Enclosure 21 to ET 07-0022

System Verification and Validation Report, Revision 0

MAIN STEAM & FEEDWATER ISOLATION SYSTEM (MSFIS) CONTROLS REPLACEMENT

SYSTEM VERIFICATION AND VALIDATION REPORT

REVISION 0

PROJECT MANAGER - GREGG CLARKSON

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1 Introduction

1. PURPOSE

The purpose of the System Verification and Validation Report (SVVR) is to document the validation and verification (V&V) processes and procedures that were used by Wolf Creek Nuclear Operating Company to assure that the Advanced Logic System Main Steam and Feedwater Isolation System (ALS MSFIS) controls being developed meets the requirements for a safety-related Class 1E qualified nuclear power plant safety system.

The SVVR will be issued in four (4) phases, as follows:

- Revision 0 -- Requirements Analysis Report
- Revision 1 -- Design Analysis Report
- Revision 2 -- Implementation and Test Analysis Report
- Revision 3 -- Validation Test Report

This is Revision 0, the Requirements Analysis Report.

The Verification and Validation Report will be a living document that is prepared and updated periodically during the course of the project development. Each phase of the project, e.g., System Conceptual Requirements, System Design Requirements, Design, ..., shall be covered by a subsection that documents in detail the V&V efforts during that phase, and the results thereof, including anomalies discovered and their resolution and consequent rework, reverification and revalidation. The documentation that each phase has been completed in full compliance with the requirements of that phase with respect to the specifications shall be included or specifically referenced from among the other required project documentation. The final report will consist of these subsections, together with subsections providing an overview and a summary of the entire V&V effort. The Traceability Matrix shall be included as an appendix to the V&V report. The format of the report will generally follow the outline below:

1. Purpose/Applicability/Limits/Exclusions of this VVR.

2. Summary/Overview of the Project V&V effort.

3. System Requirements Phase V&V

4. Hardware Requirements Phase V&V

5. Design Phase V&V

6. Implementation Phase V&V (including PPTR)

7. Test Phase V&V (including FATR)

8. Installation and Checkout Phase V&V.

Appendix: Traceability Matrix

The VVR will supplement the Qualification Test Report (QTR) by providing the details of the qualification of the system.

The Verification and Validation Report shall be prepared by the V&V Engineer, and approved by the Project Manager.

2. REFERENCE MATERIAL

2.1 Binding documents applicable to the Verification and Validation Plan for this project are:

2.1.1 Wolf Creek Nuclear Operating Company (WCNOC) Specification J-105A
2.1.2 CMP – Configuration Management Plan for Class 1E Qualified ALS MSFIS
2.1.3 AP 05F-001 - Design Verification
2.1.4 AP 05-002 - Dispositions and Change Packages
2.1.5 AP 05-005 - Design, Implementation & Configuration Control of Modifications

3. VERIFICATION AND VALIDATION OVERVIEW

3.1. ORGANIZATION

This section describes the organization for design/development and verification and validation of the subject system.

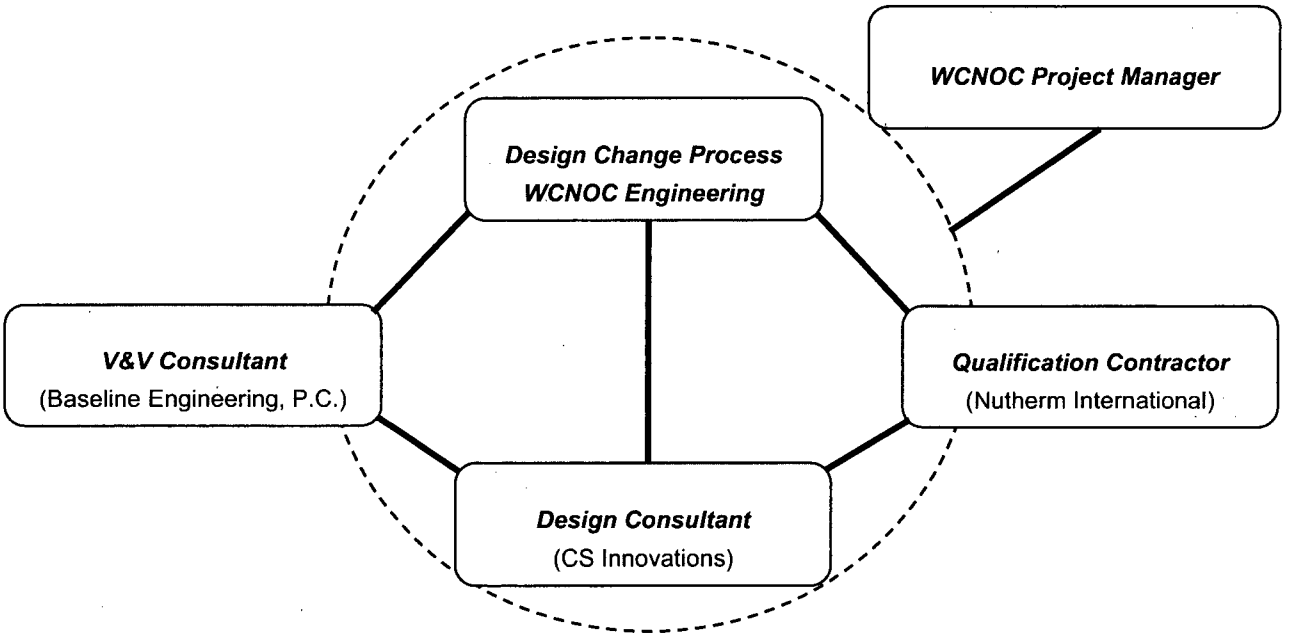
The project includes three independent groups, under the oversight of the ALS MSFIS Project Manager and WCNOC Engineering:

