



Department of Energy
National Nuclear Security Administration
Washington, DC 20585



July 28, 2005

The Honorable A. J. Eggenberger
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, N.W., Suite 700
Washington, D.C. 20004-2901

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2005 AUG -9 AM 9:04
DNFSB SAFETY BOARD

Dear Mr. Chairman:

The purpose of this letter is to inform you that the National Nuclear Security Administration (NNSA) has completed Commitments 4.2.3.3 and 4.2.4.3 of the Implementation Plan for Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 2002-1, *Quality Assurance for Safety Software at Department of Energy Defense Nuclear Facilities*. Commitment 4.2.3.3 required NNSA to complete the identification, selection, and assessments of safety system software and firmware in accordance with the schedule established in Commitment 4.2.3.2. Similarly, Commitment 4.2.4.3 required NNSA to complete the assessments in accordance with the schedule established in 4.2.4.2.

In our letter of December 22, 2003, we had provided you schedules for completing the identification, selection and assessment of safety software. These schedules have been periodically updated and provided to you and your staff during our quarterly briefings.

The list of safety software at NNSA nuclear facilities is provided in Enclosure 1. As a part of our Roadmap for Quality Assurance Excellence effort, we are continuing to validate the list of software and updating it, as appropriate. Furthermore, we are developing a process for identifying software in accordance with the definition and scope of DOE O414.1C, *Quality Assurance*. We expect to complete this process by June 2006.

We have conducted at least one software quality assurance assessment at each site. A list of assessments is provided in Enclosure 2. The assessment reports have been provided to your staff. As a part of our Roadmap for Quality Assurance Excellence, we are continuing to assess safety software quality assurance at our facilities. Lessons learned from the assessments are being incorporated into the *NNSA Safety Software Quality Assurance Good Practices Handbook*, currently under preparation.



We will continue to provide you the status of our progress in institutionalizing software quality assurance at NNSA facilities. If you have any questions, please contact me or have your staff contact Rabi Singh at (301) 903-5864.

Sincerely,



Thomas P. D'Agostino
Acting Deputy Administrator
for Defense Programs

Enclosures:

1. List of NNSA Safety Software
2. List of Safety Software Quality Assurance Assessments

cc w/enclosures:

M. Whitaker, DR-1

J. Shaw, EH-1

J. Paul, NA-2

SEPARATION

PAGE

NNSA Safety Software List Design and Analysis (D & A) and Instrumentation and Control (I & C)

Lawrence Livermore National Laboratory (LLNL)

Area 612 (RHWM) includes Bldg 625

Software
MACCS-2

Version
Version 1.12

Type
D & A

Reference

UCRL-AR-202270, Rev. 0, Documented Safety Analysis for Report for the Waste Storage Facilities, dated May 2004, Section 3.4.1, Methodology

Comments

Bldg 239

Software
HOTSPOT

Version
Version 1.06

Type
D & A

Reference

UCRL-AR-147501-03, Rev. 0, Safety Analysis Report for the Building 239 Radiography Facility, dated February 2003. Section 3.4.1.4, Consequence Analysis

Comments

The HOTSPOT code was developed by LLNL for the Nonproliferation, Arms Control, and International Security (NAI) Program as a quick response tool for estimating radiological impacts resulting from the accidental release of radioactive material.

Bldg 251 Heavy Elements Facility

Software
HOTSPOT

Version
Version 1.0

Type
D & A

Reference

UCRL-AR-113377, Rev. 2, Safety Analysis Report for the Building 251 Heavy Element Facility, dated October 2003. Section 11.3.1, Evaluation Basis Earthquake

Comments

Version 1.0, then when the SAR was updated the 2.0 version was used to verify the consequence analysis

Bldg 332 Plutonium Facility

Software
ALOHA

Version
Version 5.2.3

Type
D & A

Reference

Section 3.4.1.4, Consequence Analysis

Comments

Consequences of chemical releases were modeled using the ALOHA (Areal Locations of Hazardous Atmospheres) code, version 5.2.3. ALOHA estimates the dispersion of gas from accidental releases. This code has evolved over the years and now includes the ability to model heavy gases. ALOHA also uses a gaussian dispersion model.

