Department of Energy
Washington, DC 20585

December 24, 2003

The Honorable John T. Conway
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, NW
Washington, D.C. 20004-2941

Dear Mr. Chairman:

Commitment 4.2.1.5 in the Department's Implementation Plan for Software Quality
Assurance (SQA) in response to Board Recommendation 2002-1 has been completed.
Commitment 4.2.1.5 requires the Department conduct a survey of design codes currently
in use to determine if any should be included as part of the toolbox codes. A copy of the
design code survey report is attached and is being posted on the Department's Central
Registry web site at http://tis.eh.doe.gov/techstds/toolsframe.html. As with other SQA
deliverables, the attached report is being finalized through a peer-review process, which
is being conducted over the next several months.

This activity has been helpful in identifying and characterizing the design codes that are
in use at multiple sites or by multiple organizations. No additional codes were identified
for inclusion in the DOE toolbox based on this activity; the design codes identified in the
report are proprietary and are being maintained externally. Some have also been through
a software quality assurance program. This activity has helped define the path forward
for sharing design information, notices, and upgrades on these key design codes.

Questions concerning this commitment may be directed to Chip Lagdon at (301) 903-
4218 or me at (301) 903-8008.

Sincerely,

Frank Russo
Deputy Assistant Secretary
for Corporate Performance Assessment

Attachments

cc: Beverly A. Cook, EH-1
        Mark B. Whitaker, DR-1

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Defense Nuclear Facilities Safety Board Recommendation 2002-1
Software Quality Assurance Implementation Plan

Safety Related Design Software Survey and Recommendations

Interim Report

U.S. Department of Energy
Office of Environment, Safety and Health
1000 Independence Ave., S.W.
Washington, DC 20585-2040

December 2003

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FOREWORD

This document provides the results of a Department of Energy Complex survey on safety related design software. Together with the survey responses, contained as a second volume to this report, the documentation meets IP commitment 4.2.1.5 to *Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 2002-1*.

Suggestions for corrections or improvements to this document should be addressed to:

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REVISION STATUS

Page/Section	Revision	Change
1. Entire Document	1. Interim Report	1. Original Issue

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Safety-Related Design Software Survey and Recommendations

EXECUTIVE SUMMARY

The Department of Energy (DOE) Implementation Plan (IP) for Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2002-1, *Quality Assurance for Safety-Related Software at Department of Energy Defense Nuclear Facilities,* identifies a series of actions and commitments that address DOE's Software Quality Assurance (SQA) programs and activities. Commitment 4.2.1.5 addresses the conduct of a survey of safety-related design software currently in use to determine if any design code should be included as part of the DOE Safety-Related Toolbox. This report contains the results and recommendations of the design software review.

Thirteen organizations at ten DOE sites provided input to the design code survey. The National Nuclear Security Administration (NNSA) and DOE Program Offices, including Environmental Management (EM), manage these organizations and sites. The survey duration was from September to December 2003. Therefore, the survey information represents a snapshot in time of design code usage. Because some sites and organizations did not respond to the survey, the design software information may not be all-inclusive. Nevertheless, the information is complete enough to provide general trends and characteristics on design codes.

The survey information was grouped into seven major categories representing design areas including civil/structural/geotechnical, mechanical, and fire protection. Fifteen design codes were identified as being used at multiple sites or by multiple organizations. They are labeled as "multiple use" design codes and are described in this report. Use of software that is used by a single organization or site is acceptable depending on the SQA status of the software, appropriateness of the software for a given application, and user training.

However, the fifteen design codes are not designated for the toolbox, which currently contains six safety analysis codes. The design codes are proprietary, and are developed and maintained externally to DOE. In addition, these codes are used widely in many industries throughout the world. Most of the vendors/developers of these codes maintain their own SQA programs to correct errors and defects, and to provide notices and upgrade information to users, in order to be competitive with other vendors of similar design software.

Instead of using the toolbox approach, the DOE Office of Environment, Safety and Health (EH) will establish a web-based information system to maintain and centralize the developer-user interface, and streamline the SQA process. DOE users will be invited to interactively supply user interface and other DOE application specific information to the web-based information system. The web-based information system will be a primary mechanism to share the vendors' design software information, notices and upgrades and to report software errors and defects. Users are still responsible for assuring that their specific design software falls within the appropriate SQA plan at their sites or organizations, and that the SQA plan is implemented properly for the specific software and specific application.

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1.0   Introduction

In January 2000, the Defense Nuclear Facilities Safety Board (DNFSB) issued Technical Report 25, (TECH-25), Quality Assurance for Safety-Related Software at Department of Energy Defense Nuclear Facilities (DNFSB, 2000). TECH-25 identified issues regarding computer software quality assurance (SQA) in the Department of Energy (DOE) Complex for software used to make safety-related decisions, or software that controls safety-related systems. Instances were noted of computer codes that were either inappropriately applied, or were executed with incorrect input data. Of particular concern were inconsistencies in the exercise of SQA from site to site, and from facility to facility, and the variability in guidance and training in the appropriate use of accident analysis software.

Progress was made in the 2000 to 2002 period assembling the basic elements to a response plan and collected data from DOE field offices and safety contractors on SQA programs and processes. However to expedite implementation of corrective actions in this area, the DNFSB issued Recommendation 2002-1, Quality Assurance for Safety-Related Software at Department of Energy Defense Nuclear Facilities, (DNFSB, 2002). As part of its Recommendation to DOE, the DNFSB enumerated many of the points noted earlier in TECH-25, but noted specific concerns regarding the quality of the software used to analyze and guide safety-related decisions, the quality of the software used to design or develop safety-related controls, and the proficiency of personnel using the software.

A series of actions that address the DNFSB's concerns are documented in the DOE Implementation Plan for DNFSB Recommendation 2002-1, Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 2002-1, (DOE, 2003). The Implementation Plan (IP) was accepted by the DNFSB in April 2003 as adequately addressing the concerns raised by Recommendation 2002-1. The IP includes a commitment (4.2.1.5) to conduct a survey of design codes currently in use to determine if any should be included as part of the toolbox codes.

The toolbox codes are a small number of standard computer models (codes) supporting DOE safety analysis that have widespread use and appropriate qualification. Generally, the toolbox codes will have been developed and maintained within the DOE Complex. However, the toolbox concept may also include commercial or proprietary grade software typically applied for design purposes. In this case, DOE may consider additional SQA controls appropriate for repetitive use of the software in safety applications.

The scope of the survey required by commitment 4.2.1.5 includes the identification of safety software currently use to support the analysis and design of defense nuclear facilities including structures, systems and components, as well electrical and control system design. The survey requested identification of both commercial off-the-shelf (COTS) software and DOE/contractor developed software, as well as other industry sources. Often the same software is used for both safety and non-safety applications, and nuclear and non-nuclear facility design.

1.1   Objectives and Content of Report

This report supports completion of the commitment (4.2.1.5) by:

- Providing the results of a survey of the design codes currently in use in the DOE Complex
- Determining if any of the identified design software should be included as part of the toolbox.

The balance of this report includes discussion of the "Survey of Safety Software Used in Design of Structures, Systems, and Components". The results and trends identified from the survey are covered next. Contrasts between the multiple-use design software and the multiple-use safety analysis software previously identified (DOE, 2002) are then highlighted, before proposing a strategy for maintaining software quality assurance among the design software. Following this discussion, a practical approach is provided for addressing other widely used categories of software commonly used in engineering and safety analysis, i.e. General Use and commercial-off-the-shelf software. The document continues with recommendations and lessons learned from the survey and interpretation process, before developing a set of conclusions on design-related safety software in light of DNFSB Recommendation 2002-1.

A second volume to this report contains the full set of responses from DOE field offices and safety contractors.

1.2   Scope

The scope of this report is limited to the safety related design codes as used within the Department of Energy.

1.3   Purpose

The purpose of this report is to document a survey of safety related design codes as used in the Department of Energy sites and laboratories to determine if any should be designated as toolbox codes and placed in the Central Registry.

1.4   Methodology for Survey

A safety-related design code survey was developed by DOE to identify multiple use software among the various sites and laboratories in late summer of 2003. The survey was based on an earlier solicitation made to identify safety analysis and instrumentation and control (I&C) software, but tailored to meet current requirements for information to support the IP. A secondary goal was to review the various programs, practices, and procedures used to assure software quality in the design software area among site contractors.

The "Survey of Safety Software Used in Design of Structures, Systems, and Components" was finalized and was transmitted to primarily NNSA and EM sites on 12 September 2003. The survey first requested identification of the principal DOE office(s) that the contractor supported.[1]

Software used in seven categories was solicited, including

- Civil/Structural/Geotechnical Systems
- Mechanical Systems
- HVAC
- Electrical Systems
- Fire Protection Systems
- Instrumentation and control
- Other categories.

For each computer code identified, the inputs to Table 1-1 were requested.

A final optional, section to the survey requested input on the contractor SQA programs, procedures, and training, and the SQA standards or DOE directives that are met in terms of compliance.

In terms of timing, the survey was in effect a snapshot of the design software used throughout the DOE Complex for safety purposes in the September – December 2003 period. It was anticipated that nearly all the software used for design purposes would be commercial grade and proprietary.

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[1] Secondary release of the survey also included Office of Civilian Radioactive Waste Management, Office of Science and Office of Nuclear Energy sites.

Table 1.1 Design Software Information Requested in Survey

a.	Code name and version
b.	Function of code
c.	Application (what projects/facilities at the site/lab)
d.	Code developer and/or sponsor
e.	Commercial, Proprietary or Other (Explain)
f.	Current Owner/Vendor and technical support provider
g.	Documentation available
h.	Code platform (Workstation, PC-based, Mainframe)
i.	Operating System (Windows, DOS, other)
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)
k.	How are error and user questions reported?
l.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues

2.0   Survey Results

This section presents the survey results.

This survey identified over seventy codes being used as safety-related design software at
Department of Energy sites. Table 2.1 presents the results of the survey in tabular form. The
rows correspond to the codes identified and are sub-grouped into one of seven use categories.
The use categories are Civil, Mechanical, HVAC, Electrical, etc. The columns of Table 2.1
correspond to the site or organization that supplied the survey information.

Table 2.1 Survey Results –Category vs. Site/Organization

	Table 2.1												
	Site/Organization												
Category	SRS	WIPP	Rocky Flats	Yucca Mtn Project	ANL-W	Hanford/ CH2M Hill	Hanford/ Bechtel National	Hanford/ Duratek	Sandia	LANL	Pantex	LLNL	DOE/Richland
1. Civil/	ABAQUS	None							ABAQUS 6.3	ABAQUS			ABAQUS
Structural/	SHAKE91						SHAKE 2000			SHAKE91			
Geotechnical Systems	GTSTRU DL						GTSTRU DL Version 25						
	SASSI						SASSI 2000			SASSI			SASSI
						SAP2000				Sap 2000 NL			SAP2000 Plus
								COSMOS	COSMOS 2.9				
										RISA3D			RISA3D
						ANSYS/ Mech. Version 7.0	ANSYS	ANSYS		ANSYS V7.1	ANSYS V7.1		ANSYS
	SRPP				Nonlinear		CE928 (DATAN), 1991	Flex PDE		BlastX	BlastX V4.2		WaterCAD
							Compress 6.187/6.214	Ansoft Mawell 3_d		ETABS NL	STADD Pro 2003		VAM3DF

Category	SRS	WIPP	Rocky Flats	Yucca Mtn Project	ANL-W	Hanford/ CH2M Hill	Hanford/ Bechtel National	Hanford/ Duratek	Sandia	LANL	Pantex	LLNL	DOE/Richland
Table 2.1													
Site/Organization													
					ALGOR		CE980 (BSIMQ KE),1984	LS-DYNA and LS-POST		PSADS	MSC MARC 2003, Dytran 2002, Nastran 2003		SAP Nonlinear
										SAFE	Pro-Engineer 2001		
2. Mechanical Systems	AutoPIPE Plus	None	None			AutoPIPE				AutoPipe Plus 6.3			AutoPipe
									COSMOS 2.8	COSMOS /M 2.6			
							Pipe-Flo Professio nal Version 7.0						Pipe-Flo
	ANSYS										ANSYS 7.1		
	ABAQUS						HTRI (IST 2.0) (PHE 2.0)						
	MSC/TH ERMAL						FLUENT			DESIRE 2000			

	Table 2.1												
	Site/Organization												
Category	SRS	WIPP	Rocky Flats	Yucca Mtn Project	ANL-W	Hanford/ CH2M Hill	Hanford/ Bechtel National	Hanford/ Duratek	Sandia	LANL	Pantex	LLNL	DOE/Richland
	Type II, III, & IIIA Tank Top Load,				ALGOR		Aspen BJAC 11.1	FLUENT/ GAMBIT		AFT Fathom 5.0			
	Type 1 Tank Top Load						Pipe-Flo compressible Version 7.0						
							DAPSS 1.0						
							Jet Impingement Code (NE155)						
							Compress 6.187/6.214						
							B31.3/Multiple Mes & versions						
3. HVAC	None	None	NONE			GOTH-SNF	FLUENT				Trace 700 V4.0		

	Table 2.1												
	Site/Organization												
Category	SRS	WIPP	Rocky Flats	Yucca Mtn Project	ANL-W	Hanford/ CH2M Hill	Hanford/ Bechtel National	Hanford/ Duratek	Sandia	LANL	Pantex	LLNL	DOE/Richland
4. Electrical Systems	PDMS	None	None				AGI32 Version 1.64	PTW			SKM Power Tools		
	ETAP						ETAP POWERSTATION 4.7.0						
							EA399/Setroute Version 8.7.1.1						
5. Fire Protection	HASS		HASS		HASS		HASS 7.5			HASS	HASS		HASS
	Pipe2000		FAST										
	KYPIPE												
	NIST Fire Dynamic Simulator and SmokeView												

Category	Table 2.1												
	Site/Organization												
	SRS	WIPP	Rocky Flats	Yucca Mtn Project	ANL-W	Hanford/ CH2M Hill	Hanford/ Bechtel National	Hanford/ Duratek	Sandia	LANL	Pantex	LLNL	DOE/Richland
6. Instrumentation and Control	None	None	None		DMT		Control Valve Sizing - Gas Service Version 1.1						
					ARCS		Control Valve Sizing - Liquid Service Version 1.1						
							Control Valve Sizing - Steam Service Version 1.1						
							FLOWEL, Version 3.0g						
7. Other Design Software					Micro-Shield	Micro-Shield 6.01	Micro Shield 6.0.1						

Category	SRS	WIPP	Rocky Flats	Yucca Mtn Project	ANL-W	Hanford/ CH2M Hill	Hanford/ Bechtel National	Hanford/ Duratek	Sandia	LANL	Pantex	LLNL	DOE/Richland
	VERSE-LC	None	RADIDOSE				Process Perf. SW 1.0		Integrated Tiger Series V5.0				
							WTP Engr. Baseline		ANITA V2000				
							HSC Chemistry 4.1		CINDER V90				
							Delmia Envision Version D5R12 (IGRIP)		DKPOWR				
									PARTISN V2.9				
									ADEPT				
							winnUPRA Version 2.0		SCALE V4.4A				
8. Other Software- Not Recommended As Design							MATHCAD 11			MATHCAD			MATLAB
							Mathematica			MASS			

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Category													
	Table 2.1												
	Site/Organization												
	SRS	WIPP	Rocky Flats	Yucca Mtn Project	ANL-W	Hanford/ CH2M Hill	Hanford/ Bechtel National	Hanford/ Duratek	Sandia	LANL	Pantex	LLNL	DOE/Richland
							MCNP 4C	MCNP ORIGEN	MCNP V5.0	MCNPx, MCNP-4C	MCNP 4A,4B,4C ,5 AND X		
		ALGEBR ACDB,B LOTCDB ,BRAGF LO,CCD2 STEP,.... etc.[1]									Transient Combusti ble EXCEL Spdsheet V2.1	SOURCE S-4C		
		RadClient /Radnet									MAR Summary 032701 V1.0.0.1	TWODA NT		
		CFAST									CFAST/F AST 5.01 3.1.7,2.01			
											SANET			
		GXQ									POSTMA X2	NARAC		
		Lpu02ab. exe									SeaTREE	SAFER V.202		
		Lpu02af.e xe									FDS2	MSC Patran 2003		
		MetData Applicati on									ERAD 3.2	ERAD		

	Table 2.1												
	Site/Organization												
Category	SRS	WIPP	Rocky Flats	Yucca Mtn Project	ANL-W	Hanford/CH2M Hill	Hanford/Bechtel National	Hanford/Duratek	Sandia	LANL	Pantex	LLNL	DOE/Richland
	CAMEO									CAMEOfm			
		CAP88-PC V1.0								AutoDesk AutoCad	MSC ADAMS 2003, Mvision		
									MELCOR	MARPLOT V3.3	SABRINA		
	ALOHA, HOTSPOT	GEN-II-s		MACCS2 Version 1.12					MACCS2	EPIcode 6.01,MACCS2,GENII 2, MELCOR, HOTSPOT 2.05, ALOHA V5.3.2	MACCS2, MELCOR, HOTSPOT 2.0, EPIcode 2.03, ALOHA	HOTSPOT V2.05	
										DANTSYS	KENO V & KENO-3D		
										SQ LIMS V3.1	VISUAL EDITOR		

Footnotes to Table
[1] Multiple codes used to model the performance of the WIPP repository, not used for safety.

Many of the computer codes identified in Table 2.1 are special use software, i.e., applicable to unique design or process requirements, or site-specific or site-developed codes used only at one site by one organization. These codes appear only once in Table 2.1.

Table A-1 (Appendix A) provides the same survey information as Table 2.1 but reorders the table to show site/organization by row and by category in the columns.

Many of the computer codes identified are used at more than one site or by more than one organization. There are fifteen codes used by more than one site or by multiple organizations with approximately half of these being in the Civil/Structural/Geotechnical category. These are listed in compact form in Table 2.2.

Table 2.2 Multiple Use Software Codes Identified

Survey of Design Codes - Multiple Use Codes				
Category	Item	Code Name	Number of Sites	Number of Orgs.
1. Civil/Structural/Geotechnical	1	ABAQUS	4	4
	2	ANSYS	4	7
	3	BlastX	2	2
	4	GTSTRDL	2	2
	5	RISA-3D	2	2
	6	SAP 2000	2	2
	7	SASSI	3	4
	8	SHAKE	3	3
2. Mechanical		ANSYS	4	7
	9	AutoPIPE	3	4
	10	COSMOS	2	2
	11	FLUENT	1	2
	12	PIPE-FLO	1	2
3. HVAC		FLUENT	1	2
4. Electrical Systems	13	ETAP	2	2
5. Fire Protection	14	HASS	6	7
6. Instrumentation and Control		none		
7. Other	15	MicroShield	2	3

Most of the computer codes listed in Table 2.2 are proprietary/commercial and tend to be widely used in a number of different industries and applications outside of the Department of Energy. The final two columns give a count of the number of sites where each code is used and the total number of organizations (regardless of being on the same site) using each code. For example, responses were received from Hanford from four different organizations, and in some cases, each organization used the same code.

Most codes are for application in specific disciplines of engineering design and used not only in the Department of Energy but also across a broad array of industries and applications. For example, ANSYS is used throughout the United States and internationally to perform structural analysis. PIPE-FLO is a general use code to analyze pressure drops and help design piping and pumping layouts in the chemical, nuclear, and other industries. FLUENT is a general use computational fluid dynamics code used in a broad array of applications ranging from assessing weir overflow in sanitary distribution systems to evaluating optimum geometry for computer drive heads. All of these computer codes have thousands of users in the United States and abroad.

Several respondents interpreted their use of a design code in what they judged as the most applicable category for use. For example, ANSYS is applied by several sites for mostly Civil/Structural/Geotechnical design while other sites view their application of the same code as mostly for Mechanical System design. Similarly, FLUENT is used in both Mechanical System and HVAC design applications.

The following sub-sections, 2.1 – 2.7, describe the multiple-use software. A listing of the Area of Applicability is given along with a summary description of the software. Contact information, SQA-related discussions, and training information for each computer code are found in Appendix B. The contact information includes the website address, as well as phone numbers and email information when provided on the website as of December 2003. The synopsis of each code's quality assurance is based primarily on information gleaned from the website associated with the code, or based on information that could be gathered from the web. There is very likely additional information that a vendor could provide on request to prospective users.

The fifteen multiple-use code websites provide varying levels of discussion on SQA and related verification and validation programs associated with the development and maintenance of their software. Several point to ISO 9000 or 9001 certification, while others are said to be compliant with 10 CFR 50 Appendix B or applicable parts of ASME NQA-1. A small number of these codes are relatively silent on how they formally address and maintain quality assurance in their software

2.1   Civil/Structural/Geotechnical Engineering Design Applications

Software identified in this area of applicability includes ABAQUS, ANSYS, BlastX, GTStrudl, RISA-3D, SAP2000, SASSI, and SHAKE. Refer to Tables B-1 through B-8 for more information.

2.1.1   ABAQUS

ABAQUS provides solutions for linear, non-linear, explicit and multi-body dynamics problems to deliver a unified finite element analysis environment. The ABAQUS suite consists of three core products - ABAQUS/Standard, ABAQUS/Explicit and ABAQUS/CAE. Each of these packages offers additional optional modules that address specialized capabilities some customers may need.
ABAQUS/Standard®, provides ABAQUS solver technology to solve traditional implicit finite element analyses, such as static, dynamics, thermal, all powered with the widest range of contact and nonlinear material options. ABAQUS/Standard also has optional add-on and interface products with address design sensitivity analysis, offshore engineering, and integration with third party software, e.g., plastic injection molding analysis.
ABAQUS/Explicit®, provides ABAQUS solver technology focused on transient dynamics and quasi-static analyses using an explicit approach appropriate in many applications such as drop test, crushing and many manufacturing processes.
ABAQUS/CAE®, provides a complete modeling and visualization environment for ABAQUS solvers. With direct access to CAD models, advanced meshing and visualization, and with an exclusive view towards ABAQUS solvers, ABAQUS/CAE is the modeling environment of choice for ABAQUS solvers.

2.1.2   ANSYS

ANSYS is structural analysis software. Its structural models have a full complement of nonlinear elements, nonlinear and linear material laws, and inelastic material models. ANSYS simulates the largest and most intricate of structures. Its nonlinear contact functionality allows for the analysis of complicated assemblies. ANSYS offers users an intuitive, tree-structured GUI for easy definition of even the most intricate material models and a choice of iterative and direct solvers for optimal. ANSYS mechanical models include a full complement of nonlinear and linear elements, material laws ranging from metal to rubber, and a comprehensive set of solvers. The mechanical models can handle complex assemblies—for example, those involving nonlinear contact—and can used for determining stresses, temperatures, displacements and contact pressure distributions on component and assembly designs.

2.1.3   BlastX

BLASTX is a code developed by the Army Corps of Engineers Energy and Research Development Center that calculates blast overpressure. It accurately computes both the positive and negative phases of the shock wave. BLASTX (version 3.0) code calculates the propagation of blast shock waves and detonation product gases in multi-room structures. The code provides predictions of the pressure-time and temperature-time histories in these structures. The 3.0 version includes: (1) a variety of room shapes that may be used throughout a structure, (2) an interactive menu-driven input module, (3) an enhanced version of the burning, venting, and wall-failure models from the Naval Surface Warfare Center INBLAST code, (4) failure models using the total shock and quasi-static gas pressure on a wall, (5) heat conduction to walls, (6) a more accurate model of shock propagation through openings, and (7) modeling of blast-effects within and outside of explosive storage magazines. The code uses dynamic memory allocation so that structures ranging from a single room to many rooms may be treated.

BlastX was the only non-commercial software of the fifteen multiple-use codes identified through the survey process.

2.1.4   GTStrudl

GT STRUDL is a Structural Design & Analysis software program for Architectural - Engineering - Construction (AEC), CAE/CAD, utilities, offshore, industrial and civil works. GT STRUDL is a fully integrated general- purpose structural information processing system capable of supplying an engineer with accurate and complete technical data for design decision-making.

GT STRUDL integrates graphical modeling and result display, frame and finite static, dynamic, and nonlinear analysis, finite element analysis, structural frame design, graphical result display, and structural database management into a menu driven information processing system.

2.1.5   RISA-3D

RISA-3D for Windows is a general purpose three-dimensional analysis and design program developed to make the definition, solution and modification of 3D problem data faster and more manageable. Complete hot rolled steel, cold formed steel, and wood design is included. Analysis, up to and including calculation of maximum deflections and stresses, may be done on structures constructed of any material or combination of materials.

RISA-3D is based on the widely accepted Linear Elastic Stiffness method for model solution. The stiffness of each element of the structure is calculated independently. These stiffnesses are then combined to produce the model's overall (global) stiffness matrix. This global matrix is then solved (versus the applied loads to calculate joint deflections.) These joint deflections are then used to calculate the individual element stresses. The dynamic analysis is performed using a subspace iteration procedure.

2.1.6   SAP2000

SAP2000 is a tool to provide three dimensional static and dynamic finite element analysis and design of structures. The intuitive interface allows creation of structural models rapidly and intuitively without long learning curve delays. Complex models can be generated and meshed with powerful templates built into the interface.

The advanced analytical techniques allow for step-by-step large deformation analysis, multiple p-delta, eigen and ritz analyses, cable analysis, tension or compression only analysis, buckling analysis, blast analysis, fast nonlinear analysis for dampers, base isolators and support plasticity, energy methods for drift control and segmental construction analysis.

2.1.7   SASSI

SASSI (a System for Analysis of Soil-Structure Interaction) was originally developed by a group of graduate students at the University of California, Berkeley. SASSI2000 is a package of interrelated computer programs that can be used to solve a wide range of dynamic soil-structure interaction problems in two or three dimensions. SASSI has been used by many engineering firms and other institutions for dynamic soil-structure interaction analysis. It is currently an industry standard for solving soil-structure interaction problems.

The seismic design of all standard nuclear power plants in the United States (ABWR, SBWR, AP600, and System 80+) and many of the older plants is based on the SASSI solution for generation of seismic responses. SASSI is increasingly used in other industries including transportation, petrochemical, and industrial facilities when subjected to dynamic loading.

2.1.8   SHAKE

SHAKE is software for equivalent linear seismic response analysis of horizontally layered soil deposits. It is developed and supported by the University of California. The SHAKE program has been a widely used program for computing the seismic response of horizontally layered soil deposits. The program computes the response of a semi-infinite horizontally layered soil deposit overlying a uniform half-space subjected to vertically propagating shear waves. The analysis is done in the frequency domain, and, therefore, for any set of properties, it is a linear analysis. An iterative procedure is used to account for the nonlinear behavior of the soils. The object motion (i.e., the motion that is considered to be known) can be specified at the top of any sub layer within the soil profile or at the corresponding outcrop.

Manuals source code and information can be found through the National Information Service for Earthquake Engineering, University of California, Berkeley.

2.2   Mechanical System Analysis

Software identified in this area of applicability includes ANSYS, AutoPIPE, COSMOS, FLUENT, and PIPE-FLO. Refer to Tables B-9 through B-12 for more information.

ANSYS was described earlier in section 2.1.1 and will not be repeated.

2.2.1   AutoPIPE

AutoPIPE is a computer aided engineering program for stress analysis of piping systems. AutoPIPE enables engineers to explore different alternatives for piping design and perform code compliance checks in a time and cost efficient manner. AutoPIPE contains a comprehensive and extensible library of material properties and piping components including pipes, reducers, tees, valves, flanges, flexible connectors and other items. It performs single and multiple spring hanger design for one or more operating conditions. The code performs linear or nonlinear static analysis of piping systems and their supports. The software's proven nonlinear algorithm solves complex problems containing gaps, friction, buried pipe, limit stops, and other piping configurations. Loading includes gravity, buoyancy, support displacements, point and distributed loads, thermal expansion, pressure thrust, equivalent static earthquake, wave, and wind loadings

2.2.2. COSMOS

COSMOSM™ is one of a series of COSMOS modules that offer a wide range of material properties and thermal analysis capabilities, including:
Modeling, meshing and visualization of parts as well as assemblies
Comprehensive analysis capabilities, stress, frequency, displacement, buckling, heat transfer, nonlinear, dynamic response and fatigue capabilities; and
Design optimization.

COSMOSM features an extensive library of 1D, 2D and 3D elements supports isotropic, orthotropic, anisotropic, multi-layer composite, and temperature-dependent material properties.

Capabilities include linear gap/contacts, stress stiffening, sub-structuring, multi-point constraints, constraint equations and more. COSMOSM can solve the computation of heat transfer due to conduction, including with convection and radiation boundary condition, for materials with isotropic, orthotropic, composite, and temperature-dependent properties. The code can also perform nonlinear analyses.

2.2.3 FLUENT

FLUENT is a computational fluid dynamics (CFD) code used to resolve a wide range of problems. It has unique capabilities as an unstructured, finite volume based solver. It is frequently coupled with pre-processing and post-processing software offered by the software developer. Some of its features include: Complete mesh flexibility; All speed regimes (low subsonic, transonic, supersonic, and hypersonic flows); Parallel processing; Solution-based mesh adaption; Steady-state and transient flows; Inviscid, laminar, and turbulent flows; Newtonian or non-Newtonian flows; Full range of turbulence models from simple k-epsilon models to large eddy simulation; Heat transfer including forced, natural, and mixed convection, conjugate heat transfer, as well as several radiation models; Chemical species transport and reaction, including homogeneous and heterogeneous combustion models and surface reaction models; Free surface, Eulerian and mixture multiphase models; Lagrangian trajectory calculation for dispersed phase modeling (particles/droplets/bubbles); Phase change model for melting/solidification applications; Cavitation model; Materials property database; Integrated problem set-up and post-processing; and Extensive customization via user-defined functions.

2.2.4 PIPE-FLO

PIPE-FLO is a piping system analysis tool. It can provide a picture of the entire piping system by integrating the following tasks into a single program: 1) A flow diagram interface showing how the system components and pipelines are connected, 2) A powerful calculation engine showing how the system operates, 3) Communication tools to share the design with others, 4)Links to supporting documents in electronic format.

PIPE-FLO draws a piping system schematic or FLO-Sheet showing all the pumps, components, tanks, control valves and interconnecting pipelines. It sizes the individual pipelines using electronic pipe, valve, and fluid data tables. It selects pumps and control valves from manufacturer's Electronic Catalogs, to optimize pump and system operation. PIPE-FLO calculates how the system operates including pressures and flow rates, net positive suction head, and annual operating costs. It creates FLO-Links to provide immediate access to supporting documents needed to design, build and operate the piping system. The user can share the piping system information with others by way of the PIPE-FLO Viewer.

2.3   HVAC System Analysis

Software identified in this area of applicability includes FLUENT.

2.4   Electrical Systems Analysis

Software identified in this area of applicability includes ETAP. Refer to B-13 for more information.

2.4.1   ETAP

ETAP PowerStation is a fully integrated electrical power system analysis tool. Over 50,000 engineers use PowerStation worldwide in the design, analysis, maintenance, and operation of electrical power systems. ETAP PowerStation offers a wide selection of modules including: panel systems, short-circuit, load flow, motor acceleration, transient stability, generator start-up, harmonic analysis, etc.

2.5   Fire Protection

Software identified in this area of applicability includes HASS. Refer to B-14 for more information.

2.5.1 HASS

HASS (Hydraulic Analyzer of Sprinkler Systems) was introduced in 1976 and has been upgraded annually. The code operates with all versions of Windows in English or metric units as well as metric units with Spanish text. Data entry features include a grid estimator, tree generator, system builder and utilities to develop equivalents for K-factors, branch lines, grids and fitting lengths. Other utilities calculate earthquake bracing, report flow results, analyze water hammer, and more. HASS calculates complex systems in seconds using either the Hazen-Williams or the Darcy-Weisbach formulas, with or without velocity pressure. HASS performs hydraulic analysis in accordance with NFPA 13, calculating any connection of nodes and pipes.

2.6   Instrumentation and Control Applications

No one software package was identified for I &C applications with more than one contractor. In most cases, the responses indicated that no commercial grade software is used for this purpose.

2.7   Other

Software identified in this area of applicability includes MicroShield. Refer to B-15 for more information.

2.7.1 MicroShield

MicroShield is a comprehensive photon/gamma ray shielding and dose assessment program being used by more than 500 organizations. It is widely used for designing shields, estimating source strength from radiation measurements, minimizing exposure to people, and teaching shielding principles. Its use requires a basic knowledge of radiation and shielding principles. It was originally developed by Grove Engineering, which was acquired by Framatome ANP.

3.0   Contrast to Safety Analysis Toolbox Software Codes

This section compares the six designated safety analysis codes with the multiple-use safety-related design software, as well general use analytical software. It then contrasts typical practice for using the design software with the use of safety analysis software.

3.1   Design Software

The design software listed in Table 2.2 is widely used outside of the DOE Complex, has been in use for many years, and in most cases, can be considered to have widespread acceptance and extensive user's groups. In general, their individual user communities are considerably larger than those for the designated safety analysis toolbox codes. Additionally, use of the safety-related design software tends to be industry-independent, typically spanning many sectors of engineering design. Finally, the design software is typically proprietary. Thus, commercial interests (competitive acceptance) create a dynamic for the software developer to identify and correct deficiencies or errors in a timely manner.

In contrast, the safety analysis toolbox software codes have relatively smaller user groups, and with the exception of EPIcode, are not proprietary. Thus, the competitive commercial incentive to maintain a comprehensive error identification and correction process does not exist. To address this shortcoming, the DOE established the toolbox software strategy as part of the Implementation Plan response to the DNFSB Recommendation. These safety analysis codes are thus supplemented with DOE published user guidance documents that establish the applicable usage, appropriate range of use and cautionary instructions to minimize the potential for inappropriate software applications.

Design software is usually used to establish the minimum structural or system details necessary to fulfill a SSC's design function(s). As such, there are established design methodologies, design requirements (i.e., building codes and standards) safety factors and construction techniques associated with the software use. These established protocols reduce the potential for software errors that result in unacceptable SSC performance. In addition, typical industry practice is to submit the design of critical SSCs to alternate verification (e.g., independent calculation or physical testing). This further reduces the potential for unacceptable SSC performance based on one specific computer analysis alone.

When used in a safety analysis context, the design software is commonly used to evaluate the actual safety margins that exist for an SSC. These safety margins are then used to judge if the selected safety class (SC) and safety significant (SS) controls are adequately robust. Thus, the design software usually does not have a direct affect on the stated DSA accident consequences. In this context, there is typically a high degree of independent technical confirmation that assures a robust analytical process.

The designated toolbox software are usually used to either estimate postulated accident conditions (e.g., CFAST) or the consequences (e.g., MACCS2). As such, predictions from safety analysis software are used directly in deriving the SC and SS controls. In addition, the safety analysis software predictions often are not subject to as robust an independent technical

confirmation by alternate calculation compared to design software applications. Rather, the software predictions are taken as valid if the software inputs and outputs are confirmed.

Since design software is typically proprietary, has widespread use, and does not have as direct a bearing on SSC determination and ultimately, DSA conclusions, the software quality assurance implementation process need not be as rigorous as proposed for the safety analysis toolbox software. As such, the critical SQA functions that DOE should address, independent of the software developer, are (1) a process for error identification, tracking, and correction, (2) adequate user training, and (3) incorporation of lessons learned.

A strategy to discuss how these SQA functions will be accomplished will be presented in Section 4.

3.2 Analytical Software

Another group of software reported in the survey, cannot be categorized as strictly design software or safety analysis software. It is more appropriately thought of as *analytical* software. Analytical software does not focus on any specific application, and is widely used outside of the DOE Complex throughout science, engineering, and business sectors. It is usually general-purpose, proprietary software used to solve a wide array of problems in design as well as other engineering areas. This software, of which MATLAB, MATHEMATICA, MATHCAD, and EXCEL are examples from the design software survey, is used directly without modification, and is commercial off-the-shelf in nature. Analytical software has been in use for many years and has even greater acceptance and extensive user base than safety-related design software. As with the design software, these characteristics are very different from the designated safety analysis toolbox software.

Because of their flexibility, analytical software cannot be readily demonstrated as adequate using a back-fit SQA process, based on the outcome of a gap analysis. In addition, such a process is usually not warranted since commercial interests ensure that a SQA process must exist. In addition, DOE sites have a QA program that controls the preparation of calculations. The site-specific QA program must include a requirement for independent review of all design products (10CFR830.122(f)). Thus, a centralized approach to SQA for analytical software is neither practical nor desirable. Rather the SQA for such software will be assured through existing site-specific QA programs.

While a formalized SQA effort related to analytical software is not warranted, it would be desirable to facilitate the sharing of information between software users and the publication of lesions learned. To accomplish this objective, provisions for a web-based information system will be made for the exchange of this information and is discussed in Section 4.

4.0 SQA Strategy

This section describes the proposed DOE strategies to address SQA for design and analytical software.

4.1 Strategy for Design Software

As discussed in Section 3, the infrastructure supporting the design software SQA is very different from that supporting the designated safety analysis toolbox software. Thus, upgrades to the DOE SQA program as defined in the IP must be adapted to reflect these realities. In essence, the current competitive dynamic existing among design software developers, and the proprietary nature of the multiple-use software will be used to focus the proposed DOE SQA strategy. Primarily, the DOE SQA program will assume that the developer of the design software has an adequate process to verify, test and control the software prior to its release. However, other aspects of a robust and mature SQA process must be present. DOE efforts will then focus to promote these areas by promoting the following:

- Reporting and tracking of errors and deficiencies
- Incorporation of lessons learned, and
- Adequate user training.

The reporting and tracking of errors and deficiencies will be accomplished through a DOE web-based information system. DOE design software users will be encouraged to report known errors through the web-based information system and encouraged to share lesions learned. Such an effort will contribute to, but not replace, adequate user training.

This centralized approach is expected to streamline the SQA implementation effort related to design software and reduce the likelihood of unrecognized errors affecting multiple projects. It is considered appropriate because the software is:

- widely used, thus the potential for unreported errors is low
- nearly all proprietary, thus the DOE influence to modify the existing SQA is limited
- subject to alternate reviews in the DSA development process.

This approach necessitates that each DOE software user:

- Identifies and justifies the version of design software being used
- Has been adequately trained
- Understands limitations of the software
- Uses inputs and assumptions that are consistent with the intent of the software, and the specific application.

4.2   Strategy for Analytical Software

Analytical software such as MATLAB, MATHEMATICA, MATHCAD, and EXCEL were identified in the survey (See table 2.1 and the category tilted: Other software not recommended as design). As noted earlier, these codes are general-purpose, proprietary software used to solve a wide array of problems in design as well as other engineering areas. Many of these codes are used directly without modification, and are commercial off-the-shelf in nature. This software is often used in simple ways to sum data as well as perform simple mathematical operations. The software of this category is also used for much more complex analysis including solving sets of differential equations, and programming complex conditional logic.

