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# QAS 1.0 Briefing on Weapon Quality Program within LANL Design Agency

Tony Vidlak

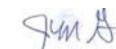
W-12 DA Weapon Quality Engineering

April 30, 2012



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This document deemed Unclassified by  
Jennifer M. Gallegos, W-12 Quality Engineer  
(DC)

A handwritten signature in blue ink that appears to read "JMN G".

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# Design Agency Weapon Quality Program

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## Overview

- QAS 1.0 Scope
- Design Agency Weapon Quality Program
  - Historical Perspectives
  - Program Development and Focus Areas
  - Organizational Changes
- Highlights
  - Configuration Management
  - Metrics
  - Continuous Improvement

# QAS 1.0 Scope

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- From NA-10 WQAPM (March 30, 2009):
  - *“QAS 1 (Quality Management System): NNSA examines how the Contractor implements, monitors, and improves the Quality Management System and its implementing policies, processes, and procedures, as well as the level of compliance with the contractual requirements. These may be performed annually or every two years, depending on the quality history of the contractor and on results from previous surveys. The team leader may focus on specific quality elements during the off-years. A QAS 1 survey may include, but not be limited to, a review of contractor annual management survey reports and management response.”*

# QAS 1.0 Scope

- Memorandum QA-12-132-ABL, dated April 12, 2012;  
*“The purpose of the survey is to evaluate LANL’s programmatic implementation of QC-1, Revision 10.”*
- The elements of QC-1, Revision 10 specified in the above memorandum are:
  - 2.1 Risk Based Program
  - 2.2 Quality Management Program
  - 2.2.1 Submittal, Approval, Implementation, and Reporting
  - 2.3 Organization
  - 2.4 Application of Quality Principles
  - 2.5 Establishing Requirements
  - 2.6 Planning
  - 2.7 Metrics
  - 3.1.1 Continuous Improvement Process
  - 3.1.2 Prevention Versus Detection
  - 3.1.3 Quality Cost Management
  - 3.2 Training

# QAS 1.0 Scope

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- The elements of QC-1, Revision 10 specified in the above memorandum are (continued):
  - 3.3 Design
  - 3.3.1 Design Input
  - 3.3.2 Design Process
  - 3.3.3 Design Verification/Review/Qualification
  - 3.3.4 Design Documents
  - 3.3.5 Design Change Control and Configuration Management
  - 3.3.6 Interface Control
  - 3.3.7 Design Records
  - 3.4 Instructions, Procedures, Drawings
  - 3.5 Document Control
  - 3.12 Nonconformance
  - 3.13 Corrective Action
  - 3.14 Records
  - 3.15 Assessments
  - 4.1 Senior Management

# Design Agency Weapon Quality Program

## Evolution of DA Weapon Quality Program

- 2006 to 2008
  - Focused on Configuration Management of WR Design Definition
    - Change Control
    - Design Review and Release
- 2009 & 2010
  - Focused on expansion of DA Weapon Quality Program
    - DA interactions with all production plants
    - Extensive qualification work at production plants
    - Expanded metrics trending
- 2011 & 2012
  - Focused on expansion of quality program into Experimental Program
    - Not part of this DA QAS audit

# Design Agency Weapon Quality Program

## DA has formal Quality Plans

- Have established a robust Design Agency weapon quality program
  - Issued fifth iteration of Weapon Quality Assurance Program [WQAP] (ADWE-Q-0001 Rev E)

# Design Agency Weapon Quality Program

- DA Weapon Quality Program is based on intellectual products and expert judgment
  - As discussed in QC-1, Revision 10; Section 1.0 Introduction: *“Nuclear weapon design and assessment are based on expertise that has not been statistically derived. Expert judgment will continue to be the basis of nuclear weapon performance assessments. That expert judgment must be based on a foundation of quality assurance controls; including calibrated equipment, controlled engineering procedures, trained people and statistical methods; to assure safety and reliability of weapon performance.”*
- LANL DA produces intellectual products in the form of:
  - documented data
  - reports
  - specifications
  - engineering designs
- Assessments of intellectual product are based on analysis and interpretation of data and information by experts with education and experience in the subject matter

# Design Agency Weapon Quality Program

- LANL DA uses a risk-based graded approach
  - That appropriate levels of rigor and formality are applied
  - That results that are technically effective while remaining responsive and efficient
  - The manner in which the quality requirements are applied is determined by line managers at a level consistent with the importance of the work and its associated risks
  - Documented in *Risk Management Plan* (W-SE-0013)
- QC-1, Revision 10; Section 3.3:
  - “*The design authority shall be responsible for the design of items and processes under its responsibility. Procedures shall be established and maintained to define and control the design process, including design-related development.*”
  - Documented in *System Engineering Management Plan, Weapon System Engineering Division* (W-SE-0021)

# Design Agency Weapon Quality Program

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Building on these principles:

- DA defines the intellectual product (the design definition)
- DA defines the technical evidence necessary for qualifying the weapon system
- DA validates that the design definition is in compliance with military customer requirements
- DA validates design intent and technical requirements will achieve desired weapon performance

# Design Agency Weapon Quality Program

## QC-1 Compliant Program

- High degree of documentation of the processes
  - Master Document List (W-AD-0044)
  - Issue H released and includes extensive QC-1 Crosswalk
- Design Change Control and Configuration Management (QC-1 Element 3.3.5)
  - Change control and approval within EA Link/PDM Link
  - Record Copy released to the Weapon Complex
- Design Definition is Reviewed and Approved (QC-1 Elements 3.3, 3.3.3 and 3.5)
  - *System Engineering Management Plan, Weapon System Engineering Division* (W-SE-0021)
  - *Control and Release of Weapon Design Definition* (W-SE-0008)

# Design Agency Weapon Quality Program

## QC-1 Compliant Program

- Document Control and Records (QC-1 Elements 3.5 and 3.14)
  - W-SE-0021 *System Engineering Management Plan, Weapon System Engineering Division*
  - W-AD-0036 *Maintaining Design Definition Within PDMLink Product Structure (Classified Network)*
  - W-SE-0008 *Control and Release of Weapon Design Definition*
  - W-SE-0012 *Weapon Systems Engineering (W) Division Configuration Management Plan*
  - W-11-SE-0003 *Design Definition Release Process*
- Internal Division Business Processes
  - W-AD-0001 *Document Control Procedure*
  - W-AD-0023 *Document Numbering Procedure*
  - W-AD-0050 *W-Division Document File Plan*
  - W-12-AD-0002 *Engineering Authorization (EA) Document Quality Review Checklist*
  - W-12-AD-0006 *Change Requests/Notices for Documents in PDMLink*

