RESOLUTION OF COMMENTS BY THE OFFICE OF NUCLEAR REACTOR REGULATION
REGARDING THE DRAFT SAFETY EVALUATION FOR
TRICONEX TOPICAL REPORT 7286-545-1, REVISION 4
INVENSYS OPERATIONS MANAGEMENT
PROJECT NO. 709

This Attachment provides the U.S. Nuclear Regulatory Commission (NRC) staff's review and disposition of the comments made by Invensys Operations Management (IOM) on the draft safety evaluation (SE) for the Triconex Topical Report (Agencywide Documents and Management System (ADAMS) Accession No. ML112930222). IOM provided its comments in a letter dated February 7, 2012 (ADAMS Accession No. ML120470047).

SUMMARY TABLE OF PROPOSED CHANGES TO TRICONEX TOPICAL REPORT DRAFT SE

Item	Page	Line	Section	Comment	NRC Staff Comment Resolution
(1)	ii	NA	NA	Acronym list correction – capitalize formal title for QAM, as below: "QAM – Quality Assurance Manual"	Accepted, editorial
(2)	ii	NA	NA	Acronym list correction – capitalize formal title for QPM, as below: "QPM – Quality Procedures Manual"	Accepted, editorial
(3)	1	23	1.0	Reference inconsistency (error) with section 6.0 References: On page 1, "Reference 7" is given as the NRC Acceptance Letter, but Reference 7 in section 6.0 is for something else. There is no reference document in section 6.0 that matches the NRC Acceptance Letter (which would appear to be ML102220073). New reference is needed in section 6.0 for this.	Acknowledged, Reference 67 added and correction made to Line 23

ATTACHMENT

SUMMARY TABLE OF PROPOSED CHANGES TO TRICONEX TOPICAL REPORT DRAFT SE

Item	Page	Line	Section	Comment	NRC Staff Comment Resolution
(4)	1	27	1.0	Reference inconsistency (error) with section 6.0 References: On page 1, "Reference 8" is supposed to be an August 5, 2010 letter, but Reference 8 in section 6.0 is for something else. (Reference 59 appears to be the intended reference)	Acknowledged, Reference 59 correction made to Line 27
(5)	1	40	1.0	Reference inconsistency (error) with section 6.0 References: On page 1, "Reference 9" called out in the text discusses an NRC audit. Reference 9 in section 6.0 is for the V9 SER. (Reference 6 appears to be the intended reference)	Acknowledged, Reference 59 correction made to Line 40
(6)	1	45	1.0	Document date error: Date indicated as "March 14, 2010" should be "March 14, 2011."	Acknowledged, correction made to 2011
(7)	6	11	2.2	Second paragraph, line 6 – add "of" before *IEEE*	Accepted, editorial
(8)	7	18	2.2	First paragraph after list of bullets at the top of the page (line 7) – add "that" between *standards* and *contain*	Accepted, editorial
(9)	--	--	--	Comment deleted.	IOM deleted comment
(10)	12	14	3.1.2	First paragraph – delete "and" before *the main processor*	Accepted, editorial
(11)	12	14	3.1.2	First paragraph – add "modules" after *I/O*	Accepted, editorial
(12)	12	20	3.1.2.1	Correction: "…CHASIS…" should be "CHASSIS…"	Accepted, editorial
(13)	13	27	3.1.2.2	Correction: "…CHASIS…" should be "CHASSIS…"	Accepted, editorial