All of these codes are widely used. A huge number of users apply the codes to problems across many disciplines on a daily basis. Within the DOE Complex, these general use tools are fundamental tools for engineers and solve all sorts of design problems. Quality assurance for these types of codes presents a unique set of challenges.

Simple models or mathematical manipulations are documented easily and may be checked by hand calculations or with a calculator. Quality assurance in simple cases can be achieved by inspection.

More complex models present more of a challenge and can become equivalent to having designed an independent piece of software thereby invoking all the rules, requirements and necessary actions that would be called for by generation of one of the proprietary codes listed in Table 2.1.

Quality assurance is controlled for these general use codes through the local site/lab/facility software quality assurance program. Typically, each use of one of these codes is validated on an individual basis. Inputs to the code, the models employed, and the output are documented according to rules and guidelines specific to the site/lab/facility requirements when the results are to be applied. The level of detail and documentation applied is graded based on the level of complexity.

5.0   Lessons Learned and Recommendations

5.1   Lessons Learned

A survey has been completed for determining widely used, safety-related design software applied in the DOE Complex to support the analysis and design of defense nuclear facilities including structures, systems and components, as well electrical and control systems. From the responses to this survey, the following lessons learned are noted:

- Over seventy computer codes are used to support safety-related design functions.
- Fifteen of these codes are used by least two or more contractor organizations.
- Thirteen from this group of design software are used at two or more DOE sites.
- Most of the software is used for either civil/structural/geotechnical system analysis and design, or mechanical system analysis and design.
- There is no common software tool applicable to HVAC system design that is used at more than one site. The same is true for the instrumentation and control area.
- Nearly all of the fifteen computer codes are commercial-grade, proprietary software offered by United States-based software developers. The one exception is BlastX, a computer code for calculating blast overpressure, and developed and maintained by the U.S. Army Engineering Research and Development Center.
- Most of the software is updated on a frequent basis, on the order of one to two years.
- Nearly all of the codes in the multiple-use group have extensive, worldwide user communities. In a limited review of these code developers, most have a user-friendly internet website. Many of these sites provide newsletters, list online or remote training opportunities, and provide developer/user and user message boards. However, several codes' sites that appeared to offer little more than registration and callback opportunities.

The review of survey results and subsequent evaluation of the multiple-use design software was limited. However, it did reveal some indication of the level of formal compliance claimed to SQA standards. Six of the fifteen computer codes have Quality Assurance Plans and processes that are compliant with one or more of the following: 10 CFR 50 Appendix B, ISO 9001:2000 or ISO 9000-3. Only two, AutoPIPE and ETAP, claimed compliance with applicable parts of ASME NQA-1. More evaluation work is needed to confirm these levels of compliance.

Finally, it must be emphasized that no one computer code should be excluded from use at a specific site because it is not used elsewhere. If certain software is the best tool for a design or safety analysis purpose, and the user clearly understands the nature of the problem being modeled and the limitations of the code being applied, then that software should not be disallowed because other sites do not use it. Conceivably, the multiple-use code may result in an inferior performance compared to the single-site code in the use intended. Each safety analyst and design engineer is responsible for understanding the pedigree of the software they apply to each and every task, being appropriately trained, and obtaining sufficient peer review of their analyses.

5.2 Recommendations

Recommendations based on the outcome of the safety-related design software survey and interpretation of the lessons learned include the following:

1. **Toolbox Recommendation**: Safety-related design software is different from safety-related analysis software in its development, maintenance and application in the DOE Complex. Most of the software identified in the survey have worldwide user groups spanning many industries, have well-organized and comprehensive websites, and are commercially driven to minimize software deficiencies and provide corrective actions when identified. Based on this understanding, no design software is recommended for inclusion in the DOE Safety Software Toolbox.

2. **Design Software Links on a DOE Web-based information system**: A web-based information system is recommended to report design software issues on the part of DOE users, communicate lessons learned, and to promote dialogue with the software developers on fixes, new software versions, and training opportunities. The links could be set by use category as defined in the survey, i.e., civil/structural/geotechnical; mechanical; HVAC; electrical; fire protection; and I&C. A separate link would be available for the same purpose for general-use analytical software. While the multiple-use software identified earlier would be expected to be the basis for most of information "traffic" on each link, all software use would be included as long as it is applied in the use category of interest.

3. **Survey Updates**: While the survey reported herein is a good basis for decision-making on safety-related design software at this time, it is imperative that a survey of this nature be updated on a regular basis. Trends identified over the course of successive surveys would be invaluable in identifying problem areas or aspects of SQA protocol among developers, users, and DOE that may need attention. A survey update would help confirm whether changes in specific software have taken place, and if the composition of the list of fifteen computer codes identified through the 2003 "snapshot" should be changed. A survey could also evaluate the effectiveness of the DOE Web-based information system and the various design software links.

4. **SQA Standard Compliance**: While the multiple software developers appear to recognize the value of compliance with one or more of the SQA standards, there does not appear to be a set of minimum expectations that are clearly defined for each of the use categories. It is suggested that minimum requirements be developed by category and posted on the appropriate link in the DOE Web-based information system. In practice, the various categories could have the same set of standards, e.g. NQA-1, or ISO 9000, but some may also choose additional industry-specific standards.

6.0   Conclusion

A safety design code survey was completed per IP Commitment 4.2.1.5. The survey scope was within the DOE complex for facilities under major management of NA, EM, NE, and SC, and was limited to safety-related design software. The survey categorized software into seven major groups dependent on technical discipline or area, and was conducted over the October to December 2003 period. While several sites and organizations did not input to the survey, the trends and characteristics identified especially for multiple use software are believed to be representative of the DOE Complex, and would likely not be altered with the addition of inputs from the missing sites.

The survey results identify approximately seventy codes in the design arena. The survey also found that most of the software being used is proprietary. A significant number of the codes are site-specific codes (See Table 2.1 and A-2). Multiple sites/organizations use fifteen codes that are identified in Table 2.2. These are summarized in Table 6.1 below.

Table 6.1 Summary Table of Multi-use Design Codes

Survey of Design Codes - Multiple Use Codes		
Code Name	Number of Sites Using Code	Number of Organizations Using Code
1. ABAQUS	4	4
2. ANSYS	4	7
3. Autopipe	3	4
4. BlastX	2	2
5. COSMOS	2	2
6. ETAP	2	2
7. FLUENT	1	2
8. GTSTRDL	2	2
9. HASS	6	7
10. MicroShield	2	3
11. PIPE-FLO	1	2
12. RISA3D	2	2
13. SAP 2000	2	2
14. SASSI	3	4
15. SHAKE	3	3

These codes are used in industries outside of the Department of Energy Complex with most being widely distributed, used for multiple applications, and by many industries.

In contrast to the safety analysis toolbox codes, these codes generally:

- Are proprietary or controlled distribution codes
- Have general industry acceptance
- Have long standing use with successful histories
- Have extensive user groups
- Are commercially competitive (helps drive QA)
- Have critical use applications based on alternative methods (The results are not usually stand alone, but are supported in the context of the application by other means to assure quality.)

Based on the differences between the safety analysis toolbox codes and the design codes, it is concluded that a new software quality assurance strategy is needed for design codes.

For the design code software quality assurance strategy, no design codes are selected for the toolbox. The software quality assurance strategy for the design codes is dependent primarily on the fact that the design codes have been widely used, and have historically demonstrated acceptable quality. It is the user's responsibility to select the software version in a particular design application and justify its use. To centralize and streamline the software quality assurance process, several steps will be taken for the multiple-use design codes. DOE users will be invited to communicate user issues and supply other DOE application specific information on a web-based information system. Information on DOE specific applications and common quality problems can be shared in this way. Software developer-supplied information (including user group location and information, bug reporting, and training resources) can be provided to this web-based information system. Useful information exchange (on errors, defects, notices, upgrades) can be maintained and revised as needed on such a proposed system.

It is concluded that existing software quality assurance for the safety related design codes is adequate. However, some attention should be given towards identifying the industry standards that should be complied with in various categories of design software use. The web-based information system would be useful for posting this level of information for software developers and users alike.

A number of codes used in design are general-use/commercial off the shelf software. The survey has identified some of these codes such as Mathematica, MathCAD, and Excel. These codes have broad use worldwide. Use of these codes should be controlled though existing site/laboratory software quality assurance programs.

This survey is a snapshot in the October to December 2003 time frame of safety related design code usage in the DOE Complex. Although the survey was not responded to by all potential sites and organizations, the response was believed sufficiently large to base identification of trends and characteristics. As new codes are identified through the web-based information system, they may be used to determine if the current set should be modified.

It is the users' responsibility to assure appropriate software quality assurance is employed and implemented for each specific design code in a specific application. Users are responsible for

assuring that use of a specific code falls within the appropriate overall quality assurance plan at their DOE site or laboratory.

7.0   Acronyms and Definitions

ACRONYMS:

ABWR	Advanced Boiling Water Reactor
AEC	Architectural Engineering Construction
ANL	Argonne National Laboratory
ANS	American Nuclear Society
ANSI	American National Standards Institute
AP600	Advanced Pressurized Reactor 600 Mega-Watts
ASME	American Society of Mechanical Engineers
CAD	Computer Aided Design
CAE	Computer Aided Engineering
CFD	Computational Fluid Dynamics
CFR	Code of Federal Regulations
COTS	Commercial Off-The-Shelf
CSI	Computers and Structures Inc.
DNFSB	Defense Nuclear Facilities Safety Board
DOE	Department of Energy
DSA	Documented Safety Analysis
EH	DOE Office of Environment, Safety and Health
EM	DOE Office of Environmental Management
GUI	Graphical User Interface
HVAC	Heating, Ventilation, and Air Conditioning
IEEE	Institute of Electrical and Electronics Engineers
IP	Implementation Plan
ISO	International Organization for Standardization
IV&V	Integrated Verification & Validation
LANL	Los Alamos National Laboratory
LLNL	Lawrence Livermore National Laboratory
NE	DOE Office of Nuclear Energy Science and Technology
NA	National Nuclear Security Administration
NFPA	National Fire Protection Association
NNSA	National Nuclear Security Administration
NQA	National Quality Assurance (standards)
OTI	Operations Technology Inc.
PLC	Programmable Logic Controller
QA	Quality Assurance
QAP	Quality Assurance Program (alternatively, Plan)
SASG	Safety Analysis Software Group
SBWR	Simplified Boiling Water Reactor
SC	Safety Class
SC	DOE Office of Science
SNL	Sandia National Laboratories
SQA	Software Quality Assurance
SSC	System Structure or Component
SRS	Savannah River Site
SRS	Software Requirements Specification
SS	Safety Significant
SVVP	Software Verification & Validation Plan

SVVR	Software Verification & Validation Report
V&V	Verification and Validation
WIPP	Waste Isolation Pilot Project
YMP	Yucca Mountain Project

DEFINITIONS:

The following definitions are taken from the Implementation Plan. References in brackets following definitions indicate the original source, when not the Implementation Plan.

Central Registry — An organization designated to be responsible for the storage, control, and long-term maintenance of the Department's safety analysis "toolbox codes." The central registry may also perform this function for other codes if the Department determines that this is appropriate.

Computer Code — A set of instructions that can be interpreted and acted upon by a programmable digital computer (also referred to as a module or a computer program).

Design Requirements — Description of the methodology, assumptions, functional requirements, and technical requirements for a software system.

Gap Analysis — Evaluation of the Software Quality Assurance attributes of specific computer software against identified criteria.

Independent Verification and Validation (IV&V) — Verification and validation performed by an organization that is technically, managerially, and financially independent of the development organization.

Safety Analysis and Design Software — Computer software that is not part of a structure, system, or component (SSC) but is used in the safety classification, design, and analysis of nuclear facilities to ensure proper accident analysis of nuclear facilities; proper analysis and design of safety SSCs; and proper identification, maintenance, and operation of safety SSCs.

Safety Analysis Software Group (SASG) — A group of technical experts formed by the Deputy Secretary in October 2000 in response to Technical Report 25 issued by the Defense Nuclear Facilities Safety Board (DNFSB). This group was responsible for determining the safety analysis and instrument and control (I&C) software needs to be fixed or replaced, establishing plans and cost estimates for remedial work, providing recommendations for permanent storage of the software and coordinating with the Nuclear Regulatory Commission on code assessment as appropriate.

Safety-Class Structures, Systems, and Components (SC SSCs) — SSCs, including portions of process systems, whose preventive and mitigative function is necessary to limit radioactive hazardous material exposure to the public, as determined from the safety analyses. [10 CFR 830]

Safety-Significant Structures, Systems, and Components (SS SSCs) — SSCs which are not designated as safety-class SSCs, but whose preventive or mitigative function is a

major contributor to defense in depth and/or worker safety as determined from safety analyses. [10 CFR 830] As a general rule of thumb, SS SSC designations based on worker safety are limited to those systems, structures, or components whose failure is estimated to result in prompt worker fatalities, serious injuries, or significant radiological or chemical exposure to workers. The term serious injuries, as used in this definition, refers to medical treatment for immediately life-threatening or permanently disabling injuries (e.g., loss of eye, loss of limb). The general rule of thumb cited above is neither an evaluation guideline nor a quantitative criterion. It represents a lower threshold of concern for which an SS SSC designation may be warranted. Estimates of worker consequences for the purpose of SS SSC designation are not intended to require detailed analytical modeling. Consideration should be based on engineering judgment of possible effects and the potential added value of SS SSC designation. [DOE G 420.1-1]

Safety Software — Includes both safety system software and safety analysis and design software.

Safety Structures, Systems, and Components (SSCs) — The set of safety-class SSCs and safety-significant SSCs for a given facility. [10 CFR 830]

Safety System Software — Computer software and firmware that performs a safety system function as part of a structure, system, or component (SSC) that has been functionally classified as Safety Class (SC) or Safety Significant (SS). This also includes computer software such as human-machine interface software, network interface software, programmable logic controller (PLC) programming language software, and safety management databases that are not part of an SSC but whose operation or malfunction can directly affect SS and SC SSC function.

Software — Computer programs, operating systems, procedures, and possibly associated documentation and data pertaining to the operation of a computer system. [IEEE Std. 610.12-1990]

Software Design Verification —The process of determining if the product of the software design activity fulfills the software design requirements. [NQA-1]

Source Code — A computer code in its originally coded form, typically in text file format. For programs written in a compilable programming language, the uncompiled program.

Toolbox Codes — A small number of standard computer models (codes) supporting DOE safety analysis, having widespread use, and of appropriate qualification that are maintained, managed, and distributed by a central source. Toolbox codes meet minimum quality assurance criteria. They may be applied to support 10 CFR 830 DSAs provided the application domain and input parameters are valid. In addition to public domain software, commercial or proprietary software may also

be considered. In addition to safety analysis software, design codes may also be included if there is a benefit to maintain centralized control of the codes [modified from DOE N 411.1].

Validation — Assurance that a model as embodied in a computer code is a correct representation of the process or system for which it is intended. This is usually accomplished by comparing code results to either physical data or a validated code designed to perform the same type of analysis. [IEEE-610.12]: The process of evaluating a system or component during or at the end of the development process to determine whether it satisfies specified requirements. Contrast with: **verification**.

Verification — Assurance that a computer code correctly performs the operations specified in a numerical model or the options specified in the user input. This is usually accomplished by comparing code results to a hand calculation or an analytical solution or approximation. [IEEE-610.12]: (1) The process of evaluating a system or component to determine whether the products of a given development phase satisfy the conditions imposed at the start of that phase. Contrast with: **validation**. (2) Formal proof of program correctness.

8.0   References

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Appendices

Appendix	Subject
A	Site/Organization and Software Use by Design Category
B	Information Summaries Related To Multiple-Use Safety Design Codes Identified In The Survey

APPENDIX A.- Site/Organization and Software Use by Design Category

Table A-1 provides the same survey information as Table 2.1, but reorders the table to show site/organization by row and by category in the columns.

Footnotes to Table
[1] Multiple codes used to model the performance of the WIPP repository, not used for safety.

	Table A-1. Site/Contractor and Software Used by Design Category							
Site/ Organization	**Category**							
	Civil/Structural/ Geotechnical	Mechanical Systems	HVAC	Electrical Systems	Fire Protection	Instrumentation and Control	Other Design Software	Other Software- Not Recommended As Design
SRS	ABAQUS	ANSYS	None	PDMS	HASS	None	VERSE-LC	
	GTSTRUDL	Autopipe Plus		ETAP				
	SHAKE91	Type II, III, & IIIA Tank Top Load,						
	SASSI	MSC/THERMAL						
	SRPP	ABAQUS						
WIPP	None	None	None	None	None	None	None	CAP88-PC V1.0
								GEN-II-s
								MetData Application
								RadClient/Radnet
								Lpu02af.exe
								Lpu02.ab.exe
								ALGEBRACDB,BLOTCDB,BRAGFLO,CCD2STEP,.... etc[1]
								GXQ
Rocky Flats	None	None	None	None	HASS	None	RADIDOSE	

Site/Organization	Table A-1. Site/Contractor and Software Used by Design Category							
	Category							
	Civil/Structural/ Geotechnical	Mechanical Systems	HVAC	Electrical Systems	Fire Protection	Instrumentation and Control	Other Design Software	Other Software- Not Recommended As Design
					FAST			
Yucca Mtn.								MACCS2 Version 1.12
ANL-W	SAP2000	ALGOR			HASS	DMT	Micro-Shield	
	Nonlinear					ARCS		
	ALGOR							
Hanford/CH2M Hill	ANSYS/Mech . Version 7.0	AutoPIPE	GOTH-SNF				Micro-Shield 6.01	
Hanford/Bechtel National	ANSYS	Aspen BJAC 11.1	FLUENT	AGI32 Version 1.64	HASS 7.5	Control Valve Sizing - Gas Service Version 1.1	WTP Engr. Baseline	MATHCAD 11
	CE980 (BSIMQKE),1 984	Compress 6.187/6.214		ETAP POWERSTAT ION 4.7.0		Control Valve Sizing - Liquid Service Version 1.1	Process Perf. SW 1.0	Mathematica
	Compress 6.187/6.214	DAPSS 1.0		EA399/Setrout e Version 8.7.1.1		Control Valve Sizing - Steam Service Version 1.1	Micro Shield 6.0.1	MCNP 4C
	CE928 (DATAN),	FLUENT				FLOWEL, Version 3.0g	HSC Chemistry 4.1	

Site/Organization	Table A-1. Site/Contractor and Software Used by Design Category							
	Category							
	Civil/Structural/ Geotechnical	Mechanical Systems	HVAC	Electrical Systems	Fire Protection	Instrumentation and Control	Other Design Software	Other Software-Not Recommended As Design
	1991							
	GTSTRUDL Version 25	HTRI (IST 2.0) (PHE 2.0)					Delmia Envision Version D5R12 (IGRIP)	
	SASSI 2000	B31.3/Multiple Mes & versions					winnUPRA Version 2.0	
	SHAKE 2000	Jet Impingement Code (NE155)						
		Pipe-Flo compressible Version 7.0						
		Pipe-Flo Professional Version 7.0						
Hanford/Duratek	ANSYS	FLUENT/GAMBIT		PTW				MCNP ORIGEN
	Flex PDE							
	LS-DYNA and LS-POST							
	Ansoft Mawell 3_d							

Site/ Organization	Table A-1. Site/Contractor and Software Used by Design Category							
	Category							
	Civil/Structural/ Geotechnical	Mechanical Systems	HVAC	Electrical Systems	Fire Protection	Instrumentation and Control	Other Design Software	Other Software- Not Recommended As Design
	0							
Sandia	ABAQUS 6.3	COSMOS 2.8					Integrated Tiger Series V5.0	MACCS 2
	COSMOS 2.8						ADEPT	MELCOR
							ANITA V2000	MCNP V5.0
							CINDER V90	
							DKPOWR	
							PARTISN V2.9	
							SCALE V4.4A	
LANL	Sap 2000 NL	AutoPipe Plus 6.3			HASS			MATHCAD
	ETABS NL	AFT Fathom 5.0						MASS
	SAFE	COSMOS/M 2.6						SQ LIMS V3.1
	RISA3D	DESIRE 2000						Transient Combustible EXCEL Spdsheet V2.1

	Table A-1. Site/Contractor and Software Used by Design Category							
Site/Organization	**Category**							
	Civil/Structural/ Geotechnical	Mechanical Systems	HVAC	Electrical Systems	Fire Protection	Instrumentation and Control	Other Design Software	Other Software-Not Recommended As Design
	ABAQUS							MAR Summary032701 V1.0.0.1
	SHAKE91							CFAST/FAST 5.01 3.1.7,2.01
	SASSI							SANET
	BlastX							POSTMAX2
	ANSYS V7.1							SeaTREE
	PSADS							FDS2
								ERAD 3.2
								CAMEOfm
								AutoDesk AutoCad
								MARPLOT V3.3
								EPIcode 6.01,MACCS2, GENII 2, MELCOR, HOTSPOT 2.05
								ALOHA V5.3.2
								DANTSYS
								MCNPx, MCNP-4C

	Table A-1. Site/Contractor and Software Used by Design Category							
Site/ Organization	**Category**							
	Civil/Structural/ Geotechnical	Mechanical Systems	HVAC	Electrical Systems	Fire Protection	Instrumentation and Control	Other Design Software	Other Software- Not Recommended As Design
Pantex	ANSYS V7.1	ANSYS 7.1	Trace 700 V4.0	SKM Power Tools	HASS			MCNP 4A,4B,4C,5 AND X
	BlastX V4.2							SOURCES-4C
	STADD Pro 2003							TWODANT
	MSC MARC 2003, Dytran 2002, Nastran 2003							SAFER V.202
	Pro-Engineer 2001							MSC Patran 2003
								ERAD
								NARAC
								MSC ADAMS 2003, Mvision
								SABRINA
								MACCS 2, MELCOR, HOTSPOT 2.0, EPIcode 2.03, ALOHA
								KENO V & KENO -3D
								VISUAL EDITOR

Site/Organization	Table A-1. Site/Contractor and Software Used by Design Category							
	Category							
	Civil/Structural/ Geotechnical	Mechanical Systems	HVAC	Electrical Systems	Fire Protection	Instrumentation and Control	Other Design Software	Other Software-Not Recommended As Design
LLNL								HOTSPOT V2.05
DOE Richland	VAM3DF	AutoPipe			HASS			MATLAB
	ABAQUS	Pipe-Flo						
	SASSI							
	ANSYS							
	SAP2000 Plus							
	SAP Nonlinear							
	WaterCAD							
	RISA3D							

APPENDIX B.— Information Summaries Related To Multiple-Use Safety Design Codes Identified In The Survey

Introduction

Table 2.2 of the main text identifies the codes from the survey that are used at more than one site, or by more than one organization (multiple-use codes). This Appendix presents brief one-page descriptions of each code. Contact information is provided. A synopsis based on web information available is provided concerning the quality assurance status of each code.

Table B-1. ABAQUS

a.	Area of Applicability	Civil/Structural/Geotechnical Systems;
b.	Code name and version(s)	ABAQUS
c.	Function of code	ABAQUS provides solutions for linear, non-linear, explicit and multi-body dynamics problems to deliver a unified finite element analysis environment. The ABAQUS suite consists of three core products - ABAQUS/Standard, ABAQUS/Explicit and ABAQUS/CAE. Each of these packages offers additional optional modules that address specialized capabilities some customers may need. **ABAQUS/Standard®**, provides ABAQUS solver technology to solve traditional implicit finite element analyses, such as static, dynamics, thermal, all powered with the widest range of contact and nonlinear material options. ABAQUS/Standard also has optional add-on and interface products with address design sensitivity analysis, offshore engineering, and integration with third party software, e.g., plastic injection molding analysis. **ABAQUS/Explicit®**, provides ABAQUS solver technology focused on transient dynamics and quasi-static analyses using an explicit approach appropriate in many applications such as drop test, crushing and many manufacturing processes. **ABAQUS/CAE®**, provides a complete modeling and visualization environment for ABAQUS solvers. With direct access to CAD models, advanced meshing and visualization, and with an exclusive view towards ABAQUS solvers, ABAQUS/CAE is the modeling environment of choice for ABAQUS solvers.
d.	Software Developer/Owner; Contact Information	ABABAQUS, Inc., 1080 Main Street, Pawtucket, Rhode Island 02860-4847 Tel: 401 727 4200; Fax: 401 727 4208 E-mail: info@abaqus.com; http://www.abaqus.com/contact.html Technical support: support@abaqus.com
e.	SQA Standard(s) Cited	Quality assurance is stated to meet the ISO 9001 standard. However, vendor indicates QA Plan allows providing software that conforms to the US Nuclear Regulatory Commission's quality assurance requirements and may thus be used for calculations associated with the licensing of nuclear power facilities in the USA.
f.	Training/User-Developer Interaction	ABAQUS and its representatives offer regularly scheduled public seminars as well as training seminars at customer sites. An extensive range of seminars is available, ranging from basic introductions to advanced seminars, which cover specific analysis topics and applications. Three times a year ABAQUS Insights newsletter is published. Since 1988, each year in late spring, ABAQUS Inc.hosts the annual worldwide ABAQUS Users' Conference. ABAQUS employs over 350 people worldwide, with over 24 direct offices providing technical support, sales, and services and with a network of technically advanced distributors in emerging markets.
g.	Estimated Number of Users	Worldwide

Table B-2. ANSYS

a.	**Area of Applicability**	Civil/Structural/Geotechnical Systems; Mechanical;
b.	**Code name and version(s)**	ANSYS
c.	**Function of code**	ANSYS is structural analysis software. Its structural models have a full complement of nonlinear elements, nonlinear and linear material laws, and inelastic material models. ANSYS simulates the largest and most intricate of structures. Its nonlinear contact functionality allows for the analysis of complicated assemblies. ANSYS offers users an intuitive, tree-structured GUI for easy definition of even the most intricate material models and a choice of iterative and direct solvers for optimal. ANSYS mechanical models include a full complement of nonlinear and linear elements, material laws ranging from metal to rubber, and a comprehensive set of solvers. The mechanical models can handle very complex assemblies—for example, those involving nonlinear contact—and is used for determining stresses, temperatures, displacements and contact pressure distributions on component and assembly designs.
d.	**Software Developer/Owner; Contact Information**	ANSYS, Inc. Southpointe 275 Technology Drive Canonsburg, PA 15317 ansysinfo@ansys.com T 724.746.3304 F 724.514.9494 Toll Free USA and Canada: 1.866.ANSYS.AI (1.866.267.9724) Home Page: http://www.ansys.com/index.htm
e.	**SQA Standard(s) Cited**	ANSYS, Inc. is claimed to be the first developer of simulation software to obtain ISO 9001:2000 certification, the internationally accepted quality standard for the software industry.
f.	**Training/User-Developer Interaction**	Training courses are provided on a regular basis and newsletters are issued.
g.	**Estimated Level of Use**	Worldwide.

Table B-3. BLASTX

a.	Area of Applicability	Civil/Structural/Geotechnical Analysis
b.	Software name and version(s)	BLASTX
c.	Function of Software	BLASTX is a code developed by the Army Corps of Engineers Energy and Research Development Center that calculates blast overpressure. It accurately computes both the positive and negative phases of the shock wave. BLASTX (version 3.0) code calculates the propagation of blast shock waves and detonation product gases in multi-room structures. The code provides predictions of the pressure-time and temperature-time histories in these structures. The 3.0 version includes: (1) a variety of room shapes that may be used throughout a structure, (2) an interactive menu-driven input module, (3) an enhanced version of the burning, venting, and wall-failure models from the Naval Surface Warfare Center INBLAST code, (4) failure models using the total shock and quasi-static gas pressure on a wall, (5) heat conduction to walls, (6) a more accurate model of shock propagation through openings, and (7) modeling of blast-effects within and outside of explosive storage magazines. The code uses dynamic memory allocation so that structures ranging from a single room to many rooms may be treated.
d.	Software Developer/Owner; Contact Information	U.S. Army Engineer Research and Development Center Geotechnical and Structures Laboratory 3909 Halls Ferry Road Vicksburg, MS 39180-6199 No website information is available.
e.	SQA Standard(s) Cited	No SQA information has been identified.
f.	Training/User-Developer Interaction	-No Training/User-Developer Interaction Information is available.
g.	Estimated Level of Use	Unknown.

Table B-4. GTStrudl

a.	**Area of Applicability**	Civil/Structural/Geotechnical Systems
b.	**Software name and version(s)**	GT STRUDL
c.	**Function of Software**	GT STRUDL is a Structural Design & Analysis software program for Architectural - Engineering - Construction (AEC), CAE/CAD, utilities, offshore, industrial and civil works. GT STRUDL is a fully integrated general- purpose structural information processing system capable of supplying an engineer with accurate and complete technical data for design decision-making. GT STRUDL integrates graphical modeling and result display, frame and finite static, dynamic, and nonlinear analysis, finite element analysis, structural frame design, graphical result display, and structural database management into a menu driven information processing system. In over 25 years of use, GT STRUDL has become a widely accepted Computer-Aided Engineering and Design tools for the structural analyst and structural design engineer.
d.	**Software Developer/Owner; Contact Information**	**GT STRUDL** Georgia Tech - CASE Center 790 Atlantic Drive Atlanta, Georgia 30332-0355 USA Phone: (404) 894-2260; FAX: (404) 894-8014 E-mail: casec@ce.gatech.edu Home Page: http://www.gtstrudl.gatech.edu/
e.	**SQA Standard(s) Cited**	The vendor claims that GT STRUDL is validated and certified in full conformance to the applicable provisions of the United States Nuclear Regulatory Commission software quality assurance and quality control regulations. Additionally, it is stated that GT STRUDL support and quality assurance standards offered by the Georgia Tech - CASE Center are among the most rigorous in the industry. GT STRUDL software certification procedures are in full conformance with the applicable provisions of the U.S. Nuclear Regulatory Commission quality assurance and quality control regulations (10CFR-50, Appendix B), and ISO9000-3. Full-service support provided by the CASE Center includes software verification and certification, quality control and assurance, program updates, enhancements, performance improvements, and telephone hot- line support (providing installation assistance, systems support, and advice on the effective uses of GT STRUDL.
f.	**Training/User-Developer Interaction**	Training and seminars on using of GTSTRUDL are provided.
g.	**Estimated Level of Use**	Worldwide: GT STRUDL is used on a regular basis by thousands of engineers in over 30 countries.

Table B-5. RISA-3D

a.	**Area of Applicability**	Civil/Structural/Geotechnical Analysis
b.	**Software name and version(s)**	RISA-3D
c.	**Function of Software**	RISA-3D for Windows is a general purpose three-dimensional analysis and design program developed to make the definition, solution and modification of 3D problem data as fast and easy as possible. Complete hot rolled steel, cold formed steel, and wood design is included. Analysis, up to and including calculation of maximum deflections and stresses, may be done on structures constructed of any material or combination of materials. This program is based on the widely accepted Linear Elastic Stiffness method for model solution. The stiffness of each element of the structure is calculated independently. These stiffnesses are then combined to produce the model's overall (global) stiffness matrix. This global matrix is then solved (versus the applied loads to calculate joint deflections.) These joint deflections are then used to calculate the individual element stresses. The dynamic analysis is performed using a subspace iteration procedure.
d.	**Software Developer/Owner; Contact Information**	RISA Technologies 26632 Towne Centre Drive, Suite 210 Foothill Ranch, CA 92610 United States of America Voice: (949) 951-5815 (local & international) Toll Free: (800) 332-RISA (inside the US) Fax: (949) 951-5848 E-mail: info@risatech.com Home Page: : http://www.risatech.com/default.asp
e.	**SQA Standard(s) Cited**	The RISA Technology site has an error and bug-reporting page. The site lists technical frequently asked questions. No other QA specific information was found on the web site.
f.	**Training/User-Developer Interaction**	Training courses are offered by RISA Technologies.
g.	**Estimated Level of Use**	Appears extensive, but could not be confirmed

Table B-6. SAP2000

a.	**Area of Applicability**	Civil/Structural/Geotechnical Analysis
b.	**Software name and version(s)**	SAP2000
c.	**Function of Software**	SAP2000 provides three dimensional static and dynamic finite element analysis and design of structures. The intuitive interface allows creation of structural models rapidly and intuitively without long learning curve delays. Complex models can be generated and meshed with powerful templates built into the interface. The advanced analytical techniques allow for step-by-step large deformation analysis, multiple p-delta, eigen and ritz analyses, cable analysis, tension or compression only analysis, buckling analysis, blast analysis, fast nonlinear analysis for dampers, base isolators and support plasticity, energy methods for drift control and segmental construction analysis.
d.	**Software Developer/Owner; Contact Information**	Computers & Structures, Inc. (CSI) Telephone Number: 510-845-2177 E-Mail Address: baser@comp-engineering.com Home Page: http://www.csiberkeley.com/SAP2000_Software.html
e.	**SQA Standard(s) Cited**	SAP 2000 Version 8.0 has a new QA program in place with a new verification manual. A verification document provides example problems used to test various features and capabilities of the SAP2000 program. The problems demonstrate the adequacy of the program for use in all applications, including safety-related nuclear, as governed by 10CFR50 requirements as well as other international QA standards, such as ISO 9000:2000 requirements.
f.	**Training/User-Developer Interaction**	Tutorials are provided on the web and training is scheduled by CSI on a regular basis.
g.	**Estimated Level of Use**	Unknown

Table B-7. SASSI

a.	**Area of Applicability**	Civil/Structural/Geotechnical Systems
b.	**Software name and version(s)**	SASSI
c.	**Function of Software**	SASSI (a System for Analysis of Soil-Structure Interaction) was originally developed by a group of graduate students at the University of California, Berkeley. SASSI2000 is a package of interrelated computer programs that can be used to solve a wide range of dynamic soil-structure interaction problems in two or three dimensions. SASSI has been used by many engineering firms and other institutions for dynamic soil-structure interaction analysis. It is currently an industry standard for solving soil-structure interaction problems. The seismic design of all standard nuclear power plants in the United States (ABWR, SBWR, AP600, and System 80+) and many of the older plants is based on the SASSI solution for generation of seismic responses. SASSI is increasingly used in other industries including transportation, petrochemical, and industrial facilities when subjected to dynamic loading.
d.	**Software Developer/Owner; Contact Information**	SASSI2000 2 Agnes St Oakland CA 94618-2523 USA Fax number for Registration: (510) 652 2958 Account enquiries: accounts@sassi2000.com Information enquiries about SASSI2000: info@sassi2000.com Home Page: http://www.sassi2000.com
e.	**SQA Standard(s) Cited**	The site has a discussion forum and manuals. No other QA information was found on the web site. In the recent soil-structure interaction field experiment in Lotung, Taiwan, SASSI was one of the most successful programs to predict the response of the containment model and its components.
f.	**Training/User-Developer Interaction**	Tutorials are provided on the website for training.
g.	**Estimated Level of Use**	Worldwide.

Table B-8. SHAKE

a.	**Area of Applicability**	Civil/Structural/Geotechnical Analysis
b.	**Software name and version(s)**	SHAKE
c.	**Function of Software**	SHAKE is software for equivalent linear seismic response analysis of horizontally layered soil deposits. It is developed and supported by the University of California. The SHAKE program has been a widely used program for computing the seismic response of horizontally layered soil deposits. The program computes the response of a semi-infinite horizontally layered soil deposit overlying a uniform half-space subjected to vertically propagating shear waves. The analysis is done in the frequency domain, and, therefore, for any set of properties, it is a linear analysis. An iterative procedure is used to account for the nonlinear behavior of the soils. The object motion (i.e., the motion that is considered to be known) can be specified at the top of any sub layer within the soil profile or at the corresponding outcrop. Manuals source code and information can be found through the National Information Service for Earthquake Engineering, University of California, Berkeley.
d.	**Software Developer/Owner; Contact Information**	National Information Service for Earthquake Engineering University of California, Berkeley EERC Library 1301 S. 46th Street Richmond, CA 94804-4698 Phone: 510-231-9403 Fax: 510-231-9461 Email: eerclib@nisee.berkeley.edu Home Page: http://nisee.berkeley.edu/software/shake91
e.	**SQA Standard(s) Cited**	No SQA information has been identified.
f.	**Training/User-Developer Interaction**	Unknown, Online manuals available.
g.	**Estimated Level of Use**	Unknown

Table B-9. AutoPIPE

a.	**Area of Applicability**	Mechanical
b.	**Software name and version(s)**	AutoPIPE
c.	**Function of Software**	AutoPIPE is a computer aided engineering program for stress analysis of piping systems. AutoPIPE enables engineers to explore different alternatives for piping design and perform code compliance checks in a time and cost efficient manner. AutoPIPE contains a comprehensive and extensible library of material properties and piping components including pipes, reducers, tees, valves, flanges, flexible connectors and other items. It performs single and multiple spring hanger design for one or more operating conditions. The code performs linear or nonlinear static analysis of piping systems and their supports. The software's proven nonlinear algorithm solves complex problems containing gaps, friction, buried pipe, limit stops, and other piping configurations. Loading includes gravity, buoyancy, support displacements, point and distributed loads, thermal expansion, pressure thrust, equivalent static earthquake, wave, and wind loadings.
d.	**Software Developer/Owner; Contact Information**	Bentley Systems, Inc. 685 Stockton Drive Exton, PA 19341 1-800-BENTLEY or +1 610 458 5000 Home Page: http://www.bentley.com/products/disciplines/plant/engineering/autopipe/ Contact site: http://www.bentley.com/tools/sales.cfm?product=AutoPIPE
e.	**SQA Standard(s) Cited**	The vendor claims that AutoPIPE's rigorous quality assurance program has passed numerous independent on-site audits to 10CFR50 App. B, ASME NQA-1, and ANSI N45.2 standards. Bentley has formally written and approved test plans for verification of every modification and new feature to AutoPIPE as well as integration testing for features implemented in previous versions with records of validation spanning more than six years. Users can receive formal error reports that classify errors based on severity, an explanation of the implications of each error, and known workarounds..
f.	**Training/User-Developer Interaction**	Training is provided for the code by a number of vendors.
g.	**Estimated Level of Use**	Worldwide.