1. WCNOC Engineering - responsible for the design and implementation of modifications at Wolf Creek using established Wolf Creek processes and procedures (AP 05-002 Design Change Process). As a part of the established processes and procedures, an independent V&V of the Design Change Package is performed by a qualified Wolf Creek Engineer.

2. Design Contractor - responsible for the design, development and integration of the product. For this project, CSI is providing this function.

3. Qualification Contractor - responsible to provide both oversight and direct actions to ensure that the requirements on qualification of Safety-Related hardware for the Class 1E system, including its performance, integration, configuration control, and documentation, are satisfied. As the Appendix B supplier, NI is performing this function.

4. V&V Consultant - responsible to provide independent oversight and direct actions to ensure that the V&V requirements for a Class 1E system are satisfied. Baseline Engineering.



ALS MSFIS PROJECT ORGANIZATION CHART

3.2. V&V RESOURCES SUMMARY

3.2.1 V&V Staffing:

3.2.1.1 V&V Engineer, having broad background and experience in the design, development, test and operation of nuclear power plant instrumentation and control systems, and the standards and practices in this discipline, particularly regarding the experience in applying digital computer technology in these applications. The V&V Engineer shall perform and/or direct the performance of the V&V activities of the project.

3.3. TASKS AND RESPONSIBILITIES

This section identifies the responsibilities of specific individuals and organizations within the framework of the SVVP.

3.3.1. Project Manager Responsibilities

The project manager is responsible either personally, or through the actions of others, for the performance of the entire ALS MSFIS Project, including all aspects of design, development, manufacture, testing, and shipping. The following elements of V&V related activities are included in these responsibilities:

Prepare System Specification

Prepare Project Plan

Coordinate subcontracted design, qualification and test

3.3.2. Verification and Validation Engineer Responsibilities

The V&V engineer is an independent individual that is responsible to supervise and/or perform the V&V plan including the documentation thereof. Responsibilities include:

Perform and/or supervise verification and validation activities for each project phase.

Prepare the following plans:

System V&V Plan (SVVP)

Configuration Management Procedure (CMP)

Prepare the Following Documents:

Verification and Validation Report (VVR, this document)

Requirements Traceability Matrix (RTM)

System Reliability Analysis (SRA)*

Failure Modes and Effects Analysis (FMEA)*

* The SRA and FMEA, although not "traditional" V&V functions, are being performed by the V&V engineer. The reports will be included in the V&V Report as significant factors in the total system V&V.

3.3.3. Qualification Contractor Responsibilities

The Qualification Contractor is responsible for all aspects of the Class 1E qualification of the ALS MSFIS System. The following elements of V&V related activities are included in these responsibilities:

Prepare the following plans:

Qualification Plan
Dedication Plan

Prepare the Following Procedures:

Seismic Test Procedure
EMI Test Procedure

3.4. TOOLS, TECHNIQUES AND METHODOLOGY

3.4.1. Tools

One special tool is used in the V&V program, as follows:

1) A software tool (IBM Rational Pro) for tracking system requirements from the original specification through the various design documents, and generating the Requirements Traceability Matrix.

3.4.2 Techniques and Methodologies

The fundamental methodology is to verify and document that each phase of the system development life cycle resulted in a product that satisfies the requirements for that phase. It must be proven that all elements of the design conform to the requirements. Further, it must be demonstrated that the integrated product performs all of the required functions, with no unintended functions.

