Waste Treatment Plant Project

Software Quality

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Software Quality – Why Should I Care?

- Software Quality Requirements
  - When software is used in a design/safety analysis calculation, how do you know the results are correct?
  - Lack of a Software Quality Program that fully implements the software quality requirements can result in
    - the accuracy of the calculation being questioned
    - a code 3 for the calculation (cannot proceed)

- With a Software Quality Program in place you will have objective evidence that
  - Software used in calculations is managed and controlled
  - Software is used within its intended use and range of inputs
  - Software results can be trusted

Software Subject Matter Expert Planning

- Review supplier's scope

  - Software used in design/safety analysis calculations

  - Software used is acquired, developed, government furnished

- Supplier Software Quality Program

  - Review of Quality Assurance Manual

  - Review of procedures

  - Review of objective evidence of following procedures

- We work with the WTP responsible engineer to ensure the software's intended use, range of inputs, limitations, and validation test cases meet WTP requirements

What Do We Find?

Supplier Qualification Software Questionnaire - RE

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Part I - USE OF SOFTWARE FOR DESIGN OR SAFETY ANALYSIS BY Q SUPPLIERS

MR No.:

Purpose: The following are screening questions that help us scope the work that needs to be done to qualify equipment supplier's software quality program. These questions are focused on the supplier's use of software in design. This questionnaire is not intended to scope the supplier's software quality program for the development of software used to operate the equipment they are supplying.

Will software be used in this procurement or subcontract?

Discussion: The following questions are to aid the RE in understanding the analysis that may be part of a purchase order or subcontract. Understanding the potential use of software in a PO or subcontract is essential in identifying the software requirements and verification of the supplier's or subcontractor's implementation of those requirements.

1. What are the safety functions of the equipment or associated with the service provided by the supplier?

2. Based on the safety function(s), identify the type of design analysis or safety analysis that the supplier will perform to accomplish their work related to those safety functions.

- Types of analysis that will be performed within the scope of work: Seismic, Environmental, Code compliance (National codes used to qualify the equipment, ASME Code, ASCE Code, fire code, NEC code)

- Some performance analysis may relate to safety – how is this done and is software going to be used to perform the analysis?

- Some analysis may be related to ALARA (i.e. shielding calculations, airsole removal, etc . . .) considerations. Is software used?

- Does the scope of the procurement include equipment qualification activity that use software. For example, the effects of aging may be analyzed through the use of software rather than destructive testing techniques.

- Will the supplier or subcontractor subcontract out the design or safety analysis scope of the PO or subcontract?

3. What other types of design analysis will the supplier perform to accomplish their work?

4. Have the requirements of subpart 2.7 been flowed to the supplier? How? (via Q data sheet, specification, contract mod., ...)

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Part 1 WTP Responsible Engineer Completes

Supplier Qualification Software Questionnaire - Supplier

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USE OF SOFTWARE FOR DESIGN OR SAFETY ANALYSIS BY Q SUPPLIERS	
Vendor:	MR No.:

How will the Supplier use software?
The questions below will assist WTP to determine what portions of NQA-1 related to software will be included in the supplier qualification audit. These questions will help determine the supplier's specific use of software and identify supplier/subcontractor program requirements.

1. If design analysis or safety analysis is being performed using software, what is the method for "affirming" the design? Suppliers may use software in design, but "affirm" the design through alternative means (e.g. - alternate calculations, qualification testing, Pre-Verification of the software)

2. Will the supplier subcontract-out any of the design/safety analysis work? If yes, what type of requirements flow down has/will occur? Who are the subcontractors and what will they perform?

3. What software (name and version) is the supplier using to perform analysis for WTP? For each software item identified, answer the following:
- Is the software acquired (e.g. - commercial off the shelf software; freeware; shareware; software provided by a college, university or government agency; download from a web page or provided by a sub-contractor) or developed by the supplier?
- If the software is acquired, where was it acquired from?
- Does the supplier use Excel, Mathcad, Mathematica or other commercial off the shelf (COTS) general purpose software in design calculations or design analysis? How does the supplier ensure correct results when this software is used (i.e. - how are results checked)?
- Some analysis may be related to ALARA (i.e. shielding calculations, aerosol removal, etc.) considerations. Is software used in this analysis?

4. How is the software used referenced in analysis/design reports, calculations, etc? What information is recorded (e.g. name, version)?

5. Do you receive error notification from the suppliers of the software being used? What do you do when these notices are received? How are they tracked?

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Part 2 Supplier Completes

What Do We Find?

- "Just an Excel spreadsheet" – consisting of Visual Basic

- Calculation – with uncontrolled, untested software

- "Checking" vs. "review" – no procedure for checking calculations

- Alternate calculation – use of another similar Excel spreadsheet

- Pre-verified – software used outside its range of inputs

- Developed, acquired, government furnished

- Commercial grade dedication – CGD of software not allowed

What is Important

- Baseline of approved software (baseline, name, version)

- Software life cycle defined:
  - Planned
  - Software requirements
  - Software acquisition
  - Software design*
  - Software design verification*
  - Software implementation (coding)*
  - Acceptance test planning/reporting
  - Software configuration management
  - Software retirement

- Trace requirement to design, implementation, test, test result

- Software error reporting

* Does not apply to acquired or government-furnished software

NQA-1 2000 for Design and Safety Analysis

NQA-1
- **Part 1**
  - **Requirement 3**
  - **Requirement 4**
  - **Requirement 11**

- **Part 2**
  - **Sub-Part 2.7**

- **DOE Order 414.1C**

- **ANSI/ANS 10.4**

Specifications

- **T0014,** *Engineering Specification for Supplier Design Analysis*
- **T0045,** *Engineering Specification for Supplier Design Analysis with Developed Software*

- **The Calculation**

- **Control and Management of Software**

- **Black and white**
  - **not graded**

NOTE: from *24590-WTP-3PS-G000-T0045, Section 4.1.5* "The Seller shall obtain Buyer written permission to use or develop custom developed or utility calculation software that has not been checked in accordance with the requirements of Section 3.3.6 to perform any analyses within the scope of this requisition. Buyer written permission is also required for the acquisition of services related to custom developed software or the development of utility calculation software"

QUESTIONS?

Email or Text

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