencies (and sometimes observations) for a specific quarter. The moving range can also be defined as the absolute difference between two successive data points, in this case quarterly assessment counts. The constant discussed above, referred to as d2 in Introduction to Statistical Quality Control, is defined as the mean of the distribution of the relative range and is used in calculating the estimate of the standard deviation, which is defined as the average moving range divided by this constant (d2). The value of d2 ranges anywhere from 1.128 to 3.931 depending on how many observations are in each sample. The moving range is used instead of the range because each data point in the control charts used in this analysis is based on individual counts and not a sample average. Because the moving range is calculated using two successive data points, our value of n is two (n=2). Therefore, the value of d2 is defined as 1.128 in Table VI in Introduction to Statistical Quality Control.

In many cases, the control limits were adjusted and calculated for fewer quarters than what is displayed on the control chart in order to emphasize the more recent data, which often produces tighter control limits. If this adjustment was done for a control chart, it is noted on the bottom of the chart.

If there was a rare incidence of deficiencies within a subject, then the frequency of deficiencies was converted to a rate of deficiencies per year, and this rate was used as each data point on the control chart. The centerline becomes the average rate of deficiencies per year, but the formula for calculating the UCL and UWL does not change. This control chart is referred to as the deficiency rate per year control chart. Note that the x-axis becomes the date, not the quarter, the deficiency was identified. We look within the process control charts for special causes of variation, which can be found by using common tests. The common tests (below) are called action limits, as listed in the Introduction to Statistical Quality Control:

- One data point falling above the UCL or below the LCL
- Two (or three) out of three points in a row are more than UWL from the mean in the same direction
- Four out of five points in a row are more than one standard deviation from the mean in the same direction
- Eight consecutive points plot on one side of the centerline

Theoretically, if a process is "in-control," then none of the data points meet the requirements of an action limit. If an action limit is met, a more detailed examination of the specific deficiencies will occur in order to determine if repetitive, programmatic, or systemic weaknesses exist that may be reportable to the DOE Noncompliance Tracking System (NTS). If data within a subject meets an action limit, but has already been reported to NTS, further explanation will not be provided. The following four other common tests are used, but are not considered action limits:

- One data point above the UWL
- Single increase in data points for the quarter in question
- Recent increasing trend for more than one quarter
- An unusual or nonrandom pattern in the data

Some of the common tests described above are more conservative than the typical set of decision rules listed in Introduction to Statistical Quality Control. These non-typical common tests are meant to detect subjects that should be analyzed using control charts in future performance analyses to watch for potential nonrandom patterns.

- One standard deviation: one times the average moving range divided by a constant with value 1.128 below the mean
- Upper Warning Limit (UWL): two times the average moving range divided by a constant with value 1.128 above the mean
- Upper Control Limit (UCL): three times the average moving range divided by a constant with value 1.128 above the mean
- Lower Warning Limit (LWL): two times the average moving range divided by a constant with value 1.128 below the mean

- Lower Control Limit (LCL): three times the average moving range divided by a constant with value 1.128 below the mean

The key element, the UCL, is a common calculation for control charts. Ideally, the majority of data would lie within the UCL and the LCL.
The moving range is defined as |xi-xi-1|, where x is the number of internal assessments for a specific quarter. The moving range can also be defined as the absolute difference between two successive data points, in this case quarterly assessment counts. The constant discussed above, referred to as d2 in the Introduction to Statistical Quality Control (Montgomery, 1997) is defined as the mean of the distribution of the relative range and is used in calculating the estimate of the standard deviation, which is defined as the average moving range divided by this constant (d2). The value of d2 ranges anywhere from 1.128 to 3.931, depending on how many observations are in each sample. The moving range is used instead of the range because each data point in the control charts used in this analysis is based on individual counts and not a sample average. Because the moving range is calculated using two successive data points, our value of n is two (n=2). Therefore, the value of d2 is defined as 1.128 in Table VI in the Introduction to Statistical Quality Control.

We look within the process control charts for special causes of variation, which can be found by using common tests. The common tests (below) are called action limits, as listed in the Introduction to Statistical Quality Control:

- One data point falling above the UCL or below the LCL
- Two (or three) out of three points in a row are more than UWL from the mean in the same direction
- Four out of five points in a row are more than one standard deviation from the mean in the same direction
- Eight consecutive points plot on one side of the centerline

Theoretically, if a process is "in-control" then none of the data points meet the requirements of an action limit. If an action limit is met, the assessment data is analyzed further.

12.0 Definitions

Correlation: The strength of the linear relation between two quantitative variables (e.g., observations and deficiencies).

Correlation Coefficient (Rho): A number between -1 and 1 that measures the degree to which two variables are linearly related. If there is perfect linear relationship with positive slope between the two variables, we have a correlation coefficient of 1; if there is positive correlation, whenever one variable has a high (low) value, so does the other. If there is a perfect linear relationship with negative slope between the two variables, we have a correlation coefficient of -1; if there is negative correlation, whenever one variable has a high (low) value, the other has a low (high) value. A correlation coefficient of 0 means that there is no linear relationship between the variables.

Correlation Test (Pearson): The statistical significance of *r* is tested using a t-test. The hypotheses for this test are:

H_0: rho = 0
H_a: rho <> 0

A low p-value for this test (less than 0.05, for example) means that there is evidence to reject the null hypothesis in favor of the alternative hypothesis, or that there is a statistically significant relationship between the two variables.

P-value: The probability of wrongly rejecting the null hypothesis if it is in fact true. Examples of null hypotheses used in this analysis:

H_0: The process is in a state of control
H_0: rho (correlation coefficient) = 0

Simple Linear Regression: Simple linear regression aims to find a linear relationship between a response variable and a possible predictor variable by the method of least squares and production of a regression equation. A regression equation allows us to express the relationship between two variables algebraically. It indicates the nature of the relationship between two variables. In particular, it indicates the extent to which you can predict a variable by knowing another, or the extent to which variables are associated with one another.

Standard deviation: A way to measure how far the observations are from their mean. It is also referred to as a measure of spread.

State of Control: The extent of variation of the output of the process does not exceed that which is expected on the basis of the natural statistical variability of the process. None of the data points fall outside of the Upper or Lower Control Limits.

Statistically Significant: The probability (usually less than 5 percent or less than a p-value of 0.05) that a finding or result is caused by something other than just chance.

13.0 References

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