Table B-10. COSMOS

a.	Area of Applicability	Civil/Structural/Geotechnical Systems; Mechanical
b.	Software name and version(s)	COSMOS
c.	Function of Software	COSMOSM™ is one of a series of COSMOS modules that offer a wide range of analysis capabilities, including: • Modeling, meshing and visualization of parts as well as assemblies • Comprehensive analysis capabilities, stress, frequency, displacement, buckling, heat transfer, nonlinear, dynamic response and fatigue capabilities; and • Design optimization. COSMOSM features an extensive library of 1D, 2D and 3D elements supports isotropic, orthotropic, anisotropic, multi-layer composite, and temperature-dependent material properties. Capabilities include linear gap/contacts, stress stiffening, sub-structuring, multi-point constraints, constraint equations and more. COSMOSM can solve the computation of heat transfer due to conduction, including with convection and radiation boundary condition, for materials with isotropic, orthotropic, composite, and temperature-dependent properties. It can perform nonlinear analyses.
d.	Software Developer/Owner; Contact Information	Structural Research & Analysis Corp. 12121 Wilshire Blvd. Suite 700 Los Angeles, CA 90025 Phone: 310.207-2800 Fax: 310.207-2774 E-mail: info@srac.com Home Page: http://www.cosmosm.com/pages/products/cosmosm.html
e.	SQA Standard(s) Cited	Not apparent. The web site allows for feedback and error reporting. A newsletter for the product is offered. Frequently asked questions for running the code are posted on the site.
f.	Training/User-Developer Interaction	Training packages are offered through Structural Research & Analysis Corporation. Some are available "online".
g.	Estimated Level of Use	Worldwide.

Table B-11. FLUENT

a.	**Area of Applicability**	Mechanical Analysis; HVAC Analysis
b.	**Software name and version(s)**	FLUENT
c.	**Function of Software**	FLUENT is a computational fluid dynamics (CFD) code used to resolve a wide range of problems. It has unique capabilities in an unstructured, finite volume based solver. It is coupled with pre-processing and post-processing software offered by FLUENT Inc. Some of its features include: Complete mesh flexibility; All speed regimes (low subsonic, transonic, supersonic, and hypersonic flows); Parallel processing; Solution-based mesh adaption; Steady-state and transient flows; Inviscid, laminar, and turbulent flows; Newtonian or non-Newtonian flows; Full range of turbulence models from simple k-epsilon models to large eddy simulation; Heat transfer including forced, natural, and mixed convection, conjugate heat transfer, as well as several radiation models; Chemical species transport and reaction, including homogeneous and heterogeneous combustion models and surface reaction models; Free surface, Eulerian and mixture multiphase models; Lagrangian trajectory calculation for dispersed phase modeling (particles/droplets/bubbles); Phase change model for melting/solidification applications; Cavitation model; Materials property database; Integrated problem set-up and post-processing; and Extensive customization via user-defined functions.
d.	**Software Developer/Owner; Contact Information**	FLUENT USA 10 Cavendish Court, Centerra Park Lebanon, New Hampshire 03766 Phone: (603) 643-2600 Fax: (603) 643-3967 Home Page: http://www.fluent.com/ http://www.fluent.com/worldwide/usa/about/nh.htm
e.	**SQA Standard(s) Cited**	FLUENT's quality management system is now registered to the ISO 9001:2000 international standard and TickIT. FLUENT has chosen the widely recognized ISO 9001 standard for quality assurance and the TickIT scheme for software development organizations as the basis for a quality management system. ISO 9001 applies to businesses that are involved in design, development, production, installation, and servicing. The TickIT scheme contains guidelines for applying ISO 9001 requirements specifically to software industries.
f.	**Training/User-Developer Interaction**	-Consulting and University Program Information is available from website; Some initial training is offered with original license.
g.	**Estimated Level of Use**	- Worldwide.

Table B-12. PIPE-FLO

a.	**Area of Applicability**	Mechanical System Analysis
b.	**Software name and version(s)**	Pipe-Flo
c.	**Function of Software**	PIPE-FLO Professional provides a picture of the entire piping system by integrating the following tasks into a single program: 1)A flow diagram interface showing how the system components and pipelines are connected, 2)A powerful calculation engine showing how the system operates, 3)Communication tools to share the design with others, 4)Links to supporting documents in electronic format. PIPE-FLO draws a piping system schematic or FLO-Sheet showing all the pumps, components, tanks, control valves and interconnecting pipelines. It sizes the individual pipelines using electronic pipe, valve, and fluid data tables. It selects pumps and control valves from manufacturer's Electronic Catalogs, to optimize pump and system operation. PIPE-FLO calculates how the system operates including pressures and flow rates, net positive suction head, and annual operating costs. It creates FLO-Links to provide immediate access to supporting documents needed to design, build and operate the piping system. The user can share the piping system information with others by way of the PIPE-FLO Viewer.
d.	**Software Developer/Owner; Contact Information**	Engineered Software, Inc. 4531 Intelco Loop SE Lacey, WA 98503-5941 Sales - (800) 786-8545 Technical Support - (360) 412-0702 opt. 4 Office - (360) 412-0702 Fax - (360) 412-0672 Home Page: http://www.eng-software.com/pro.htm
e.	**SQA Standard(s) Cited**	A newsletter is provided. Technical information on the code is provided at the site. No other QA information was found on the web site.
f.	**Training/User-Developer Interaction**	Training on the software is provided by Engineered Software.
g.	**Estimated Level of Use**	Engineered Software indicates that the software is used in 20 different industries with over 15,000 customers.

Table B-13. ETAP

a.	**Area of Applicability**	Electrical Systems
b.	**Software name and version(s)**	ETAP
c.	**Function of Software**	ETAP PowerStation is a fully integrated electrical power system analysis tool. Over 50,000 engineers use PowerStation worldwide in the design, analysis, maintenance, and operation of electrical power systems. ETAP PowerStation offers a wide selection of modules including: panel systems, short-circuit, load flow, motor acceleration, transient stability, generator start-up, harmonic analysis, etc.
d.	**Software Developer/Owner; Contact Information**	OTI Inc. 17 Goodyear Irvine, CA 92618-1812 (949) 462-0100 (800) 477-ETAP Fax: (949) 462-0200 Home Page: :www.etap.com
e.	**SQA Standard(s) Cited**	PowerStation is developed under an established quality assurance program and is being used in the majority of high-impact nuclear facilities in the United States. OTI's commitment to providing the highest quality product in the marketplace is thoughtfully executed through the ETAP Quality Assurance program, first implemented in 1991. The Quality Assurance Plan has since been expanded and enhanced to comply with the following widely accepted and firmly established standards: United States Code of Federal Regulations, 10 CFR 50, Appendix B, 10 CFR 21, ANSI/ASME N45.2-1977, ASME NQA-1 (Including Subpart 2.7), ISO 9001 Standard, ANSI/IEEE Std 730.1-1989, CAN/CSA-Q396.1.2. When purchased as a 'Safety-Related' (High-Impact) Nuclear version, the ETAP package is accompanied by the following: · Certification Letter, Software Requirements Specification (SRS), Software Verification & Validation Plan (SVVP), Software Verification & Validation Report (SVVR), Test Files & Output Report Files in an Electronic Format, and Opportunity to Audit & Assess OTI's Quality System.
f.	**Training/User-Developer Interaction**	Training packages are offered through Structural Research & Analysis Corporation. Some are available "online".
g.	**Estimated Level of Use**	Worldwide. Over 50,000 engineers use PowerStation worldwide in the design, analysis, maintenance, and operation of electrical power systems.

Table B-14. HASS

a.	**Area of Applicability**	Fire Protection
b.	**Software name and version(s)**	HASS
c.	**Function of Software**	HASS (Hydraulic Analyzer of Sprinkler Systems) was introduced in 1976 and has been upgraded annually. The code operates with all versions of Windows in English or metric units as well as metric units with Spanish text. Data entry features include a grid estimator, tree generator, system builder and utilities to develop equivalents for K-factors, branch lines, grids and fitting lengths. Other utilities calculate earthquake bracing, report flow results, analyze water hammer, and more. HASS calculates complex systems in seconds using either the Hazen-Williams or the Darcy-Weisbach formulas, with or without velocity pressure. HASS performs hydraulic analysis in accordance with NFPA 13, calculating any connection of nodes and pipes.
d.	**Software Developer/Owner; Contact Information**	HRS Systems Phone: 770.934.8423 fax 770.934.7696 hass@hrssystems.com http://www.hrssystems.com/index.html
e.	**SQA Standard(s) Cited**	Users are supplied with updates and code revisions annually. No other quality assurance data on the code was found on the web site.
f.	**Training/User-Developer Interaction**	No training was discussed on the web site. The web site states most HASS users have experience in sprinkler system design, layout or review. HASS was designed for those with sprinkler knowledge and capable of making value judgments concerning the calculations.
g.	**Estimated Level of Use**	Vendor reports the code is used by thousands in over fifty countries.

Table B-15. MicroShield

a.	**Area of Applicability**	Other: Radiological Shielding
b.	**Software name and version(s)**	MicroShield
c.	**Function of Software**	MicroShield is a comprehensive photon/gamma ray shielding and dose assessment program being used by more than 500 organizations. It is widely used for designing shields, estimating source strength from radiation measurements, minimizing exposure to people, and teaching shielding principles. Its use requires a basic knowledge of radiation and shielding principles. It was originally developed by Grove Engineering, which was acquired by Framatome ANP.
d.	**Software Developer/Owner; Contact Information**	Framatome ANP Grove Engineering 3416 Olanwood Court Suite 211 Olney, Maryland (301) 929-3028 Fax (301) 929 3047 http://www.framatech.com/radsoft/radsoft.asp
e.	**SQA Standard(s) Cited**	MicroShield has a verification and validation package available. The overall purpose of the V&V package is to furnish documentation and software as an aid to users in their internal software qualification or verification and validation. The V&V package includes a two-part "MicroShield Verification & Validation Report". This report consolidates a myriad of information sources used over the years for development of MicroShield. It also shows the mathematical basis for all the calculations performed by the program. In general, it is a complete compendium of the technical bases for MicroShield. Part I of the report contains the V&V test plan and results and the user instructions for VNV.EXE. Part II contains the mathematical formulation for the calculations. Historical test results are included in appendices for traceability and completeness.
f.	**Training/User-Developer Interaction**	Training is discussed on the web site.
g.	**Estimated Level of Use**	Widely used by more than 500 organizations.

SEPARATION

PAGE

DOE-EH-4.2.1.5- Design Codes Survey

Volume 2

**Defense Nuclear Facilities Safety Board Recommendation 2002-1
Software Quality Assurance Implementation Plan**

Safety-Related Design Software Survey and Recommendations

Volume II - Field Office and Contractor Inputs

Interim Report

U.S. Department of Energy
Office of Environment, Safety and Health
1000 Independence Ave., S.W.
Washington, DC 20585-2040

December 2003

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FOREWORD

This document provides the inputs from the Department of Energy Complex responding to the safety related design software survey. Together with the main report, this documentation meets IP commitment 4.2.1.5 to *Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 2002-1*. Included are responses from approximately fifteen contractors at nearly all the major Department of Energy sites and laboratories.

Suggestions for corrections or improvements to this document should be addressed to –

Chip Lagdon
EH-31/GTN
U.S. Department of Energy
Washington, D.C. 20585-2040
Phone (301) 903-4218
Email: chip.lagdon@eh.doe.gov

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REVISION STATUS

Page/Section	Revision	Change
1. Entire Document	1. Interim Report	1. Original Issue

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CONTENTS

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Safety-Related Design Software Survey and Recommendations
Volume II - Field Office and Contractor Inputs

EXECUTIVE SUMMARY

A series of actions that address Software Quality Assurance issues identified in Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2002-1, *Quality Assurance for Safety-Related Software at Department of Energy Defense Nuclear Facilities*, are documented in the Department of Energy (DOE) Implementation Plan (IP) for DNFSB Recommendation 2002-1. The IP includes a commitment (4.2.1.5) to conduct a survey of design software currently in use to determine if any should be included as part of the toolbox codes.

A safety design software survey was completed per IP Commitment 4.2.1.5. The main report to this document, Volume I, summarizes inputs received from DOE field offices and DOE safety contractors, and recommends a path forward to address issues of additional design software placement in the Central Registry. The current document, Volume II, contains all design software responses as received by the DOE Office of Quality Assurance through December 10, 2003.

Information contained in an individual response is presented in its entirety, with the exception of extraneous material (e.g., cover notes, facsimile pages or electronic mail pages, etc.). Discussions of code use and software quality assurance programs, procedures, and practices are reproduced as received from the field. However, full Quality Assurance Plans where provided by a contractor, are not shown. In other cases, the editors chose to reconfigure inputs to improve the readability of the information.

The information contained herein is in two major sections. First, the *Survey of Safety Software Used in Design of Structures, Systems, and Components* that was transmitted on September 12, 2003, is shown (pages 1-6). Secondly, the inputs from the field offices and the safety contractors follow (pages 7-210).

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Survey of Safety Software

Used in Design of Structures, Systems, and Components

1.   Introduction

The Department's Implementation Plan for Software Quality Assurance (SQA) that was developed in response to Defense Nuclear Facilities Safety Board Recommendation 2002-01, *Quality Assurance for Safety-Related Software*, includes a commitment (4.2.1.5) to conduct a survey of design codes currently in use to determine if any should be included as part of the toolbox codes. The toolbox codes are a small number of standard computer models (codes) supporting DOE safety analysis that have widespread use and appropriate qualification. Generally, the toolbox codes will have been developed and maintained within the DOE complex. However, the toolbox may also include commercial proprietary design codes where additional software quality assurance controls are appropriate.

The scope of the survey required by commitment 4.2.1.5 includes the identification of safety software currently use to support the analysis and design of defense nuclear facilities including structures, systems and components, as well electrical and control system design. Both commercial off-the-shelf software and DOE/contractor developed software should be included in the survey. Often the same software is used for both safety and non-safety, and nuclear and non-nuclear facility design. Therefore, care should be taken in identifying the safety software.

DOE field elements, including contractors and sub-contractors, as appropriate, should provide the information in the attached survey forms. The Office of Environment, Safety and Health (EH) will review the information submitted through this survey and determine if additional safety software should be included as toolbox codes.

In addition to the safety software information requested in this survey, EH would also like to receive information regarding your organization's SQA programs, procedures and training. This information should be entered in Section 5 of the survey form. This information will assist EH in the preparation of DOE SQA directives, which are also an Implementation Plan deliverable. However, this Section 5 of the survey form is optional.

Please submit completed survey information to Chip Lagdon, EH-31, using the design software survey email address **sqa@eh.doe.gov** by **October 31, 2003**.

2.   Survey Information Prepared By

Name(s):   _____

Organization(s): _____

Site or Laboratory: _____

Address: _____

Phone/email/facsimile: _____

                            _____

Principal DOE organization(s) supported (NNSA, EM) _____

Date Survey Form Submitted: _____

3.   *Design Safety Software*

List the safety software that is used to support the analysis and design of safety-class structures, systems, and components (SC SSCs) and safety-significant structures, systems, and components (SS SSCs) for DOE defense nuclear facilities.

Attach additional sheets if needed.

1.1.1 Area of Applicability	1.1.2 Computer Software Name*
Civil/Structural/Geotechnical Systems	
Mechanical Systems	
HVAC	
Electrical Systems	
Fire Protection Systems	
Instrumentation and Control	
Others (not included above)	

* Enter "None" if no safety software is applicable to the area.

4. *Safety Software Information*

For each safety software application identified in Section 3, provide the information requested below. Attachment 1 is provided as an example. For additional assistance, email questions to sqa@eh.doe.gov.

a.	**Code name and version**	
b.	**Function of code**	
c.	Application (what projects/facilities at the site/lab)	
d.	Code developer and/or sponsor	
e.	Commercial, Proprietary or Other (Explain)	
f.	Current Owner/Vendor and technical support provider	
g.	Documentation available	
h.	Code platform (Workstation, PC-based, Mainframe)	
i.	Operating System (Windows, DOS, other)	
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	
k.	How are error and user questions reported?	
k.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	

5.   *Other Information on Your Organization's Software Quality Assurance Program (Optional)*

Please take a moment to provide this additional information regarding your SQA programs, procedures, and training.

5.1   What documented SQA programs and procedures do you follow for developing, testing, documenting, maintaining, and applying safety software?_____

Document title(s) and report number(s): _____

_____

_____

_____

5.2   Do your procedures comply in whole or in part with (check compliance)?

Yes/No/Uncertain	Standard/Rule/DOE or Other Directive
	a. 10 CFR 830, Subpart A, Quality Assurance Requirements
	b. ASME NQA-1a-1999, NQA-1a-2000 (Part 2.7); or predecessor (indicate which)
	c. ANSI/ISO/ASQ Q9001-2000, Quality Management Systems – Requirements, or Related Standards
	d. DOE Order 414.1, *Quality Assurance*
	e. DOE Order 420.1, *Facility Safety*
	f. DOE Order 200.1, *Information Management Program*
	g. DOE Guide 200.1-1, *Department of Energy Software Engineering Methodology*
	h. DOE Guide 414.1-1, Assessment Guide for QA
	i. ANSI/ANS-10.4-1987, *Guidelines for the Verification and Validation of Scientific and Engineering Computer Programs for the Nuclear Industry*
	j. Other DOE, National, International, or Industry Standards, Requirements, or Guidelines (Please identify)

5.3   How do you apply QA procedures to safety software? _____
_____

5.4   How do you train users on safety software? _____
_____
_____
_____

1.2 Attachment 1. EXAMPLE OF SAFETY SOFTWARE INFORMATION

The following input is provided to guide survey respondents on the level of detail for completing the Section 4 survey information

a.	Code name and version	*STRUCTUREcode; Version 2003.1*
b.	Function of code	STRUCTRUEcode is used in the structural analysis and design of nuclear facilities and related structures.
c.	Application (what projects/facilities at the site/lab)	The software has been used in the analysis of many Hazard Category 2 and 3 facilities at the Site. It was used in the design of Facility A, and the upgrades to Facility B.
d.	Code developer and/or sponsor	*XYZ Structural Safety Associates,* Address: Email: Phone:
e.	Commercial, Proprietary or Other (Explain)	*P; Site-license*
f.	Current Owner/Vendor and technical support provider	Same as (d.) above; Technical Support is included and is part of Site license fee.
g.	Documentation available	1. User's Manual 2. *Software Model Description* 3. Software Requirements Specification 4. Test Problems- Input and Output files
h.	Code platform (Workstation, PC-based, Mainframe)	The software runs on a PC-based platform.
i.	Operating System (Windows, DOS, other)	WINDOWS-NT, -XP; -2000 are supported.
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	R
k.	How are error and user questions reported?	The vendor reports updates and sends out error notices via email. A website exists for reporting software problems and posing questions on use of the code. Response is within 24 hours of the request.
l.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	STRUCTUREcode requires a formal training class (given by vendor) and completion of several test studies before a user is qualified. Most users are structural engineers at the BS level. Documentation is upgraded with each version update. Experience with this software has been good and relatively few (minor) errors have been identified in five years of use.

Hanford

Bechtel National, Inc.

WTP

Survey Information Prepared By:

Name: Carlos Villalpando
Organization: **Bechtel National, Inc.**
Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
Address: **2435 Stevens Center Place, Richland WA 99352**
Phone/email/facsimile: 371-2782
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	AGI32 version 1.64
Function of code	System Design Lighting Analysis
*Area of applicability - see above	Electrical Systems
Application (what projects/facilities at the site/lab)	Across all facilities
Code developer and/or sponsor	*Lighting Analysts, Inc.*
Commercial, Proprietary, or Other (explain)	Commercial
Current Owner/Vendor and technical support provider	Bechtel National, Inc. / *Lighting Analysts, Inc.* is the vendor/tech support
Documentation available	Yes - Manuals in acrobat format & online documentation
Code Platform (Workstation, PC-based, Mainframe)	PC workstations
Operating System (Windows #, DOS, Other)	Windows NT 4.0, Windows 2000, Windows XP
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	Routine usage
How are error and user questions reported?	Error notification is handled according to procedure 24590-WTP-GPP-IT-001, *Use of Quality Affecting Software Applications* and can be obtained through Project Archives and Document Controls. User questions are handled internally, or by *Lighting Analysts, Inc.* technical support.
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	AGI32 is a state of the art illumination engineering program. It will run satisfactorily on the Minimum required hardware for relatively simple applications. Users planning on taking advantage of the full

	spectrum of power offered by AGI32 should consider the Recommended hardware requirements (see next page). AGI32 provides a software tool used to predict the lighting performance of selected luminaires in a simulated environment. The environments that may be considered in AGI32 can range from a simple rectangular space to a multilevel interchange or complex auditorium. AGI32 is a stand-alone tool, meaning that other software is not required to create or output the calculations results. Software errors are reported in accordance to procedure 24590-WTP-GPP-IT-001, *Use of Quality Affecting Software Applications*. No errors have been reported at this time.
Design and analysis work being performed using this application	See above. Lighting Calculations for the illuminated areas of all facilities.

Survey Information Prepared By:

Name: Tim Milot
Organization: **Bechtel National, Inc.**
Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
Address: **2435 Stevens Center Place, Richland WA 99352**
Phone/email/facsimile: 509-371-4542 / tsmilot@bechtel.com /
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	ANSYS
Function of code	Finite Element mechanical Analysis of equipment
*Area of applicability - see above	Structural, Mechanical systems
Application (what projects/facilities at the site/lab)	pressure vessels, equipment
Code developer and/or sponsor	ANSYS Inc
Commercial, Proprietary, or Other (explain)	Commercial off the shelf
Current Owner/Vendor and technical support provider	JLR ANSYS
Documentation available	Yes
Code Platform (Workstation, PC-based, Mainframe)	Workstation
Operating System (Windows #, DOS, Other)	Windows
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	R
How are error and user questions reported?	Software error notices
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	ANSYS is industry standard Finite Element Analysis software, which is very thoroughly documented and supported by the vendor
Design and analysis work being performed using this application	preliminary sizing of pressure vessels, stress and thermal analysis of equipment

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Survey Information Prepared By:

Name: Snehal Shah
Organization: **Bechtel National, Inc.**
Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
Address: **2435 Stevens Center Place, Richland WA 99352**
Phone/email/facsimile: 509-371-4540 / ssshah@bechtel.com /
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the preliminary design of safety class and safety significant structures, systems, and components in the following areas: Mechanical Systems

Note: This software is not used for final design of any component regardless of safety classification.

For each safety software application identified:

Code/application name and version	Aspen - BJAC 11.1
Function of code	Mechanical design of shell and tube heat exchangers
*Area of applicability - see above	Mechanical systems
Application (what projects/facilities at the site/lab)	heat exchangers for PTF, HLW, LAW, BOF, LAB
Code developer and/or sponsor	Aspen Technology Inc.
Commercial, Proprietary, or Other (explain)	Commercial off the shelf
Current Owner/Vendor and technical support provider	Aspen Technology Inc.
Documentation available	Yes
Code Platform (Workstation, PC-based, Mainframe)	PC-based, Workstation
Operating System (Windows #, DOS, Other)	Windows
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	R
How are error and user questions reported?	Software error notices
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Aspen-BJAC is widely used software for mechanical design of shell and tube heat exchanger, which is very thoroughly documented and supported by the vendor
Design and analysis work being performed using this application	Preliminary mechanical design of shell and tube type heat exchangers to support Material Requisition for quotes and to verify the vendor design. This is **not** used for final design of any shell and tube heat exchanger.

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Survey Information Prepared By:

Name: Ivan Papp
Organization: **Bechtel National, Inc.**
Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
Address: **2435 Stevens Center Place, Richland WA 99352**
Phone/email/facsimile: 371-3605/igpapp@bechtel.com/371-3507
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	WTP Engineering Baseline Process Performance Software, Version 1.0
Function of code	To provide stream data to support design and Commissioning and Testing of WTP (Waste Treatment Plant) facility.
*Area of applicability - see above	O
Application (what projects/facilities at the site/lab)	• Design input for design calculations (PT, LAW Vit, HLW Vit, Lab) • Forecasts performance of various feed streams to the WTP and effluent streams to LERF/ETF • Represents the design performance capability during cold and hot commissioning
Code developer and/or sponsor	Sponsor: Ivan Papp
Commercial, Proprietary, or Other (explain)	O The routine was produced by the Process Engineering Department using fundamental engineering and chemistry equations. The Quality Affecting Software (QAS) routine was developed using Microsoft® Excel 2000.
Current Owner/Vendor and technical support provider	Central Process Engineering/Central Process Engineering
Documentation available	24590-WTP-VV-ENG-03-005, Rev. 0.
Code Platform (Workstation, PC-based, Mainframe)	Workstation

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Operating System (Windows #, DOS, Other)	Windows 2000
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	R
How are error and user questions reported?	Error identification and notification is per procedure 24590-WTP-GPP-IT-001 (Use of Quality Affecting Software Application). User questions are reported to the Project Program Sponsor (Ivan Papp).
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	It is a Microsoft® Excel based model where all the inputs into the routine are listed in Appendix C of 24590-WTP-VV-ENG-03-005. A desktop instruction on using the routine is available from Ivan Papp or Dale Obenauer.
Design and analysis work being performed using this application	• Estimated Hydrogen Generation Rates for Pretreatment and HLW Calculation • Memo reporting stream data for AY-102 and AP-101

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Survey Information Prepared By:

Name: **Farhang Ostadan**
Organization: **Bechtel National, Inc.**
Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
Address: **2435 Stevens Center Place, Richland WA 99352**
Phone/email/facsimile: **415-768-3734**
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	CE980 (BSIMQKE), 1984, version B1-4PC
Function of code	Generation of spectrum-compatible time histories
*Area of applicability - see above	C
Application (what projects/facilities at the site/lab)	All Seismic Category I WTP buildings
Code developer and/or sponsor	Bechtel
Commercial, Proprietary, or Other (explain)	P
Current Owner/Vendor and technical support provider	Bechtel
Documentation available	Computer Service Library of Bechtel Corp. in San Francisco, California
Code Platform (Workstation, PC-based, Mainframe)	PC-based
Operating System (Windows #, DOS, Other)	Windows 95/98/2000
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	O
How are error and user questions reported?	Report to technical specialist or the Computer Service Library of Bechtel Corp. in San Francisco, California
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Specialized program needs experienced user
Design and analysis work being performed using this application	Generation of spectrum-compatible time histories

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Survey Information Prepared By:

Name: Tim Milot
Organization: **Bechtel National, Inc.**
Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
Address: **2435 Stevens Center Place, Richland WA 99352**
Phone/email/facsimile: 509-371-4542 / tsmilot@bechtel.com /
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Compress Codeware is an ASME VIII pressure vessel calculation program used for preliminary sizing of pressure vessels and nozzles. Compress is not used for final design.

For each safety software application identified:

Code/application name and version	Compress 6.187/6.214
Function of code	Pressure vessel sizing software
*Area of applicability - see above	Structural, Mechanical systems
Application (what projects/facilities at the site/lab)	pressure vessels
Code developer and/or sponsor	Codeware
Commercial, Proprietary, or Other (explain)	Commercial off the shelf
Current Owner/Vendor and technical support provider	Codeware
Documentation available	PDF manual
Code Platform (Workstation, PC-based, Mainframe)	Workstation
Operating System (Windows #, DOS, Other)	Windows
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	R
How are error and user questions reported?	Software error notices are reported per procedure 24590-WTP-3DP-G04B-00038 rev 1. User questions are directed to PPS and Codeware technical support.
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Compress is straightforward to use and user friendly. It is only applicable to pressure vessels, not tanks. Manuals are updated with version revisions and are in PDF format.
Design and analysis work being performed using this application	Preliminary sizing of pressure vessels. Compress Codeware is not used for final design.

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Survey Information Prepared By:

Name: Sean G. Smith
Organization: **Bechtel National, Inc.**
Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
Address: **2435 Stevens Center Place, Richland WA 99352**
Phone/email/facsimile: (509) 371-8179 / sgsmith2@bechtel.com / (509) 371-8172
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	Control Valve Sizing - Gas Service, Version 1.1
Function of code	Calculate Valve Sizing
*Area of applicability - see above	Instrumentation and Control (I&C) Mechanical Systems
Application (what projects/facilities at the site/lab)	WTP RPP Project for the LAW, PTF, HLW, BOF, and other facilities as needed on the project.
Code developer and/or sponsor	Calvin Lasley (PPS)
Commercial, Proprietary, or Other (explain)	Other. The routine was generated by I&C Central Engineering on the WTP RPP project.
Current Owner/Vendor and technical support provider	Calvin Lasley (PPS)
Documentation available	• 24590-WTP-VV-ENG-03-002, Control Valve Sizing for Gas Service - QAS Routine • 24590-WTP-GPG-J-016, Design Guide Control Valve Sizing
Code Platform (Workstation, PC-based, Mainframe)	PC-Based
Operating System (Windows #, DOS, Other)	Windows 2000 Service Pack 3 Windows NT 6 SP6a
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	Routine
How are error and user questions reported?	All errors will be reported to the PPS and processed in accordance with 24590-WTP-GPP-IT-001. All questions are also directed to the PPS.
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	I&C have generated a significant amount of calculations with this routine and have not experienced any technical errors or issues.

Design and analysis work being performed using this application	Design work being performed involves I&C generating a valve size calculation based upon committed process data from Mechanical Systems. Once the sizing is completed and the calculation released, the HOLDS are removed from the P&ID's and Plant Design can model accordingly.

Survey Information Prepared By:

Name: Sean G. Smith
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Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
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Phone/email/facsimile: (509) 371-8179 / sgsmith2@bechtel.com / (509) 371-8172
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	Control Valve Sizing - Liquid Service, Version 1.1
Function of code	Calculate Valve Sizing
*Area of applicability - see above	Instrumentation and Control (I&C) Mechanical Systems
Application (what projects/facilities at the site/lab)	WTP RPP Project for the LAW, PTF, HLW, BOF, and other facilities as needed on the project.
Code developer and/or sponsor	Calvin Lasley (PPS)
Commercial, Proprietary, or Other (explain)	Other. The routine was generated by I&C Central Engineering on the WTP RPP project.
Current Owner/Vendor and technical support provider	Calvin Lasley (PPS)
Documentation available	24590-WTP-VV-ENG-03-001, Control Valve Sizing for Liquid Service - QAS Routine 24590-WTP-GPG-J-016, Design Guide Control Valve Sizing
Code Platform (Workstation, PC-based, Mainframe)	PC-Based
Operating System (Windows #, DOS, Other)	Windows 2000 Service Pack 3 Windows NT 6 SP6a
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	Routine
How are error and user questions reported?	All errors will be reported to the PPS and processed in accordance with 24590-WTP-GPP-IT-001. All questions are also directed to the PPS.
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	I&C have generated a significant amount of calculations with this routine and have not experienced any technical errors or issues.

Design and analysis work being performed using this application	Design work being performed involves I&C generating a valve size calculation based upon committed process data from Mechanical Systems. Once the sizing is completed and the calculation released, the HOLDS are removed from the P&ID's and Plant Design can model accordingly.

Survey Information Prepared By:

Name: Sean G. Smith
Organization: **Bechtel National, Inc.**
Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
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Phone/email/facsimile: (509) 371-8179 / sgsmith2@bechtel.com / (509) 371-8172
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	Control Valve Sizing - Steam Service, Version 1.1
Function of code	Calculate Valve Sizing
*Area of applicability - see above	Instrumentation and Control (I&C) Mechanical Systems
Application (what projects/facilities at the site/lab)	WTP RPP Project for the LAW, PTF, HLW, BOF, and other facilities as needed on the project.
Code developer and/or sponsor	Calvin Lasley (PPS)
Commercial, Proprietary, or Other (explain)	Other. The routine was generated by I&C Central Engineering on the WTP RPP project.
Current Owner/Vendor and technical support provider	Calvin Lasley (PPS)
Documentation available	24590-WTP-VV-ENG-03-003, Control Valve Sizing for Steam Service - QAS Routine 24590-WTP-GPG-J-016, Design Guide Control Valve Sizing
Code Platform (Workstation, PC-based, Mainframe)	PC-Based
Operating System (Windows #, DOS, Other)	Windows 2000 Service Pack 3 Windows NT 6 SP6a
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	Routine
How are error and user questions reported?	All errors will be reported to the PPS and processed in accordance with 24590-WTP-GPP-IT-001. All questions are also directed to the PPS.
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	I&C have generated a significant amount of calculations with this routine and have not experienced any technical errors or issues.

Design and analysis work being performed using this application	Design work being performed involves I&C generating a valve size calculation based upon committed process data from Mechanical Systems. Once the sizing is completed and the calculation released, the HOLDS are removed from the P&ID's and Plant Design can model accordingly.

Survey Information Prepared By:

Name: Amir Hamaoui
Organization: **Bechtel National, Inc.**
Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
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Phone/email/facsimile: (415) 768-5516 / ahamaoui@bechtel.com / (415) 768-5512
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	DAPSS 1.0
Function of code	Process Tool
*Area of applicability - see above	Piping
Application (what projects/facilities at the site/lab)	PTF, HLW
Code developer and/or sponsor	Amir Hamaoui
Commercial, Proprietary, or Other (explain)	Developed
Current Owner/Vendor and technical support provider	Amir Hamaoui
Documentation available	Non-QAS documentation
Code Platform (Workstation, PC-based, Mainframe)	PC-based
Operating System (Windows #, DOS, Other)	Windows
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	R
How are error and user questions reported?	Email to PPS
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Increases efficiency and quality.
Design and analysis work being performed using this application	Pipe Support Calculation Qualification Report

Survey Information Prepared By:

Name: **Farhang Ostadan**
Organization: **Bechtel National, Inc.**
Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
Address: **2435 Stevens Center Place, Richland WA 99352**
Phone/email/facsimile: **415-768-3734**
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	CE928 (DATAN), 1991, version C1-4PC
Function of code	Probabilistic data analysis
*Area of applicability - see above	C
Application (what projects/facilities at the site/lab)	All Seismic Category I WTP buildings
Code developer and/or sponsor	Bechtel
Commercial, Proprietary, or Other (explain)	P
Current Owner/Vendor and technical support provider	Bechtel
Documentation available	Computer Service Library of Bechtel Corp. in San Francisco, California
Code Platform (Workstation, PC-based, Mainframe)	PC-based
Operating System (Windows #, DOS, Other)	Windows 95/98/2000
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	O
How are error and user questions reported?	Report to technical specialist or the Computer Service Library of Bechtel Corp. in San Francisco, California
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Specialized program needs experienced user
Design and analysis work being performed using this application	Probabilistic data analysis of ground motions

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Survey Information Prepared By:

Name: Carlos Villalpando
Organization: **Bechtel National, Inc.**
Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
Address: **2435 Stevens Center Place, Richland WA 99352**
Phone/email/facsimile: 371-2782
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	ETAP POWERSTATION 4.7.0
Function of code	Electrical Power System Analysis
*Area of applicability - see above	Electrical Systems
Application (what projects/facilities at the site/lab)	Across all facilities
Code developer and/or sponsor	OTI.
Commercial, Proprietary, or Other (explain)	Commercial
Current Owner/Vendor and technical support provider	Bechtel National, Inc. / OTI is the vendor/tech support
Documentation available	Yes - Manuals & online documentation
Code Platform (Workstation, PC-based, Mainframe)	PC workstations
Operating System (Windows #, DOS, Other)	Windows NT 4.0, Windows 2000, Windows Millennium, Windows XP
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	Routine usage
How are error and user questions reported?	Error notification is handled according to procedure 24590-WTP-GPP-IT-001, *Use of Quality Affecting Software Applications* and can be obtained through Project Archives and Document Controls. User questions are handled internally, or by OTI technical support.
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	ETAP PowerStation is a fully graphical power systems analysis program that runs on Microsoft® Windows® 98, NT 4.0, 2000, Me, and XP environments. ETAP PowerStation is used to

	analyze complex power distribution networks requiring intensive computation. The software has been in use from the beginning of the project. There have been software errors reported in accordance to procedure 24590-WTP-GPP-IT-001, *Use of Quality Affecting Software Applications*. These errors have not affected project calculations. All the recorded errors have been documented and can be obtained through Project Archives and Document Controls.
Design and analysis work being performed using this application	See above. Electrical system analysis work such as short circuit, load flow, cable pull, and grounding calculations as required.

Survey Information Prepared By:

Name: Sean G. Smith
Organization: **Bechtel National, Inc.**
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Address: **2435 Stevens Center Place, Richland WA 99352**
Phone/email/facsimile: (509) 371-8179 / sgsmith2@bechtel.com / (509) 371-8172
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	FLOWEL, Version 3.0g
Function of code	Calculate Orifice Plate Size(s)
*Area of applicability - see above	Instrumentation and Control (I&C)
Application (what projects/facilities at the site/lab)	WTP RPP Project for the LAW, PTF, HLW, BOF, and other facilities as needed on the project.
Code developer and/or sponsor	Kenonic Controls LTD Sean G. Smith (PPS)
Commercial, Proprietary, or Other (explain)	Commercial
Current Owner/Vendor and technical support provider	Kenonic Controls LTD
Documentation available	• 24590-WTP-PL-IN-03-001, Project Plan for FLOWEL • 24590-WTP-RPT-ENG-03-016, FLOWEL Software Requirements Specification • 24590-WTP-PL-ENG-03-016, FLOWEL V&V Plan • 24590-WTP-VV-HS-03-002, Verification and Validation Report for FLOWEL • FLOWEL 3.0 for Windows, Revision G, July 1999, Kenonic Controls Ltd. • FLOWEL 3.0 Equations Validation Vol. 1, 2, 3, February 1995, Kenonic Controls Ltd.
Code Platform (Workstation, PC-based, Mainframe)	PC-based
Operating System (Windows #, DOS, Other)	Windows NT 6 SP6a

Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	Occasional
How are error and user questions reported?	All errors will be reported to the PPS and processed in accordance with 24590-WTP-GPP-IT-001. All questions are also directed to the PPS.
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	I&C have generated calculations with this routine and have not experienced any technical errors or issues.
Design and analysis work being performed using this application	Design work being performed involves I&C generating an orifice size calculation based upon committed process data from Mechanical Systems.

Survey Information Prepared By:

Name: Jon Berkoe
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Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
Address: **2435 Stevens Center Place, Richland WA 99352**
Phone/email/facsimile: 415-768-2149; jberkoe@bechtel.com; 415-768-1794
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	Fluent - Version 6.1.18
Function of code	Computational Fluid Dynamics
*Area of applicability - see above	HVAC, Mechanical Systems
Application (what projects/facilities at the site/lab)	HLW, LAW, and Pre-Treatment Buildings –Mixing Vessels, Pour Caves, Canisters
Code developer and/or sponsor	Fluent, Inc. (Lebanon, NH)
Commercial, Proprietary, or Other (explain)	Commercial
Current Owner/Vendor and technical support provider	Fluent, Inc. (Lebanon, NH)
Documentation available	Yes - CDROM
Code Platform (Workstation, PC-based, Mainframe)	Workstation and PC
Operating System (Windows #, DOS, Other)	Linux, Windows 2000, Unix
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	R
How are error and user questions reported?	Documentation or email replies sent from vendor to PPS; PPS to notify users of significant errors
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Very robust and industry-tested software. User-friendly Graphical user interface. Excellent CDROM documentation. Errors reported and resolved effectively.
Design and analysis work being performed using this application	CFD analysis of pulsed jet mixing systems for Newtonian and non-newtonian vessels; CFD analysis for LAW/HLW pour cave HVAC design and structural heat transfer.