To assure adequacy of the design and to facilitate the performance of the verification and validation process the following steps were taken:

a. Detailed, well defined requirements shall be established and formatted to facilitate verification that each requirement is satisfied, e.g., to facilitate testing and tracking.

b. To the maximum practicable extent, requirements were specified in well defined mathematical language, such as logic diagrams, state tables, or other unambiguous forms.

c. A traceability matrix is maintained to facilitate verification that the requirements were correctly propagated forward through the design, testing and validation steps of the development process, and so that validation at each phase of the development process could be related specifically to these requirements.

d. Testing was shall be defined and derived from the established requirements.

e. Testing results shall be well documented.

f. Configuration management shall be enforced.

g. Changes in requirements shall be controlled through a process of approval, documentation, and verification and validation commensurate with the scope and criticality of the changes.

h. Software that has been procured for use in design and/or testing shall be controlled during all phases of MSFIS development.

i. Procedures shall assure configuration control, including verification that the configuration used during testing is the same as that used for the final system.

4. LIFE CYCLE V&V

The life cycle used in this project follows the "waterfall" model and includes the following phases:

1) System Requirements Phase
2) Hardware Requirements Phase
3) Design Phase
4) Implementation Phase
5) Test Phase
6) Installation and Checkout
7) Operation and Maintenance

4.1. MANAGEMENT

The management of the V&V process for this project entails a close working relationship between the V&V Engineer and the Project Manager, to define the "fine structure" for the V&V work within the framework defined in this document as shown in Figure 4-1. The V&V report (this document) is prepared and maintained as a living document during the life of the project by updating and adding material as each phase of the project is completed and any necessary iterations are performed.

4.2. SYSTEM REQUIREMENTS V&V

4.2.1. Overview

System requirements were established by Wolf Creek in Specification J-105A. CSI used this document to base the preparation of the conceptual design. One verification and validation step was taken in this phase:

1) Critical review of J-105A and resolution of comments and questions deriving there from.

The principal V&V used in this phase was the critical review of the Wolf Creek specification followed by discussions to resolve any comments or questions. The traceability matrix was initiated to provide a formalized data base that provides item number by item number correlations. Particular attention was given to assuring that the requirements are amenable to demonstration by test of the completed system. Approval was obtained from the CSI Lead Design Engineer, Qualification contractor (NI), V&V Engineer and the Project Manager following resolution of all comments resulting from the System Requirements Verification. The criteria for satisfactory completion of this phase were the agreement by all parties that closure was achieved on all issues and that each individual technical requirement could be demonstrated through either test or analysis.

4.2.2. Inputs/Outputs

The input for this phase was the initial J-105A specification, Revision 1

The output for this phase was the issue of the approved J-105A specification, resolving all comments, Revision 2.

4.3. HARDWARE REQUIREMENTS V&V

The hardware requirements phase consisted of one step:

1) The preparation of the System Requirements Documents (SRD, "ALS MSFIS System Specification") by CSI.

The SRD provides a structured delineation of the system requirements contained in the J-105A specification that will be satisfied by the design, and the manner and structure in which the design will function to satisfy those requirements. The SRD addresses:

a. Process inputs, including test inputs.

b. System logic required for operation of the MSFIS.

c. Process outputs, including ranges, accuracies, update interval, and human factors considerations of the operator interface.

d. Initialization requirements such as initial values and start-up sequence.

e. Logic for response to detected failures.

f. Operator interfaces (control panels, displays).

g. In-service test and diagnostic capabilities.

h. Timing requirements for all time dependent events, including overall system requirements.

i. Limitations on processing time.

j. Security requirements such as passwords.

k. Design features that provide administrative control of all devices capable of changing the content of stored setpoints and logic.

l. Initialization requirements such as power-up and power-down.

m. Design features for the detection of system failure.

n. Manually initiated in-service test or diagnostic capabilities.

o. Human factors engineering design features encompassing operator interfaces associated with operation, maintenance, and testing.

p. Mechanical and electrical interfaces with Wolf Creek's existing systems and structures.

q. Design features necessary to assure satisfaction of the seismic and electromagnetic interference design requirements for the system.

The SRD includes all of the technical requirements of the project in a form that facilitates tracking back to the statements of the J-105A specification, and forward to the succeeding phases of the development program.

4.3.1. Verification and Validation Tasks

The verification and validation tasks for the requirements phase consisted of independent reviews of the documents prepared in this phase against the Wolf Creek J-105 specification. All questions, comments or anomalies found during the reviews were documented and resolved before proceeding to the next phase (design) of the development program.

4.3.2. Methods and Criteria

The traceability matrix was updated to confirm that the complete set of J-105A specification requirements were covered by the SRD. This step included:

1. Tracing the requirements to the system requirements.

2. Review of identified relationships for correctness, consistency, completeness, and accuracy.

3. Review to assure the requirements are testable.

4. Assessment of how well system requirements were satisfied, and identification of key performance and critical areas of the design.

5. VERIFICATION AND VALIDATION SUMMARY

The Verification and Validation of the requirements phase of the development program for the ALS MSFIS was successfully completed.

