

*This is the third in a series of newsletters designed to provide updates to the Quality Assurance community on Software Quality Assurance (SQA) activities to improve communications and support of field activities.*

## WHAT'S NEW?

### Code Guidance Reports are on the SQA Knowledge Portal

The Code Guidance Reports are on the Central Registry portion of the SQA Knowledge Portal at <http://www.eh.doe.gov/sqa/>. The reports provide guidance in the use of the six toolbox codes for supporting Documented Safety Analysis applications. The reports contain information that supplements information found in the documentation provided by the code developer. The contents of the Code Guidance Reports are applicable in the interim period until measures are completed to bring the toolbox codes into compliance with defined SQA standards. The Office of Quality Assurance Programs is currently working with the code developers to determine cost and schedule for upgrading the six toolbox codes.

### Completing SQA FAQS Competency Requirements

Several questions have been raised concerning the three competencies in the Safety Software Quality Assurance Functional Area Qualification Standard that were not satisfied by the ASQ Software Quality Engineering Course that was presented earlier this year. Here is how one site qualified individuals on the three competencies.

### ***Suggested tasks to address Competency #1 and Competency #3:***

Individuals participate in at least two SQA assessments of safety system software (I&C), and safety design and analysis software, which includes the review of both custom software and commercial off-the-shelf software (COTS). Individuals demonstrate their level of knowledge for each competency using their SQA assessment notes, observation and/or finding write ups.

Prior to participating in a SQA assessment, it is highly recommended that individuals complete the American Society for Quality (ASQ) Software Quality Engineering course or equivalent and read the suggested sections of NUREG/CR-6263.

### ***Suggested tasks to address Competency #9:***

Individuals read and demonstrate an understanding of the following in Volume #1 and #2 of NUREG/CR-6263:

**VOLUME 1:** Executive Summary, Section 2 *System Context and Framework*, Section 3 *Development of Candidate Guidelines*, Section 4 *Framework Elements and Candidate Guidelines*, and Section 5 *Assessment of Technical Basis*.

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**VOLUME 2:** Section 1.2 *Objective and Scope*, Section 1.3.2 *Technical Basis*, Section 1.4 *Organization of the Report*; and then the “Overview” and ALL “Candidate Guidelines” subsections of Section 2 *System Context and Framework*, Section 3 *Software Requirements Specification*, Section 4 *Software Design*, Section 5 *Software Coding*, Section 6 *Software V&V-Static*, Section 7 *Software V&V-Dynamic (Testing)*, Section 8 *Software V&V-General Considerations*, Section 9 *Software Safety Analysis*, Section 10 *Software Operation and Maintenance*, Section 11 *Software Configuration Management*, and Section 12 *Software Quality Assurance*.

This is then followed up with a performance test where individuals sketch and describe what is communicated in Figures ES-1, ES-2, ES-3, and ES-4.

For further information, please contact Chip Lagdon at (301) 903-4218 or [Chip.Lagdon@eh.doe.gov](mailto:Chip.Lagdon@eh.doe.gov).



## Quickplace Plug-in Needed for Discussion Forum

The purpose of the SQA Knowledge Portal is to promote continuous improvement and sharing of SQA knowledge among interested parties across the DOE complex. The Discussion Forum is one of the features on the SQA Knowledge Portal used to do this. Recently we learned that it requires the Quickplace Active X plug-in to be installed before you can post a message on the Discussion Forum. System administrator privileges are typically required to perform this installation, which is installed automatically once you create your first message. It is recommended that once your Discussion Forum account is approved you return to this website and login. If you don't have administrative privileges on

your workstation (i.e. the ability to install software), a person with system administrator privileges needs to logon to your workstation, access the Discussion Forum, and initiate a response to a posted discussion. Quickplace will then prompt for installation of the Active X plug-in. The Administrator will respond “yes” to the installation prompt. You can cancel your response before you publish it, if you do not wish to reply to any comment at that time. The download procedure is performed only once. The required plug-in will be permanently installed on your workstation. If you are NOT a registered user, please use the online form in the Discussion Forum portion of the SQA Knowledge Portal <http://www.eh.doe.gov/sqa/> to request a User Name and Password. Once approved, you will be contacted with your Discussion Forum account information. You can then return to this website to access the Discussion Forum by clicking on the link in the SQA Knowledge Portal and entering your account information.

For further information, please contact [sqa@eh.doe.gov](mailto:sqa@eh.doe.gov) or Lily Alexander at (301) 903-1236 or [Lily.Alexander@eh.doe.gov](mailto:Lily.Alexander@eh.doe.gov).