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Survey Information Prepared By:

Name: Ronald Graves
Organization: **Bechtel National, Inc.**
Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
Address: **2435 Stevens Center Place, Richland WA 99352**
Phone/email/facsimile:
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	Fluent 6.1.18
Function of code	Computational Fluid Dynamics
*Area of applicability - see above	Mechanical Systems
Application (what projects/facilities at the site/lab)	Species transport and heat transfer in HLW waste tanks.
Code developer and/or sponsor	Jon Berkoe
Commercial, Proprietary, or Other (explain)	Commercial
Current Owner/Vendor and technical support provider	Fluent, Inc.
Documentation available	Document is online at www.fluent.com and on CD Rom
Code Platform (Workstation, PC-based, Mainframe)	PC (Compaq W6000)
Operating System (Windows #, DOS, Other)	Windows 2000, SP3
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	Repeated use, code of choice
How are error and user questions reported?	Fluent technical support/PPS
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Running the code requires training and knowledge in physics and fluid dynamics.
Design and analysis work being performed using this application	The Bechtel SF group is using the code for a number of WTP projects. E&NS is using the code for safety analysis work.

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Survey Information Prepared By:

Name: **Sam Ramesh**
Organization: **Bechtel National, Inc.**
Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
Address: **2435 Stevens Center Place, Richland WA 99352**
Phone/email/facsimile: **509-371-5425**
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	GTSTRUDL Version 25
Function of code	Structural and Finite Element Analysis - Concrete and Steel Design
*Area of applicability - see above	C
Application (what projects/facilities at the site/lab)	All major WTP buildings and structures
Code developer and/or sponsor	Georgia Tech University
Commercial, Proprietary, or Other (explain)	P
Current Owner/Vendor and technical support provider	Georgia Tech University
Documentation available	Yes
Code Platform (Workstation, PC-based, Mainframe)	Workstation installation, License off wtps0050 server
Operating System (Windows #, DOS, Other)	Windows 2000 Service Pack 3
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	R
How are error and user questions reported?	Errors are reported to Computer Service Library in San Francisco. The Computer Service Library forwards the Error Notices to the PPS. User Questions are reported to the to the PPS.
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Comprehensive program for analysis and design of structures. Known errors are distributed to users through SENs.
Design and analysis work being performed using this application	Structural and Finite Element Analysis - Concrete and Steel Design

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Survey Information Prepared By:

Name: Charles W. McKnight
Organization: **Bechtel National, Inc.**
Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
Address: **2435 Stevens Center Place, Richland WA 99352**
Phone/email/facsimile: (509)371-3145/cwmcknig@bechtel.com/(509)371-3508
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	HASS 7.5
Function of code	Hydraulic analysis of automatic fire protection sprinkler systems
*Area of applicability - see above	Fire Protection
Application (what projects/facilities at the site/lab)	Hydraulic analysis of automatic fire protection sprinkler systems
Code developer and/or sponsor	N/A
Commercial, Proprietary, or Other (explain)	Commercial
Current Owner/Vendor and technical support provider	Bechtel National Inc/ Haestad Methods Inc.
Documentation available	Yes
Code Platform (Workstation, PC-based, Mainframe)	PC-Based and Workstation
Operating System (Windows #, DOS, Other)	Windows NT, 2000, XP
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	R
How are error and user questions reported?	Via phone or email
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	This software is very easy to use and does an excellent job of modeling fire protection sprinkler systems. There are no known errors or issues at this time.
Design and analysis work being performed using this application	This software is being used to verify fire sprinkler designs supplied by subcontractors.

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Survey Information Prepared By:

Name: Scott Rossell
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Phone/email/facsimile: Phone: (509) 371-3843, e-mail: srossell@bechtel.com, fax: (509) 371-3507
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	HSC Chemistry 4.1
Function of code	Chemical Reaction Equilibrium Software with Thermodynamic Database
*Area of applicability - see above	Other
Application (what projects/facilities at the site/lab)	Used to define enthalpies for certain compounds
Code developer and/or sponsor	Outokumpu Research Oy
Commercial, Proprietary, or Other (explain)	Commercial
Current Owner/Vendor and technical support provider	developer: mailto:hsc@outokumpu.com vendor: http://www.esm-software.com/ or http://www.chemsw.com/
Documentation available	Users have a manual
Code Platform (Workstation, PC-based, Mainframe)	Workstation
Operating System (Windows #, DOS, Other)	Windows
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	O
How are error and user questions reported?	Users can refer to the manual, other users or the PPS for questions. The procedure for error reporting is documented in: 24590-WTP-3DP-G04B-00038.
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	• It is useful as a quick reference for thermodynamic information • The documentation does a good job of explaining the features and giving examples. • Upgrade information is posted on the website: http://www.outokumpu.com/hsc

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Design and analysis work being performed using this application	Temperature Enthalpy data was extracted from the database for several minor compounds.
	The majority of the enthalpy information in the mass balance was taken from *Thermochemical Data of Pure Substances* by Barin. However, for completeness temperature enthalpy data was extracted from the HSC database for several minor components that were not found in the Barin reference.

Survey Information Prepared By:

Name: Snehal Shah
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Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
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Phone/email/facsimile: 509-371-4540 / ssshah@bechtel.com /
Principal DOE Organization(s) supported: U.S. **Department of Energy, Office of River Protection**

Applicability

Application is used in the preliminary sizing of safety class and safety significant structures, systems, and components in the following areas: Mechanical Systems

Note: This software is not used for final design of any component regardless of safety classification.

For each safety software application identified:

Code/application name and version	HTRI (IST 2.0)
Function of code	Thermal design/rating of shell and tube heat exchangers
*Area of applicability - see above	Mechanical systems
Application (what projects/facilities at the site/lab)	heat exchangers for PTF, HLW, LAW, BOF, LAB
Code developer and/or sponsor	HTRI Inc.
Commercial, Proprietary, or Other (explain)	Commercial off the shelf
Current Owner/Vendor and technical support provider	HTRI Inc.
Documentation available	Yes
Code Platform (Workstation, PC-based, Mainframe)	PC-based, Workstation
Operating System (Windows #, DOS, Other)	Windows
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	R
How are error and user questions reported?	Software error notices
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	HTRI (IST 2.0) is widely used software for thermal design of shell and tube heat exchanger design and rating, which is very thoroughly documented and supported by the vendor
Design and analysis work being performed using this application	Preliminary sizing of shell and tube type heat exchangers to support Material Requisition for quotes and to verify the vendor design. This is **not** used for final design of any shell and tube heat exchanger.

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Survey Information Prepared By:

Name: Snehal Shah
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Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
Address: **2435 Stevens Center Place, Richland WA 99352**
Phone/email/facsimile: 509-371-4540 / ssshah@bechtel.com /
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

This program is not used on WTP/RPP project, this program is part of HTRI package.

Note: This software is not used for final design of any component regardless of safety classification.

For each safety software application identified:

Code/application name and version	HTRI (PHE 2.0)
Function of code	Design/rating of plate and frame heat exchangers
*Area of applicability - see above	None
Application (what projects/facilities at the site/lab)	N/A
Code developer and/or sponsor	HTRI Inc.
Commercial, Proprietary, or Other (explain)	Commercial off the shelf
Current Owner/Vendor and technical support provider	HTRI Inc.
Documentation available	Yes
Code Platform (Workstation, PC-based, Mainframe)	PC-based, Workstation
Operating System (Windows #, DOS, Other)	DOS
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	N/A
How are error and user questions reported?	N/A
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Not used
Design and analysis work being performed using this application	Not used

Survey Information Prepared By:

Name: Stephen Troilett
Organization: **Bechtel National, Inc.**
Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
Address: **2435 Stevens Center Place, Richland WA 99352**
Phone/email/facsimile: (509) 371 3710   sptroile@bechtel.com
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability
Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	Delmia Envision Version D5R12 (IGRIP)
Function of code	Look at overall design of Remotely operated plant and equipment
*Area of applicability - see above	O
Application (what projects/facilities at the site/lab)	RPP-WTP. High Level Waste Treatment Plant, Pre Treatment Facility, Low Active Waste and Laboratories
Code developer and/or sponsor	PPS / Stephen Troilett
Commercial, Proprietary, or Other (explain)	C
Current Owner/Vendor and technical support provider	WTP / Delmia and Delmia
Documentation available	Delmia Online Documentation
Code Platform (Workstation, PC-based, Mainframe)	PC-based
Operating System (Windows #, DOS, Other)	Windows 2000
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - Q)	Routine
How are error and user questions reported?	Directly to Delmia support services, either via e-mail or over the phone.
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	IGRIP is a 3 Dimensional software which is a very good tool for viewing plant and equipment in a virtual world.
Design and analysis work being performed using this application	Envision provides a virtual model for looking at the overall design and functionality of complete systems. Taking into account equipment dynamic movement and reach, system cycle times, overall equipment

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	layout, equipment functionality and maintainability, remote viewing from cameras and shield windows.

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Survey Information Prepared By:

Name: Mary Hull
Organization: **Bechtel National, Inc.**
Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
Address: **2435 Stevens Center Place, Richland WA 99352**
Phone/email/facsimile: 509-371-3739
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	Mathcad 11, Roark's and Civil Engineering Library
Function of code	Application used to complete calculations
*Area of applicability - see above	ALL
Application (what projects/facilities at the site/lab)	ALL
Code developer and/or sponsor	PPS - Mary Hull
Commercial, Proprietary, or Other (explain)	C
Current Owner/Vendor and technical support provider	Mathsoft
Documentation available	User Guide
Code Platform (Workstation, PC-based, Mainframe)	Concurrent License on server wtps0024, shared on workstations
Operating System (Windows #, DOS, Other)	Win2K service Pack 3
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	R
How are error and user questions reported?	To the PPS and then with SENs
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	MathCAD is a widely used software (comparable to Microsoft excel), it is easy to use because it displays calculations and output in a "book" like manner. Known errors, documentation, and templates are found off their website.
Design and analysis work being performed using this application	Every calculation for the WTP can be created using this software.

Survey Information Prepared By:

Name: **Ronald Graves**
Organization: **Bechtel National, Inc.**
Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
Address: **2435 Stevens Center Place, Richland WA 99352**
Phone/email/facsimile: **509-371-3744**
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	Mathematica
Function of code	Mathematical tool
*Area of applicability - see above	Mechanical Systems, Safety Analysis
Application (what projects/facilities at the site/lab)	Used as a mathematical tool for WTP safety analysis.
Code developer and/or sponsor	Ronald Graves
Commercial, Proprietary, or Other (explain)	Commercial
Current Owner/Vendor and technical support provider	Wolfram Research.
Documentation available	Documentation is in a book, which came with the product. Help files are accessible when the program is running.
Code Platform (Workstation, PC-based, Mainframe)	PC (Compaq W6000)
Operating System (Windows #, DOS, Other)	Windows 2000, SP3
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	Repeated use, code of choice
How are error and user questions reported?	Wolfram Research
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Running the code requires training and knowledge in mathematics. Also, some features require Lisp programming knowledge.
Design and analysis work being performed using this application	The code is being used as a tool to solve safety analysis related problems.

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Survey Information Prepared By:

Name: Steven M. Henry
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Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
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Phone/email/facsimile: 371-3695/ smhenry@bechtel.com/ 371-3511
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	MCnP 4C
Function of code	Criticality and dose rate determination
*Area of applicability - see above	Criticality and shielding analysis
Application (what projects/facilities at the site/lab)	WTP
Code developer and/or sponsor	LANL
Commercial, Proprietary, or Other (explain)	Commercial
Current Owner/Vendor and technical support provider	ORNL
Documentation available	Yes
Code Platform (Workstation, PC-based, Mainframe)	PC-Based
Operating System (Windows #, DOS, Other)	DOS program but runs under windows
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	Routine
How are error and user questions reported?	Software Error Notification Form
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	No problems`
Design and analysis work being performed using this application	Criticality and dose rate analysis

Survey Information Prepared By:

Name: Jack Shen
Organization: **Bechtel National, Inc.**
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Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	B31.3/ME101 Release N8
Function of code	Process Tool for pipe stress analysis
*Area of applicability - see above	M (Piping Systems)
Application (what projects/facilities at the site/lab)	RPP-WTP Project, all Facilities
Code developer and/or sponsor	Milton Dong
Commercial, Proprietary, or Other (explain)	P
Current Owner/Vendor and technical support provider	Milton Dong/Mo Khlafallah
Documentation available	QAS Documentation
Code Platform (Workstation, PC-based, Mainframe)	PC-based
Operating System (Windows #, DOS, Other)	Windows NT and Windows 2000
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - Q)	R
How are error and user questions reported?	If an error is discovered, the user immediately notices the Project Program Sponsor (PPS). The PPS analyzes software application errors and classifies them. User notification of Class 1 errors is optional, at the PPS's discretion. User notification is required for Class 2 and Class 3 errors. After being informed of application errors, the PPS prepares a Software Error Notification and e-mail notification of the error to IT Change Manager. Upon receiving a software error notification from the PPS or IT Change manager, the user determines if past or present

	activities are impacted or affected by the error and take appropriate action to avoid use of results with the error present.
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	ME101 performs both static and dynamic piping stress analyses. It includes the analyses of weight, thermal expansion, the combined weight load and thermal expansion with non-linear effect, thermal stratification, wind (UBC or ASCE standards), static seismic, uniform response spectrum method, the independent support motion, and water hammer with linear or non-linear elements. Harmonic analysis is available to evaluate steady-state vibrations. Bechtel's non-linear energy absorber may be used to reduce dynamic response. All load cases can be evaluated in a single computer run, and the results can be combined easily according to project criteria to generate support and hanger guidance and to perform stress checks. ME101 provides standard material property tables and a standard AISC table, and has code compliance checks for the ANSI B31 Codes, ASME Section III Codes, and the British Code.
	TheME101 input is simple and user-friendly. On Windows 95/NT platforms, a windows-based intuitive and easy-to-use GUI interface is provided through the ME101PRE module. State-of-the-art numerical techniques and analytical methods are incorporated to provide the best solutions with fast turnaround time. On Windows 95/NT platforms, all graphics can be exported to any Microsoft Office program such as Word. Either a simple linedraw mode or a more realistic solid model mode can be selected to view the system, and animation of mode shapes or deformation is available as well. Response from time history analysis can be plotted in the form of time history traces.
	Based on the staffing curve in Pipe Stress Group, we may need ME101 software licenses up to 15 – 20 copies to perform the piping stress analysis for this project.
Design and analysis work being performed using this application	Pipe stress analysis and code compliance

Survey Information Prepared By:

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Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability
Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	Code: B31.3 Application name and version ME150 Version 19 ME152 Version 11 ME153 Version 11 ME149 Version 6 ME035 Version 16
Function of code	Process Tool for pipe support design
*Area of applicability - see above	M (Piping Systems)
Application (what projects/facilities at the site/lab)	RPP-WTP Project, all Facilities
Code developer and/or sponsor	Harendra Shah
Commercial, Proprietary, or Other (explain)	P
Current Owner/Vendor and technical support provider	Harendra Shah /Mo Khlafallah
Documentation available	QAS Documentation
Code Platform (Workstation, PC-based, Mainframe)	PC-based
Operating System (Windows #, DOS, Other)	Windows NT and Windows 2000
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	R
How are error and user questions reported?	If an error is discovered, the user immediately notices the Project Program Sponsor (PPS). The PPS analyzes software application errors and classifies them. User notification of Class 1 errors is optional, at the PPS's discretion. User notification is required for Class 2 and Class 3 errors. After being informed

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	of application errors, the PPS prepares a Software Error Notification and e-mail notification of the error to IT Change Manager. Upon receiving a software error notification from the PPS or IT Change manager, the user determines if past or present activities are impacted or affected by the error and take appropriate action to avoid use of results with the error present.
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	ME150 is a suite of unique integrated computer programs for pipe support engineering work that increases productivity, consistency and quality while reducing engineering and construction cost. The family of programs effectively addresses technical, industry and documentation issues, and eliminates the time consuming manual calculation, expensive engineering judgment and "cookbook" approach, while reducing material and construction cost, and unnecessary repairs. The results provide the margin factors of various pipe support elements, thus assist in making sound engineering decisions in a timely fashion, and reduce the need for re-calculation. ME150 family of programs contains five PC-based computer programs. Together with Windows OpenGL graphic, this program provides us more power and versatility than the traditional mainframe systems. The Windows 95/NT version utilizes a graphical user interface to ease our work as we have expected from today's computer technology. ME150 family of programs has user's friendly interface, flexibility and simplicity, and provides consistency and integration.
Design and analysis work being performed using this application	Pipe support design and code compliance

Survey Information Prepared By:

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Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	Micro Shield 6.01
Function of code	Calculate Dose rate
*Area of applicability - see above	Shielding Analysis
Application (what projects/facilities at the site/lab)	WTP
Code developer and/or sponsor	Grove Engineering
Commercial, Proprietary, or Other (explain)	Commercial
Current Owner/Vendor and technical support provider	BNI/Grove Engineering
Documentation available	Yes
Code Platform (Workstation, PC-based, Mainframe)	PC-Based
Operating System (Windows #, DOS, Other)	Windows
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	R
How are error and user questions reported?	Software Error Notification Form
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	No problems
Design and analysis work being performed using this application	Shielding Analysis

Survey Information Prepared By:

Name: Sharok Khabir
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Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	Jet Impingement Code (NE155)
Function of code	Jet Impingement forces and zone
*Area of applicability - see above	Mechanical Systems
Application (what projects/facilities at the site/lab)	All
Code developer and/or sponsor	Bechtel
Commercial, Proprietary, or Other (explain)	None
Current Owner/Vendor and technical support provider	Bechtel
Documentation available	User Manual (on hand per Corporate procedure for SCP's.)
Code Platform (Workstation, PC-based, Mainframe)	PC - Based
Operating System (Windows #, DOS, Other)	Window/DOS
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	Occasional
How are error and user questions reported?	Errors are to be handled per Project procedures 24590-WTP-GPP-IT-001, *Use of Quality Affecting Software Applications*.
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Working knowledge of heat transfer and fluid flow required. About 4 hours are required to familiarize a user with the code.
Design and analysis work being performed using this application	None at this time. Plans are to use the software for Hazard topography final implementation and completion.

Survey Information Prepared By:

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Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	Pipe-Flo Compressible Version 7.0
Function of code	Calculate flow parameters in compressible fluid flow piping networks.
*Area of applicability - see above	M
Application (what projects/facilities at the site/lab)	WTP Mechanical Systems Richland
Code developer and/or sponsor	PPS - Tim Eichhorn
Commercial, Proprietary, or Other (explain)	C
Current Owner/Vendor and technical support provider	WTP - Licensee Engineered Software Inc. - technical support provider
Documentation available	24590-WTP-RPT-M-02-002 Rev 2, Test Plan/Report for Pipe-Flo Compressible Version 7.0
Code Platform (Workstation, PC-based, Mainframe)	Windows NT Version 4.0 SP6A workstations: Compaq AP550, Deskpro EN, Evo D500, and AP400 Windows 2000 Version 5.0 SP3 workstations: Compaq Deskpro ENS, AP550, Evo D500, Evo D510, and W6000 Single Processor
Operating System (Windows #, DOS, Other)	Windows NT Version 4.0 SP6 and/or Windows 2000 Version 5.0 SP3
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	R
How are error and user questions reported?	Errors are reported on screen at local workstation when the program hits an error/interrupt. Questions answered by consultation with another engineer,

	engineering automation, or vendor.
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	None
Design and analysis work being performed using this application	Newtonian, compressible, fluid flow through piping systems.

Survey Information Prepared By:

Name: Tim Eichhorn
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Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability
Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	Pipe-Flo Professional Version 7.0
Function of code	Calculate non-compressible flow parameters in fluid flow piping networks.
*Area of applicability - see above	M
Application (what projects/facilities at the site/lab)	WTP Mechanical Systems Richland
Code developer and/or sponsor	PPS - Tim Eichhorn
Commercial, Proprietary, or Other (explain)	C
Current Owner/Vendor and technical support provider	WTP - Licensee Engineered Software Inc. - technical support provider
Documentation available	24590-WTP-VV-M-01-001 Rev 4, Verification and Validation Report for Pipe-Flo Professional
Code Platform (Workstation, PC-based, Mainframe)	Windows NT Version 4.0 SP6A workstations: Compaq AP500, Deskpro ENS, AP550, Deskpro EN, Evo D500, W6000 single Processor and AP400 Windows 2000 Version 5.0 SP3 workstations: Compaq Deskpro ENS, AP550, Evo D500, Evo D510, and W6000 Single Processor
Operating System (Windows #, DOS, Other)	Windows NT Version 4.0 SP6A and/or Windows 2000 Version 5.0 SP3
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - Q)	R
How are error and user questions reported?	Errors are reported on screen at local workstation when the program hits an error/interrupt. Questions answered by consultation with another engineer,

	engineering automation, or vendor.
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Due to the limited number of pumps contained in the software database, engineering judgment must be used when filling out the Mechanical System Data Sheet to start the bid-procurement process.
Design and analysis work being performed using this application	Newtonian, non-compressible, fluid flow through piping systems.

Survey Information Prepared By:

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Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
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Phone/email/facsimile: **415-768-3734**
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	SASSI 2000
Function of code	Analysis of soil-structure interaction
*Area of applicability - see above	C
Application (what projects/facilities at the site/lab)	All Seismic Category I WTP buildings
Code developer and/or sponsor	University of California, Berkeley
Commercial, Proprietary, or Other (explain)	P
Current Owner/Vendor and technical support provider	University of California, Berkeley
Documentation available	Computer Service Library of Bechtel Corp. in San Francisco, California
Code Platform (Workstation, PC-based, Mainframe)	PC-based
Operating System (Windows #, DOS, Other)	Windows 95/98/2000
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	R
How are error and user questions reported?	Report to technical specialist or Computer Service Library of Bechtel Corp. in San Francisco, California
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Specialized program needs experienced user
Design and analysis work being performed using this application	Analysis of soil-structure interaction

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Survey Information Prepared By:

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Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability
Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	EA399 / Setroute Ver. 8.7.1.1
Function of code	Cable, raceway and wiring system
*Area of applicability - see above	Electrical Systems
Application (what projects/facilities at the site/lab)	WTP / All Facilities and Construction Site
Code developer and/or sponsor	Bechtel Information Systems & Technology (IS&T) / Kenneth Hobbs
Commercial, Proprietary, or Other (explain)	Commercial
Current Owner/Vendor and technical support provider	Bechtel Corporation (Owner) and David Kennedy (TechnicaSupport)
Documentation available	Bechtel Software Library
Code Platform (Workstation, PC-based, Mainframe)	Workstation
Operating System (Windows #, DOS, Other)	WIN 2000 Service Pack 3
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - Q)	R
How are error and user questions reported?	Error and user questions are reported to Setroute Administrator and Program Sponsor and also forwarded to Setroute tTchnical Support.
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	An efficient software program to be used on the project. No error and issues has been identified for SR ver. 8.7.1.1.
Design and analysis work being performed using this application	Yes, electrical engineers, designers, project control and construction are using this application.

Survey Information Prepared By:

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Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	SHAKE 2000
Function of code	Program for conducting equivalent linear seismic response analyses of horizontally layered soil deposits
*Area of applicability - see above	C
Application (what projects/facilities at the site/lab)	All Seismic Category I WTP buildings
Code developer and/or sponsor	Bechtel
Commercial, Proprietary, or Other (explain)	P
Current Owner/Vendor and technical support provider	Bechtel
Documentation available	Computer Service Library of Bechtel Corp. in San Francisco, California
Code Platform (Workstation, PC-based, Mainframe)	PC-based
Operating System (Windows #, DOS, Other)	Windows 95/98/2000
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	O
How are error and user questions reported?	Report to technical specialist or the Computer Service Library of Bechtel Corp. in San Francisco, California
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Specialized program needs experienced user
Design and analysis work being performed using this application	Equivalent linear seismic response analyses of horizontally layered soil deposits

Survey Information Prepared By:

Name: Robert Niall Hunt
Organization: **Bechtel National, Inc.**
Site or Laboratory: **River Protection Project - Waste Treatment Plant, Hanford**
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Phone/email/facsimile: 371-3314
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability

Application is used in the analysis and design of safety class and safety significant structures, systems, and components in the following areas: Civil/Structural/Geotechnical Systems, Mechanical Systems, HVAC, Electrical Systems, Fire Protection Systems, Instrumentation and Control, Other.

For each safety software application identified:

Code/application name and version	WINNupra, Version 2.0
Function of code	Integrated Probabilistic Risk Assessments
*Area of applicability - see above	Other - Reliability Analysis
Application (what projects/facilities at the site/lab)	WTP Operations Risk Assessment
Code developer and/or sponsor	SCIENTECH, Inc.
Commercial, Proprietary, or Other (explain)	Proprietary
Current Owner/Vendor and technical support provider	SCIENTECH, Inc.
Documentation available	User's Manual, V&V Report
Code Platform (Workstation, PC-based, Mainframe)	PC-Based
Operating System (Windows #, DOS, Other)	Windows
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - Q)	O
How are error and user questions reported?	There si an error reporting process to SCIENTECH
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	No problems although we do not use all of the functions provided by the code.
Design and analysis work being performed using this application	Reliability analyses (Fault trees) for WTP system configurations

Hanford

CH2M Hill Hanford Group, Inc.

Survey of Safety Software
Used in Design of Structures, Systems, and Components

1.   **Survey Information Prepared By**

Name(s):	Ernie Hamm, Larry Julyk, Robert Brown, Jack Nicholson, Dave Barnes
Organization(s):	CH2M HILL Hanford Group Inc.
Site or Laboratory:	Office of River Protection, Hanford Site
Address:	P.O. Box 1500, MSIN R1-14 Richland, Washington 99352
Phone/email/facsimile:	(509) 372-0310 FAX (509) 372-1608
Principal DOE organization(s) supported (NNSA, EM, NE, etc.): EM	
Date Survey Form Submitted: 11/15/03	

2. **Design Safety Software**

Area of Applicability	Computer Software Name*
Civil/Structural/Geotechnical Systems	ANSYS/ Mechanical Version 7.0
Mechanical Systems	AutoPIPE
HVAC	GOTH-SNF
Electrical Systems	None
Fire Protection Systems	None
Instrumentation and Control	None
Others (not included above)	Micro-Shield 6.01

* Enter "None" if no safety software in
applicable the area.

3. Safety Software Information

a.	Code name and version	ANSYS/ Mechanical Version 7.0
b.	Function of code	General purpose finite-element code used to solve linear and non-linear, static and dynamic structural, and heat transfer problems.
c.	Application (what projects/facilities at the site/lab)	Double-Shell Tank Integrity Program, Single- and Double-Shell Dome Load Program, PUREX connector analysis for Waste Feed Delivery Project, support for Tank Farm FSAR.
d.	Code developer and/or sponsor	ANSYS, Inc. Address: Southpointe 275 Technology Drive Canonsburg, PA 15317 Email: ansysinfo@ansys.com Web: http//www.ansys.com Phone: 724-746-3304
e.	Commercial, Proprietary or Other (Explain)	C; Site-license
f.	Current Owner/Vendor and technical support provider	Same as (d) above; Technical Support included in Site license fee through East coast vendor JLR, The Engineering Solutions Company Address: 111 SE Everett Mail Way, Suite E-201 Everett, WA 98208-3236 Email: jradochia@jlrcom.com Web: http//www.jlrcom.com Phone: 425-353-8089, x251
g.	Documentation available	1. User's Manual (hard copy and online) 2. Verification Manual 3. Class notes
h.	Code platform (Workstation, PC-based, Mainframe)	PC-based
i.	Operating System (Windows, DOS, other)	Windows XP

j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	Routine
k.	How are error and user questions reported?	ANSYS, Inc. provides hard copy Class 3 error reports and QA Notices. Website and customer portal also provided as well as direct contact support for user questions.
l.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	Formal training classes are available by vender. Documentation is available on-line for current version and updates. Vender is responsive to user identification of potential errors. Patches and updates are periodically made available to correct errors.

a.	Code name and version	AutoPIPE, Version 6.2
b.	Function of code	Piping stress analysis for safety and non-safety related systems (ASME B31 and Boiler and Pressure Vessel Code piping systems)
c.	Application (what projects/facilities at the site/lab)	Project W-211 and W-314; safety significant and general service piping systems
d.	Code developer and/or sponsor	Rebis/Bently Corporate Headquarters address: 685 Stockton Drive Exton, PA 19341 E-mail: autopipe.com Phone: 1-800-236-8539 (corporate & technical)
e.	Commercial, Proprietary or Other (Explain)	Commercial
f.	Current Owner/Vendor and technical support provider	Same as (d.) above; Technical Support is included and is part of Site license fee.
g.	Documentation available	1. User's Manual 2. Verification Manual
h.	Code platform (Workstation, PC-based, Mainframe)	PC-based
i.	Operating System (Windows, DOS, other)	Windows
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	Routine
k.	How are error and user questions reported?	The vendor reports updates and sends out error notices via email. A website exists for reporting software problems and posing questions on use of the code. Response is within 24 hours of the request.
l.	Comments on experience with this computer software, ease of	Documentation is upgraded with each version update.

application, documentation provided; known errors or issues	Experience with this software has been good and relatively few (minor) errors have been identified in more than five years of use.

a.	Code name and version	Micro-Shield 6.01
b.	Function of code	Estimate radiation levels and evaluate shielding
c.	Application (what projects/facilities at the site/lab)	Tank Farm Nuclear Facilities
d.	Code developer and/or sponsor	Grove Engineering 15215 Shady Grove Road Rockville, MD 20850
e.	Commercial, Proprietary or Other (Explain)	Commercial
f.	Current Owner/Vendor and technical support provider	Grove Engineering 15215 Shady Grove Road Rockville, MD 20850
g.	Documentation available	Users Manual Verification Manual
h.	Code platform (Workstation, PC-based, Mainframe)	PC Based
i.	Operating System (Windows, DOS, other)	Windows
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	Routine
k.	How are error and user questions reported?	Customer help lines
l.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	This is a good software package. It requires the user to have a knowledge of Health Physics. This is a recent upgrade from 5.05.

a.	Code name and version	GOTH-SNF Version 5.3 and Version 6
b.	Function of code	GOTH-SNF is a multi-dimensional, multi-phase, finite-difference, thermal-hydraulic computer code
c.	Application (what projects/facilities at the site/lab)	Analyzing pneumatic flow and pressure drops for the new Project 314 provided exhauster, and for analyses of waste tanks.
d.	Code developer and/or sponsor	John Marvin, Incorporated (JMI) 5335 West Van Giesen Street West Richland, WA 99353 509-967-2940
e.	Commercial, Proprietary or Other (Explain)	Proprietary
f.	Current Owner/Vendor and technical support provider	John Marvin Incorporated
g.	Documentation available	Analysis Output and QA documentation
h.	Code platform (Workstation, PC-based, Mainframe)	Workstation
i.	Operating System (Windows, DOS, other)	Unknown
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	Routine
k.	How are error and user questions reported?	Proprietary Code: Handled internal to the vendor
l.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	This software was derived from the EPRI GOTHIC code and has been used to support various Tank Farm Design Efforts for several years.

Hanford

Bechtel National, Inc.

Duratek Federal Services

Survey Information Prepared By:

Name: Duratek
Organization: Federal Services
Site or Laboratory: **River Protection Project - Waste Treatment and Immobilization Plant, Richland, WA**
Address: 345 Hill St, Richland WA
Phone/email/facsimile: 509-376-9942
Principal DOE Organization(s) supported: **U.S. Department of Energy, Office of River Protection**

Applicability
List the commercial software packages and proprietary software used in the analysis, design, and testing of design for the Waste Treatment and Immobilization Plant (WTP) in Richland, WA.

For each safety software application identified:

Code/application name and version	Fluent/Gambit
Function of code	Finite Element Analysis
*Area of applicability - see above	Waste Glass Melter Design
Application (what projects/facilities at the site/lab)	River Protection Project Waste Glass Melters
Code developer and/or sponsor	Fluent
Commercial, Proprietary, or Other (explain)	Commercial
Current Owner/Vendor and technical support provider	Fluent
Documentation available	Manuals and CDs
Code Platform (Workstation, PC-based, Mainframe)	PC Based
Operating System (Windows #, DOS, Other)	Windows
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	Occasional
How are error and user questions reported?	E-mail and website
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Good. No issues
Design and analysis work being performed using this application	Process CFD design of gas flow and heat transfer.

Code/application name and version	Algor
Function of code	Finite Element Analysis
*Area of applicability - see above	Waste Glass Melter Design
Application (what projects/facilities at the site/lab)	River Protection Project Waste Glass Melters
Code developer and/or sponsor	Algor
Commercial, Proprietary, or Other (explain)	Commercial
Current Owner/Vendor and technical support provider	Algor
Documentation available	Manuals and CDs
Code Platform (Workstation, PC-based, Mainframe)	PC Based
Operating System (Windows #, DOS, Other)	Windows
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - Q)	Occasional
How are error and user questions reported?	E-mail and website
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Good. No issues
Design and analysis work being performed using this application	Structural and seismic analysis of melter and heat transfer of refractory.

Code/application name and version	Flex PDE
Function of code	Finite Element Analysis .
*Area of applicability - see above	Waste Glass Melter Design
Application (what projects/facilities at the site/lab)	River Protection Project Waste Glass Melters
Code developer and/or sponsor	Flex PDE
Commercial, Proprietary, or Other (explain)	Commercial
Current Owner/Vendor and technical support provider	Flex PDE
Documentation available	Manuals and CDs
Code Platform (Workstation, PC-based, Mainframe)	PC Based
Operating System (Windows #, DOS, Other)	Windows
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	Occasional
How are error and user questions reported?	E-mail and website
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Good. No issues
Design and analysis work being performed using this application	Electrical design for melter electrodes and bus work.

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Code/application name and version	LS-DYNA and LS-POST
Function of code	Finite Element Analysis
*Area of applicability - see above	Waste Glass Melter Design
Application (what projects/facilities at the site/lab)	River Protection Project Waste Glass Melters
Code developer and/or sponsor	LSTC (Livermore Software Technology Corp.)
Commercial, Proprietary, or Other (explain)	Commercial
Current Owner/Vendor and technical support provider	LSTC (Livermore Software Technology Corp.)
Documentation available	Manuals and CDs
Code Platform (Workstation, PC-based, Mainframe)	PC Based
Operating System (Windows #, DOS, Other)	Windows
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - Q)	Occasional
How are error and user questions reported?	E-mail and website
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Good. No issues
Design and analysis work being performed using this application	Non Linear stress analysis of melter dam

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Code/application name and version	Ansoft Mawell 3-D
Function of code	Finite Element Analysis
*Area of applicability - see above	Waste Glass Melter Design
Application (what projects/facilities at the site/lab)	River Protection Project Waste Glass Melters
Code developer and/or sponsor	Ansoft
Commercial, Proprietary, or Other (explain)	Commercial
Current Owner/Vendor and technical support provider	Ansoft
Documentation available	Manuals and CDs
Code Platform (Workstation, PC-based, Mainframe)	PC Based
Operating System (Windows #, DOS, Other)	Windows
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - Q)	Occasional
How are error and user questions reported?	E-mail and website
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Good. No issues
Design and analysis work being performed using this application	Analysis of electrical fields for bus work of glass melter.

Code/application name and version	ANSYS
Function of code	Finite Element Analysis
*Area of applicability - see above	Waste Glass Melter Design
Application (what projects/facilities at the site/lab)	River Protection Project Waste Glass Melters
Code developer and/or sponsor	ANSYS
Commercial, Proprietary, or Other (explain)	Commercial
Current Owner/Vendor and technical support provider	ANSYS
Documentation available	Manuals and CDs
Code Platform (Workstation, PC-based, Mainframe)	PC Based
Operating System (Windows #, DOS, Other)	Windows
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - Q)	Occasional
How are error and user questions reported?	E-mail and website
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Good. No issues
Design and analysis work being performed using this application	Used for structural analysis of glass melter damn and trough.

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Code/application name and version	MCNP/ORIGEN
Function of code	Finite Element Analysis
*Area of applicability - see above	Waste Glass Melter Design
Application (what projects/facilities at the site/lab)	River Protection Project Waste Glass Melters
Code developer and/or sponsor	Origen
Commercial, Proprietary, or Other (explain)	Commercial
Current Owner/Vendor and technical support provider	Origen
Documentation available	Manuals and CDs
Code Platform (Workstation, PC-based, Mainframe)	PC Based
Operating System (Windows #, DOS, Other)	Windows
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	Occasional
How are error and user questions reported?	E-mail and website
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Good. No issues
Design and analysis work being performed using this application	Used for radioactive shielding calculations associated with the waste glass melters..

Code/application name and version	COSMOS
Function of code	Finite Element Analysis
*Area of applicability - see above	Waste Glass Melter Design
Application (what projects/facilities at the site/lab)	River Protection Project Waste Glass Melters
Code developer and/or sponsor	Structural Research & Analysis Corporation (SRAC)
Commercial, Proprietary, or Other (explain)	Commercial
Current Owner/Vendor and technical support provider	Structural Research & Analysis Corporation (SRAC)
Documentation available	Manuals and CDs
Code Platform (Workstation, PC-based, Mainframe)	PC Based
Operating System (Windows #, DOS, Other)	Windows
Frequency of Use (Routine, repeated use, code of choice -R; Occasional - O)	Occasional
How are error and user questions reported?	E-mail and website
Comments on experience with this computer software, ease of application; documentation provided; known errors or issues.	Good. No issues
Design and analysis work being performed using this application	Used for structural and thermal analysis of the waste glass melters..

Hanford

Richland Operations Office/Fluor Hanford, Inc.

**U.S. Department of Energy
Richland Operations Office**

**Schedule for Conducting Software Quality Assurance Assessments
(Commitments 4.2.3.2 and 4.2.4.2, DOE Implementation Plan for
DNFSB Recommendation 2002-1)**

Attachment 1 provides a schedule for completing the identification, selection, and assessment of safety system software and safety analysis and design software.

The following assumptions were made in order to bound the workscope:

- Safety Software was identified as that supporting selected Vital Safety Systems tracked in accordance with DNFSB Recommendation 2000-2, that used in the design and analysis of passive safety systems, and that used in safety analyses.
- Safety Software includes design software and design modifications used since the start of the Project Hanford Management Contract (PHMC) on October 1, 1996.
- Safety Software does not include software systems used by subcontracted vendors that performed design or analysis under contracts with already defined quality assurance standards.
- Safety Software includes only repetitive use software (no hand calculations or single-use applications wholly incorporated into technical reports).