SUMMARY TABLE OF PROPOSED CHANGES TO TRICONEX TOPICAL REPORT DRAFT SE

Item	Page	Line	Section	Comment	NRC Staff Comment Resolution
(14)	14	6	3.1.2.3	Correction: "…CHASIS…" should be "CHASSIS…"	Accepted, editorial
(15)	14	12	3.1.2.3	Revise to read as follows: "…one channel/division."	Accepted, editorial
(16)	15	21	3.1.2.5	The end of this paragraph has a listing of qualified ETAs which contains redundant (duplicated) references to several models, i.e., ETA 9664-810N DO is listed twice ETA 9783-110N AI is listed four times ETA 9790-610N AI is listed twice Listing each one once is sufficient. Delete redundant references.	Accepted, editorial
(17)	15	36	3.1.2.6	Revise for more precise description of equipment as follows: "All power supply modules are rated for 175 watts, which is sufficient to supply the power requirements of all configurations expected in SR applications."	Accepted, editorial, does not change basis of acceptance
(18)	15	39	3.1.2.6	For improved clarity, reword this line to read: "…120 VAC/DC (alternating or direct current), 230 VAC, and 24 VDC."	Accepted, editorial
(19)	20	31	3.1.2.8	For improved clarity, reword this sentence to read: "…an alarm is raised <u>by</u> the 3008N modules <u>on the main chassis power modules</u>."	Accepted, clarification that does not change basis for acceptance
(20)	21	26	3.1.2.8.1	Change to read: "…hardware and software <u>were</u> requalified…"	Accepted, editorial

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Item	Page	Line	Section	Comment	NRC Staff Comment Resolution
(21)	22	38	3.1.2.8.4	Capitalize title to read: "…Next Generation…"	Accepted, editorial
(22)	23	18	3.1.2.8.4	To clarify this paragraph, delete the sentence starting on this line, as follows: "~~This is a non-triplicated module for use on non-critical points that are not compatible with 'high-side' solid-state switches.~~" NOTE – the reference to "non-critical points" pertains to compliance with IEC *functional safety* requirements (e.g., IEC 61508). All Tricon V10 N-modules are qualified for nuclear safety-related use.	Accepted, NRC staff agrees with clarification
(23)	23	24	3.1.2.8.4	To clarify this paragraph, reword the sentence starting on this line, as follows: "Ongoing diagnostics test the operational status of the relay output module. ~~which is not intended for use on critical points or switching of field loads.~~" NOTE – the reference to "critical points" pertains to compliance with IEC *functional safety* requirements (e.g., IEC 61508). All Tricon V10 N-modules are qualified for nuclear safety-related use.]	Accepted, NRC staff agrees with clarification
(24)	23	28	3.1.2.8.4	Correct model number to read: "…Model 3636TN was …"	Accepted, NRC staff agrees with clarification
(25)	24	9	3.1.2.9	Correction: "…Document NTX-10-14..." should be "Document NTX-SER-10-14..."	Accepted, NRC staff agrees with clarification

SUMMARY TABLE OF PROPOSED CHANGES TO TRICONEX TOPICAL REPORT DRAFT SE

Item	Page	Line	Section	Comment	NRC Staff Comment Resolution
(26)	24	33	3.1.2.9	Provide clarity for first use of Abbreviations: "P2P" should be "Peer-to-Peer (P2P)…" and "SAP" should be "Safety Application Protocol (SAP)…"	Accepted, editorial
(27)	28	36	3.1.3.2	Item 4.2(4) indicates that the TriStation "should not be connected" to the Tricon during SR operation, and references section 3.1.3.2. This is not a restriction in the TR. For consistency with the Topical Report Appendix B (Application Guide), section 6.4.D, revise page 28, line 39 to read: "…~~prevented~~ controlled through plant-specific procedures…" [See related comment p 130, p152]	Accepted, NRC staff agrees with clarification
(28)	30	16	3.2	Correction to read: "…for review are listed…"	Accepted, editorial
(29)	30	47	3.2	Reference inconsistency with section 6.0: "Reference 9" is incorrect in this location (Reference 10 appears to be intended). Also the IOM document number should be corrected to read "NTX-SER-09-05."	Accepted, editorial
(30)	31	47, 48	3.2.1	Confusion due to extra bullet: Remove bullet on line 49 and repair punctuation to make lines 47-49 coherent as a single bulleted item.	Accepted, editorial
(31)	33	4	3.2.1	Terminology correction: "…injection…" should read "…insertion..."	Accepted, NRC staff agrees with clarification
(32)	33	25	3.2.1	Correction: "…IOM adapted..." should be "…IOM adopted..."	Accepted, editorial