## IEEE Standards Work on Software Safety

Last fall the Institute of Electrical and Electronic Engineers' (IEEE) Computer Society established a relationship with DOE that created a DOE liaison for the Software and Systems Engineering Standards Committee (S2ESC). The liaison, Debra Sparkman, is working with the S2ESC Executive Committee to develop a strategic plan for extending the IEEE software and system engineering standards to address high integrity systems. High integrity systems include both safety and security systems as well as the data associated with these systems. Initial plans for this effort will be to harmonize IEEE 1228, *Standard for Software Safety Plans* with IEEE 12207, *Software Life Cycle Processes* and IEEE 15288, *System Life Cycle Processes*. This harmonization is expected to include safety and security processes based upon the Federal Aviation Administration's and Software Engineering Institute's 16 application practices defined

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in the Safety and Security Extensions to Integrated Capability Maturity Models. These application practices address system and software integrity levels, risk management, monitoring and improvement, and maintaining an infrastructure to define, develop and maintain high integrity systems in a safe and secure environment. As other standards within the IEEE software engineering series, such as IEEE 730, *Software Quality Assurance Plans* and IEEE 1012, *Software Verification and Validation* are opened for modification, they may be updated to incorporate the efforts of the high integrity systems standards development.

For further information, please contact Debra Sparkman at (301) 903-6888 [Debra.Sparkman@eh.doe.gov](mailto:Debra.Sparkman@eh.doe.gov).

### Lessons Learned in Software Quality Assurance

Over the years, NASA has become increasingly reliant on software to provide the functionality of the systems it develops and uses. SQA is critical to the success of every project, but the roles and responsibilities are often misunderstood. SQA covers all phases of the Software Development Process including safety, reliability, Independent Verification and Validation (IV&V), and metrics. However, it is often difficult for projects to understand the relationships and apply appropriate quality assurance at an affordable cost. Twelve lessons learned in Software Quality Assurance are presented here. The complete article can be found at <http://www.softwaretechnews.com/stn6-2/stn6-2.pdf>. Here is a summary of the lessons learned.

1. Project Managers and Software Developers need to understand what software quality assurance is and how their project can benefit by its application.
2. Software quality assurance implementation is a balancing activity that must be tailored as project appropriate.
3. Software quality assurance must evaluate the process as well as the products.
4. There must be a software assurance plan.
5. Software quality assurance must span the entire software development cycle.
6. Requirements, the birthplace of successful projects.
7. Software quality assurance does NOT equal testing.
8. Metrics are a necessity.
9. Safety and reliability are critical aspects of SQA.
10. Independent verification and validation (IV&V) is an important tool within SQA.
11. Hardware does NOT equal software.
12. Risk management is NOT optional.



[editor@dacs.dtic.mil](mailto:editor@dacs.dtic.mil). An archive of past newsletters is available at [www.SoftwareTechNews.com](http://www.SoftwareTechNews.com).



## DOE Directives for Safety Software

DOE O 414.1C, *Quality Assurance* is now available for review through the DOE's Directives review system, RevCom. Its associated Guide for safety software, DOE G 414.1-4, *Safety Software Guide for use with 10 CFR 830 Subpart A, Quality Assurance Requirements, and DOE O 414.1C, Quality Assurance* is also in the DOE's formal Guide review process. SQA subject matter experts are strongly encouraged to thoroughly review both documents and provide comments to their DOE Directive's POC. Additionally, please feel free to discuss your comments with any member of the Guide writing team listed below.

For safety software, the Order and the Guide establish ASME NQA-1 as the preferred standard supplemented by other consensus standards. The Order identifies 10 software quality work activities that are to be performed using the graded approach specified in the Order. These 10 work activities are: (1) software project management, (2) software risk management, (3) software configuration management, (4) procurement and vendor management, (5) software requirements identification and management, (6) software design and implementation, (7) software safety design, (8) verification and validation, (9) problem reporting and corrective action, and (10) training of personnel in the design, development, use and evaluation of safety software. These 10 work activities were consolidated from practices and activities identified in several well known consensus standards, including ASME NQA-1-2000.

The Guide further describes how these 10 software quality work activities may be implemented using a graded approach to satisfy the Order criteria. The graded approach specifies if each work activity must be fully met or may be graded. Each work activity identifies sub-activities or tasks that should be performed for that work activity. For work activities that can be graded, a list of optional or informally implemented sub-activities is included. The grading is based upon the impact on safety (e.g., Level A or Level B) and the safety software type (e.g., custom developed, configurable, or acquired).

## DID YOU KNOW?

Test your knowledge of SQA with the following "did you know" facts:

Did you know that collecting data on the root cause of a software defect would most appropriately be assigned to a "programmer"? The most appropriate person to collect data is the owner of that data. The owner is the person who generates the data or is closest to the point where the data is generated. In the case of a software defect, the programmer is the most appropriate person to determine the root cause since s/he is the closest to the software and its defects.

The Guide contains two key appendices: Appendix 2, *Procedure for Adding or Revising Software to, or Deleting From the DOE Safety Software Central Registry* and Appendix 6, *DOE O 414.1C Criteria Review and Approach Document*. These appendices have been updated to reflect the 10 work activities in the Order. The Guide also includes crosswalks between DOE O 414.1C quality requirements, the ASME NQA-1 requirements, and the DOE O 414.1C safety software quality assurance 10 work activities. These crosswalks are intended to assist in implementing the safety software quality assurance requirements in DOE O 414.1C.