MACCS-2

Version 1.12

D & A

Section 3.4.1.4, Consequence Analysis

The MELCOR Accident Consequence Code (MACCS-2) code, version 1.12. The MACCS-2 code consists of a sequence of mathematical and statistical models that represent the radioactive material immediately

Fire Detection and Alarm System I & C

Emergency Power I & C

after release from its source, the movement of the material as it disperses downwind of the facility, the deposition of the radioactive material on the ground, and the effects of the airborne and deposited material on man and his environment.

detects and sounds alarms for fire protection

Bldg 334 Hardened Engineering Test Building (HETB)

Software	Version	Type
HOTSPOT	Version 1.06	D & A

Reference

UCRL-AR-123109-03, Rev. 0, Documented Safety Analysis for Building 334, Hardened Engineering Test Building, dated April 2003, Section 3.4.1.4, Consequence Analysis

Comments

Bldg 695

Software	Version	Type
ALOHA	Version 5.2.3	D & A

Reference

UCRL-AR-149550, Rev. 1, Documented Safety Analysis for the Building 695 Segment of the Decontamination and Waste Treatment Facility, dated July 2003, Section Ex.4, Safety Analysis Overview

Comments

HSC Outokumpo	Version 2	D & A
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Appendix B, Section B.4 Release Scenarios

Version 2. Thermochemistry analysis software used to determine potential interactions between reagent chemicals and the heat released as a result of an exothermic reaction.

WIPP Mobile Vendor

Software	Version	Type
MACCS-2	Version 1.5.11.1	D & A

Reference

UCRL-MA-152462, Nuclear Materials Transportation Safety Manual, dated October 2003. , Revision 0, dated April 2004.

Comments

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Los Alamos National Laboratory (LANL)

Software	Version	Type	Reference	Comments
ABAQUS		D & A	Analysis	DSA - Seismic Analysis
AFT Fathom	5.0	D & A	Pipe flow analysis modeling, incompressible flow	Any liquid flow modeling at any size
ANSYS	7.1	D & A	Finite Element Analysis	SHEBA CAV, misc support structures, exp. Hardware
Autodesk - Autocad		D & A		HVAC
AutoPipe Plus	6.3	D & A	Pipe stress analysis, hanger design stress	Dynamic pipe fitting stress for any piping project
BlastX		D & A	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.	DSA, Seismic Analysis
CFAST/FAST	5.0.1, 3.1.7,	D & A	Accident Analysis, Fire growth and smoke transport	DSA/JCO
COSMOS/M	2.6	D & A	Finite Element analysis, analytical solutions	TA-55 Glove box systems
DANTSYS		D & A	Code solves the Boltzmann neutron transport equation using the discrete-ordinates technique	Used for accident analyses in nuclear facilities
DESIRE 2000		D & A	Code solves coupled point kinetics and heat transfer differential equations	Used for accident analyses in nuclear facilities
EPIcode	6.01 DOS /	D & A	Chemical release/Dispersion and Consequence Design and Analysis	DSA
ETABS, NL		D & A		Documented Safety analysis, seismic analysis
Explosive Release	3.2 (Windows)	D & A	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-field radiological hazards which would result from an explosive	DSA
FDS2		D & A	Accident Analysis	DSA/JCO
GENII 2		D & A	Radionuclide dispersion	DSA
HASS		D & A	Hydraulic Calculation of fire suppression systems per NFPA 13-16, 20 E.g. TA-3-29, TA-16-205/450, TA-55-4	Applicable to any facility w/sprinkler or other water-based systems
HOTSPOT	2.05	D & A	Radionuclide dispersion	DSA
MACCS2		D & A	Radionuclide dispersion	DSA
MAR_Summary032701	Version 1.0.0.1	D & A	To sum the MAR in the CMR Facility to aid in the performance of the MAR inventory TSR	CMR facility-wide