# Design Agency Weapon Quality Program

## QC-1 Compliant Program

### ➤ Validating Requirements (QC-1 Elements 2.5 and 3.3)

- *System Engineering Management Plan, Weapon System Engineering Division* (W-SE-0021)
- *Requirements Management Plan, Weapon Systems Engineering Division* (W-SE-0001)
- *Engineering Requirements for Confinement and Containment* (W-SE-0027)
- *Design-Basis Qualification Test Process* (W-SE-0024)

### ➤ Continuous Improvement (QC-1 Elements 3.1.1 and 3.15)

- Assessment Plans (W-12-TR-0012, W-12-TR-0022, W-12-TR-0036)
- Assessment Reports (see later slides)
- Annual Reports (FY09: W-12-TR-0010, FY10: W-12-TR-0021, FY11: W-12-TR-0031)

# Design Agency Weapon Quality Program

## QC-1 Compliant Program

- Metrics Program (QC-1 Element 2.7)
  - *Metric Plan* (W-12-SE-0002)
- Risk-Based Program (QC-1 Element 2.1)
  - *Risk Management Plan* (W-SE-0013)
- Planning (QC-1 Element 2.6)
  - *System Engineering Management Plan, Weapon Systems Engineering Division* (W-SE-0021)
  - *Program Controls Plan, Weapon Systems Engineering Division* (W-SE-0018)
  - *Change Control Plan, Weapon System Engineering Division* (W-SE-0022)

# Design Agency Weapon Quality Program

## QC-1 Compliant Program

- Nonconformance Reporting process (QC-1 Element 3.12)
  - *Nonconformance Reporting* (P 330-6)
  - *DA Weapon Quality Nonconformance Reporting Procedure* (W-12-AD-0013)
- Corrective Action guidance given (QC-1 Element 3.13)
  - *Laboratory Performance Feedback and Improvement Process* (P 322-4)

# Design Agency Weapon Quality Program

## QC-1 Compliant Program

### ➤ Training program (QC-1 Element 3.2)

- *Conduct of Training Manual (P 781-1)*
- *Internal training and training aids for internal processes:*
  - *Training Implementation Plan (W-AD-0052)*
  - *Training Program Management Plan (W-AD-0056)*
  - *W-Division Training Program Curriculum (W-AD-0059)*
  - Required reading documents
  - Seminars
  - External specialized training courses
  - GD&T Classes
  - Mentoring

# Design Agency Weapon Quality Program

## QC-1 Compliant Program

### ➤ Instructions, Procedures, and Drawings (QC-1 Element 3.4)

- *System Engineering Management Plan, Weapon Systems Engineering Division (W-SE-0021 )*
- *Integrated Work Management (P 300)*
- *W Division Technical Procedure Work Process (W-AD-0096)*
- *Significant Finding Investigation (SFI) Process (W-SE-0016)*
- *Method for Performing Expert Elicitations (W-10-AD-0001)*
- *Method for Documenting and Reviewing Expert Judgments (W-10-AD-0002)*
- *Design Definition Release Process (W-11-SE-0003)*
- Utilization of industrial standards where applicable

# Design Agency Weapon Quality Program

## QC-1 Compliant Program

- Quality Management Program since 2006 (QC-1 Element 2.2)
  - *Los Alamos National Laboratory Design Agency Weapons Quality Assurance Program* (ADWE-Q-0001)
  - *DA WQAP Implementation Plan* (ADWE-Q-0002)

## DA Quality Program Focus Areas

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- Continuing capturing supporting documentation for SQA program
- Moving forward expanding the use of Risk and Requirement tracking tools
  - Acquired license for ARM
  - Actively engaged with B61 LEP program

# Design Agency Self Assessments

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- **FY11 W-Division Assessment Reports**

- W-12-TR-0023U – W Division Individual Management Assessment Plan and Report: W-12 Document Control and Record Management Process
- W-12-TR-0026U – W Division Individual Management Assessment Plan and Report: Configuration Management of B61 LEP Documents
- W-12-TR-0027U – W Division Individual Management Assessment Plan and Report: Implementation of Experimental Quality Program for Hydrodynamic Tests
- W-12-TR-0028U – W Division Individual Management Assessment Plan and Report: Shipping and Inventory Control

# Design Agency Self Assessments

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- **FY10 W-Division Assessment Reports**

- W-12-TR-0011U – Weapon Quality Management Assessment of Closure Data for Barolo Corrective Action Finding Number CM-FND-5
- W-12-TR-0013U – Review of Hydrodynamic Experiment 3618 and Comparison to Draft Experimental Program Quality Documents (On Classified Network)
- W-12-TR-0014U – FMEA Hydro Shot 3618 (On Classified Network)
- W-12-TR-0016U – W Division Individual Management Assessment Plan and Report: Process of Design Change and Release

# Design Agency Self Assessments

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- **FY09 W-Division Assessment Reports**

- W-12-TR-0007U – W Division Individual Management Assessment Plan and Report: Review of Document Change Control and Design Definition Review and Approval
- W-12-TR-0008U - W Division Individual Management Assessment Plan and Report: Review of Configuration Management of Surveillance and Significant Finding Investigation Closure Documentation
- W-12-TR-0009U – W Division Individual Management Assessment Plan and Report: Assessment of Progress on the Design Agency (DA) Weapon Quality Assurance Program (WQAP)