The schedule broadly identifies the activities and their durations from the time RL gives formal direction to its contractor for undertaking the assessments. It is noted that the definitions for Safety Software and Safety System Software do not currently exist in the PHMC.

During FY 2003, RL's prime contractor, Fluor Hanford Inc. restructured its entire software QA program; requiring all projects to have a Software Management Plan, and to evaluate all inventoried software against current NQA software life cycle requirements for compliance. This work effort was completed at the end of FY 2003 and, therefore, all Safety Software can be expected to meet quality assurance expectations.

Software List

Software Short Name	Version	Vendor	Discipline/ Function	Abstract
VAM3DF	1	Hydro Geologic	Nuclear Engineering	3-D flow and transport
ABAQUS	5.8	Abaqus, Inc.	Civil/Structural Engineering	Nonlinear/advanced linear finite element analysis
SASSI	1.1	Advanced Computational Software	Civil/Structural Engineering	Soil structure interaction finite element analysis
ANSYS	5.5, 5.7	Ansys, Inc.	Civil/Structural Engineering	General service finite element program
SAP2000 Plus	6.13	Computers & Structures, Inc.	Civil/Structural Engineering	General service finite element program
SAP Nonlinear	8.0	Computers & Structures, Inc.	Civil/Structural Engineering	General service finite element program, includes nonlinear capabilities
WaterCAD	6.0	Haestad Methods	Civil/Structural Engineering	Water distribution analysis
RISA3D	4.5	RISA Technologies	Civil/Structural Engineering	Small scale finite element program
PTW	4.5.11	SKM Power Tools	Electrical Engineering	Power system analysis
AUTOPIPE	6.2	Bentley	Mechanical Engineering	Piping system stress analysis
HASS	6.1 R2	HRS Systems, Inc.	Mechanical Engineering	Fire protection system analysis
Pipe-Flo	6.0	Engineered Software	Mechanical Engineering	Pipe flow analysis
MATLAB	6.10.4	-	Process Engineering	Analysis of differential equations

October 23, 2003

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Hanford

Rocky Flats Environmental Technology Site

Survey of Safety Software
Used in Design of Structures, Systems, and Components

1. **Survey Information Prepared By**

Name(s):	Doyle Gillespie
Organization(s):	Kaiser-Hill Company, LLC
Site or Laboratory:	Rocky Flats Environmental Technology Site
Address:	10808 Highway 93, Golden, CO 80403-8200
Phone/email/facsimile:	303-966-2413/Doyle.Gillespie@rfets.gov/303-966-3407

Principal DOE organization(s) supported (NNSA, EM, NE, etc.) EM

Date Survey Form Submitted: 10/23/03

2. **Design Safety Software**

List the safety software that is used to support the analysis and design of safety-class structures, systems, and components (SC SSCs) and safety-significant structures, systems, and components (SS SSCs) for DOE defense nuclear facilities.

Attach additional sheets if needed.

Area of Applicability	Computer Software Name*
Civil/Structural/Geotechnical Systems	None
Mechanical Systems	None
HVAC	None
Electrical Systems	None
Fire Protection Systems	HASS FAST
Instrumentation and Control	None
Others (not included above)	RADIDOSE

* Enter "None" if no safety software in applicable the area.

3. Safety Software Information

For each safety software application identified in Section 3, provide the information requested below. Attachment 1 is provided as an example. For additional assistance, email questions to sqa@eh.doe.gov.

a.	Code name and version	HASS v 7.4
b.	Function of code	Hydraulic Model
c.	Application (what projects/facilities at the site/lab)	Fire Protection – Sprinkler System design
d.	Code developer and/or sponsor	HRS Systems, Inc.
e.	Commercial, Proprietary or Other (Explain)	Commercial
f.	Current Owner/Vendor and technical support provider	HRS
g.	Documentation available	Vendor-provided Manual
h.	Code platform (Workstation, PC-based, Mainframe)	PC
i.	Operating System (Windows, DOS, other)	Windows
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	O
k.	How are error and user questions reported?	To/through vendor – none experienced to date
k.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	Good experience. well-considered by industry

a.	Code name and version	FAST v 3.1.7
b.	Function of code	Fire and Smoke Modeling
c.	Application (what projects/facilities at the site/lab)	Fire Protection: Fire and Smoke modeling
d.	Code developer and/or sponsor	NIST Building and Fire Research
e.	Commercial, Proprietary or Other (Explain)	Government
f.	Current Owner/Vendor and technical support provider	NIST
g.	Documentation available	Yes
h.	Code platform (Workstation, PC-based, Mainframe)	PC
i.	Operating System (Windows, DOS, other)	Windows
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	R
k.	How are error and user questions reported?	To NIST directly
k.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	Most Used Program in United States for this application

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a.	Code name and version	RADIDOSE v 1.4.3
b.	Function of code	Analyze radiological consequences from postulated accidents based on potential configuration/operational changes
c.	Application (what projects/facilities at the site/lab)	All nonreactor nuclear facilities on Site.
d.	Code developer and/or sponsor	Kaiser-Hill
e.	Commercial, Proprietary or Other (Explain)	O – this software is specific to Rocky Flats
f.	Current Owner/Vendor and technical support provider	Kaiser-Hill Nuclear Safety and Licensing
g.	Documentation available	Can be obtained on the Intra-Net on Site
h.	Code platform (Workstation, PC-based, Mainframe)	PC-based
i.	Operating System (Windows, DOS, other)	Windows; code embedded in Micosoft Excel
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use.– O;)	R
k.	How are error and user questions reported?	Via e-mail to Site owner
k.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	Easy to use; simple to apply. No issues currently identified.

4/5. Other Information on Your Organization's Software Quality Assurance Program (Optional)

Please take a moment to provide this additional information regarding your SQA programs, procedures, and training.

5.1 What documented SQA programs and procedures do you follow for developing, testing, documenting, maintaining, and applying safety software?_____

Document title(s) and report number(s): MAN-004 CSMM Computer Software Management Manual

5.2   Do your procedures comply in whole or in part with (check compliance)?

Yes/No/Uncertain	Standard/Rule/DOE or Other Directive
Y	a. 10 CFR 830, Subpart A, Quality Assurance Requirements
Y	b. ASME NQA-1a-1999, NQA-1a-2000 (Part 2.7); or predecessor (indicate which)
NA	c. ANSI/ISO/ASQ Q9001-2000, Quality Management Systems – Requirements, or Related Standards
Y	d. DOE Order 414.1, *Quality Assurance*
Y	e. DOE Order 420.1, *Facility Safety*
Y	f. DOE Order 200.1, *Information Management Program*
U	g. DOE Guide 200.1-1, *Department of Energy Software Engineering Methodology*
U	h. DOE Guide 414.1-1, Assessment Guide for QA
Y	i. ANSI/ANS-10.4-1987, *Guidelines for the Verification and Validation of Scientific and Engineering Computer Programs for the Nuclear Industry*
DOE/CBFO-94-1012	j. Other DOE, National, International, or Industry Standards, Requirements, or Guidelines (Please identify)

5.3   How do you apply QA procedures to safety software? ____ Via software QA plans generated to comply with MAN-004-CSMM

5.4   How do you train users on safety software? _____ Site Training Program

:

Savannah River Site

Westinghouse Savannah River Company

2.   Survey Information Prepared By

Name(s):	**Keith Morrell**
Organization(s):	**WSRC**
Site or Laboratory:	**SRS**_____
Address:	**730-4B Room 3091 Aiken, SC 29808**_____
Phone/email/facsimile:	**803-952-8101**_____
	keith.morrell@srs.gov_____
Principal DOE organization(s) supported (NNSA, EM) _____	
Date Survey Form Submitted: 10/31/03_____	

3. Design and Analysis Safety Software

List the safety software that is used to support the analysis and design of safety-class structures, systems, and components (SC SSCs) and safety-significant structures, systems, and components (SS SSCs) for DOE defense nuclear facilities.

Attach additional sheets if needed.

Area of Applicability	Computer Software Name*
Civil/Structural/Geotechnical Systems	GTStrudl, Shake91, SASSI, SRPP, ABAQUS
Mechanical Systems	ANSYS,
	Autopipe Plus, Type 1 Tank Top Load, Type II, III & IIIA Tank Top Load, MCS/THERMAL,ABAQUS
HVAC	None
Electrical Systems	PDMS, ETAP
Fire Protection Systems	None
Instrumentation and Control	None
Others (not included above)	VERSE-LC

- Enter "None" if no safety software is applicable the area.

4. Design & Analysis Safety Software Information

a.	Code name and version	GTStrudl Version 26
b.	Function of code	Finite Element Code for analysis and design of structures.
c.	Application (what projects/facilities at the site/lab)	Tank Farm tank top structures. TEF interior steel structures
d.	Code developer and/or sponsor	Georgia Institute of Technology – Computer Aided Structural Engineering Laboratory
e.	Commercial, Proprietary or Other (Explain)	Commercial
f.	Current Owner/Vendor and technical support provider	Georgia Institute of Technology – Computer Aided Structural Engineering Laboratory
g.	Documentation available	User Documentation.
h.	Code platform (Workstation, PC-based, Mainframe)	PC
i.	Operating System (Windows, DOS, other)	Windows 2000 and later
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	Routine
k.	How are error and user questions reported?	Contact with GT through the PE&CD Software library.
k.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	Excellent.

a.	Code name and version	SHAKE91
b.	Function of code	Establish soil behavior under the action of seismic motion. Used a basis for input to other programs such as SASSI.
c.	Application (what projects/facilities at the site/lab)	Tank Farm underground tanks. TEF Process Building, KAMS Program.
d.	Code developer and/or sponsor	University of California
e.	Commercial, Proprietary or Other (Explain)	Commercial
f.	Current Owner/Vendor and technical support provider	University of California
g.	Documentation available	User Documentation.
h.	Code platform (Workstation, PC-based, Mainframe)	PC, WorkStation and Mainframe
i.	Operating System (Windows, DOS, other)	Windows NT and later
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	Routine
k.	How are error and user questions reported?	Contact with University of California through the PE&CD Software library.
k.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	Code requires expert knowledge in soil-structure interaction analysis. Code does not have GUI.

a.	Code name and version	SASSI 2000
b.	Function of code	Finite Element Code for the soil-structure interaction of surface and embedded structures.
c.	Application (what projects/facilities at the site/lab)	Tank Farm underground tanks. TEF Process Building, KAMS Program.
d.	Code developer and/or sponsor	University of California
e.	Commercial, Proprietary or Other (Explain)	Commercial
f.	Current Owner/Vendor and technical support provider	University of California
g.	Documentation available	User Documentation.
h.	Code platform (Workstation, PC-based, Mainframe)	PC, WorkStation and Mainframe
i.	Operating System (Windows, DOS, other)	Windows NT and later
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	Routine
k.	How are error and user questions reported?	Contact with University of California through the PE&CD Software library.
k.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	Code requires expert knowledge in soil-structure interaction analysis. Code does not have GUI..

a.	Code name and version	SRPP
b.	Function of code	Develop seismic time histories whose response spectra match a given design response spectrum.
c.	Application (what projects/facilities at the site/lab)	Tank Farm underground tanks. TEF Process Building, KAMS Program.
d.	Code developer and/or sponsor	University South Carolina
e.	Commercial, Proprietary or Other (Explain)	Owned by DOE Developed through SCURF funds.
f.	Current Owner/Vendor and technical support provider	DOE Technical support by WSRC PE&CD Structural Mechanics Section
g.	Documentation available	User Documentation.
h.	Code platform (Workstation, PC-based, Mainframe)	PC,
i.	Operating System (Windows, DOS, other)	Windows NT and later
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	Routine
k.	How are error and user questions reported?	Contact with WSRC Structural Mechanics Department.
k.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	This code will be retired within the next two years since criteria for enveloping response spectra will be changed with the release of the governing ASCE Standard

a.	Code name and version	ANSYS/Mechanical, versions 5.7, 6.0, 6.1, 7.0
b.	Function of code	Structural analysis and design of nuclear facility systems, structure and components.
c.	Application (what projects/facilities at the site/lab)	The software has been used extensively in the evaluation of many Hazard Category 2 and 3 systems, structures and components at the Site. Examples include the 3013 storage container welds, 3013 storage racks, and TEF module tops.
d.	Code developer and/or sponsor	ANSYS, Inc. Southpointe 275 Technology Drive Canonsburg, PA, 15317 Ansysinfo@ansys.com
e.	Commercial, Proprietary or Other (Explain)	P, Controlled license access (managed by FlexLM)
f.	Current Owner/Vendor and technical support provider	Mallett Technology 4601 Creekstone Drive, Suite 112 Durham, NC 27703 919/474-9222
g.	Documentation available	User's Manual, Verification Manual,
h.	Code platform (Workstation, PC-based, Mainframe)	Two platforms are used at SRS: Sun Work Station and PC-based
i.	Operating System (Windows, DOS, other)	SUN UltraSPARC/Solaris Windows NT, 98 & 2000
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	Routine
k.	How are error and user questions reported?	The vendor reports Code updates. The Code developer sends out error notices via email
k.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	Program benefits from ease of use for routine evaluations typical at SRS. Complex evaluations require formal training for advanced users.

a.	Code name and version	Type II, III, & IIIA Tank Top Load Program, Version 1
		Type I Tank Top Load Program, Version 0
b.	Function of code	To maintain the structural integrity of the Types I, II, III & IIIA Tanks, these two Programs evaluate the reinforced concrete tank tops for tank top loads (track tank top loads and evaluate changes in these loads).
c.	Application (what projects/facilities at the site/lab)	The Type I, II, III, & IIIA Tanks in F and H Areas.
d.	Code developer and/or sponsor	Structural Mechanics
		Wade Faires
		730-1B/2174
e.	Commercial, Proprietary or Other (Explain)	Other – Used to evaluate the tank top loads (tracks loads and evaluate changes) for the Type I, II, III & IIIA Tanks in F and H Areas.
f.	Current Owner/Vendor and technical support provider	Same as "d."
g.	Documentation available	Software Quality Assurance Plan, Validation Package and User Manual (with test problems). No formal training is required. User friendly.
h.	Code platform (Workstation, PC-based, Mainframe)	PC Based
i.	Operating System (Windows, DOS, other)	WINDOWS-98, NT, & 2000 are supported.
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	Routine
k.	How are error and user questions reported?	Software Error Notice (SEN) Forms are used to report errors and are sent out via email. A website exists for reporting software problems and posing questions on use of the code. Response is within 24 hours of the request.
k.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	The two programs enable tank top loads to be tracked and changes (adds/deletes) evaluated in a timely and efficient manner. No errors have been reported or issues identified.

a.	Code name and version	PDMS - Plant Data Management System
b.	Function of code	Track Electrical Components: cable routing and conduit & tray percent fills and their weights per ft.
c.	Application (what projects/facilities at the site/lab)	All site areas that have opt to use it.
d.	Code developer and/or sponsor	Cygna Energy Services (Glenn Smith and Tim Fay)
e.	Commercial, Proprietary or Other (Explain)	Commercial (then made client specific for SRS use)
f.	Current Owner/Vendor and technical support provider	Cygna Energy Services
g.	Documentation available	Validation Reports, Test Reports/Cases, Topology, User Guide(s) and other release documentation.
h.	Code platform (Workstation, PC-based, Mainframe)	UNIX server with Windows 2000 client (minimum)
i.	Operating System (Windows, DOS, other)	Windows 2000
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	Daily routine functions
k.	How are error and user questions reported?	Email to SRS Authority then to Vendor through SRS error handle process.
k.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	Used in all phases of SRS Projects. Design, construction, operations and maintenance. Large user base. Living database & documentation. Learning curve = 10-20 hands-on-hours.

a.	Code name and version	ETAP 3.0.1N/4.7N/4.7.4N
b.	Function of code	Electrical analysis and calculation
c.	Application (what projects/facilities at the site/lab)	Any/all projects and facilities
d.	Code developer and/or sponsor	Operations Technology, Inc. (OTI)
e.	Commercial, Proprietary or Other (Explain)	Commercial software but proprietary code
f.	Current Owner/Vendor and technical support provider	BSRI/OTI
g.	Documentation available	Manuals test cases and error notification
h.	Code platform (Workstation, PC-based, Mainframe)	PC Workstation stand alone
i.	Operating System (Windows, DOS, other)	Windows
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	R
k.	How are error and user questions reported?	Notification system from vendor (OTI) to BSRI Software Library, then to users from BSRI Software Library
k.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	Very good quality product

a.	Code name and version	AutoPIPE Version 6.20.09
b.	Function of code	AutoPIPE is used for the structural analysis of piping systems.
c.	Application (what projects/facilities at the site/lab)	General site application used for all functional classifications (GS,PS,SS,SC) and performance categories (PC-0 thru PC-4) as necessary.
d.	Code developer and/or sponsor	Bentley Address: 1600 Riviera Ave., Suite 300 Walnut reek, CA 94596 Phone: 925-933-2525
e.	Commercial, Proprietary or Other (Explain)	P, Site licensed (17 users)
f.	Current Owner/Vendor and technical support provider	Same as (d) above; Technical Support is included and is part of Site license fee.
g.	Documentation available	User Manual (computer based) Initial Software Verification Software Validation Report Microcomputer Application Control Form and Software Revision Description User Software Verification Instructions
h.	Code platform (Workstation, PC-based, Mainframe)	PC-Based
i.	Operating System (Windows, DOS, other)	Windows
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	R
k.	How are error and user questions reported?	Critical errors are by phone and email within 24 hr of confirmation. Vendor reports updates and sends out error notices via email on a monthly basis. The vendor can be contacted by phone for immediate response. A website exists for reporting software problems and posing questions on use of the code. Response is within 24 hours of the request.

a.	Code name and version	ABAQUS, Version 5.8
b.	Function of code	Structural and heat conduction analyses
c.	Application (what projects/facilities at the site/lab)	Structural analyses of Type B radioactive material packages such as 9975, SAFKEG, and 5320.
d.	Code developer and/or sponsor	Hibbitt, Karlsson & Sorensen, Inc. 1080 Main Street Pawtucket, RI 02860-4847 Tel. 401-727-4200 Email: info@abaqus.com
e.	Commercial, Proprietary or Other (Explain)	Commercial
f.	Current Owner/Vendor and technical support provider	Same as (d.) above; Technical Support is included and is part of the license fee.
g.	Documentation available	User's Manual. Sample Problems including input and output files.
h.	Code platform (Workstation, PC-based, Mainframe)	Mainframe; Workstation; PC-based
i.	Operating System (Windows, DOS, other)	UNIX; WINDOWS 2000
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	R
k.	How are error and user questions reported?	The vendor reports updates and sends out error notices via mail.
l.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	Vendor documentation is upgraded with each version update.

a.	Code name and version	MSC/THERMAL Version 8.5
b.	Function of code	Thermal analysis for the design of subsystems and components. The pre-processor MSC/PATRAN is used to create finite element models for thermal and structural analyses.
c.	Application (what projects/facilities at the site/lab)	Type B radioactive material packages such as 9975, SAFKEG, and 5320, furnaces in the FB-Line and HB-Line, material storage cans, inertial welds.
d.	Code developer and/or sponsor	MacNeal-Schwendler Corporation, Costa Mesa, CA www.mscsoftware.com PH: 1-800-732-7284
e.	Commercial, Proprietary or Other (Explain)	Commercial
f.	Current Owner/Vendor and technical support provider	Same as (d.) above; Technical Support is included and is part of the license fee.
g.	Documentation available	On-Line documentation, test problems selected by SRS are used for QA documentation.
h.	Code platform (Workstation, PC-based, Mainframe)	Mainframe; Workstation; PC-based
i.	Operating System (Windows, DOS, other)	UNIX; WINDOWS 2000
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	R
k.	How are error and user questions reported?	Errors and patches are posted on the developer website. Solutions and patches are posted on the website.
l.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	Vendor documentation is upgraded with each version update.

a.	Code name and version	VERSE-LC v7.80
b.	Function of code	VERSE is an advanced dynamic simulation package for both batch and continuous liquid chromatography.
c.	Application (what projects/facilities at the site/lab)	Ion-Exchange Modeling: Low Curie Salt Program Hanford Waste Treatment Plant
d.	Code developer and/or sponsor	R. D. Whitley and N-H. L. Wang School of Chemical Engineering, Purdue University
e.	Commercial, Proprietary or Other (Explain)	Commercial
f.	Current Owner/Vendor and technical support provider	Same as (d) above.
g.	Documentation available	HTML User's Guide
h.	Code platform (Workstation, PC-based, Mainframe)	PC-based
i.	Operating System (Windows, DOS, other)	Windows-NT and 2000 are supported.
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	R
k.	How are error and user questions reported?	Errors and user questions are reported to the developers via email or phone.
l.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	University developed code. No user interface. HTML documentation.

5. Other Information on Your Organization's Software Quality Assurance Program (Optional)

> **Please take a moment to provide this additional information regarding your SQA programs, procedures, and training.**

5.1 What documented SQA programs and procedures do you follow for developing, testing, documenting, maintaining, and applying safety software?
Site SQA procedure QAP 20-1 and Engineering SQA E7 Manual
Document title(s) and report number(s): **Attachment 1**

5.2 Do your procedures comply in whole or in part with (check compliance)?

Yes/No/Uncertain	Standard/Rule/DOE or Other Directive
Yes	a. 10 CFR 830, Subpart A, Quality Assurance Requirements
Yes	b. ASME NQA-1a-1999, NQA-1a-2000 (Part 2.7); or predecessor (indicate which)
Yes	c. ANSI/ISO/ASQ Q9001-2000, Quality Management Systems – Requirements, or Related Standards
Yes	d. DOE Order 414.1, *Quality Assurance*
Yes	e. DOE Order 420.1, *Facility Safety*
Yes	f. DOE Order 200.1, *Information Management Program*
Yes	g. DOE Guide 200.1-1, *Department of Energy Software Engineering Methodology*
Yes	h. DOE Guide 414.1-1, Assessment Guide for QA
Uncertain	i. ANSI/ANS-10.4-1987, *Guidelines for the Verification and Validation of Scientific and Engineering Computer Programs for the Nuclear Industry*
Yes	j. Other DOE, National, International, or Industry Standards, Requirements, or Guidelines

5.3 How do you apply QA procedures to safety software? Graded approach based on classification. Using 5.2 documents above as guidance. Details are in procedures.

5.4 How do you train users on safety software? Software Engineering Training including SQA, Required reading of QA and SQA procedures, Required user documentation and training of users. Simulators are used where applicable.

WSRC 1Q Quality Assurance Manual
      20-1 Software Quality Assurance

WSRC E7 Conduct of Engineering and Technical Support
    Section 2.0 - Technical Baseline Change Control
        2.25 Functional Classification
        2.31 Engineering Calculations
        2.40 Design Verification and Checking
    Section 5.0 - Software Engineering and Control
        5.01 Software Engineering and Control - Overview
        5.03 Software Quality Assurance Plan (SQAP)
        5.04 Software Project Management Plan (SPMP)
        5.05 Software Classification
        5.07 Evaluation of Existing or Acquired Software
        5.10 Software Requirements
        5.20 Software Design and Implementation
        5.40 Software Testing, Acceptance and Turnover
        5.61 Eng. & Scientific Software Distribution and Control
        5.62 Computer Program Modification Tracker (CMT)
        5.80 Data Management Plan

Waste Isolation Pilot Plant

Sandia National Laboratories

Washington TRU Solutions

2. Survey Information Prepared By

Name(s): James R. Schuetz

Organization(s): Carlsbad Field Office (CBFO) Technical Assistance
Contractor (CTAC)

Site or Laboratory: Various as follows: (a and b)

(a) Washington TRU Solutions (WTS) – performing
maintenance and operations for and at the Waste Isolation Pilot
Plant (WIPP) repository

(b) Sandia National Laboratory – performing contract services
related to the design of the Waste Isolation Pilot Plant (WIPP)
repository and to the safety of the repository

Address: Carlsbad Field Office

4021 National Parks Highway

Post Office Box 1270

Carlsbad, New Mexico 88221-1270

Attn: J. R. Schuetz / GSA 215 – C235

Phone/email/facsimile: Ph. (505) 234-7181   FAX (505) 234-1799

e-Mail: james.schuetz@wipp.ws

Principal DOE organization(s) supported (NNSA, EM, NE, etc.) CBFO

Date Survey Form Submitted: December 3, 2003

3. **Other Information on Your Organization's Software Quality Assurance Program (Optional)**

   Please take a moment to provide this additional information regarding your SQA programs, procedures, and training.

5.1   What documented SQA programs and procedures do you follow for developing, testing, documenting, maintaining, and applying safety software?_____

   Document title (s) and report number (s): U.S. Department of Energy, Carlsbad Field Office (CBFO), *Quality Assurance Program Document (QAPD)*, DOE/CBFO-94-1012, Revision 5, Effective May 2003 upper-tier requirements document including section 6 related to software quality assurance requirements based on NQA-1 and NQA Part 2, Section 2.7

   Washington TRU Solutions (WTS), *Software Screening and Action Plan*, WP 16-2, Revision 4, Effective May 28, 2003 software quality assurance procedure

   Sandia National Laboratories (SNL), *Software Requirements*, NP 19-1, Revision 10, Effective may 29, 2003 software quality assurance procedure

5.2 Do your procedures comply in whole or in part with (check compliance)?

Yes/No/Uncertain	Standard/Rule/DOE or Other Directive
Y CBFO, WTS, and SNL	a. 10 CFR 830, Subpart A, Quality Assurance Requirements
Y CBFO, WTS, and SNL	b. ASME NQA-1a-1999, NQA-1a-2000 (Part 2.7); or predecessor (indicate which)
U	c. ANSI/ISO/ASQ Q9001-2000, Quality Management Systems – Requirements, or Related Standards
Y CBFO, WTS, and SNL	d. DOE Order 414.1, *Quality Assurance*
Y CBFO, WTS, and SNL	e. DOE Order 420.1, *Facility Safety*
Y CBFO, WTS, and SNL	f. DOE Order 200.1, *Information Management Program*
U	g. DOE Guide 200.1-1, *Department of Energy Software Engineering Methodology*
Y CBFO, WTS, and SNL	h. DOE Guide 414.1-1, Assessment Guide for QA
U	i. ANSI/ANS-10.4-1987, *Guidelines for the Verification and Validation of Scientific and Engineering Computer Programs for the Nuclear Industry*
U	j. Other DOE, National, International, or Industry Standards, Requirements, or Guidelines (Please identify)

5.3   How do you apply QA procedures to safety software? __See section 5.1 of this__
__document for references and procedure numbers for application of software__
__quality assurance to contractor and site activities. Also, contractors are required to__
__implement all sections of the CBFO QAPD including requirements for an internal__
__assessment program. The CBFO QAPD provides details of these requirements__
__and the sites individual procedures give details for site-specific implementation.__
__The CBFO conducts certification audits and annual re-certification audits of__
__individual site QA program implementation.   CBFO audit scope includes__
__evaluation of individual site implementation of software quality assurance,__
__training, and QA program activities.__

5.3.1   How do you train users on safety software? __Contractors conduct classroom__
__training for site personnel to CBFO QAPD requirements. Contractor trains their__
__personnel to site-specific implementation procedures on a required reading basis.__
__Procedure up-dates are also assigned on a required reading basis. This method of__
__training is applicable to technical and quality assurance programmatic procedures.__

Waste Isolation Pilot Plant

Washington TRU Solutions

Washington TRU Solutions Software Inventory

Area of Applicability	Software Name	Version	Date	Note
Civil/Structural/Geotechnical Systems	NONE			
Mechanical Systems	CAP88 PC Radiation Risk Assessment Software	2.0	1/13/99	
	GENII-S	1.485	10/10/94	For background and assistance from the Hanford software authors visit the following website. http://www.pnl.gov/eshs/softw are/genii.html
	GXQ	4.0A	4/24/00 6/12/00	
	MetData Application	4/2003	5/5/03	
	RadClient/Radnet	RadclaJ1	8/12/03	
	Lpu02 af.exe	af	6/12/02	
	Lpu 022ab.exe	ab	6/12/02	
HVAC	NONE			
Electrical Systems	NONE			
Fire Protection Systems	NONE			
Instrumentation and Control	NONE			
Others (not included above)	NONE			

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Washington TRU Solutions Software Inventory (Cont.)

A. SoftwareName/ Version	CAP88 PC Radiation Risk Assessment Software - Version 1.0	GENII -S Version 1.485	GXQ Version 4.0A
B. Function of Code	CAP88-PC version 1.0 is a personal computer software system used for calculating dose and risk from annual average releases of radionuclide to the air and for demonstrating compliance with 40 CFR 61.93 (a).	Environmental Radiation Dosimetery Software System	General Purpose Atmospheric Dispersion Code produced by Westinghouse Hanford Company Users Guide documented in WHC-SD-GN-SWD-30002 Rev. 1
C. Application	Applied to monitoring and reporting possible release of radioactive materials from the Waste Isolation Pilot Project (WIPP) and estimating surface area impacted.	Applied to Environmental monitoring and reporting at the WIPP site.	Applied to Environmental monitoring and reporting at the WIPP site.
D. Code Developer/Sponsor	EPA – Developer Linda Frank-Supka – Sponsor at the WIPP location	C. Ortiz	B. Faulk J. McCormick
E. Commercial, Proprietary, or Other (explain)	Commercial	Commercial	Commercial
F. Current Owner/ Vendor and Technical Support Provider	EPA	C. Ortiz	B. Faulk J. McCormick
G. Documentation Available	Model Document (including calculation algorithms), User Manual, Installation instructions, WIPP Software Inventory, and WIPP Installation and Check-out Forms (including installation testing and reporting)	User Manuals and Design Documentation	User Manuals and Design Documentation
H. Code Platform (Workstation, PC-based, Mainframe)	Desktop PC	Desktop PC	Desktop PC
I. Operating System (Windows, DOS, Other)	Windows NT, 2000, or XP	DOS	Windows
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	Quarterly	Daily	Daily

Washington TRU Solutions Software Inventory (Cont.)

K. How are Error and User Questions Reported?	Generated internally using the WTS SQA protocol and contacting EPA as appropriate based on type of problem/error identified	Contact Mr. Peter Damm with WTS software quality assurance and vendor based on classification of problem or error.	Contact Mr. Peter Damm with WTS software quality assurance and vendor based on classification of problem or error.
L. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	EPA has approved use of CAP88-PC version 2.0 for demonstrating compliance with 40 CFR 61.93 (a) NESHAPs subpart H-emissions of Radionuclides Other than Radon from Department of Energy Facilities.	For background and assistance from the Hanford software authors visit the following website. http://www.pnl.gov/eshs/software/genii.html	None

Washington TRU Solutions Software Inventory (Cont.)

A. SoftwareName/Version	MetData Application Version 4/2003	RadClient/Radnet Version RadclaJ1	Lpu02 af.exe Version af
B. Function of Code	Converts the onsite meteorological data into stability array (STAR) format that is part of required input for the CAP88-PC in order to calculate the effective dose equivalent resulting from normal operations conducted at WIPP to the maximally exposed individual.	Software for remote monitoring/control of RADOS Radiation Monitoring System	Controls the Area Radiation Monitor Local Processing Unit. Receives communications from all the other ARMs which use Local Control Units
C. Application	Applied to Environmental monitoring and reporting at the WIPP site.	Applied to Environmental monitoring and reporting at the WIPP site.	Applied to Environmental monitoring and reporting at the WIPP site.
D. Code Developer/Sponsor	H. Chiou D. Kump	R. Sanchez R. Elmore	R. Sanchez T. Burrington
E. Commercial, Proprietary, or Other (explain)	Commercial	Proprietary (supplied by vendor with monitoring equipment)	Proprietary (supplied by vendor with monitoring equipment)
F. Current Owner/ Vendor and Technical Support Provider	H. Chiou D. Kump	R. Sanchez R. Elmore	R. Sanchez T. Burrington
G. Documentation Available	User Manuals and Design Documentation	User Manuals and Design Documentation	User Manuals and Design Documentation
H. Code Platform (Workstation, PC-based, Mainframe)	Desktop PC	Desktop PC	Monitoring Equipment
I. Operating System (Windows, DOS, Other)	Windows NT	W98/2000	Windows 98
J. Frequency of Use (Routine, repeated use, code of choice - R;Occasional Use - O;)	Daily	Daily	Daily
K. How are Error and User Questions Reported?	Contact Mr. Peter Damm with WTS software quality assurance and vendor based on classification of problem or error.	Contact Mr. Peter Damm with WTS software quality assurance and vendor based on classification of problem or error.	Contact Mr. Peter Damm with WTS software quality assurance and vendor based on classification of problem or error.
L. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	None	None	None

Washington TRU Solutions Software Inventory (Cont.)

A. SoftwareName/Version	Lpu 022ab.exe Version ab
B. Function of Code	Controls the Area Radiation Monitor Local Processing Unit.
C. Application	Applied to Environmental monitoring and reporting at the WIPP site.
D. Code Developer/Sponsor	R. Sanchez T. Burrington
E. Commercial, Proprietary, or Other (explain)	Proprietary (supplied by vendor with monitoring equipment)
F. Current Owner/ Vendor and Technical Support Provider	R. Sanchez T. Burrington
G. Documentation Available	User Manuals and Design Documentation
H. Code Platform (Workstation, PC-based, Mainframe)	Monitoring Equipment
I. Operating System (Windows, DOS, Other)	Windows 98
J. Frequency of Use (Routine, repeated use, code of choice - R;Occasional Use - O;)	Daily
K. How are Error and User Questions Reported?	Contact Mr. Peter Damm with WTS software quality assurance and vendor based on classification of problem or error.
L. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	None

National Nuclear Security Administration

Sandia National Laboratories

Sandia National Laboratories
Software Inventory

Area of Applicability	Software Name	Version	Date	Note
Civil/Structural/Geotechnical Systems	NONE			
Mechanical Systems	NONE			
HVAC	NONE			
Electrical Systems	NONE			
Fire Protection Systems	NONE			
Instrumentation and Control	NONE			
Others (not included above) NOTE: These codes are used to model the performance of the WIPP repository. They contain information related to the radioactivity characteristics of the waste interred in the repository but the software is not used for safety related reporting or reference.	ALGEBRACDB	2.35	1/13/1996	
	BLOTCDB\	1.37	6/4/1996	
	BRAGFLO	4.1	5/8/1997	
	CCD2STEP	1.08	3/22/1996	
	CCDFCALC	4.29	3/6/1996	
	CCDFGF	3.01	8/12/1997	
	CCDFSUM	2.00	12/13/1996	
	CUTTINGS_S	5.04	7/9/1997	
	DTRKCDB	1.00	2/18/2002	
	DTRKMF	1.00	9/23/2002	
	EPANUI	1.14	10/4/1996	
	EQ3/6	7.2c	8/28/1996	Acquired
	FMT	2.4	9/3/1998	
	GENMESH	6.08	1/31/1996	
	GRASP-INV	2.01	4/26/1996	
	GROPECDB	2/12	6/27/1996	
	ICSET	2.22	2/5/1996	
	Kt3d	2.0	10/4/2002	Acquired
	LHS	2.41	3/6/1996	
	LHS2STEP	1.04	4/19/1996	
	MATSET	9.10	11/29/2001	
	MODFLOW 2K	1.6	3/5/2003	Acquired
	NONLIN	2.0	8/23/1996	
	nSIGHTS	1.0	5/14/2002	Acquired
	NUCPLOT	1.2	2/27/2002	
	NUTS	2.05	5/30/1997	
	ORIGEN2	2.2	7/1/2002	Acquired
	PANEL	3.60	5/17/1996	
	PAPDB	1.0	11/15/2001	
	PATTRN	1.00	3/15/1999	Acquired
	PCCSRC	2.21	5/23/1996	
	PEST	5.51	4/3/2003	Acquired

Area of Applicability	Software Name	Version	Date	Note
	POST_EPAUNI	1.15	9/18/1997	
	PSOTBRAG	4.0	2/6/1996	
	POSTLHS	4.07	2/7/1996	
	POSTSECOFL2D	4.04	4/23/1996	
	POSTSECOTP2D	1.04	6/5/1997	
	PREBRAG	6.0	2/6/1996	
	PRELHS	2.30	11/27/2001	
	PRESECOFL2D	4.05	6/11/1996	
	PRESECOTP2D	1.22	6/12/1997	
	RELATE	1.43	3/6/1996	
	SANTOS	2.0	7/29/1996	
	SECOFL2D	3.03	5/7/1996	
	SECOTP2D	1.41a	7/9/2003	
	SGSIM	2.0	7/5/2002	Acquired
	SPLAT	1.02	10/2/1996	
	STAMMT-L	1.0	2/22/2002	
	STAMMT-R	1.0	6/25/1998	
	STEPWISE	2.21	12/2/1996	
	SUMMARIZE	2.20	7/11/1997	
	SWIFT 2	2F	N/A	
	TOUGH28W	2.00	3/3/1997	
	TRACKER	5.02	7/15/1997	
	TWBID	3.11	4/14/2003	

Sandia National Laboratories
Software Inventory

A. SoftwareName/ Version	ALGEBRACDB Version 2.35	BLOTCDB Version 1.37	BRAGFLO Version 4.1
B. Function of Code	Used to algebraically manipulate data in CAMDAT	Used to plot the mesh and results from finite-element and finite-difference analysis programs	Used to study two-phase (brine and gas), three-dimensional isothermal flow in porous media
C. Application	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics
D. Code Developer/Sponsor	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
E. Commercial, Proprietary, or Other (explain)	Proprietary	Proprietary	Proprietary
F. Current Owner/ Vendor and Technical Support Provider	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
G. Documentation Available	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7
H. Code Platform (Workstation, PC-based, Mainframe)	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations
I. Operating System (Windows, DOS, Other)	Windows and/or VMS	Windows and/or VMS	Windows and/or VMS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	R	R
K. How are Error and User Questions Reported?	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements
L. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.