Open work items remaining include the following:

- Design Analysis
- Implementation and Test Analysis
- Validation Test

This Verification and Validation Report will be updated by revision to reflect the completion of each phase.

Attachment 1

J-105A Document Comment Sheets

DOCUMENT COMMENT SHEET

Document No: J-105A(Q) Rev: 1

Reviewer: Randy Butz WCNOC 7/14/2006

Print Name *Department/Company* *Due Date*

Validation Personnel Assigned (if required) *(Print Names)*

AFFECTED STEP	COMMENTS	ACTION TAKEN	ACTION ACCEPTABL

DOCUMENT COMMENT SHEET

5.6.2.e	This requirement should only apply to the wiring to the field devices	Specify field terminal blocks	RFB 7-10-06
5.6.2.h	Need to be more specific on which vendor wording needs to be labeled, having all wiring labeled is not required	"wire numbers at each termination to field terminal blocks by means of …"	RFB 7-10-06
10.3.2	Specify which wires will be dielectric tested	Specify that all vendor wiring outside card rack shall have dielectric testing performed.	RFB 7-10-06
5.4	The radiation dose requirements in this section are not applicable	Remove the radiation wording in this section.	RFB 7-10-06
5.2.4.a.2	80mS is not too long of a filter time	Based on testing and discussion the filter time of 70mS should be the requirement	RFB 7-10-06
5.6.4	What if the vendor does not use the existing connectors?	Specify further by adding "If Controls Seller uses new connectors they will be a type which will meet seismic and noise requirements."	RFB 7-10-06
5.9.1	The wording redundant elements does not describe the separation properly	Change the wording to "Separation groups (trains) are to be electrically and ….any interaction between different separation groups…"	

7-10-06

Comments Accepted Signature *Date*

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AFFECTED STEP	COMMENTS	ACTION TAKEN	ACTION ACCEPTABLE *Initial/Date*
5.6.1	These requirements are covered under the EPRI TR102323 Rev 2	Remove current wording and insert the following "The Replacement MSFIS System shall comply with the EMI / RFI requirements of EPRI TR-102323 as modified by Regulatory Guide 1.180. Testing is specified in Section 10.7. The Controls Seller's scope of work includes any required corrective action."	RFB 7-10-06

7-10-06

Comments Accepted Signature

Date

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Note: this form provides a method of documenting review and validation comments.

Enter the Document No and the proposed Revision number.

Enter name of Reviewer or the Validation Coordinator, the responsible Department and the Due Date for the review.

If used for Validation, Enter the names of additional personnel performing Validation, otherwise this is left blank.

In the comment block:

The Reviewer identifies the affected step and provides a description of the comment in the Comments column. The Preparer responds to the comment in the Action Taken Column.

The Reviewer initials and dates the satisfactory resolution of the comment in the Action Acceptable column.

When all comments are completed, complete the page information, each comment page is numbered sequentially and a total number of pages is indicated, in the format of Page X of Y.

When all comments have been satisfactorily addressed, sign the Comments Accepted Signature block and put in the dates the comments were accepted.

DOCUMENT COMMENT SHEET

Discard this sheet

DOCUMENT COMMENT SHEET

Document No: J-105A(Q) Rev: 1

Reviewer: Tom Burns (Print Name) | Major Mods/Wolf Creek (Department/Company) | 5/24/2006 (Due Date)

Validation Personnel Assigned (if required) *(Print Names)*

AFFECTED STEP	COMMENTS	ACTION TAKEN	ACTION ACCEPTABLE *Initial/Date*
References	EPRI 102323 Rev1 is listed, why not Rev2 (which was issued to agree with RG 1.180)?	Changed from Rev 1 to Rev 2	twb / 6/2/06
5.2.2, 2nd para, last sentence	change to "...and shall continue to perform it's safety related function ..." . (for requirements traceability).	Changed as suggested	twb / 6/2/06
5.2.4 a. 2)	this seems too short (low pass 100Hz); 10Hz (100ms) would provide much better noise immunity but would need some relief on the time response requirement. Does the FSAR need 100ms MSFIS controls? If so, use slower response for handswitch, keep 10ms for ESFAS only.	Changed 5.2.4.a.2 from >10mS to > 80mS	twb / 6/2/06
5.2.4 c.1)	there was a spec of 200W @140V with the solenoid cold. If CCI confirms this it should be included	No response from CCI. No action taken at this time	twb / 6/2/06
5.2.5 b. 1)	does the 60sec time delay need to be included in the priority (i.e. OPEN is ignored during the timeout even if ES/C is not present)? If the actuator can handle it, it may be advantageous to be able to override an inadvertent CLOSE immediately (as long as the CLOSE command is not present).	The determination is yes. The closure of the valve is determined by time as opposed to valve position indication, per actuator manufacturers recommendation. Further the reversal of an inadvertent valve closure would not provide significant benefits to the operation and/or testing of the valves, actuator, or controls	twb / 6/2/06