SUMMARY TABLE OF PROPOSED CHANGES TO TRICONEX TOPICAL REPORT DRAFT SE

Item	Page	Line	Section	Comment	NRC Staff Comment Resolution
(33)	33	27	3.2.1	Correction: "…Global Quality Assurance Manager…" should be changed to read "…Global Nuclear QA Director. Although…"	Accepted, NRC staff agrees with clarification
(34)	33	37, et al	General	For consistency and clarity throughout the document, TÜV Acronym should be used instead of TUV.	Accepted, editorial
(35)	33	39	3.2.1	Correction: "…IEC 16508…" should read "…IEC 61508…" in two places in this paragraph.	Accepted, NRC staff agrees with clarification
(36)	35	47	3.2.2	Correction: Revise to read as follows: "…using the Peer-to-Peer (P2P) protocol."	Accepted, editorial
(37)	38	40	3.3	For completeness of testing areas, after "…interference (EMI/RFI)," add "electrical fast transient,…"	Accepted, NRC staff agrees with clarification
(38)	42	39	3.3.2	For clarity of response time dependence and de-emphasize specific test specimen calculation detail, it is recommended to revise the 3rd and following sentences of this bullet paragraph to read: "…The Tricon response time is dependent on specific system configuration and is calculated for each application. The acceptance criteria used for the NRC staff's evaluation is based on the calculated maximum response times given in IOM Document No. 9600164-731 Section 4.0 (Reference 43). Tested maximum response times (which met the calculated response criteria) were given in IOM Document No. 9600164-566 (Reference 44): DI to DO loop 83.0 msec, AI to DO loop	Accepted, NRC staff agrees with clarification

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Item	Page	Line	Section	Comment	NRC Staff Comment Resolution
				119.0 msec, AI to AO loop 126.5 msec. Similar exception to the EPRI TR-107330 criteria was approved by the NRC…"	
(39)	43	19	3.3.3	Correction: Change "University of Lowell" to "University of Massachusetts, Lowell."	Accepted, NRC staff agrees with clarification
(40)	45	39	3.3.4	For improved consistency (and de-emphasized test process detail, e.g., specific wiring contact points) it is recommended that this paragraph be generalized to read: "IOM recorded two internal diagnostic faults during the high temperature hold period. As described in the Environmental Test Report (Reference 46), the Model 3708E thermocouple input module reported a diagnostic fault message during the high temperature hold period. The fault cleared automatically during ramp-down from the high temperature hold period. The normal operating performance data recorded during Environmental Testing showed that the affected points of the module continued to operate correctly in the presence of the fault. The high temperature Operability Test analog I/O accuracy data shows that the points continued to meet the accuracy specifications in the presence of the fault. Model 3623T 120 VDC digital output module also reported a diagnostic fault message during the high temperature hold period. The detected fault did not impact the proper operation of the TUT during testing."	Accepted, NRC staff agrees with clarification

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Item	Page	Line	Section	Comment	NRC Staff Comment Resolution
(41)	46	29	3.3.5	Correction: Change to read, "…personnel provide*d* testing services and establish*ed*…"	Accepted, editorial
(42)	47	22	3.3.5	Paragraph beginning on line 22 (power supply details) - Suggest revision to this paragraph (to remove internal process detail on test specimen settings) starting with 7th sentence to read: "The power supply to the 120VAC and 230 VAC chassis power supply modules were set the minimum allowable operating voltage as specified by the manufacturer." (End paragraph)	Accepted, NRC staff agrees with clarification
(43)	47	43, 44	3.3.5	For consistency with Topical Report, change lines 43& 44 to read: "…rear chassis mounting brackets and fastener hardware, and standard Tricon V10 external termination assembly mounting plates. Details on the equipment…" [Power supply mounting plates were not part of the system]	Accepted, NRC staff agrees with clarification
(44)	48	5	3.3.5	Paragraph beginning on line 5 (details of seismic test set-up) contains proprietary information previously redacted in Invensys documents as addressed in Invensys 1/10/12 letter (NRC-V10-12-001). Request deletion of this entire paragraph from line 5 through line 11. Removal of this testing process detail will allow entire SER to be fully "public" and eliminate two SER versions.	NRC staff finds that removal of this paragraph does not impact the staff's conclusion. The IOM report that contains this information remains referenced in the safety evaluation.
(45)	48	44	3.3.5	Correction to statement regarding the connector - change this line to read:	Accepted, NRC staff agrees with clarification