Sandia National Laboratories
Software Inventory

A. SoftwareName/ Version	CCD2STEP Version 1.08	CCDFCALC Version 4.29	CCDFGF Version 3.01
B. Function of Code	CCD2STEP reads CCDFCALC files containing radionuclide release data for the dependent variables and writes an output file for either STEPWISE or PCCSRC	CCDFCALC calls for and collects specific radionuclide release data calculated by various WIPP PA codes designed to estimate such releases (e.g., CUTTINGS, PANEL, SECOTP2D, etc.). The release data are scenario specific and are normally provided in CAMDAT format (CDB) files	Assemble WIPP PA codes results to produce the CCDF specified in 40 CFR 191. Allow brine in the Castile Formation to be specified as input. Construct the distribution of CCDFs.
C. Application	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics
D. Code Developer/Sponsor	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
E. Commercial, Proprietary, or Other (explain)	Proprietary	Proprietary	Proprietary
F. Current Owner/ Vendor and Technical Support Provider	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
G. Documentation Available	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7
H. Code Platform (Workstation, PC-based, Mainframe)	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations
I. Operating System (Windows, DOS, Other)	Windows and/or VMS	Windows and/or VMS	Windows and/or VMS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	R	R
K. How are Error and User Questions Reported?	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements
L. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.

Sandia National Laboratories
Software Inventory

A. SoftwareName/ Version	CCDFSUM Version 2.00	CUTTINGS_S Version 5.04	DTRKCDB Version 1.00
B. Function of Code	Used to graphically display complementary cumulative distribution functions (CCDFs) constructed by the software CCDFGF	Used to estimate the quantity (in Curies) of wastes brought to the surface as a result of an inadvertent borehole drilled directly over the WIPP repository so as to penetrate a waste panel	Used to track the pathway of particles released in a fluid velocity field.
C. Application	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics
D. Code Developer/Sponsor	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
E. Commercial, Proprietary, or Other (explain)	Proprietary	Proprietary	Proprietary
F. Current Owner/ Vendor and Technical Support Provider	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
G. Documentation Available	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7
H. Code Platform (Workstation, PC-based, Mainframe)	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations
I. Operating System (Windows, DOS, Other)	Windows and/or VMS	Windows and/or VMS	Windows and/or VMS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	R	R
K. How are Error and User Questions Reported?	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements
L. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.

Sandia National Laboratories
Software Inventory

A. SoftwareName/ Version	DTRKMF Version 1.00	EPANUI Version 1.14	EQ3/6 Version 7.2c
B. Function of Code	N/A	Used to concur with the EPA standards, build a data set for the probability distribution for the volumetric EPA Unit	Used for speciation-solubility and reaction path calculation of aqueous system.
C. Application	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics
D. Code Developer/Sponsor	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
E. Commercial, Proprietary, or Other (explain)	Proprietary	Proprietary	Proprietary
F. Current Owner/ Vendor and Technical Support Provider	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
G. Documentation Available	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7
H. Code Platform (Workstation, PC-based, Mainframe)	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations
I. Operating System (Windows, DOS, Other)	Windows and/or VMS	Windows and/or VMS	Windows and/or VMS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	R	R
K. How are Error and User Questions Reported?	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements
L. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.

Sandia National Laboratories
Software Inventory

A. SoftwareName/ Version	FMT Version 2.4	GENMESH Version 6.08	GRASP-INV Version 2.01
B. Function of Code	Used to calculate chemical equilibrium in high-ionic-strength geochemical systems at 25°C.	Used to generate three-dimensional finite-difference mesh	Used to solve the inverse problem of groundwater flow for an ensemble of transmissivity fields
C. Application	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics
D. Code Developer/Sponsor	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
E. Commercial, Proprietary, or Other (explain)	Proprietary	Proprietary	Proprietary
F. Current Owner/ Vendor and Technical Support Provider	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
G. Documentation Available	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7
H. Code Platform (Workstation, PC-based, Mainframe)	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations
I. Operating System (Windows, DOS, Other)	Windows and/or VMS	Windows and/or VMS	Windows and/or VMS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	R	R
K. How are Error and User Questions Reported?	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements
L. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.

Sandia National Laboratories
Software Inventory

A. SoftwareName/ Version	GROPECDB Version 2/12	ICSET Version 2.22	Kt3d Version 2.0
B. Function of Code	Used to examine CAMDAT file. It allows a user to interactively look at the contents of CAMDAT Database (CDB) file.	Used to set initial conditions in a PA Computational Data Base (CDB) file in 1-D, 2-D, or 3-D	A GSLIB kriging program Kt3d is used to estimate the residual values at all points on the grid within a model domain.
C. Application	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics
D. Code Developer/Sponsor	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
E. Commercial, Proprietary, or Other (explain)	Proprietary	Proprietary	Proprietary
F. Current Owner/ Vendor and Technical Support Provider	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
G. Documentation Available	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7
H. Code Platform (Workstation, PC-based, Mainframe)	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations
I. Operating System (Windows, DOS, Other)	Windows and/or VMS	Windows and/or VMS	Windows and/or VMS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	R	R
K. How are Error and User Questions Reported?	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements
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Software Inventory

A. SoftwareName/ Version	LHS Version 2.41	LHS2STEP Version 1.04	MATSET Version 9.10
B. Function of Code	Used to perform Latin Hypercube Sampling	LHS2STEP reads an LHS sampled output file containing the independent variables, and writes an output file for either the STEPWISE or PCCSRC codes.	Used to set material and properties in CAMDAT
C. Application	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics
D. Code Developer/Sponsor	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
E. Commercial, Proprietary, or Other (explain)	Proprietary	Proprietary	Proprietary
F. Current Owner/ Vendor and Technical Support Provider	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
G. Documentation Available	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7
H. Code Platform (Workstation, PC-based, Mainframe)	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations
I. Operating System (Windows, DOS, Other)	Windows and/or VMS	Windows and/or VMS	Windows and/or VMS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	R	R
K. How are Error and User Questions Reported?	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements
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Sandia National Laboratories
Software Inventory

A. SoftwareName/ Version	MODFLOW 2K Version 1.6	NONLIN Version 2.0	nSIGHTS Version 1.0
B. Function of Code	A three-dimensional finite-difference ground-water model used to perform ground water hydrology simulation. MODFLOW2k also has capabilities such as solute transport and parameter estimation.	N/A	nSights consists of a numeric simulator, analytic routines that support standard well-test interpretation methodologies, and statistical sampling/optimization and post-processing procedures that enable the analyst to quantify uncertainty in parameter estimates
C. Application	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics
D. Code Developer/Sponsor	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
E. Commercial, Proprietary, or Other (explain)	Proprietary	Proprietary	Proprietary
F. Current Owner/ Vendor and Technical Support Provider	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
G. Documentation Available	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7
H. Code Platform (Workstation, PC-based, Mainframe)	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations
I. Operating System (Windows, DOS, Other)	Windows and/or VMS	Windows and/or VMS	Windows and/or VMS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	R	R
K. How are Error and User Questions Reported?	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements
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Sandia National Laboratories
Software Inventory

A. SoftwareName/ Version	NUCPLOT Version 1.2	NUTS Version 2.05	ORIGEN2 Version 2.2
B. Function of Code	Used to plot output data from the modeling codes	Used to simulate radioisotope transport through porous media and includes first-order radioactive decay processes.	N/A
C. Application	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics
D. Code Developer/Sponsor	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
E. Commercial, Proprietary, or Other (explain)	Proprietary	Proprietary	Proprietary
F. Current Owner/ Vendor and Technical Support Provider	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
G. Documentation Available	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7
H. Code Platform (Workstation, PC-based, Mainframe)	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations
I. Operating System (Windows, DOS, Other)	Windows and/or VMS	Windows and/or VMS	Windows and/or VMS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	R	R
K. How are Error and User Questions Reported?	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements
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Sandia National Laboratories
Software Inventory

A. SoftwareName/ Version	PANEL Version 3.60	PAPDB Version 1.0	PATTRN Version 1.00
B. Function of Code	PANEL takes brine flow and repository volume data and computes the amount of mobilized radioisotopes that leave the repository.	The performance assessment parameter database.	Used to detect patterns in scatterplots of independent variables versus dependent variables and used as an additional sensitivity analysis tool to aid in identifying important independent variables.
C. Application	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics
D. Code Developer/Sponsor	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
E. Commercial, Proprietary, or Other (explain)	Proprietary	Proprietary	Proprietary
F. Current Owner/ Vendor and Technical Support Provider	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
G. Documentation Available	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7
H. Code Platform (Workstation, PC-based, Mainframe)	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations
I. Operating System (Windows, DOS, Other)	Windows and/or VMS	Windows and/or VMS	Windows and/or VMS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	R	R
K. How are Error and User Questions Reported?	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements
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Sandia National Laboratories
Software Inventory

A. SoftwareName/ Version	PCCSRC Version 2.21	PEST Version 5.51	POST_EPAUNI Version 1.15
B. Function of Code	Used to evaluate parameter importance by reporting the partial correlation coefficients (PCCs) and standardized regression coefficients (SRCs) on either the raw or ranked data	Used as a "model-independent parameter estimator" and optimizes parameters pertaining to an existing simulation model, such that the outputs of that model are as well matched as possible to a set of field measurements.	Post-processor of output from EPAUNI to CAMDAT
C. Application	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics
D. Code Developer/Sponsor	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
E. Commercial, Proprietary, or Other (explain)	Proprietary	Proprietary	Proprietary
F. Current Owner/ Vendor and Technical Support Provider	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
G. Documentation Available	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7
H. Code Platform (Workstation, PC-based, Mainframe)	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations
I. Operating System (Windows, DOS, Other)	Windows and/or VMS	Windows and/or VMS	Windows and/or VMS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	R	R
K. How are Error and User Questions Reported?	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements
L. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.

Sandia National Laboratories
Software Inventory

A. SoftwareName/ Version	PSOTBRAG Version 4.0	POSTLHS Version 4.07	POSTSECOFL2D Version 4.04
B. Function of Code	Post-processor (translator) of output from BRAGFLO to CAMDAT	Post-processor (translator) of output from LHS to CAMDAT	N/A
C. Application	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics
D. Code Developer/Sponsor	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
E. Commercial, Proprietary, or Other (explain)	Proprietary	Proprietary	Proprietary
F. Current Owner/ Vendor and Technical Support Provider	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
G. Documentation Available	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7
H. Code Platform (Workstation, PC-based, Mainframe)	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations
I. Operating System (Windows, DOS, Other)	Windows and/or VMS	Windows and/or VMS	Windows and/or VMS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	R	R
K. How are Error and User Questions Reported?	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements
L. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.

Sandia National Laboratories
Software Inventory

A. SoftwareName/ Version	POSTSECOTP2D Version 1.04	PREBRAG Version 6.0	PRELHS Version 2.30
B. Function of Code	Post-processor of output from SECOTP2D to CAMDAT	Pre-processor (translator) for input to BRAGFLO	Pre-processor (translator) for input to LHS
C. Application	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics
D. Code Developer/Sponsor	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
E. Commercial, Proprietary, or Other (explain)	Proprietary	Proprietary	Proprietary
F. Current Owner/ Vendor and Technical Support Provider	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
G. Documentation Available	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7
H. Code Platform (Workstation, PC-based, Mainframe)	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations
I. Operating System (Windows, DOS, Other)	Windows and/or VMS	Windows and/or VMS	Windows and/or VMS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	R	R
K. How are Error and User Questions Reported?	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements
L. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.

Sandia National Laboratories
Software Inventory

A. SoftwareName/ Version	PRESECOFL2D Version 4.05	PRESECOTP2D Version 1.22	RELATE Version 1.43
B. Function of Code	Pre-processor for input to SECOTP2D	N/A	Used to transfer information from one CAMDAT database file (the "Reference" database) to another CAMDAT database file (the "Object" database)
C. Application	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics
D. Code Developer/Sponsor	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
E. Commercial, Proprietary, or Other (explain)	Proprietary	Proprietary	Proprietary
F. Current Owner/ Vendor and Technical Support Provider	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
G. Documentation Available	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7
H. Code Platform (Workstation, PC-based, Mainframe)	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations
I. Operating System (Windows, DOS, Other)	Windows and/or VMS	Windows and/or VMS	Windows and/or VMS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	R	R
K. How are Error and User Questions Reported?	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements
L. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.

Sandia National Laboratories
Software Inventory

A. SoftwareName/ Version	SANTOS Version 2.0	SECOFL2D Version 3.03	SECOTP2D Version 1.41a
B. Function of Code	The quasistatic, large deformation finite element code with a multi-mechanism deformation to model the creep behavior of rock salt.	Performs single and multiple component radionuclide transport in fractured aquifers, calculate the discharge across a user defined boundary.	N/A
C. Application	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics
D. Code Developer/Sponsor	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
E. Commercial, Proprietary, or Other (explain)	Proprietary	Proprietary	Proprietary
F. Current Owner/ Vendor and Technical Support Provider	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
G. Documentation Available	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7
H. Code Platform (Workstation, PC-based, Mainframe)	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations
I. Operating System (Windows, DOS, Other)	Windows and/or VMS	Windows and/or VMS	Windows and/or VMS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	R	R
K. How are Error and User Questions Reported?	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements
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Sandia National Laboratories
Software Inventory

A. SoftwareName/ Version	SGSIM Version 2.0	SPLAT Version 1.02	STAMMT-L Version 1.0
B. Function of Code	A GSLIB utility used for creating realizations by performing (Sequential Gaussian Simulation) conditional stochastic Gaussian geostatistical. simulations	Used for X-Y plot. It reads data for ASCII files generated by SUMMARIZE.	N/A
C. Application	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics
D. Code Developer/Sponsor	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
E. Commercial, Proprietary, or Other (explain)	Proprietary	Proprietary	Proprietary
F. Current Owner/ Vendor and Technical Support Provider	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
G. Documentation Available	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7
H. Code Platform (Workstation, PC-based, Mainframe)	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations
I. Operating System (Windows, DOS, Other)	Windows and/or VMS	Windows and/or VMS	Windows and/or VMS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	R	R
K. How are Error and User Questions Reported?	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements
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Software Inventory

A. SoftwareName/ Version	STAMMT-R Version 1.0	STEPWISE Version 2.21	SUMMARIZE Version 2.20
B. Function of Code	Used for ground-water transport simulation	Used for stepwise regression analysis	Data integration and conversion utility code for the analysis of binary input data. SUMMARIZE reads specific data from a series of CAMDAT binary CDB data files and generates a tabular ASCII output file or files.
C. Application	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics
D. Code Developer/Sponsor	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
E. Commercial, Proprietary, or Other (explain)	Proprietary	Proprietary	Proprietary
F. Current Owner/ Vendor and Technical Support Provider	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
G. Documentation Available	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7
H. Code Platform (Workstation, PC-based, Mainframe)	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations
I. Operating System (Windows, DOS, Other)	Windows and/or VMS	Windows and/or VMS	Windows and/or VMS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	R	R
K. How are Error and User Questions Reported?	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements
L. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.

Sandia National Laboratories
Software Inventory

A. SoftwareName/ Version	SWIFT 2 Version 2F	TOUGH28W Version 2.00	TRACKER Version 5.02
B. Function of Code	N/A	N/A	N/A
C. Application	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics	Modeling of the WIPP waste repository physical characteristics
D. Code Developer/Sponsor	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
E. Commercial, Proprietary, or Other (explain)	Proprietary	Proprietary	Proprietary
F. Current Owner/ Vendor and Technical Support Provider	SRS Carlsbad	SRS Carlsbad	SRS Carlsbad
G. Documentation Available	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7
H. Code Platform (Workstation, PC-based, Mainframe)	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations	Mainframe, accessed from server workstations
I. Operating System (Windows, DOS, Other)	Windows and/or VMS	Windows and/or VMS	Windows and/or VMS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	R	R
K. How are Error and User Questions Reported?	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements
L. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.

Sandia National Laboratories
Software Inventory

A. SoftwareName/ Version	TWBID Version 3.11
B. Function of Code	N/A
C. Application	Modeling of the WIPP waste repository physical characteristics
D. Code Developer/Sponsor	SRS Carlsbad
E. Commercial, Proprietary, or Other (explain)	Proprietary
F. Current Owner/ Vendor and Technical Support Provider	SRS Carlsbad
G. Documentation Available	Full Software Life-Cycle Development Documentation Suite Per NQA 2.7
H. Code Platform (Workstation, PC-based, Mainframe)	Mainframe, accessed from server workstations
I. Operating System (Windows, DOS, Other)	Windows and/or VMS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R
K. How are Error and User Questions Reported?	Sandia Procedure NP 19-1 implementing NQA Part 2 section 2.7 requirements
L. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	Software is used to model the physical waste repository but does not contain data and/or is not used to report release to the atmosphere or impact to the public.

Department of Energy/Office of Radioactive Waste Management

Yucca Mountain Project

2. Survey Information Prepared By

Name(s):	Roy D. Capshaw
Organization(s):	OCRWM/OQA
Site or Laboratory:	Las Vegas, NV Office of Repository Development
Address:	1551 Hillshire Drive, Suite A, Las Vegas, NV 89134
Phone/email/facsimile:	702 794-5067 / 702 794-1426

Principal DOE organization(s) supported (NNSA, EM) __RW1__

Date Survey Form Submitted: __11/05/2003__

3. Design Safety Software

List the safety software that is used to support the analysis and design of safety-class structures, systems, and components (SC SSCs) and safety-significant structures, systems, and components (SS SSCs) for DOE defense nuclear facilities.

Attach additional sheets if needed.

Area of Applicability	Computer Software Name*
Civil/Structural/Geotechnical Systems	MACCS 2
Mechanical Systems	*
HVAC	*
Electrical Systems	*
Fire Protection Systems	*
Instrumentation and Control	
Others (not included above)	* Early stages of SAR development therefore many S/W selections have not been made to date

* Enter "None" if no safety software is applicable to the area.

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4. Safety Software Information

For each safety software application identified in Section 3, provide the information requested below. Attachment 1 is provided as an example. For additional assistance, email questions to sqa@eb.doe.gov.

a.	Code name and version	MACCS 2 V 1.12
b.	Function of code	Gaussian Dispersian Analysis
c.	Application (what projects/facilities at the site/lab):	SAR for NRC Approval
d.	Code developer and/or sponsor	M.L. Young and D.I. Chanin Sandia National Laboratory
e.	Commercial, Proprietary or Other (Explain):	Limited use controlled by Sandia National Laboratory
f.	Current Owner/Vendor and technical support provider	Sandia National Laboratory
g.	Documentation available.	Yes. www.nea.fr/abs/html/ccc-0652.html
h.	Code platform (Workstation, PC based, Mainframe)	IBM PC and other platforms
i.	Operating System (Windows, DOS, other)	DOS IBM PC 80486 or Pentium 8 MB RAM 30 MB hard disk space
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	Routine
k.	How are error and user questions reported?	to Sandia
k.	Comments on experience with this computer software, ease of application, documentation provided, known errors or issues	None

5. **Other Information on Your Organization's Software Quality Assurance Program (Optional)**

Please take a moment to provide this additional information regarding your SQA programs, procedures, and training.

5.1 What documented SQA programs and procedures do you follow for developing, testing, documenting, maintaining, and applying safety software? __OCRWM__
Quality Assurance requirements and description

Document title(s) and report number(s): __Quality Assurance__
requirements and description DOE/RW-0333P
Revision 13 (NRC approved)

5.2 Do your procedures comply in whole or in part with (check compliance)?

Yes/No/Uncertain	Standard/Rule/DOE or Other Directive
Uncertain	a. 10 CFR 830, Subpart A, Quality Assurance Requirements
Yes	b. ASME NQA-1a-1999, NQA-1a-2000 (Part 2.7); or predecessor (indicate which)
Uncertain	c. ANSI/ISO/ASQ Q9001-2000, Quality Management Systems – Requirements, or Related Standards
Uncertain	d. DOE Order 414.1, *Quality Assurance*
Uncertain	e. DOE Order 420.1, *Facility Safety*
Uncertain	f. DOE Order 200.1, *Information Management Program*
Uncertain	g. DOE Guide 200.1-1, *Department of Energy Software Engineering Methodology*
Uncertain	h. DOE Guide 414.1-1, Assessment Guide for QA
Uncertain	i. ANSI/ANS-10.4-1987, *Guidelines for the Verification and Validation of Scientific and Engineering Computer Programs for the Nuclear Industry*
Yes	j. Other DOE, National, International, or Industry Standards, Requirements, or Guidelines (Please identify) (10 CFR50 appendix b)

10 CFR63.144 Quality Assurance
Program change

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5.3   How do you apply QA procedures to safety software? __Through CFR requirements__
       __DOE/OCRWM requirements and specified standards__

5.4   How do you train users on safety software? __There is no formal training__
       __program users have years of experience prior to hiring or use.__
       __Program manuals during on-the-job training__

Department of Energy/Office of Radioactive Waste Management

Argonne National Laboratory - West

ANL-W Survey of Safety Software

The following information is provided in response to a request by the Argonne Area Office – West to complete a survey requested by the DOE. This includes safety software currently used to support the analysis and design of defense nuclear facilities including structures, systems and components, as well electrical and control system design. Although ANL-W does not currently have *defense* nuclear facilities, it is responding to the survey just the same. This includes a request for information regarding SQA programs, procedures and training.

It is understood that the Office of Environment, Safety and Health (EH) will review the information for applicability as 'toolbox' codes; an effort in response to Defense Nuclear Facilities Safety Board Recommendation 2002-01, *Quality Assurance for Safety-Related Software* to in essence provide a central toolbox of safety codes used within the DOE complex.

Survey Information Prepared By

Name(s):	Deborah A. Tate
Organization(s):	Argonne National Laboratory- West
Address:	PO Box 2528, Idaho Falls, ID 83403
Phone/email/facsimile:	(208) 533-7088 / Deborah.tate@anl.gov (208) 533-7471
Principle DOE Organization(s) Supported:	NE
Date Survey Form Submitted:	November 6, 2003

1. Design Safety Software

A list of safety software that is used to support the analysis and design of safety-class structures, systems, and components (SC SSCs) and safety-significant structures, systems, and components (SS SSCs) at ANL-W is provided in the table below. Detailed information on each of the individual applications is provided in attachment 1.

Table 1 – ANL-W Safety Software

Area of Applicability	Computer Software Name*
Civil/Structural/Geotechnical Systems	SAP2000 Nonlinear
	ALGOR
Mechanical Systems	ALGOR
HVAC	None
Electrical Systems	None
Fire Protection Systems	HASS
Instrumentation and Control	DMT
	ARCS
Others (not included above)	Microshield

* Enter "None" if no safety software in applicable the area.

2. ANL-W's Software Quality Assurance Program

2.1 Documented SQA Programs and Procedures

ANL-W applies a graded approach for developing, testing, documenting, maintaining and applying all software, regardless of its use. Two main procedures document this process and they are as follows. In addition, individual formal documents prescribe procedures and requirements that are unique to a given software system. For each code listed in table 1 above, these types of documents are also listed in Attachment 1.

Document title(s) and report number(s):

- AWP 4.9, *Software Quality Assurance*
- AWP 2.9, *Engineering Procedure*

2.2   ANL-W SQA Procedure Compliance

Table 2 – ANL-W SQA Procedure Compliance List

Yes/No/Uncertain	Standard/Rule/DOE or Other Directive
Y	a. 10 CFR 830, Subpart A, Quality Assurance Requirements
Y	b. ASME NQA-1a-1999, NQA-1a-2000 (Part 2.7); or predecessor (indicate which)
N	c. ANSI/ISO/ASQ Q9001-2000, Quality Management Systems – Requirements, or Related Standards
Y	d. DOE Order 414.1, *Quality Assurance*
Y	e. DOE Order 420.1, *Facility Safety*
Y	f. DOE Order 200.1, *Information Management Program*
Y	g. DOE Guide 200.1-1, *Department of Energy Software Engineering Methodology*
Y	h. DOE Guide 414.1-1, Assessment Guide for QA
U	i. ANSI/ANS-10.4-1987, *Guidelines for the Verification and Validation of Scientific and Engineering Computer Programs for the Nuclear Industry*
U	j. Other DOE, National, International, or Industry Standards, Requirements, or Guidelines

2.3   Application of SQA Procedures To Safety Software

As part of good business practice, the version being used is verified to be the latest version available from the vendor. All analyses are checked; however, this only ensures that the software was used correctly, not that the software works correctly.

2.4   Software Training

Engineers familiar with the software train other engineers. The tutorials available for the program are also used.

Point of Contact: Brent Harris		Phone: (208) 533-7996
a.	Code name and version	**SAP2000 Nonlinear, Version 8.1.6**
b.	Function of code	Structural Analysis and Design
c.	Application (what projects/facilities at the site/lab)	Used routinely for structural analysis of facilities and equipment at the Laboratory.
d.	Code developer and/or sponsor	Computers and Structures, Inc. 1995 University Ave., Suite 540 Berkeley, CA 94704 Phone: 510-845-2177 e-mail: info@csi.berkeley.com
e.	Commercial, Proprietary or Other	C; Individual User Licenses & Maintenance Agreements
f.	Current Owner/Vendor and technical support provider	Same as (d) above. Technical support is included as part of maintenance agreement.
g.	Documentation available	Users Manual; Verification Problem Manual
h.	Code platform	PC-based
i.	Operating System	Windows XP, NT
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	R
k.	How are error and user questions reported?	A website exists for reporting software problems via e-mail; problems can also be reported by telephone.
k.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	Experience over the past several years has been quite good. The program is relatively user-friendly; however some problems have been encountered. The problems are usually resolved in periodic program updates issued by the vendor.

SQA/V&V: The vendor does not have an SQA/V&V program for structural evaluations that address safety issues. The vendor does maintain a verification manual that provides comparisons between SAP2000 solutions and theoretical solutions for a wide variety of problems using different element and analysis types. ANL-W has a current maintenance agreement for this software.

Training: Self-taught, user manuals and tutorials.

Point of Contact: Ken Durstine		Phone: (208) 533- 7492
a.	Code name and version	**ALGOR FEMPRO, Version 14.02**
b.	Function of code	Finite element code used for stress and heat transfer analysis.
c.	Application (what projects/facilities at the site/lab)	Equipment and structural analysis, used to verify adequacy of design. All facilities and projects needing this type of analysis.
d.	Code developer and/or sponsor	ALGOR Inc. 150 Beta Drive, Pittsburgh, PA.
e.	Commercial, Proprietary or Other (Explain)	Commercial
f.	Current Owner/Vendor and technical support provider	ALGOR Inc., technical support provided under maintenance agreement
g.	Documentation available	Software based owners manual, tutorials, verification examples
h.	Code platform (Workstation, PC-based, Mainframe)	Workstation /PC
i.	Operating System (Windows, DOS, other)	Windows XP
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	Routine
k.	How are error and user questions reported?	Via email to customer support, electronic notice when updates are available, QA subscription available.
k.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	Vendor continuously updates capabilities and features of software.

SQA/V&V: Performed by vendor; vendor QA program satisfies 10CFR 50, App. B, 10 CFR 21, & ISO- 9001. ANL-W has a current maintenance agreement for this software.

Training: Self-taught, user manuals and tutorials.

Point of Contact: Doug Ray		Phone: (208) 533-7800
a.	Code name and version	**DMT**
b.	Function of code	Supports daily certification of the TREAT Reactor Trip Systems (RTS).
c.	Application (what projects/facilities at the site/lab)	Transient Reactor Test Facility (TREAT)
d.	Code developer and/or sponsor	ANL-W
e.	Commercial, Proprietary or Other (Explain)	O – Code not in use at this time.
f.	Current Owner/Vendor and technical support provider	ANL-W
g.	Documentation available	
h.	Code platform (Workstation, PC-based, Mainframe)	
i.	Operating System (Windows, DOS, other)	
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	Software is not currently active, however it will be placed back in service when the final decision is made regarding TREAT restart.
k.	How are error and user questions reported?	Errors/user questions reported to the facility manager.
k.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	This code is a series of modules that run on a number of processors to support daily certification of the TREAT Reactor Trip System (RTS).

SQA/V&V: Software is controlled under the TREAT Software configuration Control Procedure (SQA No: Z0006-0004-OP). It is validated using the DMT Fault Detection System Test Procedure (L6570-8372-DA)

Training: In addition to formal educational backgrounds in computer science, electrical engineering and mathematics, this code is still maintained by one of the original code developers.

Point of Contact: Doug Ray		Phone: (208) 533-7800
a.	Code name and version	**ARCS**
b.	Function of code	Supports daily operation of the TREAT Reactor Control System.
c.	Application (what projects/facilities at the site/lab) ⁘	Transient Reactor Test Facility (TREAT)
d.	Code developer and/or sponsor	ANL-W
e.	Commercial, Proprietary or Other (Explain)	O – Code not in use at this time.
f.	Current Owner/Vendor and technical support provider	ANL-W
g.	Documentation available	
h.	Code platform (Workstation, PC-based, Mainframe)	
i.	Operating System (Windows, DOS, other)	
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	This code is a series of modules that run on the various processors that form the TREAT Automatic Reactor Control System
k.	How are error and user questions reported?	Errors/user questions reported to the facility manager.
k.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	This code is a series of modules that run on a number of processors to support daily certification of the TREAT Reactor Trip System (RTS).

SQA/V&V: Software is controlled under the TREAT Software configuration Control Procedure (SQA No: Z0006-0004-OP). It is validated using the ARCS Reference Transient Test Procedure (Z0003-0150-OP   Appendix D)

Training: In addition to formal educational backgrounds in computer science, electrical engineering and mathematics, this code is still maintained by one of the original code developers.

Point of Contact: Paul Hart or Mike Lehto	Phone: (208) 533-7319, (208) 533-7295
a.	Code name and version	MicroShield, Version 6
b.	Function of code	MicroShield is a photon/gamma ray shielding and dose assessment program used for designing shields, estimating source strength from radiation measurements, minimizing exposure to people, and teaching shielding principles.
c.	Application (what projects/facilities at the site/lab)	It is used for DTRA Training, source materials handling and HP field measurements.
d.	Code developer and/or sponsor	Grove Engineering 1700 Rockville Pike, Suite 525 Rockville, MD 20852 (301) 231-5137
e.	Commercial, Proprietary or Other	C; Individual User Licenses & Maintenance Agreements
f.	Current Owner/Vendor and technical support provider	Mike Lehto or Paul Hart. Technical support is included as part of maintenance agreement.
g.	Documentation available	Users Manual
h.	Code platform	PC-based
i.	Operating System	Windows XP, NT
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	R
k.	How are error and user questions reported?	A website exists for reporting software problems via e-mail; problems can also be reported by telephone.
k.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	

SQA/V&V: Performed by vendor, vendor QA program satisfies 10CFR50 App. B as well as ASME NQA 2a-1990, Part 2.7

Training: Attendance a formal course in addition to user manuals and tutorials.

Point of Contact: Roy Nelson		Phone: (208) 533-7576
a.	Code name and version	**HASS, Version 7.5**
b.	Function of code	HASS (**H**ydraulic **A**nalyzer of **S**prinkler **S**ystems) is used to determine water supply adequacy based on system demand and distribution piping, hydraulic analysis in accordance with NFPA 13, and calculation of any connection of nodes and pipes.
c.	Application (what projects/facilities at the site/lab)	ANL-W has a current maintenance agreement for this software. It is used for any new or to be modified ANL-W buildings.
d.	Code developer and/or sponsor	HRS Systems Inc. 4792 LaVista Rd Tucker, Georgia 30084
e.	**C**ommercial, **P**roprietary or **O**ther	C; Individual User Licenses & Maintenance Agreements
f.	Current Owner/Vendor and technical support provider	Roy Nelson. Technical support is included as part of maintenance agreement.
g.	Documentation available	Users Manual
h.	Code platform	PC-based
i.	Operating System	Windows XP, NT
j.	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O;)	O
k.	How are error and user questions reported?	A website exists for reporting software problems via e-mail; problems can also be reported by telephone.
k.	Comments on experience with this computer software, ease of application, documentation provided; known errors or issues	

SQA/V&V: The vendor has no specific SQA. Vendor provides comparisons with known calculations from previous versions and examples with NFPA 13.

Training: Self-taught; manuals and tutorials, University of Idaho classroom instruction.

National Nuclear Security Administration

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory

October 29, 2003

Mr. Phillip Hill
Acting Deputy Manager
Safety and Environmental Programs
U.S. Department of Energy
Livermore Site Office
P.O. Box 808, L-293
Livermore, CA 94551

Subject: LLNL Action Plans for DOE Software QA Implementation Plan

Reference   Letter from Phillip B. Hill to Dennis K. Fisher regarding "Recommendation 2002-1 Implementation Plan Commitment 4.2 3 2," dated October 8, 2003,

Dear Mr. Hill:

Attached is the LLNL Action Plan for QAIP 3.3 and SQAIP 4.2.1 5, 4.2.3.2, and 4.2.4.2. These plans have been coordinated with your staff. This Action Plan was developed using information provided by NNSA up to October 28, 2003. The NNSA is sponsoring a workshop on these and other commitments on November 13-14, 2003. Changes in the definitions or expectations of these action items coming out of that meeting may impact the stated commitments.

Sincerely,

Dennis K. Fisher
Associate Director
Safety and Environmental Protection

Attachments

cc   T. Larson
     J. Palmer
     H. Wong

DKF CY01 - 435

	Survey Form: Safety Design Software	
a	Code Name and Version	Hotspot Version 2.05
b	Area of Applicability (e g , structural, Fire protection)	Radioactive material dispersion code
c	Function of Code	Hotspot is used for safety-analysis of facilities handling nuclear material In addition, Hotspot provides emergency response personnel and emergency planners with a fast, field-portable set of software tools for evaluating incidents involving radioactive material
d	Application (what projects/facilities at site/lab)	Safety Analyses for LLNL and DOE facilities and Experiments LLNL Emergency Operations Center DOE RAP/RAPTOR programs
e	Code Developer and/or Sponsor	Steven Homann Lawrence Livermore National Laboratory - DOE
f	Commercial, Proprietary, or Other (Explain)	Other (DOE code)
g	Current Owner/Vendor	Lawrence Livermore National Laboratory - DOE
h	Technical Support Provider	Steven Homann Lawrence Livermore National Laboratory (925) 423-4962 shomann@llnl gov
i	Code Platform (Workstation,PC-based, Mainframe)	PC-based
j	Operating System	Windows 95/98/00/NT/XP OS
k	Frequency of Use (Routine, repeated use, code of choice-R; Occasional use – O)	R
l	Comments on experience with this computer software, ease of application, documentation provided, known errors or issues	Hotspot is used throughout the world Original software created in 1988 Program is very easy to run. Complete Hotspot documentation and user manual are contained within the run-time program (CD).
	Name and phone number of contact	Steven Homann, (925) 423-4962

Summary of Action Items

QA IP 3.3 NA will validate and verify that QA processes are effectively implemented for facility safety Due: December 31, 2003

LLNL proposes that a combination of the previous assessments, such as the Best Practices Assessment conducted in the summer of 2001, the ARO assessment of Configuration Management conducted in the Spring of 2003, various trip reports of the DNFSB Staff and other assessment processes provide a credible case that current processes are effective. These assessments looked at a variety of systems and processes and in the aggregate will be used to provide a summary overview of the application of QA practices to safety systems.

4.2.1.5. Survey of candidate design codes for toolbox. Due October 31, 2003 .

LLNL proposes Hotspot v 2.05 for inclusion into the tool box. The questionnaire is attached. LLNL is not currently funded nor tasked to validate this code.

Recommendation. DOE should establish a criteria for and a process of how codes will be qualified to be placed in the tool box. This would help the sites in making a decision on what codes be nominated for the tool box.

The assessments for 4.2 3 2, and 4.2.4.2. will be conducted together. The emphasis will be on identifying requirements and their implementation. Currently, the LLNL Work Smart Standards Set does not include software QA standards Therefore, it is expected that many of attributes defined in the CRADs will not have been formally or consistently applied. In conducting the assessment the following protocols will be followed, Where a requirement can be identified, its implementation will be verified by looking at recent activities Where a requirement does not exist or has only recently been identified, it will be assumed that the requirement has not been implemented and evidence of implementation will not be sought

This assessment will be applied site wide to both NA and EM facilities.

4 2.3.2 Establish a schedule to identify, select and assess safety system software and firmware in defense nuclear facilities Due: October 29, 2003

LLNL proposes that safety system software and firmware be identified by January 31, 2004, systems to be assessed be selected by April 30, 2004 and the assessment will take place in the spring and early summer of 2004. This assessment will be coordinated with 4 2 4.2, below

4 2.4 2. Establish a schedule to complete the assessment of the processes in place to ensure that safety software currently used to support analysis and design is adequate. Due: October 29, 2003

This is an assessment of the QA processes used to develop and support software, not a code by code review. This assessment will be coordinated with 4.2.3.2, above.

This assessment will review facility related safety software and will not include weapons design codes

National Nuclear Security Administration

Los Alamos National Laboratory

LOS ALAMOS NATIONAL LABORATORY: Design and Analysis Code Survey Data

A. SoftwareName/ Version	Sap2000, NL	ETABS, NL	SAFE
Area of Applicability	Structural	Structural	Structural-Slabs
B. Function of Code	Design and Analysis	Design and Analysis	Design and Analysis
C. Application	Documented Safety analysis, seismic analysis	Documented Safety analysis, seismic analysis	Documented Safety analysis, seismic analysis
D. Code Developer/Sponsor	Computers and Structures, Inc.	Computers and Structures, Inc.	Computers and Structures, Inc.
E. Commercial, Proprietary, or Other (explain)	Commercial	Commercial	Commercial
F. Current Owner/ Vendor and Technical Support Provider	LANL/CSI	LANL/CSI	LANL/CSI
G. Documentation Available	CSI	CSI	CSI
H. Code Platform (Workstation, PC-based, Mainframe)	PC	PC	PC
I. Operating System (Windows, DOS, Other)	Windows	Windows	Windows
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	R	R
K. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	Easy to use, support from provider is difficult	Easy to use, support from provider is difficult	Easy to use, support from provider is difficult
name and phone number of contact	Mike Salmon, 5-7244	Mike Salmon, 5-7244	Mike Salmon, 5-7244

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Design and Analysis Code Survey Data (Cont.)

A. SoftwareName/ Version	RISA-3d	MATHCAD	ABAQUS
Area of Applicability	Structural	All	Nonlinear Analysis
B. Function of Code	Analysis	Numerical Processing	Analysis
C. Application		All	DSA - Seismic Analysis
D. Code Developer/Sponsor		Mathsoft	HKS
E. Commercial, Proprietary, or Other (explain)		Commercial	Commercial
F. Current Owner/ Vendor and Technical Support Provider		LANL/Mathsoft	LANL/HKS
G. Documentation Available		Mathsoft + Users Forums	HKS
H. Code Platform (Workstation, PC-based, Mainframe)		PC	UNIX
I. Operating System (Windows, DOS, Other)		Windows	SGI/Unix
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)		R	O
K. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)		Easy to use, sufficient documentation	Difficult to use and learn, but very powerful
name and phone number of contact		Mike Salmon, 5-7244	Francisco Guerra, 7-2143

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Design and Analysis Code Survey Data (Cont.)