Thomas W. Burns — *Comments Accepted Signature*

6/2/06 — *Date*

DOCUMENT COMMENT SHEET

AFFECTED STEP	COMMENTS	ACTION TAKEN	ACTION ACCEPTABLE *Initial/Date*
5.2.5 b. 2)	why ignore inputs while in BYPASS? As long as the cabinet A/B/C outputs don't change, it would be better to verify complete input signal path (from handswitch or ESFAS). The input from ESFAS is needed anyway to provide verification of the safety function	Wording changed to be more descriptive	twb / 6/2/06
5.2.6 a. 1)	something missing in this para, "Further, the selection of BYPASS shall Except..."	Wording deleted	twb / 6/2/06
5.2.6 a. 3) a)	there is no STANDBY state		twb / 6/2/06
5.2.6 a. 3) c)	state which LED. Also, why was color deleted? Shouldn't the colors conform to a plant standard, or if there is none why not define it?	Specified which LED	twb / 6/2/06
5.2.6 a. 3)	this sequence is from the existing rotary test switch positions, which demonstrates proper response to ESFAS input with a standing OPEN command. Need to simulate an OC prior to step (d) to duplicate this.	The intent of this section is to describe the OPERATE/BYPASS sequence. The testing performed by the rotary switch in the current system will be performed via automatic system tests within the ALS	twb / 6/2/06
5.2.6 a 4)	Why were the valve position inputs dropped? Seems like good feedback to include in self test, and in 5.2.6 a 4) could be used to make sure valve position matches latched state.	The valve position inputs will be used for information only. No action taken at this time, due to electrical package associated with overall mod not complete. Valve position contacts will be added to the spec for information use only once the details of the contacts are finalized in the electrical package. This is a planned Rev 3 addition.	twb / 6/2/06
5.2.6 b. 1)	Again, why not specify color?	It was determined in the design review meeting on 12/6/2005 that we will not specifiy the color of the IEDs on the vendor controls equipment.	twb / 6/2/06

Thomas Brown — *Comments Accepted Signature*

6/2/06 — *Date*

DOCUMENT COMMENT SHEET

AFFECTED STEP	COMMENTS	ACTION TAKEN	ACTION ACCEPTABLE *Initial/Date*
5.2.7 b. – 2nd para	discusses electromechanical relays; delete.	Deleted	twb / 6/2/06
5.6.3 b. 2nd para	move DC power specs to para. (a), specify as an operating range, 105 -140V (for requirements traceability).	Moved as suggested	twb / 6/2/06
7.0	typo, Wold to Wolf.	corrected	twb / 6/2/06
8.3	isn't there a WCNOC standard/spec on tagging (per plant equipment list) for assemblies?	Not for vendor supplied items, the cabinets already have markings per Wolf Creek procedures	twb / 6/2/06
10.3.2	Should be ICS 1-1970, but why not use latest rev (ICS 1-2000).	Changed to ICS 1-2000	twb / 6/2/06
10.3.4	not sure what the impact is here. Gives Nutherm some design responsibility; do we want to do this?	Changed to Controls Vendor	twb / 6/2/06
10.4.3	"coincidence logic"?	Wording changed to" The MSFIS equipment shall be tested…"	twb / 6/2/06
10.6	add statement that the desired qualified life is 40 years either here or in para 5.4. This is needed for the Qualification Plan.	Added statement re: 40 years of life	twb / 6/2/06
General	consider adding accuracy and/or resolution requirement, at least for the timers.	No action taken at this time	twb / 6/2/06
General	consider latest revs:IEEE 336-2005 and IEEE 383-2003	Changed revs to those suggested	twb / 6/2/06

Thomas W. Brown — *Comments Accepted Signature*

6/2/06 — *Date*

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DOCUMENT COMMENT SHEET

AFFECTED STEP	COMMENTS	ACTION TAKEN	ACTION ACCEPTABLE *Initial/Date*
	possible failures or combination of failures."	Removed 10.5.3	
10.7	Last sentence. This testing is not a FAT, it is qualification or design test. Performed only once.	FAT reference removed	
12.1	This applies to the cabinets, not really the replacement system. Should be paired down to applicable sections; at request Nutherm could supply recommendations. (Could remove everything but 12.1.10, for example).	Deleted section which were not applicable to this project	
13.10	Will be generated by CS Innovations (see comments on Section 1.0).	Scope of work clarified throughout complete spec	
For APF-05-004-03, Rev. 1	Need to change time requirements (Example - Control logic prior to design?). Close review of the requirements of this entire document should be made by Wolf Creek. Many of the time/process requirements have already been exceeded or are not truly applicable to this project. Please review and revise.	Changed the timing and content of the submittals on form APF 05-004-03 Rev1	

ALL ACTIONS AS IDENTIFIED ARE ACCEPTABLE

Comments Accepted Signature — 6/12/06 *Date*

Tom Sterbis
Project Manager
FOR NUTHERM INTERNATIONAL

04/11/06
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In the comment block:

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When all comments have been satisfactorily addressed, sign the Comments Accepted Signature block and put in the dates the comments were accepted.