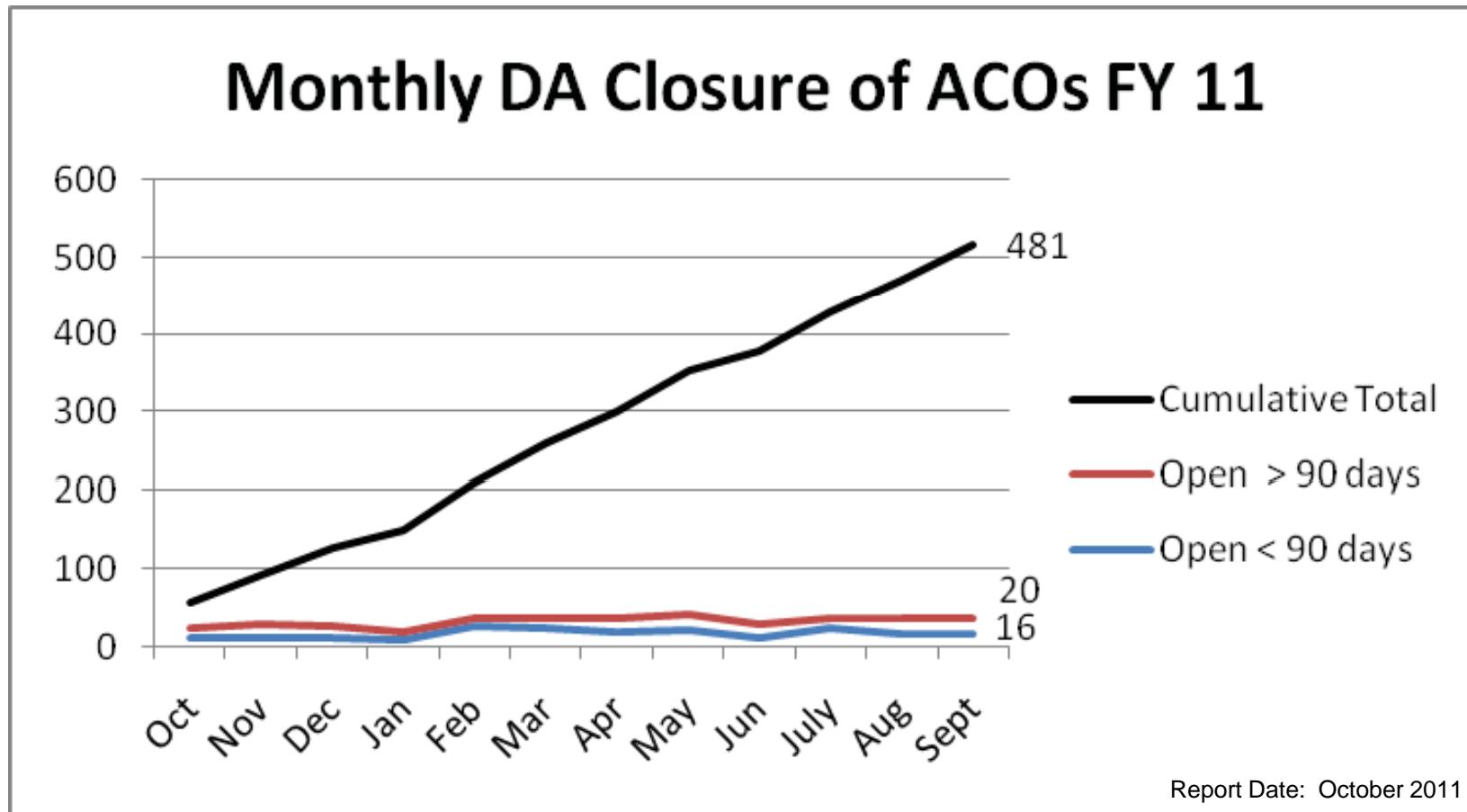
# Highlights of Current Weapon Quality Program

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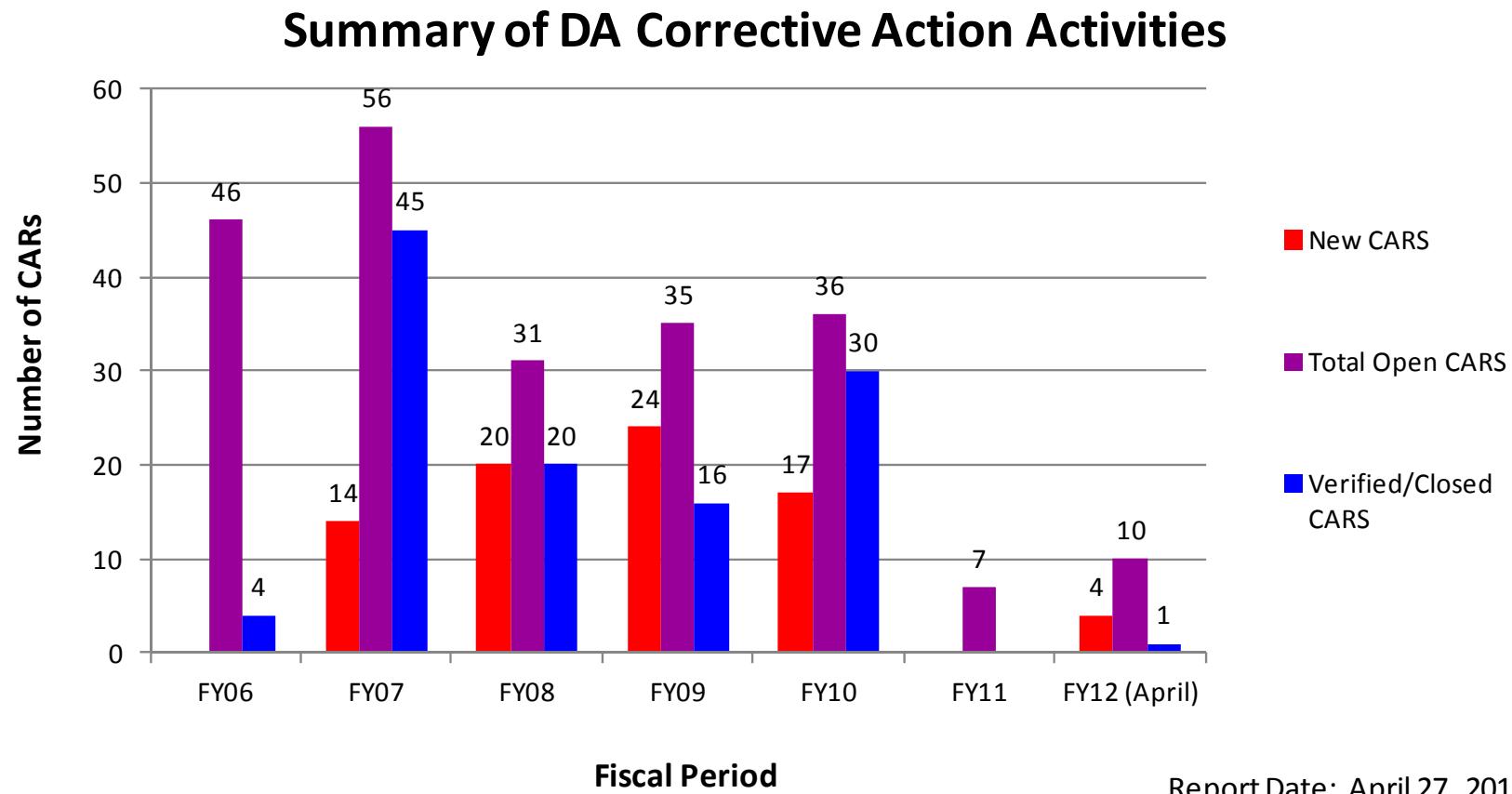
## Metrics