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Software	Version	Type	Reference	Comments
MARPLOT	3.3	D & A	Chemical dispersion	DSA
MASS		D & A	System of record for tracking nuclear material and reporting inventory and transactions to NMSS	LANL Wide
MATCHCAD		D & A	Numerical Processing	All
MCNP-4C		D & A	Design and Analysis, solves the Boltzmann neutron transport equation	Used for accident analysis
MCNPx		D & A	Monte Carlo radiation transport	
MELCOR		D & A		
POSTMAX 2		D & A	Radionuclide dispersion Accident Analysis	DSA/JCO
PSADS		D & A	Blast Design	DSA
RISA-3d		D & A	Analysis	
SAFE		D & A	Design and Analysis	Documented Safety analysis, seismic analysis
SANET		D & A	Accident Analysis	DSA/JCO
Sap2000, NL		D & A	Design and Analysis	Documented Safety analysis, seismic analysis
SASSI		D & A	Analysis	Documented Safety analysis, seismic analysis
SeaTREE		D & A	Radionuclide dispersion Accident Analysis	DSA/JCO
SHAKE91		D & A	Analysis	Documented Safety analysis, seismic analysis
SQL LIMS	Version 3.1	D & A	Inventory and track MAR	CMR facility-wide
Transient Combustible Excel	Rev. 2.1	D & A	To aid operators in the performance of transient combustible TSR surveillance calculations	CMR facility-wide
PARTISIN		D & A	Nuclear facilities	Neutron Transport calculations used for accident analysis in nuclear facilities
ABM Signal Safe		I & C	LANL site-wide	"Virtual" printer program that logs all DACS system activity on the receivers.
SIMPLEX 4100 U Panel Programmer		I & C	LANL Site-wide	Fire Alarm control Panel Configuration Utility for creating & maintaining FACP Specific programs
SIMPLEX 4010 SDACT Programmer		I & C	LANL Site-wide	Fire Alarm control Panel Configuration Utility for creating & maintaining FACP Specific programs
SIMPLEX 4010 PANEL PROGRAMMER		I & C	LANL Site-wide	Fire Alarm control Panel Configuration Utility for creating & maintaining FACP Specific programs
SAFE FIRE DETECTION		I & C	LANL Site-wide	Trouble-shooting and status software for the SCC's (TA-3-2327) early warning smoke detection system
RADIONICS 6200/6600		I & C	LANL Site-wide	Operating software for the DACS system's Digital Alarm communicator Receivers DACR's