For further information, please contact Bud Danielson at (301) 903-2954 [Bud.Danielson@eh.doe.gov](mailto:Bud.Danielson@eh.doe.gov) or Debra Sparkman at (301) 903-6888 [Debra.Sparkman@eh.doe.gov](mailto:Debra.Sparkman@eh.doe.gov).

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## DID YOU KNOW?

Test your knowledge of SQA with the following “**did you know**” facts:

Did you know that “first pass yield” is not a valid measure of the effectiveness of the design peer reviews process? This question highlights the difference between defect prevention and defect detection. First past yield is a measure of the effectiveness of a defect prevention process. A design peer review is a defect detection technique. Measures associated with design peer reviews include defect detection efficiency, defects found per staff hour and phase containment.

## Sharing SQA Information

Two mechanisms have been developed to share SQA information with others across the DOE complex. One is the **Central Registry List Server** and the other is the SQA Knowledge Portal **Discussion Forum**. Both mechanisms provide an easy to use platform to disseminate information and sharing lessons learned.

The **Central Registry List Server** is unmoderated (any subscribed account can freely send messages to the list server). All subscription requests to the lists server require approval before the subscriber is added to the list. To request a subscription to the Central Registry List Server:

- Identify the email account that you wish to subscribe to the list server. Keep in mind that once approved, all messages from the list server will be sent to that account and that messages can be sent to the list server only from that account.
- Send an email message from that email account to “LISTSERV@VM1.HQADMIN.DOE.GOV” with “SUBSCRIBE CENTREG” in the body of the message.

Once approved, you will receive an email notification from the list server indicating that your subscription has been activated. To send a message to all subscribers of the list, simply send the email message to “CENTREG@VM1.HQADMIN.DOE.GOV”. The message will be automatically forwarded to all subscribers. Instructions on using the Central Registry List Server can be found on the SQA Knowledge Portal and clicking on the [List Server Process Guide](#) link.

The **Discussion Forum** is part of the SQA Knowledge Portal and provides a virtual workspace for end users to post information regarding SQA including general issues, toolbox code usage, and lessons learned. You must be a registered user with a user name and password to use the discussion forum. If you are NOT a registered user, please use the online form to request a User Name and Password link under Discussion Forum in the SQA Knowledge Portal. Once approved, you will be contacted with your SQA Discussion Forum account information. You can then return to this website to access the SQA Discussion Forum by clicking on the link above and entering your account information.

The Discussion Forum allows for information to be posted and retrieved by areas. Currently the areas established are listed on the following page. Others may be added in the future.

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- General SQA Information
- Criteria Review & Approach Documents (CRADs) and Assessments
- Order & Guide Development
- Tool Box Codes

When a registered user posts information on the Discussion Forum, you may receive an email notification with a link to the posted topic. Email notification is at the discretion of the individual posting the information. So check back frequently for new information.

Everyone is encouraged to register and use both the Central Registry List Server and Discussion Forum to share SQA information and lessons learned throughout the DOE SQA community. For further information, please contact Chip Lagdon at (301) 903-4218 or [Chip.Lagdon@eh.doe.gov](mailto:Chip.Lagdon@eh.doe.gov).

## DID YOU KNOW?

Test your knowledge of SQA with the following “**did you know**” facts:

Did you know that formal change control starts when a software work product is “acquired” during the software con-figuration management process? Software work products are identified and place under control. The point in which a software work product is placed under control is referred to as being “acquired” under the configuration management system. Software configuration acquisition of a software work product may occur when a work product such as a document or plan is finalized, custom software has passed developer testing, or purchased software is received. Software configuration planning activities will specify when a work product is to be “acquired.” At this point in time, formal change control process for that work product begins. All future changes (problems or enhancements) are handled through formal change control procedures.

## FUTURE ACTIVITIES



### DNFSB Briefing

The fifth briefing to the DNFSB on the status of the SQA Implementation Plan will be conducted sometime in October 2004. At this briefing, the Office of Environment, Safety and Health (EH), Office of Environmental Management (EM) and National Nuclear Security Administration (NNSA) representatives will provide updates on progress made in completing the SQA Implementation Plan commitments. For further information, please contact Chip Lagdon at (301) 903-4218 or [Chip.Lagdon@eh.doe.gov](mailto:Chip.Lagdon@eh.doe.gov).

### Newsletter Articles Needed

If anyone has an interest in writing an article for this periodic newsletter, Please contact Chip Lagdon at (301) 903-4218 or [Chip.Lagdon@eh.doe.gov](mailto:Chip.Lagdon@eh.doe.gov). Please share any activities that your site is doing with respect to SQA that may help other sites or provide useful lessons learned. As we continue to verify status of SQA in the Department, field input is critical in fostering an environment that promotes continuous sharing.