- Timeliness of Response
  - ACO
  - CARs
  - REN
- Volume of Documents Processed
  - EA Team
  - DCM Team

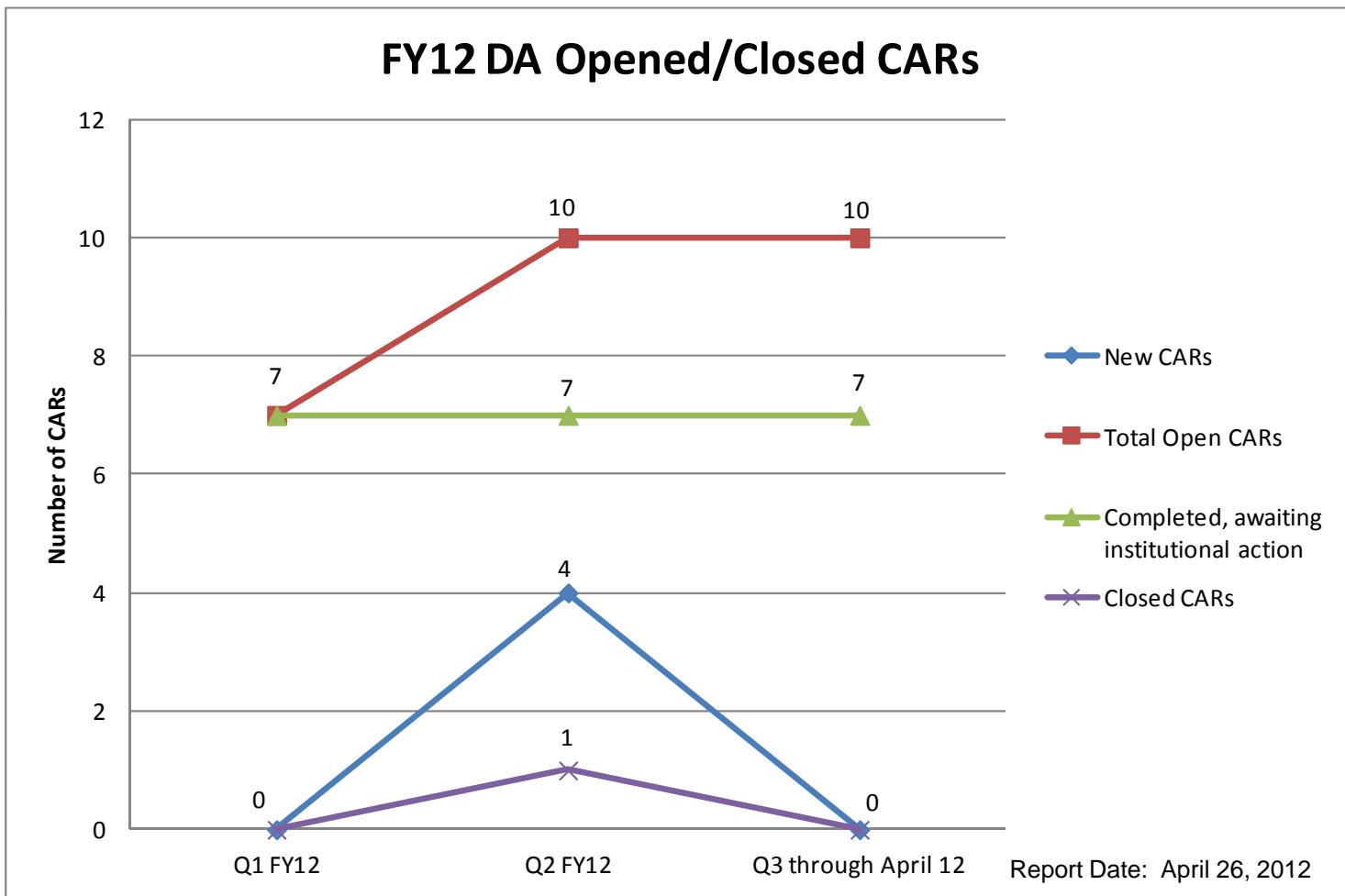