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Software	Version	Type	Reference	Comments
NSI DOUBLE-TAKE FOR WINDOWS		I & C	LANL Site-wide	Used for the failing over & replication of data to/from SERVER A & SERVER B for the DACS System
NOTIFIER VERIFIER TOOLS		I & C	LANL Site-wide	Fire Alarm Control Panel Configuration Utility for Creating & Maintaining FACP Specific Programs
FENWAL LASER LINK		I & C	LANL Site-wide	To view "real time" dectecto status, download history & change sensitivity of detector if desired
CHEMETRON MICRO 200-1		I & C	LANL Site-side	Fire Alarm Control Panel Configuration Utility for Creating & Maintaining FACP Specific Programs
FCI 7200		I & C	LANL Site-wide	Fire Alarm Control Panel Configuration Utility for Creating & Maintaining FACP Specific Programs
FCI 7100		I & C	LANL Site-wide	Fire Alarm Control Panel Configuration Utility for Creating & Maintaining FACP Specific Programs
EST-2 SDU 2		I & C	LANL Site-wide	Fire Alarm Control Panel Configuration Utility for Creating & Maintaining FACP Specific Programs
EST-2 DOS		I & C	LANL Site-wide	Fire Alarm Control Panel Configuration Utility for Creating & Maintaining FACP Specific Programs
EST QUICKSTART		I & C	LANL Site-wide	Fire Alarm Control Panel Configuration Utility for Creating & Maintaining FACP Specific Programs
EST IRC-3 DOS		I & C	LANL Site-wide	Fire Alarm Control Panel Configuration Utility for Creating & Maintaining FACP Specific Programs
AUTOCALL		I & C	LANL Site-wide	Fire Alarm Control Panel Configuration Utility for Creating & Maintaining FACP Specific Programs
ABM CENTRAL STATION		I & C	LANL Site-wide	Automation Software used to process alarms
Facility Control System		I & C	TA-55, PF-4,PF-10, PF-11, PF-8, PF-6, PF-66, PF-264, Paging system	Monitor and control TA-55 facility
Concept/Interlution Sheba effluent Treatment System		I & C	CMR Wings 2,3,4,5,7,9	Ventilation System for CMR Wings
Godiva Burst Yield system		I & C	TA-18, LACEF	Godiva burst yield system
Labview		I & C	TA-18, LACEF	Godiva Reactivity control system
Comet Reactivity Control System		I & C	TA-18, LACEF	Comet Reactivity Control System

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Software

TA-55-SST-TSR-501-SW

Version

Type

D & A

Reference

TA55, SST

Comments

Spreadsheet used to sum the MAR in the SST Facility to aid in the performance of the MAR inventory TSR
Continuous Air Monitoring system

Rockwell automation
panelbuilder 32

I & C

TA-50-69 WCRRF

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Nevada Test Site (NSO)

Software	Version	Type	Reference	Comments
BlastX	3.5, 4.6.2, 5.0.1	D & A		Bechtel Nevada; LLNL
HASS		D & A		Bechtel Nevada
HOTSPOT		D & A		LANL
MACCSS		D & A		LANL (future Bechtel)
STADD Pro		D & A		Bechtel Nevada
LS Dyna	v 960, 970	D & A		Bechtel Nevada; LLNL
Truegrid	2.1.0	D & A		Bechtel Nevada; LLNL
POSTMAX		D & A		LANL
Skm Power Tools	4.5.29	D & A		Bechtel Nevada
CAPE		D & A		Bechtel Nevada; Computer-Aided Protection Engineering
FAST	5.0.1	D & A		Bechtel
SCALE	4.4	D & A		Bechtel
ALGOR	13.38	D & A		Bechtel
VnetPC		D & A		Bechtel
CAP - 88		D & A		Bechtel

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Pantex

Software	Version	Type	Reference	Comments
ALOHA	5.2.3	D & A		Consequence Assessment; Chemical Dispersion calculations
BDIs		I & C	1 of 3 PLC systems	Interlock door controls
BDIs		I & C	1 of 3 PLC systems	Interlock door controls
BLASTX	4.2	D & A		Structural – Blast load prediction; Calculate blast load overpressures and Time history
Deluge		I & C		Det-Tronics Deluge Releasing System
Entry Door PLC		I & C	1 of 3 PLC systems	Interlock door controls
EPICODE	2.03	D & A		Consequence Assessment; Chemical Dispersion calculations EPICODE performs automated dispersion calculations using algorithms published in US EPA documents
HOTSPOT	2.0	D & A		Consequence Assessment; Radiological Dispersion calculations
LP2000; Lightning location And protection system (LLPS)	2.5.2	I & C		LLPS is an independent system that supports lightning detection and warning
MACCS2	1.13.1	D & A		Consequence assessment; Radiological Dispersion calculations
MAX2-MHC	1.0	D & A		MACCS2 code with a Fire model
MCNP	5	D & A		Analyze the nuclear criticality safety Of fissile materials