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				"…address problems with the interface cable connection. A cable restraint at the tie-down point was modified, retesting was not required." [The issue was with the interface cable restraint (tie down point to the test fixture).	
(46)	48	50	3.3.5	Correct the description of the current wording of the paragraph that begins on line 50. Reword this paragraph as follows: "During setup/checkout testing IOM determined that an interposing relay would be required to monitor the chassis alarm contacts as a result of the test setup. This configuration had a potential to mask contact chatter during the test. Therefore, the TUT chassis alarm relays were not seismically qualified as part of the Seismic Testing." [Current wording inaccurately characterized a condition planned in advance to accommodate a recognized equipment condition]	Accepted, NRC staff agrees with clarification
(47)	49	5	3.3.5	Correct statement to read: "…the tested Tricon V10 system equipment is qualified to the …" [Reference to third party power supply dropped. This equipment was not included in the qualification scope.]	Accepted, NRC staff agrees with clarification
(48)	52	11	3.3.6	Correct statement to read: "…testing of the TUT was performed inside open-frame racks. The…" [The TUT was not tested inside a shielded enclosure. It was open on all sides.]	Accepted, NRC staff agrees with clarification

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Item	Page	Line	Section	Comment	NRC Staff Comment Resolution
(49)	54	22	3.3.6	For consistency with revised TR, add new paragraph after line 22 to add an exception for lack of IEC 61000-4-10 testing. Paragraph should read: "IEC 61000-4-10 Testing: Radiated Susceptibility, Damped Oscillatory Magnetic Field • Due to test execution anomalies, the results of this testing were determined not to be valid. Therefore, compliance with IEC 61000-4-10 is indeterminate." Also make change to line 29 to read: "…1600081-001, ~~and~~ Digital Output Module 3601T (115VAC) with ETA 9663-610N, and the IEC 61000-4-10 Testing."	Accepted, NRC staff agrees with clarification.
(50)	54	27, 32	3.3.6	To clarify terminology ("outages") in this paragraph, reword as follows: Line 27, revise to read: "…above, with the exceptions as noted for the 8310…" Line 32, revise to read: "…Given the exceptions noted above, the NRC…"]	Accepted, NRC staff agrees with clarification
(51)	54	33	3.3.6	To correct erroneous reference, revise to read: "…system did not fully meet the guidance of RG 1.180, Revision 1, for the…"	Accepted, NRC staff agrees with clarification
(52)	55	29, 32	3.3.6.1	Correction: This paragraph is discussing EFT testing. Change "…surge withstand…" to "...EFT..." in two places in this paragraph.	Accepted, NRC staff agrees with clarification
(53)	59	45	3.3.8	Correction: This paragraph is discussing ESD testing. Change "Applied EFT disturbances..." to "Applied ESD disturbances…"	Accepted, NRC staff agrees with clarification

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Item	Page	Line	Section	Comment	NRC Staff Comment Resolution
(54)	60	2, 5	3.3.8	This paragraph is discussing ESD testing. Change "…surge withstand…" to "…ESD..." in two places in this paragraph.	Accepted, NRC staff agrees with clarification
(55)	61	22	3.3.9	Second paragraph – revise sentence as follows: "…capability (if these modules are…"	Accepted, editorial
(56)	61	25	3.3.9	Recommend that, for clarity and consistency within the paragraph, this line be reworded to read: "…3636TN Relay Output Module was tested for Class 1E isolation capability. This allows…"	Accepted, NRC staff agrees with clarification
(57)	61	38	3.3.9	Incomplete sentence. For clarity, change to read, "…communication port fault testing."	Accepted, editorial
(58)	62	19	3.3.9	Change to read: "During isolation testing…"	Accepted, editorial
(59)	63	21	3.3.10	First line of the paragraph is an extraneous sentence fragment. Fragment should be deleted.	Accepted, editorial
(60)	63	30	3.3.10	Title "Prudency Test" should be fully capitalized.	Accepted, editorial
(61)	63	43, 46	3.3.10	At two locations in the paragraph, "…de-gradation…" should be "…degradation…"	Accepted, editorial
(62)	67	1	3.4	For clarity, change to read: "…safety system is evidenced by a predictable…"	Accepted, editorial
(63)	67	24	3.4.1	For clarity, change to read: "…milliseconds or less,' and cites…"	Accepted, editorial