# DA Weapon Quality Program Metrics



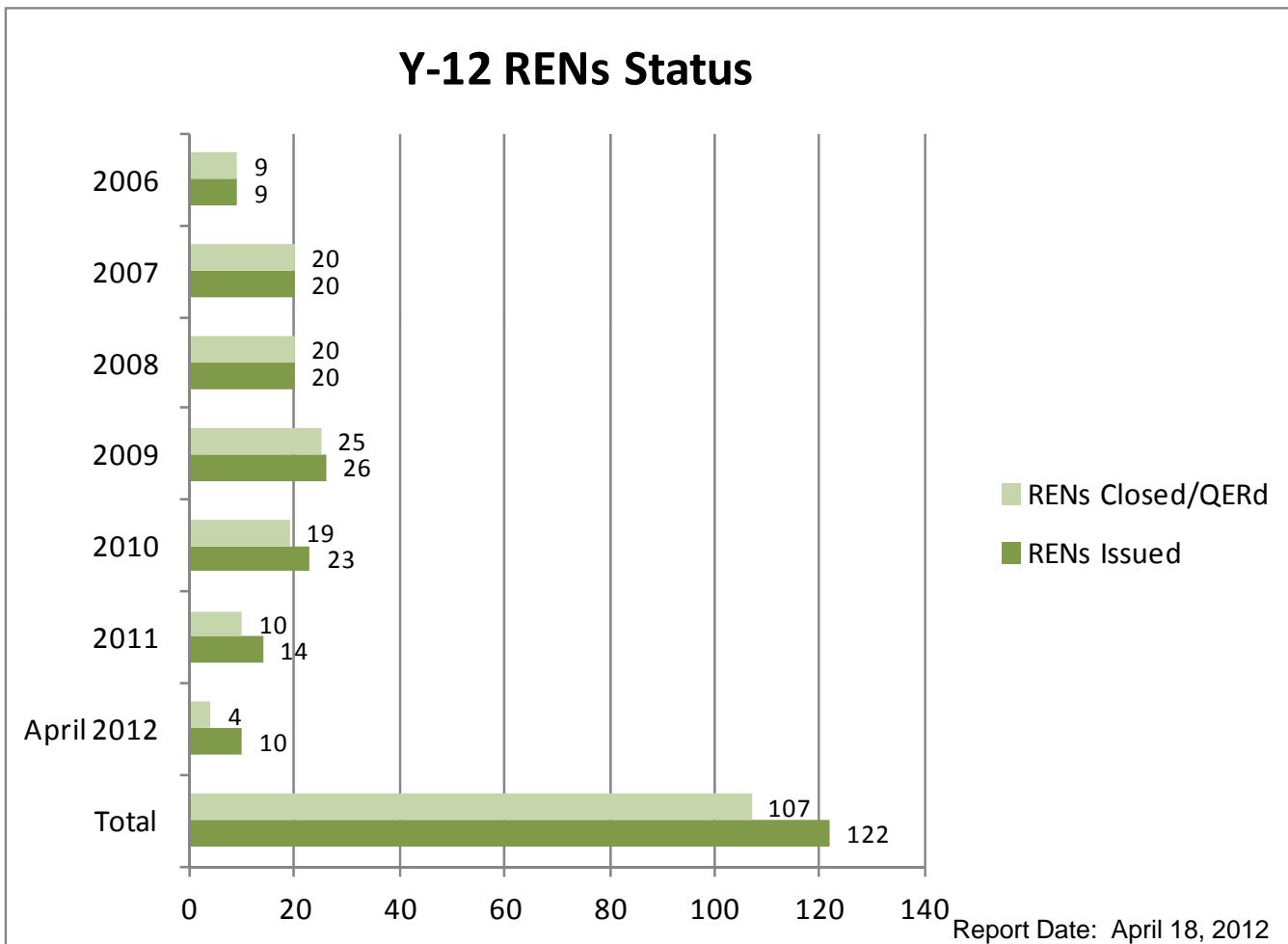
# DA Weapon Quality Program Metrics



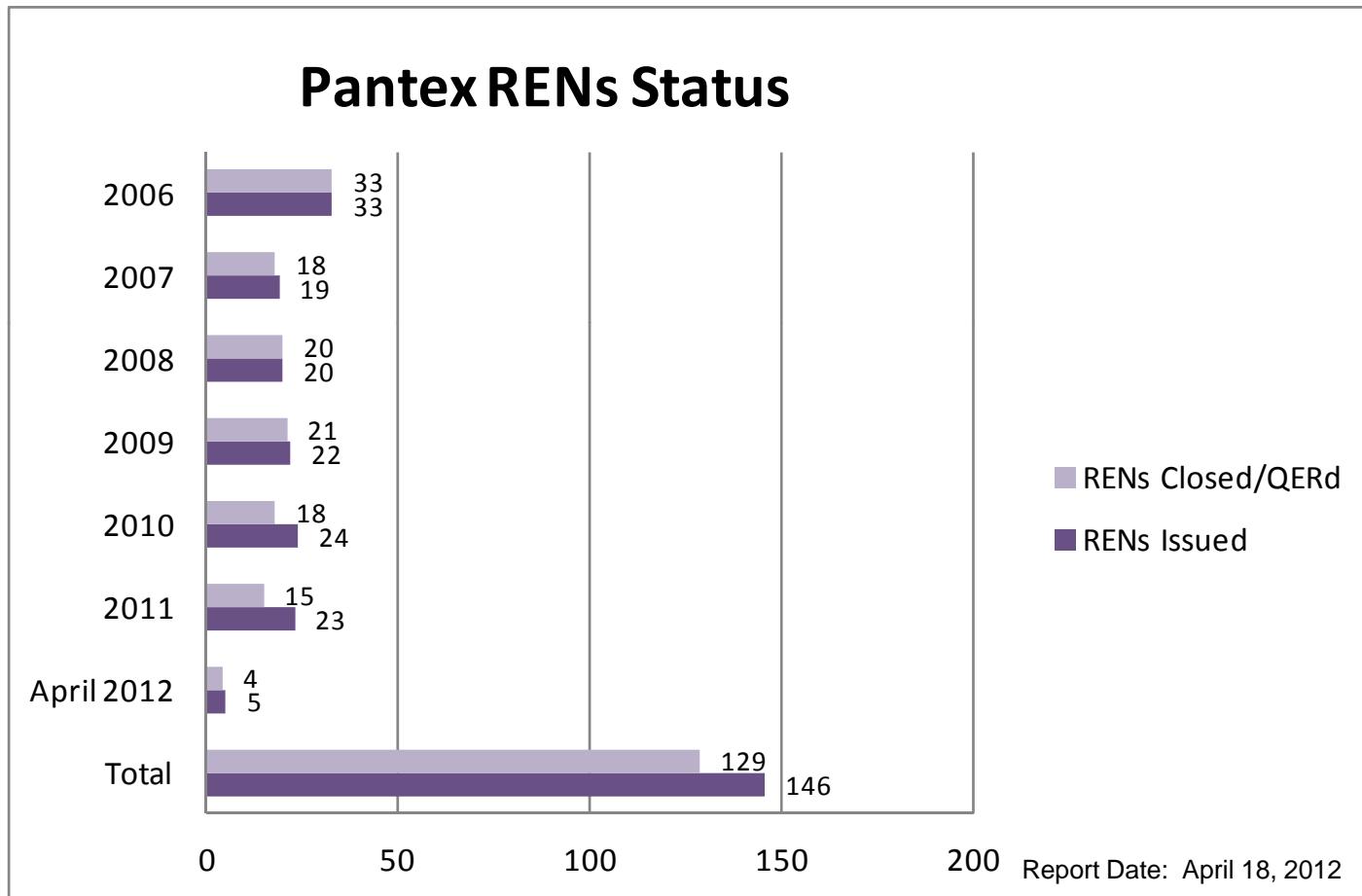
# DA Weapon Quality Program Metrics