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Software	Version	Type	Reference	Comments
MELCOR	1.8.4	D & A		Material Transport in Facility
Move Right System (MRS)		I & C		Tracks movement of material
StromSentry; NEXRAD	3.4	I & C		NEXRAD is an independent system that Supports Lightning Detection and warning
SAFER	2.0	D & A		Explosion Risk Analysis
STAAD Pro	2003	D & A		Structure Analysis for building design

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Sandia National Laboratory (SNL)

TA-V Software

Software	Version	Type	Reference	Comments
CAP88		D & A	ACRR, AHCF, & SPR	
CHFR		D & A	ACRR	
CYLLS	Rev.1	D & A	ACRR	Comparison of results to hand calcs. Simple analytical problems – Some documented, Comparison to measurements
DTF-IV		D & A	SPR	
GIF Ladder Logic for PLCs		I & C	GIF	
HOTSPOT		D & A	ACRR, AHCF, & SPR	
KENO		D & A	ACRR	
KIFLHE		D & A	ACRR	Sample problems, Evaluated Criticality Safety Benchmark Experiments
Labview		I & C	ACRR	Simple analytical problems, Comparison to pulse transient measurements Software Requirements Specification Software Design Description Software V & V Report Acceptance Test Procedure
MACCS2		D & A	ACRR, AHCF, SPR, GIF	Sample problems Comparison to Hand Calculations
MACCS2 Database		D & A	ACRR, AHCF, SPR, GIF	SSO & Peer Review Hand Calculation Sample Check
MASSFLR		D & A	ACRR	Simple analytical problems, Comparison to measurements
Mathcad		D & A	SPR	
MCNP 5		D & A	ACRR, AHCF, GIF, & SPR	
MCNP4A		D & A	ACRR, AHCF, & GIF	Sample problems, Evaluated Criticality Safety Benchmark Experiments, V&V Report for CSAs
MCNP-4B		D & A	SPR CX Addendum	Sample problems, Evaluated Criticality Safety Benchmark Experiments
Microshield	Ver. 4	D & A	GIF	
ORIGEN2		D & A	SPR	Sample problems Comparison of results to hand calculations
PK1D& SAK		D & A	ACRR, SPR	Simple analytical problems, Comparison to pulse transient measurements
PMAC		I & C	ACRR	Software Requirements Specification Software Design Description Software V & V Report Acceptance Test Procedure
RADTRACK (database)		D & A	All	Software V&V Report being developed
TWOTRAN (Now TWODANT)		D & A	ACRR	

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Savannah River Site (SRS)

Bldg 217

Software	Version	Type	Reference	Comments
ABAQUS		D & A	multiple SRS areas	
ANSYS		D & A	multiple SRS areas	
AutoPipe		D & A	multiple SRS areas	
E-14 (Mixed and Hazardous Waste Tracking		I & C	SRS	
Electronic Upload Package Data (EUPD) CLAB/SRNL		I & C	SRS/SRNL	
ETAP		D & A	multiple SRS areas	
GTStrudl		D & A	multiple SRS areas	
H-Area Water Monitors		I & C	H-Area	
HB-Line Safety System PLC		I & C	HB-Line	
H-Canyon 1st Cycle PLC		I & C	H-Canyon	
H-Canyon Safety System		I & C	H-Canyon	
MSC/THERMAL		D & A	multiple SRS areas	
Plant Data Management		D & A	multiple SRS areas	
Plant Information for Operations System (PI-Ops)		I & C	SRS	
SASSI 2000		D & A	multiple SRS areas	
Shake91		D & A	multiple SRS areas	
SRPP		D & A	multiple SRS areas	
TCON Monitoring		I & C	H-Area	
TEF Worker Protection		I & C	H-Area	
Type I Tank Top Load		D & A	multiple SRS areas	
Type II,III, IIIA Tank Top		D & A	multiple SRS areas	
VERSE-LC		D & A	multiple SRS areas	
Waste Information Tracking		I & C	SRS	