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Item	Page	Line	Section	Comment	NRC Staff Comment Resolution
(64)	68	32	3.4.2	For consistency and clarity within this section replace "main processor" with "application processor" throughout the paragraph beginning on line 32. [As described in this section each main processor has two processors (application and communication)]	Accepted, NRC staff agrees with clarification
(65)	68	45	3.4.2	For consistency and clarity within this section, revise the first sentence of this paragraph as follows: "The application processors enter corrected data into the control program, which the application processor executes in parallel with the neighboring application processors."	Accepted, NRC staff agrees with clarification
(66)	68	48	3.4.2	For consistency and clarity within this section, revise the sentence starting in this line as follows: "The I/O communication processor on each 3008N MP module sends the output data to output modules via the I/O bus."	Accepted, NRC staff agrees with clarification
(67)	69	41	3.4.3	Change to read: "…must be demonstrated; and the…"	Accepted, editorial
(68)	70	15	3.4.3	For improved clarity, revise part of second sentence at line 15 to read as follows: "…module loss of configuration, excess scan time, application not executing, and…"	Accepted, NRC staff agrees with clarification
(69)	70	17	3.4.3	For improved clarity, revise sentence to read as follows: "…The means of detection include watchdog timer, checksum…"	Accepted, NRC staff agrees with clarification

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Item	Page	Line	Section	Comment	NRC Staff Comment Resolution
(70)	70	38	3.4.3	For improved clarity, revise sentence to read as follows: "System diagnostics monitor the health of each main processor module as well as…"	Accepted, NRC staff agrees with clarification
(71)	72	22	3.6	Correction: "…TR-107300…" should be "…TR-107330..."	Accepted, NRC staff agrees with clarification
(72)	75	11	3.7.1	Correction - change to read: "…IP addresses can be programmed..."	Accepted, editorial
(73)	82	32	3.7.3.1.2	This section contains inaccuracies relative to firmware upgrades. For more accurate description of TriStation operation, change this paragraph to read as follows: "The non-safety TriStation 1131 computer will be used to ~~upgrade module firmware and/or~~ reprogram the application program installed on the Tricon controller(s). During these activities the ~~Tricon V10 keyswitch functions to take the~~ Tricon is taken out of service with site administrative procedures and by taking the Tricon keyswitch out of RUN mode.~~and place it into PROGRAM mode~~. The Tricon keyswitch is a physical interlock that controls the mode of the MPs. It prevents the TCM from accepting "write" messages when placed in the RUN position. The position of the keyswitch is continuously monitored by the TMR MPs, with the MPs voting on the detected position of the keyswitch. The Tricon is designed so that an application program output can be provided to activate an annunciator window ~~is activated~~ in the control room when the keyswitch is not in the RUN position. Furthermore, as described in Section 3.1.3.2 of this SE, plant procedures, and administrative controls will restrict using the System Operating Mode keyswitch to change	Accepted, NRC staff agrees with clarification.