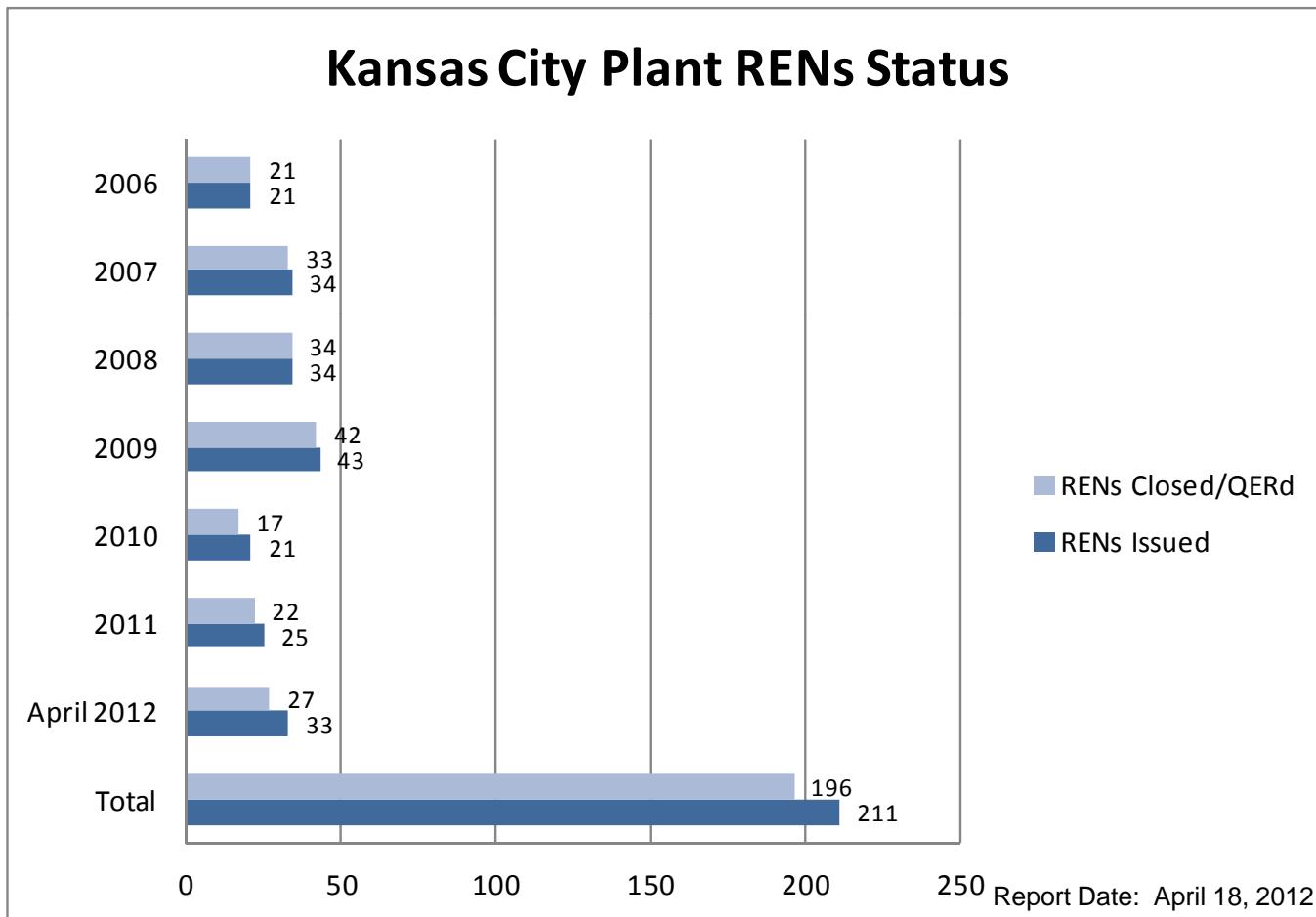
# DA Weapon Quality Program Metrics



# DA Weapon Quality Program Metrics

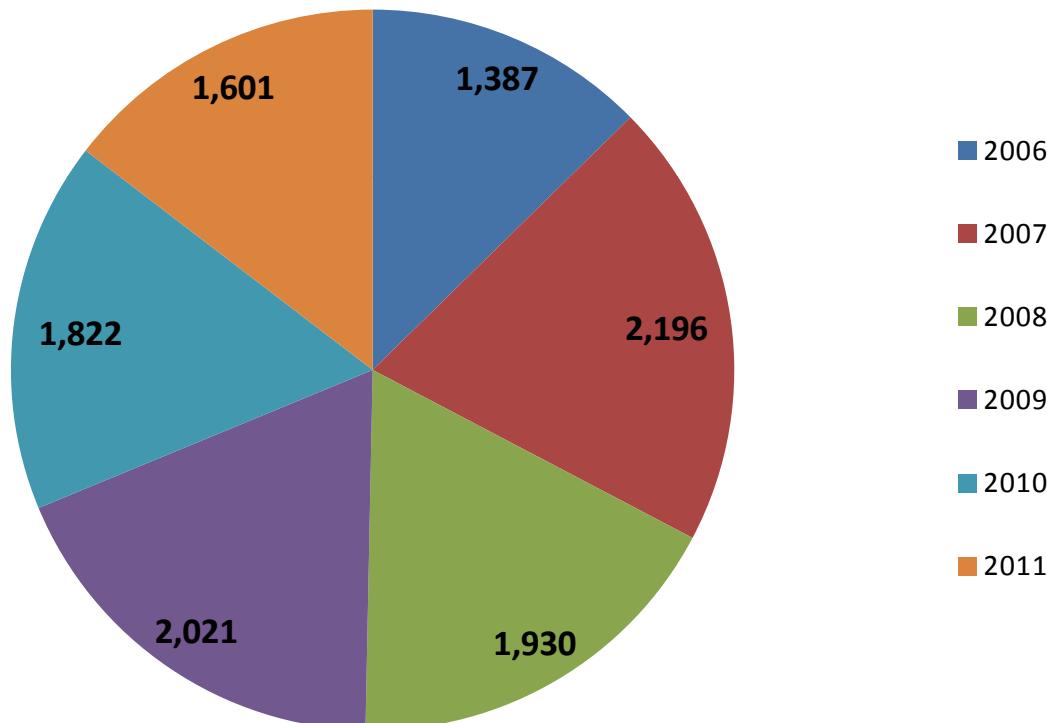