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Y-12

9204-2

Software

68_KENO3D
68_MCNP
68_SCALE
972005SH
ABAQUS
AC-TODAY
Algor
BLASTX
CFAST
Compress
EUCONTACT
EUPX3200
EUSIE
EUSXPUM
GSDB
GTStudl
HFSAFETY
HFSSD3SW
HGSYSTEM/W
HGSYSTEM3
HMS
HMS3
ISO-CSLOG
ISO-GASMS
LS DYNA
MCNPHEU
MPLE
MSC/Patran
MSC/Ptherm
NDA-FLDQA
NDA-HOLDUP
PARTISNHEU
Pro/Mech
SCADA
SKM
STAAD

Version

Type

D & A
D & A
D & A
I & C
D & A
I & C
D & A
D & A
D & A
I & C
I & C
I & C
I & C
D & A
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D & A
D & A
D & A
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D & A
D & A

Reference

Comments

Specific references and comments are omitted due to Official Use Only nature of the references and comments in the BWXT list of safety software.

SEPARATION

PAGE



Lists of Safety Software Quality Assurance Assessments

Office of Operations &
Construction Management

As of 06/27/05

Site and Facility	Dates of Assessment (team on site)	Software/SQA Processes Assessed	I&C or D&A	Report Date
Y-12 Bldg. 9215 OCF	January 19 – 23, 2004	HF Safety (Initial Assessment Doing Testing Phase)	I&C	January 2004
LANL TA-18	January 14 – 29, 2004 (initial team review). February 09 – 11, 2004 (independent V&V).	Planet Control System	I&C	February 26, 2004
SRS	February 10 – 19, 2004	TEF Worker Protection System; and TCON Protection System.	I&C	May 30, 2004
SRS	February 10 – 19, 2004	Design & Analysis Safety System Software; GTSTRUDL; and other D&A Software.	D&A	May 30, 2004



Lists of Safety Software Quality Assurance Assessments

(continued)

*Office of Operations &
Construction Management*

As of 06/27/05

Site and Facility	Dates of Assessment (team on site)	Software/SQA Processes Assessed	I&C or D&A	Report Date
SNL	March 09 – 16, 2004	ACRR Console; MCNP; and Critical Heat Flux Ratio.	I&C and D&A	May 15, 2004
PX	March 22 – 26, 2004	Move Right Software (MRS)	I&C	April 30, 2004
Y-12	April 26 – 30, 2004	HG Safety System 3 (Heavy Dense Gas Analysis)	D&A	April 30, 2004
LANL CMR	April 05 – 10, 2004	1. ventilation system PLC 2. combustible loading	I&C	May 30, 2004
LLNL	May 17 – 21, 2004	HOTSPOT	D&A	May 30, 2004
PX	June 07 – 11, 2004	MAX2_MHC and ERAD	D&A	July 15, 2004
LLNL, B332	July 12 – 16, 2004	Fire Detection and Alarm System.	I&C	August 31, 2004



Lists of Safety Software Quality Assurance Assessments

(continued)

*Office of Operations &
Construction Management*

As of 06/27/05

Site and Facility	Dates of Assessment (team on site)	Software/SQA Processes Assessed	I&C or D&A	Report Date
Y-12	January 11 – 13, 2005	HF Safety (Final Assessment)	I&C	January 2005
PX	August – September, 2004	BDI Software	I&C	September 15, 2004
PX	February 28 – March 4, 2005	STAA.PRO (Seismic Loading)	D&A	March 31, 2005
NTS, BN, and DAF	April 25 – 29, 2004	BN/SKM, LLNL and LANL Software Procurement	D&A	June 16, 2005
Y-12	February 28 – March 4, 2005	SKM (Power Distr. Modeling)	D&A	March 31, 2004
Y-12	February 28 – March 4, 2005	SCADA (Monitoring for Emergency Notification System)	I&C	March 31, 2004