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DOCUMENT COMMENT SHEET

Document No: J-105A(Q) Rev: 1

Reviewer: Tom Sterbis (*Print Name*) Nutherm (*Department/Company*) 5/5/2006 (*Due Date*)

Validation Personnel Assigned (if required) *(Print Names)*

AFFECTED STEP	COMMENTS	ACTION TAKEN	ACTION ACCEPTABLE *Initial/Date*
1.0	Drop or reword last paragraph as not applicable. At present there are at least two primary contractors; CS Innovations and Nutherm, as well as contracted employees of Wolf Creek (Tom Burns) working on this project. Nutherm does not have a contract with any of the suppliers/other contractors. The way this section is worded gives the impression that all work is being performed through Nutherm, which is not the case. Nutherm is providing dedication and qualification services as specified by our contract with Wolf Creek. Nutherm feels that this section should be reworked to reflect the responsibilities of the different vendors.	Wording changed	
1.1 & 1.2	Rework/rewrite both sections. See above.	Section re-written	
5.2.1c	As we understand the design, there are no relays on the output.	Relay references removed	
5.2.1e	Nutherm is not configuring, we are verifying. Clarify areas of responsibility (Nutherm, Wolf Creek, CS Innovations).	Clarofied areas of responsibility throughout complete spec	
5.2.2	Overly broad ? can you remove fuse blocks? Wiring? Reads as if you could pull any and all items out hot. This section should be clarified.	Clarified wording	
5.2.3	Will this be met? Input to final output. Clarify exactly what is expected.	Clarified	
5.2.4 a.2	Quantify momentary. 1msec? 1usec?	Specified >80mS	
5.2.5 a.2	AC sequence initiated. Why initiate open sequence? Section b.1.c makes some sense; need to clarify a.2.	Complete section re-written	

DOCUMENT COMMENT SHEET

AFFECTED STEP	COMMENTS	ACTION TAKEN	ACTION ACCEPTABLE *Initial/Date*
5.2.6	Nutherm understood that the continuous self-test feature was for information only and would not be tested/verified as an acceptance test. Board/component level testing was not in the project scope. This section should be clarified.	Wording changed to define 3 types of system test/detection capabilities. Added statement that Wolf Creek will V&V test and detection capabilities.	
5.2.6 a.1	Define failure of card.		
5.2.7 b.	Last sentence, first paragraph; "Isolation levels" and "output relays"? Please clarify.	Changed wording to"	
5.5.1	Measurement and design are in CS Innovations' scope. As we understood the project, Nutherm was not designing and building doors for the cabinet. If this is desired by Wolf Creek, Nutherm would be happy to discuss it.	Changed wording to "… requirements such as sufficient drive capacity for the actuator solenoids." Removed "Isolation levels" and "Output relays" Scope clarified throughout complete spec. Cabinet doors made as optional, only if required.	
5.5.3	Doors? See above.		
5.6.1	First sentence removed/revised. Change to "Environmental conditions of Wolf Creek as defined in this specification".	See above Changed as suggested	
5.6.3	Relays? b) Define "soft start".	Relays removed, "soft start" removed	
6.1.1	a) Spare parts not Nutherm scope. b) Revise wording ? CS Innovations	Scope clarified throughout complete spec	
7.0	Need to specify stamping req. by Wolf Creek.		
10.2	Remove/change to "Buyer". Wolf Creek is performing all System Reliability Analysis.	Wording clarified Changed as suggested	
10.5.3	Has to be removed or strictly defined. Impossible to test "All		

04/11/06
Rev 0

DOCUMENT COMMENT SHEET

Document No: J-105A(Q) Rev: 1

Reviewer: Tom Sterbis (*Print Name*) Nutherm (*Department/Company*) 5/5/2006 (*Due Date*)