# DA Weapon Quality Program Metrics



# DA Weapon Quality Program Metrics

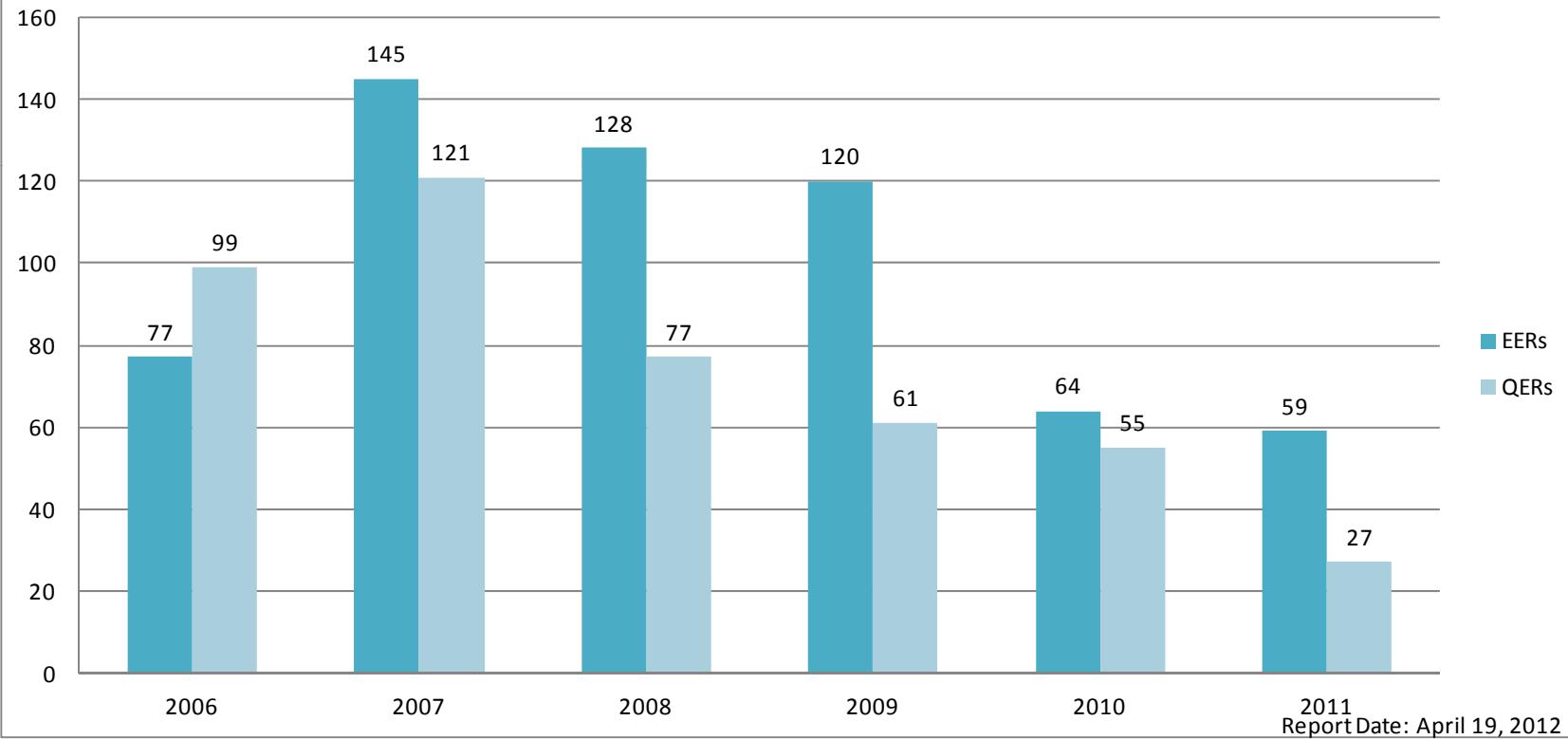
**Summary of EAs Processed by DA per Year  
(2006 - 2011)**