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				from the standard operational mode without placing the affected channel into bypass or trip." Also add the following new text to the paragraph: "TS1131 cannot modify firmware in the Tricon controllers. A separate tool is used to perform firmware upgrades with the Tricon module (e.g., 3008N MP, TCM, I/O module) removed from the chassis. The Tricon controller would have to be taken out of service (keyswitch to STOP) and the module removed from the chassis. These activities would be under site-specific administrative controls and performed in accordance with site-specific procedures." [See also revisions to p 92]	
(74)	83	5	3.7.3.1.2	Correction – change to read: "…As described in section…"	Accepted, editorial
(75)	84	21	3.7.3.1.3	Correction – change to read: "…feature which are built…"	Accepted, editorial
(76)	85	11	3.7.3.1.4	To correct reference source of information, revise to replace EQSR with the Topical Report as follows: "…As described in the Triconex Topical Report (Reference 4), all Tricon…" [The Topical Report is the most direct and current reference for the information in question]	Accepted, NRC staff agrees with clarification
(77)	87	33	3.7.3.1.4	For improved clarity, a new paragraph should start after "Send output to DPRAM." New paragraph starts with "…The Communication Task…	Accepted, editorial

SUMMARY TABLE OF PROPOSED CHANGES TO TRICONEX TOPICAL REPORT DRAFT SE

Item	Page	Line	Section	Comment	NRC Staff Comment Resolution
(78)	87	49	3.7.3.1.4	Correction - acronym "…TRMs…" should be changed to "…RXMs…"	Accepted, NRC staff agrees with clarification
(79)	92	33	3.7.3.1.10	For more accurate description of TriStation operation, revise this paragraph to read as follows: "A non-safety computer is used to upgrade module firmware and/or reprogram the application program installed on the Tricon V10 controller(s). During these activities the ~~Tricon keyswitch functions to take the~~ Tricon **is taken** out of service with site administrative procedures and by taking the Tricon keyswitch out of RUN mode. ~~and place it into PROGRAM mode.~~ The Tricon keyswitch is a physical interlock that controls the mode of the 3008N MPs. It prevents the 3008N MPs from accepting "write" messages when placed in the RUN position. This keyswitch is described in Section 3.3.1.3 of IOM Document No. NTX-SER-10-14, "Tricon V10 Conformance to Regulatory Guide 1.152" (Reference 35). It describes the physical protection of the embedded firmware and the process that must be followed to update the software. The keyswitch is implemented by a three-gang, four-position switch. Each of the gangs is connected to one of the 3008N MPs. The values are read by each of the 3008N MPs as a two bit software value. The position of the keyswitch is continuously monitored by the TMR MPs, with the MPs voting on the detected position of the keyswitch. The Tricon is designed so that an application program ouput can be provided to activate an annunciator window ~~is activated~~ in the control room when the Tricon keyswitch is not in the RUN position. The application program has access to the voted keyswitch position through specialized function blocks.	Accepted, NRC staff agrees with clarification

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				These specialized function blocks allow monitoring (i.e., read-only capability) of a system variable for the voted keyswitch position. The application can be programmed to perform any required action on a change of the keyswitch position. ~~For example, the application program could be designed so that repositioning the Tricon key switch to the PROGRAM position causes Tricon V10 to initiate program halt.~~ However, this would be an application specific feature that is beyond the scope of this review." Also add the following new text to the paragraph: "During firmware updates of the Tricon controllers the Tricon module (e.g., 3008N MP, TCM, I/O module) is removed from the chassis. The Tricon controller would have to be taken out of service (keyswitch to STOP) and the module removed from the chassis. These activities would be under site-specific administrative controls and performed in accordance with site-specific procedures." [See also changes to p82]	
(80)	93	19	3.7.3.1.10	To clarify description of device operation, revise wording of first sentence of this paragraph as follows: "However, the Tricon V10 keyswitch does not provide a physical disconnect or interruption of the connection by means of hardwired logic as required by ISG 4, Staff 17 Position 1, Point 10, but instead sets 2 bits within the software to change the operating mode of the Tricon."	Accepted, NRC staff agrees with clarification