A. SoftwareName/ Version	SHAKE91	SASSI	BlastX
Area of Applicability	Site Response	Soil Structure Interaction	Structural Safety Analysis
B. Function of Code	Analysis	Analysis	Blast Analysis-BLASTX code calculates the propagation of blast shock waves and detonation product gases in multiroom structures. The code provides predictions of the pressure-time and temperature-time histories in these structures.
C. Application	Documented Safety analysis, seismic analysis	Documented Safety analysis, seismic analysis	DSA, Seismic Analysis
D. Code Developer/Sponsor	UC-Berkeley	UC-Berkeley	US Army - SAIC
E. Commercial, Proprietary, or Other (explain)			Commercial (although may not be supported by SAIC any longer)
F. Current Owner/ Vendor and Technical Support Provider	UC-Berkeley	UC-Berkeley	US Army - SAIC
G. Documentation Available	none (TWHouston)	none (TWHouston)	SAIC
H. Code Platform (Workstation, PC-based, Mainframe)	UNIX,PC,Linux	UNIX,PC,Linux	PC
I. Operating System (Windows, DOS, Other)	Windows/Unix	Windows/Unix	Windows DOS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	O	O	O
K. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	Easy to use, sufficient documentation	Moderately easy to use and learn. Interpretation of results requires experience	Easy to use, sufficient documentation
name and phone number of contact	Tom Houston, 5-7244	Tom Houston, 5-7244	I. Cuesta, 5-1911

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Design and Analysis Code Survey Data (Cont.)

A. SoftwareName/ Version	PSADS	MASS	SQL LIMS Version 3.1
Area of Applicability	Structural	Calculating MAR (materials at risk) Authorization Basis	Authorization Basis MAR Limits
B. Function of Code	Blast Design	System of record for tracking nuclear material and reporting inventory and transactions to NMMSS	Inventory and track MAR
C. Application	DSA	LANL Wide	CMR facility-wide
D. Code Developer/Sponsor	US Army	Fermin Kelso	Marie J. De La Torre / Bryan Omalley
E. Commercial, Proprietary, or Other (explain)		Proprietary	Commercial with proprietary enhancements
F. Current Owner/ Vendor and Technical Support Provider	US Army	LANL NMT-3	Applied Bio Systems
G. Documentation Available		LANL NMT-3	Applied Bio Systems
H. Code Platform (Workstation, PC-based, Mainframe)	PC	Mainframe	Mainframe
I. Operating System (Windows, DOS, Other)	Windows	Guardian OS	VMS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	O	R	R
K. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	Moderately easy to use and learn.	none	none
name and phone number of contact	I. Cuesta, 5-1911	Michael Boor 5-1222	Bryan Omalley 5-1769

Design and Analysis Code Survey Data (Cont.)

A. SoftwareName/ Version	Transient Combustible Excel Spreadsheet Rev. 2.1	MAR_Summary032701 version 1.0.0.1	HASS
Area of Applicability	Fire Protection	Authorization Basis MAR Inventory	Fire Protection Automatic Sprinkler
B. Function of Code	To aid operators in the performance of transient combustible TSR surveillance calculations	To sum the MAR in the CMR Facility to aid in the performance of the MAR inventory TSR	Hydraulic Calculation of fire suppression systems per NFPA 13-16, 20 E.g. TA-3-29, TA-16-205/450, TA-55-4
C. Application	CMR facility-wide	CMR facility-wide	Applicable to any facility w/sprinkler or other water-based systems
D. Code Developer/Sponsor	Microsoft Excel	Chris McConaha NMT-3	Vendor
E. Commercial, Proprietary, or Other (explain)	Commercial and Proprietary	Proprietary	Commercial
F. Current Owner/ Vendor and Technical Support Provider	Microsoft Excel	NMT-3	See Below
G. Documentation Available	Ted Partch	NMT-3	Vendor
H. Code Platform (Workstation, PC-based, Mainframe)	PC-based	PC-based	PC
I. Operating System (Windows, DOS, Other)	MS Windows 200 Professional	Windows	Windows or DOS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	R	O
K. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	none	none	Commercially since 1976 Industry Standard, "Hydraulic Analyzer of Sprinkler Systems"
name and phone number of contact	Kenny Espinosa 5-5669	Chris McConaha 7-3528	ASA Tuten, 770-934-8423

Design and Analysis Code Survey Data (Cont.)

A. SoftwareName/ Version	CFAST/FAST 5.0.1 3.1.7, 2.0.1	CAMEOfm (May 02), ALOHA5.3.2 (March 00), MARPLOT 3.3	EPIcode 6.01 DOS 2.03 Windows
Area of Applicability	Safety Analysis and Fire Hazards Analysis	Safety Analysis Emergency Planning and Response	Safety Analysis Emergency Planning and Response
B. Function of Code	Accident Analysis, Fire growth and smoke transport	Chemical dispersion	Chemical release/Dispersion and Consequence
C. Application	DSA/JCO	DSA	DSA
D. Code Developer/Sponsor	National Institute of Standards and Technology (NIST)	EPA	Homann Associates
E. Commercial, Proprietary, or Other (explain)	Public Domain	Public Domain	Commercial
F. Current Owner/ Vendor and Technical Support Provider	US Commerce Department	EPA	Homann Associates
G. Documentation Available	NIST	EPA	Homann Associates
H. Code Platform (Workstation, PC-based, Mainframe)	PC 386 or higher	PC or Mac	PC
I. Operating System (Windows, DOS, Other)	DOS	Windows 95/98/00/NT/XP or Mac System 7.X	Windows or DOS
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R/O	R	R
K. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	moderate usage	none	none
name and phone number of contact	Ronald Eaton 7-8064, Eric Edmonds 7-6998	Eric Edmonds 7-6998	Eric Edmonds 7-6998

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Design and Analysis Code Survey Data (Cont.)

A. SoftwareName/ Version	MACCS2	GENII 2	MELCOR
Area of Applicability	Nuclear Facility Safety Analysis and environmental impact statements	Safety Analysis and EM&R	Leakpath Factor
B. Function of Code	Radionuclide dispersion	Radionuclide dispersion	
C. Application	DSA	DSA	
D. Code Developer/Sponsor	SNL (MACCS2)	Pacific Northwest National Laboratory (PNNL)	
E. Commercial, Proprietary, or Other (explain)	Public Domain	Public Domain	
F. Current Owner/ Vendor and Technical Support Provider	NRC	EPA	
G. Documentation Available	NRC via SNL	EPA	
H. Code Platform (Workstation, PC-based, Mainframe)	PC	PC	
I. Operating System (Windows, DOS, Other)	DOS	Windows 95/98/00/NT	
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	O	
K. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	none	none	
name and phone number of contact	Eric Edmonds 7-6998	Eric Edmonds 7-6998	Eric Edmonds 7-6998

Design and Analysis Code Survey Data (Cont.)

A. SoftwareName/ Version	MCNPx	MCNP-4C	FDS2
Area of Applicability	Neutronics (and other particle) design and analysis	Design and Analysis of Neutronic Systems, Neutron Transport Calculations	
B. Function of Code.	Monte Carlo radiation transport	Design and Analysis, solves the Boltzmann neutron transport equation	Accident Analysis
C. Application	See Detail Below: (A)	Used for accident analysis	DSA/JCO
D. Code Developer/Sponsor	Many. Primarily AFCI, also various N, ISR, LANSCE, NASA, outside contractors, others.	X-Division, LANL	
E. Commercial, Proprietary, or Other (explain)	Proprietary	Proprietary	
F. Current Owner/ Vendor and Technical Support Provider	LANL D-5	LANL	
G. Documentation Available	LANL	LANL	
H. Code Platform (Workstation, PC-based, Mainframe)	all unix , PC windows, Mac G5, and we are adding new platforms all the time	UNIX TRUE 264, PC	
I. Operating System (Windows, DOS, Other)	Unix , windows, Mac OS	Unix, Windows NT/2000	
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	The code was used extensively during the preparation of the TA-18 BIO, used extensively elsewhere.	
K. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	MCNPX currently released version at RSICC 2.4.0 (a new version, 2.5.0 will be released to RSICC probably in January. we teach 5-day classes (298 people trained since August 2001). program.	At our site, we use MCNP on a daily basis t odesign critical experiments. Tehere are many publications that appropriately advise the users on how to use the MCNP code.	
name and phone number of contact	Laurie Waters 5-4127	Rene Sanchez 662-7282	Ronald Eaton 7-8064

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Design and Analysis Code Survey Data (Cont.)

A. SoftwareName/ Version	POSTMAX 2	SeaTREE	Explosive Release Atmospheric Dispersion (ERAD) 3.2 (Windows) or 3.1 (UNIX
Area of Applicability	Nuclear Facility Safety Analysis and Emergency Response Impact Statements		Selected Safety Analysis
B. Function of Code	Radionuclide dispersion Accident Analysis	Accident Analysis	The ERAD model is a three-dimensional numerical simulation of particle dispersion in the atmosphere. The model was developed to provide realtime predictions of the near-filed radiological hazards which would result from an explosive release of hazardous material.
C. Application	DSA/JCO	DSA/JCO	DSA
D. Code Developer/Sponsor	LANL (POSTMAX)		Bruce Boughton Sandia National Laboratory Albuquerque, New Mexico 87185 babough@sandia.gov
E. Commercial, Proprietary, or Other (explain)	Public Domain		Public Domain
F. Current Owner/ Vendor and Technical Support Provider	LANL		DOE
G. Documentation Available	LANL		SNL via NMSU Kerry Alt (505)646-3645 ERAD_support @cs.nmsu.edu
H. Code Platform (Workstation, PC-based, Mainframe)	PC		PC or UNIX SPARCstation 10 or better
I. Operating System (Windows, DOS, Other)	DOS		Windows 95 or NT 4.X Solaris 2.6 (UNIX)
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R		O

Design and Analysis Code Survey Data (Cont.)

A. SoftwareName/ Version	POSTMAX 2 (cont.)	SeaTREE (cont.)	Explosive Release Atmospheric Dispersion (ERAD) 3.2 (Windows) or 3.1 (UNIX) (cont.)
K. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	none		none
name and phone number of contact	Eric Edmonds 7-6998	Ronald Eaton 7-8064	Eric Edmonds 7-6998

Design and Analysis Code Survey Data (Cont.)

A. SoftwareName/ Version	HOTSPOT 2.05	Autodesk - Autocad	AutoPipe Plus 6.3
Area of Applicability	Safety Analysis and EM&R	Mechanical Engineering	Mechanical Pipe-Stress
B. Function of Code	Radionuclide dispersion		Pipe stress analysis, hanger design stress
C. Application	DSA	HVAC	Dynamic pipe fitting stress for any piping project
D. Code Developer/Sponsor	Pacific Northwest National Laboratory (PNNL)	NA	AutoPIPE
E. Commercial, Proprietary, or Other (explain)	Public Domain	Commercial	Commercial
F. Current Owner/ Vendor and Technical Support Provider	EPA	NA	LANL (one seat)
G. Documentation Available	EPA	Marisa Gallegos	Bentley Systems
H. Code Platform (Workstation, PC-based, Mainframe)	PC	PC	PC
I. Operating System (Windows, DOS, Other)	Windows 95/98/00/NT	Windows XP	Windows
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	O	O	O
K. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	none	Powerful bur not intuitive	I have used many stress analysis programs. This is the best choice.
name and phone number of contact	Eric Edmonds 7-6998	L. Bornstein 7-4104	Doug Bailey 7-9870

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Design and Analysis Code Survey Data (Cont.)

A. SoftwareName/ Version	AFT Fathom 5.0	COSMOS/M 2.6	ANSYS V7.1
Area of Applicability	Mechanical Pipe-Flow	Structural Mechanical	Structural (Static Dynamic Thermal)
B. Function of Code	Pipe flow analysis modeling, incompressible flow	Finite Element analysis, analytical solutions	Finite Element Analysis
C. Application	Any liquid flow modeling at any sie	TA-55 Glove box systems	SHEBA CAV, misc support structures, exp. Hardware
D. Code Developer/Sponsor	Applied Flow Technology	Structural Research and Analysis Corp.	ANSYS, Inc.
E. Commercial, Proprietary, or Other (explain)	Commercial	Commercial	Commercial
F. Current Owner/ Vendor and Technical Support Provider	LANL (one sat)	Curtis Sandoval	Eric Sorensen
G. Documentation Available	Applied Flow Technology	Sunwest Cad, Albuquerque, NM	ANSYS, Inc.
H. Code Platform (Workstation, PC-based, Mainframe)	PC	PC	PC
I. Operating System (Windows, DOS, Other)	Windows	Windows NT	Windows NT/2000
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	R	O	O
K. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	Mechanical Engineering rated this program the best pipe flow analysis system available. I have used others and I agree that this is the best.	Recommended	Excellent
name and phone number of contact	Doug Bailey 7-9870	Curtis Sandoval 7-7920	Eric Sorensen 5-3630

Design and Analysis Code Survey Data (Cont.)

A. SoftwareName/ Version	DESIRE 2000	DANTSYS	SANET
Area of Applicability	Differential Equations Solver	Neutron Transport Calculations	
B. Function of Code	Code solves coupled point kinetics and heat transfer differential equations	Code solves the Boltzmann neutron transport equation using the discrete-ordinates technique	Accident Analysis
C. Application	Used for accident analyses in nuclear facilities	Used for accident analysis in nuclear facilities	DSA/JCO
D. Code Developer/Sponsor	G.A. and T. M. Korn Industrai lConsultants	LANL	
E. Commercial, Proprietary, or Other (explain)	Commercial		
F. Current Owner/ Vendor and Technical Support Provider	LANL	LANL	
G. Documentation Available	G.A. and T. M. Korn Industrai lConsultants	LANL	
H. Code Platform (Workstation, PC-based, Mainframe)	PC	UNIX TRUE 264, PC	
I. Operating System (Windows, DOS, Other)	Windows 3.1, 95, NT	Unix	
J. Frequency of Use (Routine, repeated use, code of choice - R; Occasional Use - O;)	The code was used extensively during the preparation of the TA-18 BIO	The code was used extensively during the preparation of the TA-18 BIO	
K. Comments (on experience with this computer software, ease of application, documentation provided; known errors or issues)	At our site, we use DESIRE to understand the dynamic behavior of critical experiments in the event of an accident due to miss loading the assembly or an anticipated insertion of reactivity without SCRAM. In addition, there is a comprehensive manual that explains the main features of the code.	At our site, we use DANTSYS on a daily basis t odesign critical experiments and compare its results t othose obtained with MCNP. In addition, there are many publicaions that appropriately advise the users on how to use the DANTSYS codes.	
name and phone number of contact	Rene Sanchez 662-7282	Rene Sanchez 662-7282	Ronald Eaton 7-8064

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National Nuclear Security Administration

Pantex Plant

United States Government	Department of Energy

memorandum

National Nuclear Security Administration
Pantex Site Office

DATE: NOV 1 4 2003

REPLY TO
ATTN OF: AMOA:PXSO:KEW

SUBJECT: Design Code Survey

TO: Everet H. Beckner, Deputy Administrator, Defense Programs, NA-10/FORS

REFERENCE: HQ Memorandum *Survey of Design Codes Currently in Use*, Cook/Beckner, dated September 12, 2003

This is being provided in response to the reference memorandum. Any questions may

be directed to Mark Blackburn at (806) 477-3123.

Karl E. Waltzer
Assistant Manager for
Oversight & Assessments

Attachment

cc w/attachment:
X. Ascanio, NA-124/GTN
R. Singh, NA-124/GTN

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S: AMOA/2003memos/14451

Survey Form: Safety Design Software	
a Code Name & Version	SOURCES-4C: Code System for Calculating alpha, n; Spontaneous Fission; and Delayed Neutron Sources and Spectra.
b Area of Applicability (e.g., structural, fire protection)	The nuclear criticality safety of fissile materials.
c Function of Code	**Function:** SOURCES-4C is a code system that determines neutron production rates and spectra from alpha, n reactions; spontaneous fission; and delayed neutron emission due to radionuclide decay.
d Application (what projects/facilities at the Site/Lab	SOURCES-4C is used to analyze the nuclear criticality safety of fissile materials (pits, secondaries, & radioisotopic thermoelectric generators (RTGs)) in storage vaults, weapon assembly/disassembly operations (Bays & Cells), and SNM characterization/requalification facilities.
e Code Developer and/or Sponsor	**Code developer:** Los Alamos National Laboratory (LANL) **Code distributor:** Radiation Safety Information Computational Center (RSICC).
f Commercial, Proprietary, or Other (explain)	**Other:** SOURCES-4C was prepared by the Regents of the University of California at Los Alamos National Laboratory under contract number W-7405-ENG-36 for the U.S. Department of Energy (DOE). The University retains rights in the SOURCES-4C program therefore, SOURCES-4C is restricted from distribution to third-parties without a license. SOURCES-4C is further restricted from distribution for Anti-terrorism (AT) purposes by the U.S. Department of Commerce Title 15 Commerce and Foreign Trade, Chapter VII B Bureau of Export Administration, Parts 730-774, Commerce Control List as OD999 Specific Software.
g Current Owner/Vendor	**Distributor:** Radiation Safety Information Computational Center (RSICC) http://www-rsicc.ornl.gov/rsicc.html .
h Technical Support Provider	See user manual LA-UR-02-1617.
i Code Platform (Workstation, PC-Based, Mainframe)	**Code:** Fortran 77 **Platform:** PC and Workstation
j Operating System	Windows 2000 on PC platform.
k Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O)	Routine (R) use is expected in FY05 because SOURCES-4C will become a essential element of characterizing the response of fissile materials at Pantex Plant.
l Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	The SOURCES-4C software manual are comprehensive in identifying all the functional requirements and features of the code.
Name and phone number of contact: Roy R. Hedtke, 806-477-6295 Linda Vickers, 806-477-6617	

	Survey Form:	Safety Design Software	
a	Code Name & Version	TWODANT: A two-dimensional (2D), multigroup, discrete-ordinates transport code system.	
b	Area of Applicability (e.g., structural, fire protection)	The nuclear criticality safety of fissile materials.	
c	Function of Code	**Function:** TWODANT is a cursory tool used to calculate the k-eff of fissile systems. **Nature of Problem Solved:** It is a modular computer program designed to solve the two-dimensional, time-independent, multigroup discrete-ordinates form of the Boltzmann transport equation. **Method of Solution:** TWODANT uses the discrete ordinates approximation for treating the angular variation of the particle distributions. The diamond difference scheme is used for phase space discretization. In TWODANT, there is an option to use the adaptive weighted diamond method. Both inner and outer iterations are accelerated using the diffusion synthetic acceleration method.	
d	Application (what projects/facilities at the Site/Lab)	TWODANT is used to provide a cursory evaluation of the nuclear criticality safety of fissile materials (pits, secondaries, & radioisotopic thermoelectric generators (RTGs)) in storage vaults, weapon assembly/disassembly operations (Bays & Cells), and SNM characterization/requalification facilities.	
e	Code Developer and/or Sponsor	Code developer: Los Alamos National Laboratory (LANL) Code distributor: Radiation Safety Information Computational Center (RSICC).	
f	Commercial, Proprietary, or Other (explain)	Other: TWODANT was prepared by Los Alamos National Laboratory (LANL). It is restricted from distribution to third-parties without a license. TWODANT is further restricted from distribution for Anti-terrorism (AT) purposes by the U.S. Department of Commerce Title 15 Commerce and Foreign Trade, Chapter VII B Bureau of Export Administration, Parts 730-774, Commerce Control List as OD999 Specific Software.	
g	Current Owner/Vendor	Distributor: Radiation Safety Information Computational Center (RSICC) http://www-rsicc.orni.gov/rsicc.html .	
h	Technical Support Provider	Users can receive technical support via email: xtmsn@lanl.gov .	
i	Code Platform (Workstation, PC-based, Mainframe)	Code: Fortran 77 (99.9%) and C (0.1%). Platform: PC and Workstation	
j	Operating System	Windows 2000 on PC platform.	
k	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O)	Frequency will be Routine upon validation and verification (V&V) of the code. Currently, TWODANT has not been V&V'd for use at Pantex Plant.	
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	User's experience is limited to hands-on experience. The user has easily set-up DANTSYS input decks and viewed the geometry. The tutorial manual is comprehensive and easy to use.	
Name and phone number of contact: Roy R. Hedtke, 806-477-6295 Linda Vickers, 806-477-6617			

Potential Software for DOE "Toolbox"

	Survey Form: Safety Design Software	
a	Code Name & Version	MACCS2
b	Area of Applicability (e.g., structural, fire protection)	Consequence Assessment
c	Function of Code	Radiological Dispersion Calculation
d	Application (what projects/facilities at the Site/Lab	Nuclear Explosives Safety Calculations Authorization Basis Emergency Planning and Emergency Response
e	Code Developer and/or Sponsor	SNL (developer)/US NRC (sponsor)
f	Commercial, Proprietary, or Other (explain)	Government Owned
g	Current Owner/Vendor	Radiation Safety Information Computational Center (RSICC) @ ORNL or SNL
h	Technical Support Provider	RSICC/SNL
i	Code Platform (Workstation, PC-based, Mainframe)	PC-based
j	Operating System	DOS
k	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O)	R
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	
Name and phone number of contact: Erik Eifert, x3549		

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Survey Form:	Safety Design Software	
a	Code Name & Version	MELCOR
b	Area of Applicability (e.g., structural, fire protection)	Material Transport in Facility
c	Function of Code	Material Transport in Facility
d	Application (what projects/facilities at the Site/Lab	Nuclear Explosives Safety Calculations Authorization Basis
e	Code Developer and/or Sponsor	SNL (developer)/US NRC (sponsor)
f	Commercial, Proprietary, or Other (explain)	Government Owned
g	Current Owner/Vendor	Radiation Safety Information Computational Center (RSICC) @ ORNL or SNL
h	Technical Support Provider	RSICC/SNL
i	Code Platform (Workstation, PC-based, Mainframe)	PC-based
j	Operating System	DOS
k	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O)	R
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	
Name and phone number of contact: Erik Eifert, x3549		

Survey Form: Safety Design Software		
a	Code Name & Version	ERAD
b	Area of Applicability (e.g., structural, fire protection)	Consequence Assessment
c	Function of Code	Radiological Dispersion Calculation
d	Application (what projects/facilities at the Site/Lab	Nuclear Explosives Safety Calculations Authorization Basis
e	Code Developer and/or Sponsor	SNL
f	Commercial, Proprietary, or Other (explain)	Government Owned
g	Current Owner/Vendor	Bruce Boughton Sandia National Laboratory Albuquerque, NM 87185 505-844-8545
h	Technical Support Provider	Bruce Boughton Sandia National Laboratory Albuquerque, NM 87185 505-844-8545
i	Code Platform (Workstation, PC-based, Mainframe)	PC-based
j	Operating System	Windows
k	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O)	R
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	
Name and phone number of contact: Erik Eifert, x3549		

Survey Form: Safety Design Software	
a	Code Name and Version	HotSpot Version 2.0
b	Area of Applicability (e.g., structural, fire protection)	Consequence Assessment
c	Function of Code	Radiological Dispersion Calculation
d	Application (what projects/facilities at the site/lab)	Emergency Planning Emergency Response Authorization Basis Nuclear Explosives Safety Studies
e	Code Developer and/or Sponsor	Steven G. Homann LLNL
f	Commercial, Proprietary, or Other (Explain)	Government Owned
g	Current Owner/Vendor	LLNL
h	Technical Support Provider	www.llnl.gov/nai/technologies/hotspot
i	Code Platform (Workstation, PC-based, Mainframe)	PC
j	Operating System	The Hotspot codes have been developed for the Windows, 95/98/00/NT/XP operating systems
k	Frequency of Use (Routine, repeated use, code of choice - R; Occasional use - O)	Routine
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	Easy to use, the only Tritium codes used.
Name and phone number of contact: - At Pantex: Charles Rives x-5959	

Survey Form: Safety Design Software	
a Code Name and Version	EPIcode Version 2.03
b Area of Applicability (e.g., structural, fire protection)	Consequence Assessment
c Function of Code	Chemical Dispersion Modeling
d Application (what projects/facilities at the site/lab)	Emergency Planning Emergency Response Authorization Basis Nuclear Explosives Safety Studies
e Code Developer and/or Sponsor	Homann & Associates (510)490-6379
f Commercial, Proprietary, or Other (Explain)	Commercial
g Current Owner/Vendor	Homann & Associates
h Technical Support Provider	Homann & Associates
i Code Platform (Workstation, PC-based, Mainframe)	PC
j Operating System	The Hotspot codes have been developed for the Windows, 95/98/00/NT/XP operating systems
k Frequency of Use (Routine, repeated use, code of choice - R; Occasional use - O)	R
l Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	EPI Code performs automated dispersion calculations using algorithms published in US EPA documents. No "black box" methods are included in EPI Code
Name and phone number of contact: At Pantex: Charles Rives x-5959	

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Survey Form:	Safety Design Software	
a	Code Name and Version	ALOHA 5.2.3.
b	Area of Applicability (e.g., structural, fire protection)	Consequence Assessment
c	Function of Code	Chemical Dispersion Modeling
d	Application (what projects/facilities at the site/lab)	Emergency Planning Emergency Response Authorization Basis Nuclear Explosives Safety Studies
e	Code Developer and/or Sponsor	U.S. Department of Commerce • National Oceanic and Atmospheric Administration • NOAA's National Ocean Service
f	Commercial, Proprietary, or Other (Explain)	Government
g	Current Owner/Vendor	U.S. Department of Commerce • National Oceanic and Atmospheric Administration • NOAA's National Ocean Service
h	Technical Support Provider	www.epa.gov/ceppo/cameo/aloha.htm . For additional information: visit www.response.restoration.noaa.gov/cameo/aloha.html e-mail orr.cameo@noaa.gov call 206/526-6317.
i	Code Platform (Workstation, PC-based, Mainframe)	PC
j	Operating System	ALOHA runs on Apple Macintosh computers and in Microsoft Windows 95, 98, NT, or 2000.
k	Frequency of Use (Routine, repeated use, code of choice - R; Occasional use - O)	R
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	
Name and phone number of contact: At Pantex: Charles Rives x-5959		

Survey Form: Safety Design Software	
a Code Name and Version	NARAC.
b Area of Applicability (e.g., structural, fire protection)	Consequence Assessment
c Function of Code	Chemical and Radiological Dispersion Modeling
d Application (what projects/facilities at the site/lab)	Emergency Planning Emergency Response
e Code Developer and/or Sponsor	LLNL
f Commercial, Proprietary, or Other (Explain)	Proprietary to LLNL
g Current Owner/Vendor	LLNL
h Technical Support Provider	For software technical support, please contact: NARAC Customer Support Phone: 925-422-9159 Hours: 7:30am - 4:15pm Pacific Time Monday - Friday, except holidays E-mail: narac@llnl.gov
i Code Platform (Workstation, PC-based, Mainframe)	Internet Based – Runs on a mainframe at LLNL via internet
j Operating System	Internet Based – Runs on a mainframe at LLNL via internet
k Frequency of Use (Routine, repeated use, code of choice - R; Occasional use - O)	O
l Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	
Name and phone number of contact: At Pantex, David Griffis x-4426	

Survey Form:	Safety Design Software	
a	Code Name and Version	Trace 700 Version 4.0
b	Area of Applicability (e.g., structural, fire protection)	Mechanical – HVAC (Heating Ventilation and Air Conditioning)
c	Function of Code	Calculate HVAC loads for system evaluation, sizing and design - perform life cycle cost and energy analysis
d	Application (what projects/facilities at the site/lab)	All facilities
e	Code Developer and/or Sponsor	Trane Company
f	Commercial, Proprietary, or Other (Explain)	Commercial
g	Current Owner/Vendor	Mechanical Design Group – Capital and Expense Projects Division
h	Technical Support Provider	Trane Company
i	Code Platform (Workstation, PC-based, Mainframe)	PC-based
j	Operating System	Windows
k	Frequency of Use (Routine, repeated use, code of choice - R; Occasional use - O)	O
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	Extensive training has been provided to users. Software is fairly user friendly. Adequate documentation has been provided and there are no known errors or issues.
Name and phone number of contact: Courtney Olson, 806-477-6578		

Survey Form: Safety Design Software	
a	Code Name and Version	BlastX Version 4.2
b	Area of Applicability (e.g., structural, fire protection)	Structural – Blast load prediction
c	Function of Code	Calculate blast load overpressures and time history
d	Application (what projects/facilities at the site/lab)	Used on any project where explosives operations are proposed. Basis for Cell facility dispersion analysis.
e	Code Developer and/or Sponsor	US Army Corps of Engineers, Engineer Research and Development Center
f	Commercial, Proprietary, or Other (Explain)	Other – distribution available to US Government agencies and their contractors
g	Current Owner/Vendor	Civil Design Group – Capital and Expense Projects Division
h	Technical Support Provider	US Army Corps of Engineers, Engineer Research and Development Center
i	Code Platform (Workstation, PC-based, Mainframe)	PC-based
j	Operating System	Windows – Compatible with Windows 95, 98, NT, and 2000
k	Frequency of Use (Routine, repeated use, code of choice - R; Occasional use - O)	O
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	Software is documented and easy to use. Adequate documentation has been provided and there are no known errors or issues.

Name and phone number of contact: Doug Kaczmarek, 806-477-4905

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Survey Form: Safety Design Software		
a	Code Name and Version	HASS
b	Area of Applicability (e.g., structural, fire protection)	Fire Protection
c	Function of Code	Hydraulic calculations for fire protection systems
d	Application (what projects/facilities at the site/lab)	All
e	Code Developer and/or Sponsor	HRS Systems
f	Commercial, Proprietary, or Other (Explain)	Commercial
g	Current Owner/Vendor	Infrastructure Controls
h	Technical Support Provider	HRS Systems
i	Code Platform (Workstation, PC-based, Mainframe)	PC-based
j	Operating System	Windows
k	Frequency of Use (Routine, repeated use, code of choice - R; Occasional use - O)	O
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	No known errors. The computer software is easy to use and well documented.
Name and phone number of contact: Robert Calzareta, 806-477-6998		

Survey Form: Safety Design Software		
a	Code Name and Version	SKM Power Tools
b	Area of Applicability (e.g., structural, fire protection)	Electrical design
c	Function of Code	Short circuit, ground fault, and coordination calculations
d	Application (what projects/facilities at the site/lab)	Analysis of electrical distribution systems
e	Code Developer and/or Sponsor	SKM
f	Commercial, Proprietary, or Other (Explain)	Commercial
g	Current Owner/Vendor	Electrical Design Group - CEPD
h	Technical Support Provider	SKM
i	Code Platform (Workstation, PC-based, Mainframe)	PC based
j	Operating System	Windows
k	Frequency of Use (Routine, repeated use, code of choice - R; Occasional use - O)	Anticipated frequent use
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	Recently purchased. Undergoing training and documentation appears to be adequate.
Name and phone number of contact: Dale Moon, 806-477-7070		

Survey Form: Safety Design Software	
a	Code Name and Version	STADD Pro - 2003
b	Area of Applicability (e.g., structural, fire protection)	Structural
c	Function of Code	Design of structural systems
d	Application (what projects/facilities at the site/lab)	Evaluation of structures, systems or components for seismic or wind loading
e	Code Developer and/or Sponsor	Research Engineers Inc.
f	Commercial, Proprietary, or Other (Explain)	Commercial
g	Current Owner/Vendor	CE Design Group - CEPD
h	Technical Support Provider	Research Engineers Inc.
i	Code Platform (Workstation, PC-based, Mainframe)	PC-based
j	Operating System	Windows
k	Frequency of Use (Routine, repeated use, code of choice - R; Occasional use - O)	O
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	Currently using NRC QC certified
Name and phone number of contact: Jeff Wang, 806-477-7242	

	Survey Form: Safety Design Software	
a	Code Name and Version	ANSYS 7.1 (Mechanical)
b	Area of Applicability (e.g., structural, fire protection)	Structural, Thermal, & Modal Finite Element Analysis.
c	Function of Code	Linear & Nonlinear Structural, Thermal, & Modal Analysis
d	Application (what projects/facilities at the site/lab)	Used to perform design safety analysis for special tooling.
e	Code Developer and/or Sponsor	Ansys Inc. http://www.ansys.com/
f	Commercial, Proprietary, or Other (Explain)	Commercial
g	Current Owner/Vendor	Ansys Inc. http://www.ansys.com/
h	Technical Support Provider	DRD Technology Corporation— (Tulsa, Oklahoma) http://www.drd.com/
i	Code Platform (Workstation, PC-based, Mainframe)	Workstation
j	Operating System	Microsoft Windows 2000 +
k	Frequency of Use (Routine, repeated use, code of choice - R; Occasional use - O)	Routine
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	- User's Experience is limited to Offsite training at DRD Technology Corporation. - Online Help Exists Thru The Ansys Customer portal: http://www.ansys.com/myansys/index.htm As well as electronic manual's loaded with the software. - Ansys Software Has: Formal commitment to the requirements given in the United States Nuclear Regulatory Commission's Rules and Regulations, Title 10, Chapter 1, Code of Federal Regulation, Part 50, Appendix B and applicable parts of NQA-1, Subpart 2.7, Quality Assurance Requirements for Computer Software Acceptance of provisions of Title 10, Chapter 1,Code of Federal Regulations, Part 21, titled "Reporting of Defects and Noncompliance's" for commercial grade items. Tracking of customer-reported errors in ANSYS (Which you can audit) Long-term storage of and access to quality records Expedited error reporting with certified mailing Certificates of Conformance provided with product Shipments. Per Ansys Quality Services Page: http://www.ansys.com/services/quality_assurance.htm
Name and phone number of contact: Richard L Ray, x 4665		

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Survey Form: Safety Design Software	
a	Code Name and Version	ANSYS 7.1 (Professional)
b	Area of Applicability (e.g., structural, fire protection)	Structural, Thermal, & Modal Finite Element Analysis.
c	Function of Code	Linear, Limited Nonlinear Structural, Thermal, & Modal Analysis.
d	Application (what projects/facilities at the site/lab)	Used to perform design safety analysis for special tooling.
e	Code Developer and/or Sponsor	Ansys Inc. http://www.ansys.com/
f	Commercial, Proprietary, or Other (Explain)	Commercial
g	Current Owner/Vendor	Ansys Inc. http://www.ansys.com/
h	Technical Support Provider	DRD Technology Corporation– (Tulsa, Oklahoma) http://www.drd.com/
i	Code Platform (Workstation, PC-based, Mainframe)	Workstation
j	Operating System	Microsoft Windows 2000 +
k	Frequency of Use (Routine, repeated use, code of choice - R; Occasional use - O)	Routine
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	- User's Experience is limited to Offsite training at DRD Technology Corporation. - Online Help Exists Thru The Ansys Customer portal: http://www.ansys.com/myansys/index.htm As well as electronic manual's loaded with the software. - Ansys Software Has: Formal commitment to the requirements given in the United States Nuclear Regulatory Commission's Rules and Regulations, Title 10, Chapter 1, Code of Federal Regulation, Part 50, Appendix B and applicable parts of NQA-1, Subpart 2.7, Quality Assurance Requirements for Computer Software Acceptance of provisions of Title 10, Chapter 1, Code of Federal Regulations, Part 21, titled "Reporting of Defects and Noncompliance's" for commercial grade items. Tracking of customer-reported errors in ANSYS (Which you can audit) Long-term storage of and access to quality records Expedited error reporting with certified mailing Certificates of Conformance provided with product Shipments. Per Ansys Quality Services Page: http://www.ansys.com/services/quality_assurance.htm
Name and phone number of contact: Richard L Ray, x 4665	

Survey Form: Safety Design Software	
a	Code Name and Version	ANSYS 7.1 (FLOTRAN)
b	Area of Applicability (e.g., structural, fire protection)	CFD (Computational Fluid Dynamics)
c	Function of Code	CFD (Computational Fluid Dynamics)
d	Application (what projects/facilities at the site/lab)	Used to perform design safety analysis for special tooling.
e	Code Developer and/or Sponsor	Ansys Inc. http://www.ansys.com/
f	Commercial, Proprietary, or Other (Explain)	Commercial
g	Current Owner/Vendor	Ansys Inc. http://www.ansys.com/
h	Technical Support Provider	DRD Technology Corporation-- (Tulsa, Oklahoma) http://www.drd.com/
i	Code Platform (Workstation, PC-based, Mainframe)	Workstation
j	Operating System	Microsoft Windows 2000 +
k	Frequency of Use (Routine, repeated use, code of choice - R; Occasional use - O)	Routine
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	- User's Experience is limited to Offsite training at DRD Technology Corporation. - Online Help Exists Thru The Ansys Customer portal: http://www.ansys.com/myansys/index.htm As well as electronic manual's loaded with the software. - Ansys Software Has: Formal commitment to the requirements given in the United States Nuclear Regulatory Commission's Rules and Regulations, Title 10, Chapter 1, Code of Federal Regulation, Part 50, Appendix B and applicable parts of NQA-1, Subpart 2.7, Quality Assurance Requirements for Computer Software Acceptance of provisions of Title 10, Chapter 1,Code of Federal Regulations, Part 21, titled "Reporting of Defects and Noncompliance's" for commercial grade items. Tracking of customer-reported errors in ANSYS (Which you can audit) Long-term storage of and access to quality records Expedited error reporting with certified mailing Certificates of Conformance provided with product Shipments. Per Ansys Quality Services Page: http://www.ansys.com/services/quality_assurance.htm
Name and phone number of contact: Richard L Ray, x 4665	

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Survey Form:	Safety Design Software	
a	Code Name and Version	MSC ADAMS 2003
b	Area of Applicability (e.g., structural, fire protection)	Dynamics Simulation
c	Function of Code	Dynamics Simulation
d	Application (what projects/facilities at the site/lab)	Used to perform design safety analysis and virtual tryouts for special tooling.
e	Code Developer and/or Sponsor	MSC Software Corporation http://www.mscsoftware.com/
f	Commercial, Proprietary, or Other (Explain)	Commercial
g	Current Owner/Vendor	MSC Software Corporation http://www.mscsoftware.com/
h	Technical Support Provider	MSC Software Corporation http://www.mscsoftware.com/
i	Code Platform (Workstation, PC-based, Mainframe)	Workstation
j	Operating System	Microsoft Windows 2000 +
k	Frequency of Use (Routine, repeated use, code of choice - R; Occasional use - O)	Routine
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	- User's Experience is limited to Offsite training at an MSC Training Facility. - Online Help Exists Thru The MSC's website: http://www.mscsoftware.com/support/prod_support/adams/?Q=135&Z=144&Y=174 As well as electronic manual's loaded with the software. - The MSC Software Quality Assurance Program covers all software related activities from specification through maintenance. As part of our commitment to quality, the MSC Software Quality Assurance Program complies With the applicable portions of Title 10, Code of Federal Regulations Part 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Title 10, Code of Federal Regulations, Part 21, Reporting of Safety Related Defects and Non-Compliances. Per MSC Quality Certification Page: http://www.mscsoftware.com/about/pdf/qa_statement.pdf
	Name and phone number of contact: Richard L Ray, x 4665	