Report Date: April 19, 2012

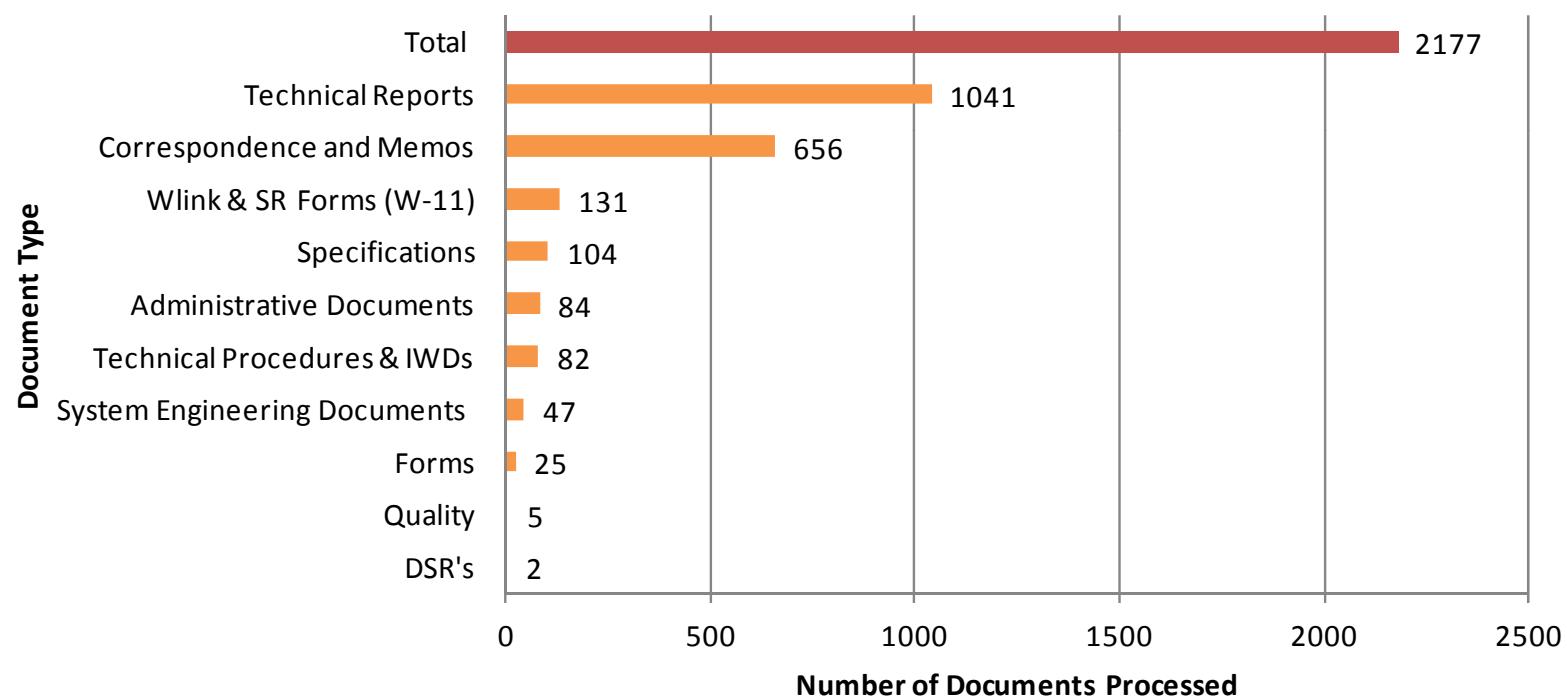
# DA Weapon Quality Program Metrics

**Summary of EERs and QERs Processed by DA per Year  
(2006 - 2011)**



# DA Weapon Quality Program Metrics

## Documents Processed by Document Control Team FY 2011



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# Design Agency Weapon Quality Program

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## Questions

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# Design Agency Weapon Quality Program

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## Back-Up

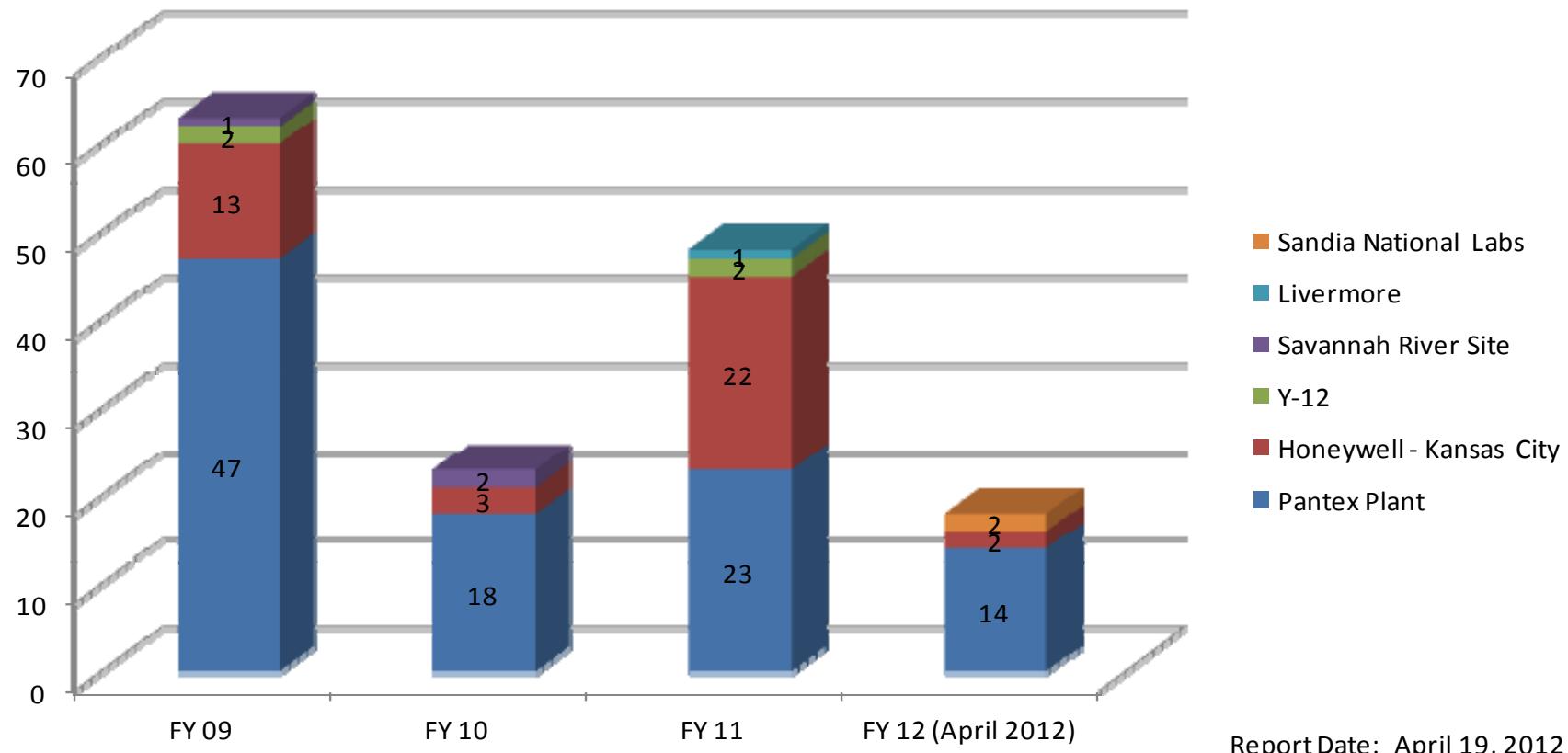
## DA Quality Program Focus Areas

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- Continuing improving the Receipt Inspection and Shipping Review processes at TA-16
  - Have created a tracking database
  - Tracking timeliness of response
  - Revised Weapon Systems Engineering (W) Division Packaging and Transportation Quality Review Procedure (W-12-AD-0004)
  - Revised Process for Transferring Materials/Components between the Weapons Systems Engineering Division and External DOE Facilities (W-12-SE-0005)
  - Created Weapon Systems Engineering (W) Division Quality Stamp Request Procedure (W-12-SE-0007)

# Design Agency Weapon Quality Program

## W-12 Receipt Inspections by Site by FY



Report Date: April 19, 2012

# Design Agency Weapon Quality Program