Validation Personnel Assigned (if required) *(Print Names)*

AFFECTED STEP	COMMENTS	ACTION TAKEN	ACTION ACCEPTABLE *Initial/Date*
5.2.2	First sentence. This should be narrowed/better defined. As stated, "all similar modules or components" is far too broad. What is similar? When you say components, do you mean every capacitor on the board? How did we verify that the ones installed are interchangeable? When reviewed, all statements are taken literally in the spec. If you say "all", that means all! I do not believe that is your intention.	Wording changed to "Items designed to be removable from the equipment…"	
5.2.6	Clarify. Specify which aspects are critical characteristics for performance of safety function and which are "nice to have". Continuous monitoring was "nice to have" from our discussions.	Wording changed to define 3 types of system test/detection capabilities. Added statement that Wolf Creek will V&V test and detection capabilities.	
6.1.1.b	Might want to specify that CS maintains capability to provide the items as Commercial Grade (someone else would dedicate/qualify them).	Added wording as suggested	

ALL ACTIONS AS IDENTIFIED ARE ACCEPTABLE

Comments Accepted Signature 6/12/06 *Date*

Tom Sterbis
PROJECT MANAGER
FOR NUTHERM INTERNATIONAL

04/11/06
Rev 0

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When all comments have been satisfactorily addressed, sign the Comments Accepted Signature block and put in the dates the comments were accepted.

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DOCUMENT COMMENT SHEET

Document No: J-105A(Q) Rev: 1

Reviewer: Steen Sorensen — *Print Name* | CS Innovations — *Department/Company* | 5/5/2006 — *Due Date*

Validation Personnel Assigned (if required) *(Print Names)*

AFFECTED STEP	COMMENTS	ACTION TAKEN	ACTION ACCEPTABLE
1.1, #6	Remove "specified"	"specified" removed	
5.2.1, c	Relays are not used in the replacement system	"except that electro-mechanical relays are used as the final output devices" removed	
5.2.2	Removal of a card in one train could impact that trains ability to perform the safety function. But will not cause a plant transient or impact the redundant train.	2nd paragraph, 2nd sentence changed to "Hot swap capability includes the requirement that the controlled equipment shall not cause a plant transient. Further the redundant train shall not lose the capability to continue operation and perform it's intended safety function, closure of MSIVs and MFIVs when required by input conditions."	
5.2.3	Clarify what the response time includes.	Added a sentence " The MSFIS System is contained within cabinets SA075A and SA075B, from field terminal block input to field terminal block output."	
5.2.4, c, 1)	Relays are not used in the replacement system	Removed final sentence. Added de-energize to first sentence, "The MSFIS shall energize / de-energize the MSIV….". Added sentence " The outputs shall provide sufficient voltage to energize the actuator solenoids. Section re-written.	

Comments Accepted Signature *Date*

DOCUMENT COMMENT SHEET

AFFECTED STEP	COMMENTS	ACTION TAKEN	ACTION ACCEPTABLE
5.2.6, a, 1), 2nd paragraph	Failure of an internal MSFIS power supply is not for system to continue ability to perform safety function.	Changed the wording to read " The actuation train … , and shall also enter BYPASS mode automatically in the event of a fatal system error."	
5.2.6, a, 2)	ALS has green lights	Remove the word "amber".	
5.2.6, 1st paragraph and section b	Clarification: Does bypass for a particular valve "mask out" the ESFAS signal only, or does it also mask out OPEN, CLOSE, ALLCLOSE?	Clarified what BYPASS effects	
5.2.6, b, 1)	Wording is too specific	Changed second sentence to read, "When enabled, a BYPASS switch shall, disable the function of the particular actuator/valve for the particular train the BYPASS switch is associated with"	
5.2.6, b, 2)	ALS has green lights	Remove the word "red". Removed 3rd sentence.	
5.2.6, b, 2)	ALS provides indication of the input states by means other than the actuation output lights.	Changed final words "output relays" in 1st paragraph to "solenoids". Remove 2nd paragraph	
5.2.7, b, 1st and 2nd paragraphs	Relays are not used in the replacement system	2nd paragraph removed	
5.5.1, 2nd paragraph	Wording is not useful and confusing	Changed 1st sentence to read "The Seller may provide replacement doors…."	

Comments Accepted Signature *Date*

DOCUMENT COMMENT SHEET

AFFECTED STEP	COMMENTS	ACTION TAKEN	ACTION ACCEPTABLE
5.6.5	Relays are not used in the replacement system	Remove section 5.6.5	
5.6.6	MOV's are not required/used in the same way any more (legacy from Relays, which is different with solid-state circuits)	Changed wording to remove legacy from relays	
5.6.8 (+ App B.)	Change from MV1(2) to MV5(6).	Changed from MV1(2) to MV5(6)	
5.6.7, b, 3rd condition	Verify this feature is required. There is a mix-up between trouble-alarm and Status.	None: Featured is required.	
5.9.2	Please clarify the actual and necessary isolation requirements.	5.9.2 N/A'd not applicable in MSFIS	
5.9.3, b	Terminal block grouping is determined by existing system, as field wiring will not be changed for the MSFIS system replacement	Removed "Grouping of terminal blocks is required for the following:" Removed all 7 groupings Added reference to 5.2.4 which specifies this information	
5.11	Interface requirements – please clarify voltage/current/resistance ranges for following signals: ALARM, STATUS, TEST.F.C, …	Clarified requirement	
7.0 10.3	Specifies components not used in the replacement MSFIS system Is this required?	Changed wording to read "System components shall be tested in accordance with Seller's standard test procedure"	

Comments Accepted Signature *Date*

DOCUMENT COMMENT SHEET

INSTRUCTIONS

Note: this form provides a method of documenting review and validation comments.