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Item	Page	Line	Section	Comment	NRC Staff Comment Resolution
				NOTE – the Tricon keyswitch has no impact on TS1131 executing on the external workstation. The Tricon keyswitch only affects the operating mode of the Tricon 3008N MPs.	
(81)	98	34	3.7.3.1.17	The sentence starting in line 34 lists "signal conditioners" twice. Second one is redundant and should be deleted.	Accepted, NRC staff agrees with clarification
(82)	103	18	3.8	For accuracy and clarity revise this paragraph to read as follows: "IOM submitted a separate document, IOM Document No. NTX-SER-10-14, "Tricon V10 Conformance to Regulatory Guide 1.152" (Reference 35), that provides a detailed description of the Tricon V10 conformance to RG 1.152, Revision ~~3~~ 2. The ~~similarities~~ differences between Revision 2 and Revision 3 for Clauses 2.1 – 2.5 are minor and the NRC staff reviewed the information considering both versions. Cyber security elements of Revision 2 and Clauses 2.6-2.9 are not addressed in this SE."	Accepted, NRC staff agrees with clarification
(83)	104	21	3.8.1	Correction – change to read as follows: "…document NTX-10-14..." should be "Document NTX-SER-10-14..."	Accepted, NRC staff agrees with clarification
(84)	115	41	3.8.1.4	Correction- change to read as follows: "…process is <u>improved</u> because…"	Accepted, editorial
(85)	117	17	3.8.1.5	Correction – change to read as follows: "…requirements <u>traceability</u> matrix…"	Accepted, editorial

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Item	Page	Line	Section	Comment	NRC Staff Comment Resolution
(86)	117	37	3.8.1.5	Correction – change to read as follows: "…these tests validated…"	Accepted, editorial
(87)	118	49	3.9	Correction: "…7286-545…" should be "…7286-545-1…"	Accepted, NRC staff agrees with clarification
(88)	130	17	3.10.2.9	Item 4.2(4) indicates that the TriStation "should not be connected" to the Tricon during SR operation. Section 3.1.3.2 reflects the need to "prevent" the connection and is repeated in this section. This is not a restriction in the TR. For consistency with the Topical Report Appendix B (Application Guide), section 6.4.D, revise page 130, line 20 to read: "…and this should be ~~prevented~~ controlled via administrative control. Any such…" [See related comment p 28, p152]	Accepted, NRC staff agrees with clarification
(89)	132	18	3.10.2.11	The second sentence in this paragraph appears to incomplete. Change to read: "…As noted above, identification of the redundant portions of a safety system (i.e., channels or divisions) is a plant specific activity."	Accepted, NRC staff agrees with clarification
(90)	135	33	3.10.3	As discussed with the staff, some minor revisions to the Topical Report relating to system accuracy are being made. For consistency with these revisions to the Topical Report, it is recommended that this paragraph be reworded as follows: "As stated in the System Accuracy report, the Tricon will maintain its rated reference accuracy specifications over extended periods. As stated in the Failure Modes Effect Analysis report, failure of components affecting the rated reference accuracy specifications are	Accepted, NRC staff agrees with clarification.

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				detected, and the system will generate an alarm and the faulted module will be indicated. Response to the alarm would require replacement of the faulted module and restoration of normal operation. No field adjustments or calibrations of the Tricon are required or possible. The key in the Tricon design is its TMR architecture. By performing continuous cross comparisons between the triplicated values, a verification of actual input and output values is maintained. The effects of calibrated accuracy including drift over time, hysteresis and non-linearity, and repeatability are applicable to the Tricon system and I/O modules and their error contributions are specified in the System Accuracy Specifications document. The effects of temperature sensitivity, power supply variations, arithmetic operations errors, vibration, radiation and relative humidity are not applicable to the Tricon system and I/O modules and their error contribution is zero."	
(91)	139	33	3.11.1.1.2	Correction – change to read: "…safety related software…"	Accepted, editorial
(92)	141	12	3.11.1.1.4	Correction – change to read: "…with sufficient independence…"	Accepted, NRC staff agrees with clarification
(93)	143	12	3.11.1.2.2	Last sentence of paragraph appears to be incomplete. Suggest addition of words to read: "…commercial grade digital equipment and existing programmable logic controllers (PLCs)."	Accepted, editorial
(94)	143	49, 50	3.11.1.3.1	Correction in two places – "…TRM…" should be "…TMR…"	Accepted, NRC staff agrees with clarification