	Survey Form: Safety Design Software	
a	Code Name and Version	MSC MARC 2003
b	Area of Applicability (e.g., structural, fire protection)	Structural, Thermal, Modal, & EM (ESD, Electromagnetic) Finite Element Analysis.
c	Function of Code	Linear & Nonlinear Structural, Thermal, Modal, & EM (ESD, Electromagnetic) Analysis.
d	Application (what projects/facilities at the site/lab)	Used to perform design safety analysis for special tooling.
e	Code Developer and/or Sponsor	MSC Software Corporation http://www.mscsoftware.com/
f	Commercial, Proprietary, or Other (Explain)	Commercial
g	Current Owner/Vendor	MSC Software Corporation http://www.mscsoftware.com/
h	Technical Support Provider	MSC Software Corporation http://www.mscsoftware.com/
i	Code Platform (Workstation, PC-based, Mainframe)	Workstation
j	Operating System	Microsoft Windows 2000 +
k	Frequency of Use (Routine, repeated use, code of choice - R; Occasional use - O)	Occasional
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	- User's Experience is limited to Offsite training at an MSC Training Facility. - Online Help Exists Thru The MSC's website: http://www.mscsoftware.com/support/prod_support/marc/?Q=135&Z=144&Y=173 As well as electronic manual's loaded with the software. - The MSC Software Quality Assurance Program covers all software related activities from specification through maintenance. As part of our commitment to quality, the MSC Software Quality Assurance Program complies With the applicable portions of Title 10, Code of Federal Regulations Part 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Title 10, Code of Federal Regulations, Part 21, Reporting of Safety Related Defects and Non-Compliances. Per MSC Quality Certification Page: http://www.mscsoftware.com/about/pdf/qa_statement.pdf
Name and phone number of contact: Richard L Ray, x 4665		

	Survey Form: Safety Design Software	
a	Code Name and Version	MSC Patran 2003
b	Area of Applicability (e.g., structural, fire protection)	FEA Pre & Post Processing
c	Function of Code	FEA Pre & Post Processing, Setup model and Review Results.
d	Application (what projects/facilities at the site/lab)	Used to perform design safety analysis and virtual tryouts for special tooling.
e	Code Developer and/or Sponsor	MSC Software Corporation http://www.mscsoftware.com/
f	Commercial, Proprietary, or Other (Explain)	Commercial
g	Current Owner/Vendor	MSC Software Corporation http://www.mscsoftware.com/
h	Technical Support Provider	MSC Software Corporation http://www.mscsoftware.com/
i	Code Platform (Workstation, PC-based, Mainframe)	Workstation
j	Operating System	Microsoft Windows 2000 +
k	Frequency of Use (Routine, repeated use, code of choice - R; Occasional use - O)	Occasional
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	- User's Experience is limited to Offsite training at an MSC Training Facility. - Online Help Exists Thru The MSC's website: http://www.mscsoftware.com/support/prod_support/patran/?Q=135&Z=144&Y=171 As well as electronic manual's loaded with the software. - The MSC Software Quality Assurance Program covers all software related activities from specification through maintenance. As part of our commitment to quality, the MSC Software Quality Assurance Program complies With the applicable portions of Title 10, Code of Federal Regulations Part 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Title 10, Code of Federal Regulations, Part 21, Reporting of Safety Related Defects and Non-Compliances. Per MSC Quality Certification Page: http://www.mscsoftware.com/about/pdf/qa_statement.pdf
	Name and phone number of contact: Richard L Ray, x 4665	

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Survey Form:	Safety Design Software	
a	Code Name and Version	MSC Dytran 2002
b	Area of Applicability (e.g., structural, fire protection)	Structural Analysis.
c	Function of Code	Crash Analysis
d	Application (what projects/facilities at the site/lab)	Used to perform design safety analysis for special tooling.
e	Code Developer and/or Sponsor	MSC Software Corporation http://www.mscsoftware.com/
f	Commercial, Proprietary, or Other (Explain)	Commercial
g	Current Owner/Vendor	MSC Software Corporation http://www.mscsoftware.com/
h	Technical Support Provider	MSC Software Corporation http://www.mscsoftware.com/
i	Code Platform (Workstation, PC-based, Mainframe)	Workstation
j	Operating System	Microsoft Windows 2000 +
k	Frequency of Use (Routine, repeated use, code of choice - R; Occasional use - O)	Occasional
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	- User's Experience is limited to Offsite training at an MSC Training Facility. - Online Help Exists Thru The MSC's website: http://www.mscsoftware.com/support/prod_sup port/dytran/?Q=135&Z=144&Y=175 As well as electronic manual's loaded with the software. - The MSC Software Quality Assurance Program covers all software related activities from specification through maintenance. As part of our commitment to quality, the MSC Software Quality Assurance Program complies With the applicable portions of Title 10, Code of Federal Regulations Part 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Title 10, Code of Federal Regulations, Part 21, Reporting of Safety Related Defects and Non-Compliances. Per MSC Quality Certification Page: http://www.mscsoftware.com/about/pdf/qa_statement.pdf
Name and phone number of contact: Richard L Ray, x 4665		

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	Survey Form:	Safety Design Software
a	Code Name and Version	MSC Nastran 2003
b	Area of Applicability (e.g., structural, fire protection)	Structural, Thermal, & Modal Finite Element Analysis.
c	Function of Code	Linear & Nonlinear Structural, Thermal, & Modal Analysis
d	Application (what projects/facilities at the site/lab)	Used to perform design safety analysis for special tooling.
e	Code Developer and/or Sponsor	MSC Software Corporation http://www.mscsoftware.com/
f	Commercial, Proprietary, or Other (Explain)	Commercial
g	Current Owner/Vendor	MSC Software Corporation http://www.mscsoftware.com/
h	Technical Support Provider	MSC Software Corporation http://www.mscsoftware.com/
i	Code Platform (Workstation, PC-based, Mainframe)	Workstation
j	Operating System	Microsoft Windows 2000 +
k	Frequency of Use (Routine, repeated use, code of choice - R; Occasional use - O)	Occasional
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	- User's Experience is limited to Offsite training at an MSC Training Facility. - Online Help Exists Thru The MSC's website: http://www.mscsoftware.com/support/prod_support/nastran/?Q=135&Z=144&Y=172 As well as electronic manual's loaded with the software. - The MSC Software Quality Assurance Program covers all software related activities from specification through maintenance. As part of our commitment to quality, the MSC Software Quality Assurance Program complies With the applicable portions of Title 10, Code of Federal Regulations Part 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Title 10, Code of Federal Regulations, Part 21, Reporting of Safety Related Defects and Non-Compliances. Per MSC Quality Certification Page: http://www.mscsoftware.com/about/pdf/qa_statement.pdf
Name and phone number of contact: Richard L Ray, x 4665		

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	Survey Form: Safety Design Software	
a	Code Name and Version	MSC Mvision
b	Area of Applicability (e.g., structural, fire protection)	Materials Database
c	Function of Code	Store and Allow Creation of Materials Data For Use in FEA and Hand Analysis.
d	Application (what projects/facilities at the site/lab)	Used to perform design safety analysis for special tooling.
e	Code Developer and/or Sponsor	MSC Software Corporation http://www.mscsoftware.com/
f	Commercial, Proprietary, or Other (Explain)	Commercial
g	Current Owner/Vendor	MSC Software Corporation http://www.mscsoftware.com/
h	Technical Support Provider	MSC Software Corporation http://www.mscsoftware.com/
i	Code Platform (Workstation, PC-based, Mainframe)	Workstation
j	Operating System	Microsoft Windows 2000 +
k	Frequency of Use (Routine, repeated use, code of choice - R; Occasional use - O)	Occasional
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	- User's Experience is limited to Offsite training at an MSC Training Facility. - Online Help Exists Thru The MSC's website: http://www.mscsoftware.com/support/prod_support/mvision/ As well as electronic manual's loaded with the software. - The MSC Software Quality Assurance Program covers all software related activities from specification through maintenance. As part of our commitment to quality, the MSC Software Quality Assurance Program complies With the applicable portions of Title 10, Code of Federal Regulations Part 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Title 10, Code of Federal Regulations, Part 21, Reporting of Safety Related Defects and Non-Compliances. Per MSC Quality Certification Page: http://www.mscsoftware.com/about/pdf/qa_statement.pdf
Name and phone number of contact: Richard L Ray, x 4665		

	Survey Form: Safety Design Software	
a	Code Name and Version	Pro-Engineer 2001
b	Area of Applicability (e.g., structural, fire protection)	Structural Design
c	Function of Code	3D Modeling of Special Tooling Designs.
d	Application (what projects/facilities at the site/lab)	Used to Design and Draft Special Tooling.
e	Code Developer and/or Sponsor	Parametric Technology Corporation http://www.ptc.com/
f	Commercial, Proprietary, or Other (Explain)	Commercial
g	Current Owner/Vendor	Parametric Technology Corporation http://www.ptc.com/
h	Technical Support Provider	Parametric Technology Corporation http://www.ptc.com/
i	Code Platform (Workstation, PC-based, Mainframe)	Workstation
j	Operating System	Microsoft Windows 2000 +
k	Frequency of Use (Routine, repeated use, code of choice - R; Occasional use - O)	Routine
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	- User's Experience is limited to Offsite training at a PTC or Equivalent Training Facility. - Online Help Exists Thru The PTC's website: http://www.ptc.com/support/support.htm As well as electronic manual's loaded with the software. This 3D modeling Package is already an NWC Standard
Name and phone number of contact: Richard L Ray, x 4665		

	Survey Form: Safety Design Software	
a	Code Name and Version	SAFER Version 2.02 (Safety Assessment for Explosives Risk)
b	Area of Applicability (e.g., structural, fire protection)	Explosion Risk Analysis
c	Function of Code	Explosion Risk Analysis
d	Application (what projects/facilities at the site/lab)	Used to assess the risk of explosions to onsite transportation at Pantex Plant
e	Code Developer and/or Sponsor	Developed by APT Research, Inc. Sponsors: DoD Explosives Safety Board, U.S. Army Technical Center for Explosives Safety, U.S. Naval Ordinance Command, U.S. Air Force Safety Center, and U.S. Marines Ammunition / EES.
f	Commercial, Proprietary, or Other (Explain)	Available with permission from DDESB and training provided by APT Research, Inc.
g	Current Owner/Vendor	Developed by APT Research, Inc. Sponsors: DoD Explosives Safety Board, U.S. Army Technical Center for Explosives Safety, U.S. Naval Ordinance Command, U.S. Air Force Safety Center, and U.S. Marines Ammunition / EES.
h	Technical Support Provider	APT Research, Inc.
i	Code Platform (Workstation, PC-based, Mainframe)	PC
j	Operating System	Microsoft Windows
k	Frequency of Use (Routine, repeated use, code of choice - R; Occasional use - O)	Occasional
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	SAFER is in a trial use period. Development is continuing.
Name and phone number of contact: Tom Forker, x6817		

Criticality Codes

Survey Form:	Safety Design Software	
a	Code Name & Version	VISUAL EDITOR: Three-Dimensional Geometry Visualization Code System.
b	Area of Applicability (e.g., structural, fire protection)	VISUAL EDITOR is used to display 3-dimensional (3D) interactive visual graphics of fissile material systems for Nuclear Criticality Safety (NCS) purposes.
c	Function of Code	Function: VISUAL EDITOR is an interactive, 3D, geometry modeling code primarily for use with MCNP.
d	Application (what projects/facilities at the Site/Lab	VISUAL EDITOR is used to visually display 3D computer models of fissile materials (pits, secondaries, & radioisotopic thermoelectric generators (RTGs)) in storage vaults, weapon assembly/disassembly operations (Bays & Cells), and SNM characterization/requalification facilities.
e	Code Developer and/or Sponsor	Code developer: Visual Editor Consultants Code distributor: Radiation Safety Information Computational Center (RSICC): http://www-rsicc.ornl.gov/rsicc.html .
f	Commercial, Proprietary, or Other (explain)	Other: VISUAL EDITOR is packaged with MCNP Version 5.
g	Current Owner/Vendor	Distributor: Radiation Safety Information Computational Center (RSICC) http://www-rsicc.ornl.gov/rsicc.html .
h	Technical Support Provider	Users can receive technical support via email: http://www.mcnpvised.com
i	Code Platform (Workstation, PC-based, Mainframe)	Code: Visual C++ Platform: PC
j	Operating System	Windows 2000 on PC platform.
k	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O)	Frequency will be Routine use with MCNP.
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	User experience is cursory until proficiency is achieved by continuous use. Known errors are published in the manual and listed on the internet at URL: http://www.mcnpvised.com .
Name and phone number of contact: Roy R. Hedtke, 806-477-6295 Linda Vickers, 806-477-6617		

Survey Form:	Safety Design Software	
a	Code Name & Version	KENO V.a module of SCALE 4.4a "Modular Code System for Performing Criticality and Shielding Assessment for Licensing Evaluation".
b	Area of Applicability (e.g., structural, fire protection)	The nuclear criticality safety of fissile materials.
c	Function of Code	Function: KENO V.A is used to calculate the k-eff for fissile systems. Nature of Problem Solved: It is a multi-group Monte Carlo code used to determine k-eff for fissile systems. Method of Solution: The user prepares a single set of input for the criticality module (KENO V.a) of SCALE 4.4a. The input is in terms of easily visualized engineering parameters specified in a simplified, free-form format. The input file is executed via the analytic sequence (CSAS).
d	Application (what projects/facilities at the Site/Lab	KENO V.A is used to analyze the nuclear criticality safety of fissile materials (pits, secondaries, & radioisotopic thermoelectric generators (RTGs)) in storage vaults, weapon assembly/disassembly operations (Bays & Cells), and SNM characterization/requalification facilities.
e	Code Developer and/or Sponsor	Code developer: Oak Ridge National Laboratory (ORNL) Code distributor: Radiation Safety Information Computational Center (RSICC).
f	Commercial, Proprietary, or Other (explain)	Other: KENO V.A was prepared by UT-Battelle at the Oak RidgeNational Laboratory (ORNL) under contract number DE-AC05-00OR22725 for the U.S. Department of Energy (DOE). KENO V.A is restricted from distribution to third-parties without a license. KENO V.A is further restricted from distribution for Anti-terrorism (AT) purposes by the U.S. Department of Commerce Title 15 Commerce and Foreign Trade, Chapter VII B Bureau of Export Administration, Parts 730-774, Commerce Control List as OD999 Specific Software.
g	Current Owner/Vendor	Distributor: Radiation Safety Information Computational Center (RSICC) http://www-rsicc.oml.gov/rsicc.html .
h	Technical Support Provider	Users can receive technical support at URL: http://www.oml.gov/scale/scale_notebook.html .
i	Code Platform (Workstation, PC-based, Mainframe)	Code: Lahey Fortran 90 version 4.00e and C Platform: PC and Workstation
j	Operating System	Windows 2000 on PC platform.
k	Frequency of Use (Routine-repeated use, code of choice – R; Occasional use – O)	Frequency will be Routine upon validation and verification (V&V) of the code. Currently, KENO V.a. has not been V&V'd for use at Pantex Plant.
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues:	User's experience is limited to formal off-site training. The user has easily set-up KENO input decks and viewed the geometry. The tutorial manual and the KENO V.A software manual are comprehensive in identifying all the functional requirements and features of the code. Known errors are published in the manual and listed on the Internet at URL: http://www.oml.gov/scale/scale_notebook.html
Name and phone number of contact: Roy R. Hedtke, 806-477-6295 Linda Vickers, 806-477-6617		

Survey Form:	Safety Design Software	
a	Code Name & Version	KENO-3D: A Visualization Tool for KENO V.a. and KENO-VI Geometry Models, Version 2.00.
b	Area of Applicability (e.g., structural, fire protection)	KENO-3D is used to display 3-dimensional (3D) interactive visual graphics of fissile material systems for Nuclear Criticality Safety (NCS) purposes.
c	Function of Code	**Function:** KENO-3D is a powerful state-of-the-art visualization tool that enables KENO V.a. users to interactively display their 3D geometry models of fissile systems. **Method of Solution:** KENO-3D reads KENO V.a. input files and displays the geometry interactively in 3D.
d	Application (what projects/facilities at the Site/Lab	KENO-3D is used to visually display computer models of fissile materials (pits, secondaries, & radioisotopic thermoelectric generators (RTGs)) in storage vaults, weapon assembly/disassembly operations (Bays & Cells), and SNM characterization/requalification facilities.
e	Code Developer and/or Sponsor	**Code developer:** Spatial Technology Inc. **Code distributor:** Radiation Safety Information Computational Center (RSICC).
f	Commercial, Proprietary, or Other (explain)	**Proprietary:** KENO-3D provides an interface to ACIS (R) 3D Toolkit. ACIS (R) is a registered trademark of Spatial Technology Inc. ACIS is the sole property of Spatial Technology Inc., and is protected by U.S. copyright laws. The software is CONFIDENTIAL, PROPRIETARY, and a TRADE SECRET, not to be disclosed without written authorization from Spatial Technology Inc.
g	Current Owner/Vendor	**Distributor:** Radiation Safety Information Computational Center (RSICC) http://www-rsicc.ornl.gov/rsicc.html .
h	Technical Support Provider	Users can receive technical support via email: scalehelp@ornl.gov .
i	Code Platform (Workstation, PC-based, Mainframe)	**Code:** Microsoft Visual C++ **Platform:** PC only
j	Operating System	Windows 2000 on PC platform.
k	Frequency of Use (Routine, repeated use, code of choice – R; Occasional use – O)	Frequency will be Routine upon validation and verification (V&V) of the KENO V.a. code. Currently, KENO V.a. has not been V&V'd for use at Pantex Plant.
l	Comments on experience with this software; ease of application, adequacy of documentation provided, known errors or issues.	User's experience is limited to formal off-site training. The user has easily set-up KENO-3D input decks and viewed the geometry. The tutorial manual and the KENO-3D software manual are comprehensive in identifying all the functional requirements and features of the code. Known errors are published in the manual and listed on the internet at URL: http://www.ornl.gov/scale/keno3d/enote.html

Name and phone number of contact:
Roy R. Hedtke, 806-477-6295
Linda Vickers, 806-477-6617

Survey Form:	Safety Design Software	
a	Code Name & Version	Monte Carlo N-Particle (MCNP) versions 4A, 4B, 4C, 5, and X
b	Area of Applicability (e.g., structural, fire protection)	The nuclear criticality safety of fissile materials.
c	Function of Code	**Function:** MCNP is used to calculate the k-eff for fissile systems. **Nature of Problem Solved:** It is a general-purpose, continuous-energy, generalized geometry, time-dependent, coupled neutron/photon/electron Monte Carlo transport code system. **Method of Solution:** The MCNP code treats an arbitrary three-dimensional configuration of materials in geometric cells bounded by first- and second-degree surfaces and fourth-degree elliptical tori. Pointwise cross-section data are used. For neutrons, all reactions given in a particular cross-section evaluation (such as ENDF/B-VI) are accounted for. Thermal neutrons are described by both the free gas and S(alpha,beta) models. For photons, the code accounts for incoherent and coherent scattering, the possibility of fluorescent emission after photoelectric absorption, absorption in pair production with local emission of annihilation radiation, and bremsstrahlung. A continuous slowing down model is used for electron transport that includes positrons, k-shell x-rays, and bremsstrahlung. Energy ranges are 0-20 MeV for neutrons, 1 keV – 1 GeV for electrons, and 1 keV – 100 GeV for photons.
d	Application (what projects/facilities at the Site/Lab.	MCNP is used to analyze the nuclear criticality safety of fissile materials (pits, secondaries, & radioisotopic thermoelectric generators (RTGs)) in storage vaults, weapon assembly/disassembly operations (Bays & Cells), and SNM characterization/requalification facilities.
e	Code Developer and/or Sponsor	**Code developer:** Los Alamos National Laboratory (LANL) **Code distributor:** Radiation Safety Information Computational Center (RSICC).
f	Commercial, Proprietary, or Other (explain)	**Other:** MCNP was prepared by the Regents of the University of California at Los Alamos National Laboratory under contract number W-7405-ENG-36 for the U.S. Department of Energy (DOE). The University retains rights in the MCNP program therefore, MCNP is restricted from distribution to third-parties without a license. MCNP is further restricted from distribution for Anti-terrorism (AT) purposes by the U.S. Department of Commerce Title 15 Commerce and Foreign Trade, Chapter VII B Bureau of Export Administration, Parts 730-774, Commerce Control List as 0D999 Specific Software.
g	Current Owner/Vendor	**Distributor:** Radiation Safety Information Computational Center (RSICC) http://www-rsicc.ornl.gov/rsicc.html .
h	Technical Support Provider	A limited amount of free user support is available from John Hendricks, mcnp@lanl.gov and Judi Briesmeister, mcnp@lanl.gov . Users are encouraged to communicate

		with other users via the two list servers, mcnp-l@psi.ch and mcnp-forum@lanl.gov .
j	Code Platform (Workstation, PC-based, Mainframe)	**Code**: Fortran 90 and C **Platform**: PC and Workstation
j	Operating System	Windows 2000 on PC platform.
k	Frequency of Use (Routine, repeated use, code of choice – R, Occasional use – O)	Routine (R)
l	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues.	MCNP is the software code of choice for determining the neutronic response of fissile materials. The user can easily set-up input decks and view the geometry. The tutorial manual and the MCNP software manual are comprehensive in identifying all the functional requirements and features of the code. Known errors are published in the manual and listed on the internet at URL: http://www-xdiv.lanl.gov/x5/MCNP/forum.html .
Name and phone number of contact: Roy R. Hedtke, 806-477-6295 Linda Vickers, 806-477-6617		

	Survey Form:	Safety Design Software	
a	Code Name & Version	SABRINA: Three-Dimensional Geometry Visualization Code System.	
b	Area of Applicability (e.g., structural, fire protection)	SABRINA is used to display 3-dimensional (3D) interactive visual graphics of fissile material systems for Nuclear Criticality Safety (NCS) purposes.	
c	Function of Code	**Function:** SABRINA is an interactive, 3D, geometry modeling code primarily for use with MCNP. **Method of Solution:** Rendering is performed by ray tracing or an edge and intersection algorithm. Volume fraction calculations are made by ray tracing.	
d	Application (what projects/facilities at the Site/Lab	SABRINA is used to visually display 3D computer models of fissile materials (pits, secondaries, & radioisotopic thermoelectric generators (RTGs)) in storage vaults, weapon assembly/disassembly operations (Bays & Cells), and SNM characterization/requalification facilities.	
e	Code Developer and/or Sponsor	**Code developer:** Los Alamos National Laboratory (LANL). **Code distributor:** White Rock Science http://www.whiterockscience.com	
f	Commercial, Proprietary, or Other (explain)	**Commercial:** White Rock Science, PO Box 4727 Los Alamos, NM 87544.	
g	Current Owner/Vendor	**Distributor:** White Rock Science, PO Box 4727 Los Alamos, NM 87544	
h	Technical Support Provider	Users can receive technical support via email: kvr@rt66.com	
i	Code Platform (Workstation, PC-based, Mainframe)	**Code:** Fortran 77; ANSI C **Platform:** PC and Workstation	
j	Operating System	Windows 2000 on PC platform.	
k	Frequency of Use (Routine, repeated use; code of choice – R; Occasional use – O)	Frequency will be Routine use with MCNP.	
l	Comments on experience with this software; ease of application, adequacy of documentation provided, known errors or issues.	User experience is cursory until proficiency is achieved by continuous use. Known errors are published in the manual and listed on the internet at URL: http://www.whiterockscience.com .	
Name and phone number of contact: Roy R. Hedtke, 806-477-6295 Linda Vickers, 806-477-6617			

National Nuclear Security Administration

Sandia National Laboratories

National Nuclear Security Administration
Sandia Site Office
P O Box 5400
Albuquerque, New Mexico 87185-5400

NOV 1 4 2003

MEMORANDUM FOR   Everet Beckner, NA-10, Hqs NNSA

FROM   Karen L Boardman, Manager

SUBJECT   Survey of Design Codes Per 4 2 1 5 Request

The purpose of this correspondence is to respond to your memorandum dated October 16, 2003, requesting site offices to conduct a survey of design codes currently in use to determine if any should be included as part of the toolbox codes The action is in response to the Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 2002-1, Quality Assurance for Safety Software at Department of Energy Defense Nuclear Facilities, commitment 4 2 1 5 Attached are electronic mail and survey forms identifying Safety Design Software from Sandia National Laboratories

The duties and responsibilities associated with the implementation of software quality assurance at the Sandia Site Office as per the Implementation Plan have been assigned to the Assistant Manager for Nuclear Facilities and Safety Basis (AMNFSB) The specific responsibilities for software quality assurance, including the fulfillment of the qualification requirements specified by the Federal Technical Capability Panel for the Computer Software Functional Area, will be assigned to a staff member under the direction of AMNFSB

If you have any questions regarding this commitment, please contact Bill Mullen of my staff at (505) 845-5025

Attachment

cc w/attachment
D Nichols, DNFSB
R Singh NA-124, HQ
R Kendall, NA-53, HQ
P Chima, SC
S Walker, SNL MS 1141

cc w/o attachment
R Simonton, SNL, MS 0361
M Blackledge, SNL MS 0638
M Hamilton, NNSA/SSO
W T Mullen, NNSA/SSO
D Ward, SNL, MS 1173

Survey Form: Safety Design Software

A	Code Name and Version	MACCS2 versions 1 12 and 1 16 MELCOR Accident Consequence Code System 2
B	Area of Applicability (e g , structural, fire protection)	Environment, Economic, and Health Impacts of Nuclear Material Plumes, Authorization Basis Analyses, Level 3 PRAs
C	Function of Code	A probabilistic code supporting risk assessments through the calculation of consequences of a nuclear material release MACCS2 can be used to analyze a single weather event or to perform weather trials based on one or more years worth of meteorological data
D	Application (what projects/facilities at the site/lab)	General application to US commercial and research reactors by the U S Nuclear Regulatory Commission Application to transportation accidents by DOE Application to DOE Nuclear Facilities across the complex
E	Code Developer and/or Sponsor	Code Developer Sandia National Laboratories, 6415 Code Sponsor U S Nuclear Regulatory Commission (currently) and U S DOE (formerly)
F	Commercial, Proprietary, or Other (Explain)	Other The last formal release of the code was version 1 12 Updates and release is done by consent of the US NRC through Sandia National Laboratories, Department 6415
G	Current Owner/Vendor	U S Nuclear Regulatory Commission
H	Technical Support Provider	Sandia National Laboratories, Dept 6415
I	Code Platform (Workstation, PC-based, Mainframe)	PC-based
J	Operating System	Windows NT, 2000, XP
K	Frequency of Use (Routine, repeated use – R, Occasional use – O)	Routine
L	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues	Extensive experience with the software, currently expanding capability, including development of a user interface, and considering modernization of the code Most users outside of Sandia use the example problems in the user manuals to develop their inputs Extensive experience is needed to develop original inputs Extensive documentation and training available
	Name and Phone number of contact	Dr Nathan Bixler, Org 6415, Sandia National Laboratories, (505)845-3144

Survey Form: Safety Design Software

A	Code Name and Version	MELCOR 1 8 5
B	Area of Applicability (e g , structural, fire protection)	Nuclear Accident Source Term, Level 2 PRA
C	Function of Code	Calculation of the nuclear material source term resulting from a nuclear accident
D	Application (what projects/facilities at the site/lab)	Primary application is the determination of the nuclear material release from an accident at a nuclear reactor or facility This has been applied to both commercial LWR reactors, DOE-complex facilities, DoD bio-hazard analyses
E	Code Developer and/or Sponsor	Code Developer Sandia National Laboratories – 6415 Code Sponsor U S Nuclear Regulatory Commission, Office of Research
F	Commercial, Proprietary, or Other (Explain)	Distribution of the code is controlled by the U S Nuclear Regulatory Commission
G	Current Owner/Vendor	U S Nuclear Regulatory Commission
H	Technical Support Provider	Sandia National Laboratories - 6415
I	Code Platform (Workstation, PC-based, Mainframe)	Workstations and Windows PC-based (Linux under development)
J	Operating System	Unix, Windows, Linux under development
K	Frequency of Use (Routine, repeated use – R, Occasional use – O)	Routine
L	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues	Internationally used by nuclear regulators Requires expert operators to generate original inputs Most users adapt models generated by Sandia National Laboratories – 6415 Extensive documentation and training is available
	Name and Phone number of contact	Dr Randall Gauntt, Org 6415, Sandia National Laboratories, (505)284-3989

Survey Form: Safety Design Software

A	Code Name and Version	ABAQUS, Version 6 3
B	Area of Applicability (e g , structural, fire protection)	Mechanical/Structural
C	Function of Code	Finite Element Analysis (FEA)
D	Application (what projects/facilities at the site/lab)	Tiedowns in NNSA/Office of Secure Transportation (OST) vehicles used to transport nuclear explosives and nuclear materials
E	Code Developer and/or Sponsor	Vendor
F	Commercial, Proprietary, or Other (Explain)	Commercial
G	Current Owner/Vendor	Vendor
H	Technical Support Provider	Vendor
I	Code Platform (Workstation, PC-based, Mainframe)	Multi-platform
J	Operating System	Multi-OS
K	Frequency of Use (Routine, repeated use – R, Occasional use – O)	O
L	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues	Just beginning to use, includes Software QA, has website for QA http //www abaqus com/products/products_qa html and error reporting http //www abaqus com/forms/ts_status-reports html
	Name and Phone number of contact	Jeff Gruda, Sandia National Laboratories, (505) 844-9782

Survey Form: Safety Design Software

A	Code Name and Version	COSMOS, Version 2 8 2003/095
B	Area of Applicability (e g , structural, fire protection)	Mechanical/Structural
C	Function of Code	Finite Element Analysis (FEA)
D	Application (what projects/facilities at the site/lab)	Tiedowns in NNSA/Office of Secure Transportation (OST) vehicles used to transport nuclear explosives and nuclear materials
E	Code Developer and/or Sponsor	Vendor
F	Commercial, Proprietary, or Other (Explain)	Commercial
G	Current Owner/Vendor	Vendor
H	Technical Support Provider	Vendor
I	Code Platform (Workstation, PC-based, Mainframe)	Multi-platform
J	Operating System	Multi-OS
K	Frequency of Use (Routine, repeated use – R, Occasional use – O)	O
L	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues	Vendor provides excellent training, have been able to successfully apply COSMOS to tiedown design problems
	Name and Phone number of contact	Ken Padilla, Sandia National Laboratories, (505) 844-2412

Survey Form: Safety Design Software

A	Code Name and Version	Integrated Tiger Series Ver. 5.0
B	Area of Applicability (e g , structural, fire protection)	Radiation Effects Gamma
C	Function of Code	Coupled electron/photon radiation transport (1-D, 3-D).
D	Application (what projects/facilities at the site/lab)	Auxiliary Hot Cell Facility/Various design and analysis of experiments associated with accelerators
E	Code Developer and/or Sponsor	SNL/Radiation Effects
F	Commercial, Proprietary, or Other (Explain)	Other – in-house (currently under copyright assertion considerations)
G	Current Owner/Vendor	SNL; RSICC for Ver. 3.0
H	Technical Support Provider	SNL
I	Code Platform (Workstation, PC-based, Mainframe)	Various
J	Operating System	Various
K	Frequency of Use (Routine, repeated use – R, Occasional use – O)	Occasional
L	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues	Users manual available; no physics manual available.
	Name and Phone number of contact	Ron Kensek, 505-845-7642

Survey Form: Safety Design Software

A	Code Name and Version	ADEPT Ver. ??
B	Area of Applicability (e g , structural, fire protection)	Safety, Shielding
C	Function of Code	One Dimensional Electron-Photon Transport by Discrete Ordinates
D	Application (what projects/facilities at the site/lab)	Nuclear Facilities – Gamma Electron Beam Shielding
E	Code Developer and/or Sponsor	SNL
F	Commercial, Proprietary, or Other (Explain)	Other – In-House
G	Current Owner/Vendor	SNL
H	Technical Support Provider	None
I	Code Platform (Workstation, PC-based, Mainframe)	Any
J	Operating System	Any
K	Frequency of Use (Routine, repeated use – R, Occasional use – O)	Occasional
L	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues	
	Name and Phone number of contact	Len Lorence, 505-845-7066

Survey Form: Safety Design Software

A	Code Name and Version	**MCNP Ver. 5**
B	Area of Applicability (e g , structural, fire protection)	**Safety – Shielding, Nuclear Criticality**
C	Function of Code	**Photonic/Neutronic – Monte Carlo shielding/criticality**
D	Application (what projects/facilities at the site/lab)	**Nuclear Facility Safety Analysis**
E	Code Developer and/or Sponsor	**RSICC** Radiation Safety Information Computational Center (RSICC)
F	Commercial, Proprietary, or Other (Explain)	**Commercial**
G	Current Owner/Vendor	**RSICC**
H	Technical Support Provider	**RSICC**
I	Code Platform (Workstation, PC-based, Mainframe)	**PC-Based, UNIX**
J	Operating System	**Windows/DOS, UNIX, LINUX**
K	Frequency of Use (Routine, repeated use – R, Occasional use – O)	**Repeated Use**
L	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues	
	Name and Phone number of contact	**[Note: this is a code that is currently available in DOE's RSICC; Sandia nominates this code for toolbox consideration]**

Survey Form: Safety Design Software

A	Code Name and Version	**ANITA** **Ver. 2000**
B	Area of Applicability (e g , structural, fire protection)	**Safety**
C	Function of Code	**Activation Analysis**
D	Application (what projects/facilities at the site/lab)	**Annular Core Research Reactor Sandia Pulsed Reactor**
E	Code Developer and/or Sponsor	**Commission of the European Communities**
F	Commercial, Proprietary, or Other (Explain)	**Commercial**
G	Current Owner/Vendor	**CEC/RSICC** Radiation Safety Information Computational Center (RSICC)
H	Technical Support Provider	**None**
I	Code Platform (Workstation, PC-based, Mainframe)	**PC-Based, UNIX**
J	Operating System	**Windows/UNIX**
K	Frequency of Use (Routine, repeated use – R, Occasional use – O)	**Occasional**
L	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues	
	Name and Phone number of contact	**[Note: this is a code that is currently available in DOE's RSICC; Sandia nominates this code for toolbox consideration]**

Survey Form: Safety Design Software

A	Code Name and Version	CINDER Ver. 90
B	Area of Applicability (e g , structural, fire protection)	Safety
C	Function of Code	Fission Product Decay & Activation Analysis
D	Application (what projects/facilities at the site/lab)	Annular Core Research Reactor Sandia Pulsed Reactor
E	Code Developer and/or Sponsor	LANL
F	Commercial, Proprietary, or Other (Explain)	Other
G	Current Owner/Vendor	LANL (RSICC?) Radiation Safety Information Computational Center (RSICC)
H	Technical Support Provider	LANL
I	Code Platform (Workstation, PC-based, Mainframe)	Any
J	Operating System	Any
K	Frequency of Use (Routine, repeated use – R, Occasional use – O)	Occasional
L	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues	
	Name and Phone number of contact	[Note: this is a code that was developed at LANL but is also in use at Sandia; Sandia nominates this code for toolbox consideration]

Survey Form: Safety Design Software

A	Code Name and Version	DKPOWR Ver. ??
B	Area of Applicability (e g , structural, fire protection)	**Safety and Design**
C	Function of Code	**Calculates fission product, Electron Generation, Photon Generation, & Heat Generation following a shutdown.**
D	Application (what projects/facilities at the site/lab)	**Design of Cooling Systems** **Safety Analysis – Heat Removal Post Accident**
E	Code Developer and/or Sponsor	**LANL**
F	Commercial, Proprietary, or Other (Explain)	**Other - ?**
G	Current Owner/Vendor	**LANL**
H	Technical Support Provider	**None needed**
I	Code Platform (Workstation, PC-based, Mainframe)	**PC**
J	Operating System	**Windows/DOS**
K	Frequency of Use (Routine, repeated use – R, Occasional use – O)	**Repeated**
L	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues	
	Name and Phone number of contact	**[Note: this is a code that was developed at LANL but is also in use at Sandia; Sandia nominates this code for toolbox consideration]**

Survey Form: Safety Design Software

A	Code Name and Version	SCALE Ver. 4.4A
B	Area of Applicability (e g , structural, fire protection)	**General Reactor Safety Analysis including shielding and criticality.**
C	Function of Code	**See above**
D	Application (what projects/facilities at the site/lab)	**Nuclear Facility Safety**
E	Code Developer and/or Sponsor	**Oakridge**
F	Commercial, Proprietary, or Other (Explain)	**Commercial**
G	Current Owner/Vendor	**Oakridge/RSICC**
H	Technical Support Provider	**Oakridge**
I	Code Platform (Workstation, PC-based, Mainframe)	**Any**
J	Operating System	**Any**
K	Frequency of Use (Routine, repeated use – R, Occasional use – O)	**Occasional**
L	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues	
	Name and Phone number of contact	**[Note: this is a code that was developed at OakRidge but is also in use at Sandia; Sandia nominates this code for toolbox consideration]**

Survey Form: Safety Design Software

A	Code Name and Version	**PARTISN Ver. 2.99**
B	Area of Applicability (e g , structural, fire protection)	**Safety**
C	Function of Code	**Radiation Transport**
D	Application (what projects/facilities at the site/lab)	**All Nuclear Facilities**
E	Code Developer and/or Sponsor	**LANL**
F	Commercial, Proprietary, or Other (Explain)	**Commercial**
G	Current Owner/Vendor	**LANL/RSICC**
H	Technical Support Provider	**LANL**
I	Code Platform (Workstation, PC-based, Mainframe)	**UNIX**
J	Operating System	**UNIX**
`	Frequency of Use (Routine, repeated use – R, Occasional use – O)	**Occasional**
L	Comments on experience with this software, ease of application, adequacy of documentation provided, known errors or issues	
	Name and Phone number of contact	**[Note: this is a code that was developed at LANL but is also in use at Sandia; Sandia nominates this code for toolbox consideration]**

National Nuclear Security Administration

Savannah River Site
(Refer to Item 1.c under DOE/EM)