Enter the Document No and the proposed Revision number.

Enter name of Reviewer or the Validation Coordinator, the responsible Department and the Due Date for the review.

If used for Validation, Enter the names of additional personnel performing Validation, otherwise this is left blank.

In the comment block:

The Reviewer identifies the affected step and provides a description of the comment in the Comments column. The Preparer responds to the comment in the Action Taken Column.

The Reviewer initials and dates the satisfactory resolution of the comment in the Action Acceptable column.

When all comments are completed, complete the page information, each comment page is numbered sequentially and a total number of pages is indicated, in the format of Page X of Y.

When all comments have been satisfactorily addressed, sign the Comments Accepted Signature block and put in the dates the comments were accepted.

DOCUMENT COMMENT SHEET

Discard this sheet

Document No: J-105A(Q) Rev: 2

Reviewer: Steen Sorensen (*Print Name*) CS Innovations (*Department/Company*) 7/28/2006 (*Due Date*)

Validation Personnel Assigned (if required) *(Print Names)*

AFFECTED STEP	COMMENTS	ACTION TAKEN	ACTION ACCEPTABLE *Initial/Date*
5.2.4 (b)	Need to include '2/4-ESFAS-voting'	Voting is described in section 5.2.5(a)(2)	
5.2.5 1st paragraph	There is no response to feedback signals in the MSFIS application.	Removed reference to feedback signals	
5.2.5 (a)(2)	Need to include '2/4-ESFAS-voting'	Changed paragraph to: "The ***ESFAS*** command is generated from the Solid State Protection System. The Solid State Protection System provides the inputs to the MSFIS from a separate slave relay for each the MSIVs and MFIVs. Each slave relay provides four contacts into the MSFIS, one contact for each valve. The four contacts from a particular slave relay for either the MSIVs or MFIVs shall be evaluated using 2-out-of-4-voting. The 2-out-of-4 vote shall be required for a valid ***ESFAS*** command. The ***ESFAS*** command shall place the **CLOSE** output state for the particular valve based on the contact inputs from the SSPS slave relay, and the particular system MSIV or MFIV. Note: Under Normal Operating conditions the four ***ESFAS*** commands will come in at the same time, as they are derived from the same slave relay coil. The output state shall remain **CLOSE** for 60sec +/- 1sec after the ***ESFAS*** command was initiated. After the 60sec time delay the output shall be changed to **KEEP CLOSED**."	
5.2.6 (2)	What is required here - Please clarify?	Changed wording to: "Ability to manually initiate automatic test(s) and/or detection capabilities which monitor or test the ability of the system to perform the required safety function."	
5.2.6 (a)(1) 2nd paragraph	"regardless of the system state at the time of the command".... This is not correct. If the system is in process of closing a valve (the 60sec period) then the bypass command should be ignored, until after the 60sec period is over, and the output state has	Changed wording to the following "The actuation train for a particular side of a particular valve shall enter BYPASS mode upon command. There shall be one exception to this, which is the situation where the output state is CLOSE and	

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	changed to KEEP CLOSED.	the 60 sec delay is active, in this situation the CLOSE state must be completed and the 60 sec time complete prior to entering the BYPASS [illegible]	
5.2.6 (a)	Last comment: "to prevent accidental….": This is not necessary, and should not be necessary. As long as the overall requirements are maintained then the sequence should not matter.	Wording removed	
5.2.6 (b)	Redundant information – already covered.	Removed section as all information was covered in 5.2.6.a.1 and 2	
5.2.6 (c)	Remove if no requirements	Section Removed	
5.6.7	Alarm is a NO-contact, which open-to-alarm. Open contact = Alarm Closed contact = system is OK.	Changed wording to "open-to-alarm"	
5.6.7 (b)	The last 2 paragraphs are the same – or ??	Removed last paragraph	
5.6.8	The fuses we plan to use is nom. 3.2Amps (recommendation from Tom and used at Callaway).	Changed to 3.2 ampere	
10.3.2	Performed by who?	Qualification Seller added for performing test	
14	Remove if no requirements	Removed section	
Page 30-31	Remove empty pages	Empty pages removed	
App C	Text related to F129 – remove clutter	Clutter removed	