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(95)	144	5	3.11.1.3.1	Clarity of wording – change to read: "…the NRC Staff review of the platform's capability…"	Accepted, editorial
(96)	148	39	3.11.1.6	As this line appears to begin a new separate section (not a continuation of 3.11.1.6), it is recommended that the section from this line through section 4.0 be given a new section number, for example, "3.12 Summary of Regulatory Compliance" and be appropriately reflected in the Table of Contents.	Accepted, editorial
(97)	150	39	(3.11.1.6 or 3.12?)	Correction – change to read: "…I&C systems implemented…"	Accepted, editorial
(98)	151	14	4.1	More accurately characterize this subject, revise to read as follows: "Chassis alarm relays were not seismically qualified as part of Seismic Testing as noted in section 3.3.5." NOTE - Chassis alarms were not monitored during seismic qualification testing.]	Accepted, NRC staff agrees with clarification
(99)	--	--	--	Comment deleted.	IOM deleted comment
(100)	152	6	4.2(4)	Item 4.2(4) indicates that the TriStation "should not be connected" to the Tricon during SR operation. This is not a restriction in the TR. For consistency with the Topical Report Appendix B (Application Guide), section 6.4.D, reword this paragraph as follows: "Section 3.1.3.2 of this SE discusses the use of the TriStation 1131. That section noted that the Tricon V10 PLC system is designed such that the Tricon PLC system is not normally connected to a TriStation PC during SR operation. The plant-specific procedures	Accepted, NRC staff agrees with clarification

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				which control the connection of the TriStation PC to the Tricon PLC system during SR operation will be reviewed by the NRC staff when an applicant requests NRC approval for the installation of a SR system based on the Tricon V10 platform. In addition, the testing of the operational software produced by the TriStation 1131, and these test plans, procedures, and results will be reviewed by the NRC staff when an applicant requests NRC approval for the installation of a SR system based on the Tricon V10 platform." [See also revisions to page 28, line 39 and page 130, line 20]	
(101)	153	28	4.2	This sentence is ambiguous due to document numbering mismatch or missing information. If the ISG 2&4 document is intended, then this line should read "…and ISG 2&4 NTX-SER-09-10…" [If the intent is to include the RG 1.152 document (NTX-SER-10-14), then the sentence needs to be rewritten]	Accepted, NRC staff agrees with clarification and corrects the document number
(102)	154	24	4.2	Correction – change to read: "…NTX-SER-10-14..."	Accepted, editorial
(103)	154	50	4.2	Corrections – change to read: "…Appendix B, Application Guide," to IOM Document No. 7286-545-1, provide guidance…"	Accepted, editorial
(104)	155	27	4.2	Correction – change to read: "…based on the Tricon V10 platform."	Accepted, editorial
(105)	156	NA	6.0	Correction of date in Reference 6– change to read: (Reference 6): "…'Audit Report Regarding the Invensys Triconex V10 Upgrade,' March 14, 2011..."	Accepted, editorial

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(106)	159	NA	6.0	Correction of error in ADAMS ML number for the Reference 34: Number indicated as “ML20730573” should be “ML020730573.”	Accepted, editorial
(107)	160	NA	6.0	Correction of error in ADAMS ML number for the Reference 48: Number indicated as “ML093370329” should be “ML093370329, page 14.”	Accepted, editorial
(108)	160	NA	6.0	Correction of error in ADAMS ML number for the Reference 59: Number indicated as “ML102230297, page 28” should be “ML102230297, page 8” (based on discussion on page 78, line 3).	Accepted, editorial
(109)	160	NA	6.0	Revisions were made to several Reference documents in this section and transmitted to the staff in connection with the draft SER comments. Revision number updates to reflect current submitted documents should be made for Reference 26 (EMI/RFI Test Report), Reference 28 (Failure Modes and Effects Analysis), Reference 29 (Compliance with Interim Guidance ISG-2 & ISG-4, Document NTX-SER-09-10), and Reference 58 (System Accuracy Specification).	Accepted, editorial