行政院及所屬各機關出國報告

(出國類別：洽公)

執行NUPIC聯合稽查

服務機關：台灣電力公司核安處

出 國 人　職　　稱：副 處 長

姓　　名：吳 永 富

出國地區：美 國

出國期間：95 年 10 月 19 日至 95 年 10 月 30 日

報告日期：95 年 11 月 24 日

行政院及所屬各機關出國報告審核表

<table>
<tr><td colspan="2">出國報告名稱：執行NUPIC聯合稽查</td></tr>
<tr><td colspan="2">出國計畫主辦機關名稱：台灣電力公司人事處</td></tr>
<tr><td colspan="2">出國人姓名／職稱／服務單位：吳永富／副處長／台灣電力公司核能安全處</td></tr>
<tr><td>出國計畫
主辦機關
審核意見</td><td>☐1.依限繳交出國報告
☐2.格式完整
☐3.內容充實完備
☐4.建議具參考價值
☐5.送本機關參考或研辦
☐6.送上級機關參考
☐7.退回補正，原因：
☐①不符原核定出國計畫
☐②以外文撰寫或僅以所蒐集外文資料為內容
☐③內容空洞簡略
☐④未依行政院所屬各機關出國報告規格辦理
☐⑤未於資訊網登錄提要資料及傳送出國報告電子檔
☐8.其他處理意見</td></tr>
<tr><td>層轉機關
審核意見</td><td>☐同意主辦機關審核意見
☐全部 ☐部分 _____(填寫審核意見編號)
☐退回補正，原因：_____(填寫審核意見編號)
☐其他處理意見：</td></tr>
</table>

說明：

一、出國計畫主辦機關即層轉機關時，不需填寫「層轉機關審核意見」。

二、各機關可依需要自行增列審核項目內容，出國報告審核完畢本表請自行保存。

三、審核作業應於出國報告提出後二個月內完成。

報告人：	直接主管 ：	單位主管 ：	總經理 副總經理 ：

行政院及所屬各機關出國報告提要

出國報告名稱 ：龍門計劃反應器系統主蒸汽隔離閥及安全釋壓閥製程品質查驗

頁數: 37 含附件：☑是

出國計畫主辦機關／聯絡／電話：台灣電力公司

出國人員姓名／服務機關／單位／職稱／電話：

吳永富／台灣電力公司／核能安全處／副處長／(02)23667172

出國類別：☐1.考察☐2.進修☐3.研究☐ 4.實習☑ 5.其他(洽公)

出國期間：95年10月19日至95年10月30日　　出國地區：美國

報告日期：95年 11月24日

分類號／目：

關鍵詞：稽查、聯合稽查、NUPIC、Audit

內容摘要：

本次出國主要係因本公司為美國 NUPIC 組織會員，會員須履行會員義務，包括派員加入 NUPIC 聯合稽查團隊，赴選定之核能設備供應廠家執行稽查。本次出國稽查對象為美國 United Controls International 公司，此公司主要業務為商業級產品檢證作業與電氣儀控設備檢修與測試。

聯合稽查實施要領為依據美國 10CFR50 附錄 B、ANSI 45.2、ASME NQA-1 等核能品質保證法規、標準及方案，並使用 NUPIC 稽查核對項目表(Audit Check List)對廠家之現場作業、技術資料、作業程序書、品質記錄等執行查證，就發現之缺失，要求廠家限期改善，以確保其供應核能設備之品質。

本次稽查發現廠家有潛在影響設備品質之缺失並開立「供應商改正行動要求」有兩件，分別是(1)文件管控缺失：所有舊版之設備檢證規範未銷毀，也未依規定蓋「已被新版取代」之識別章，容易被誤用；設備檢證規範內容已做變更，但未依規定先開立「變更要求書」並依規定程序審查核準，影響變更的正確性；(2)「改正行動要求」結案程序不確實：先前公司內部稽查開立之「改正行動要求」未經查證是否已改正完成即予以結案，容易導致缺失未確實改正。

本公司履行 NUPIC 會員義務，參與聯合稽查，將可分享 NUPIC 執行廠家聯合稽查之所有結果，以及 NUPIC 所建立之資料庫內之核能設備供應廠家資訊，從而建立本公司的合格廠家名單，確保購得的核電廠安全相關設備之品質無虞。

目　錄

頁次

壹、出國目的與出國日程

本公司為確保購得的核電廠安全相關設備之品質無虞，之前申請加入美國核能採購事務委員會(NUclear Procurement Issue Committee, NUPIC)成為該組織之會員，會員可獲取 NUPIC 所建立之資料庫內之核能設備供應廠家資訊，以及分享 NUPIC 執行廠家聯合稽查之所有結果，從而建立本公司的合格核能供應廠家名單，未來核能設備都由合格核能供應廠家購入，必可確保購得的核電廠安全相關設備之品質。NUPIC 會員享有上述權利(好處)，但須履行會員義務，包括派員加入 NUPIC 聯合稽查團隊，並赴選定之核能設備供應廠家執行稽查。本次出國既是履行會員義務，加入 NUPIC 聯合稽查團隊，赴美國 UCI (United Controls International)公司執行聯合稽查，整個任務期間為民國 95 年 10 月 19 日至 10 月 30 日。

貳、出國工作概述

聯合稽查實施要領為依據美國 10 CFR 50 APP. B 、ANSI 45.2、ASME NQA-1 等核能品質保證法規、標準及方案，並使用 NUPIC 事先備妥之稽查核對項目表(Audit Check List)，對受稽查廠家之所有作業事項執行『績效基準(Performance-based)』的查證，就發現之不符合事項，提出並要求廠家限期改善，以確保其供應之核能設備之品質。

本次聯合稽查的對象為美國United Controls International (UCI)公司，茲就①NUPIC聯合稽查主要目的、②United Controls International公司簡介、③聯合稽查做法與稽查結果摘要三方面做說明：

一、NUPIC聯合稽查主要目的

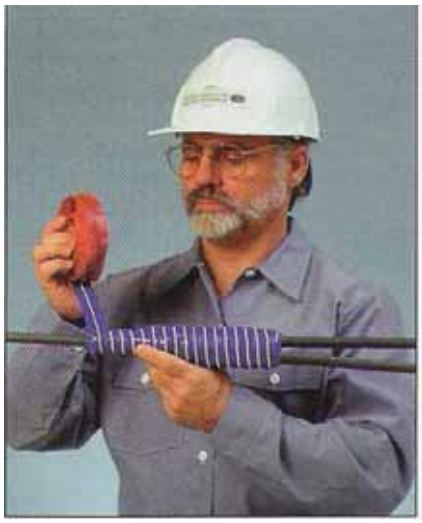
NUPIC聯合稽查之主要目的是在查察受稽查之核能供應商其品保計劃(QA program)的完整性以及品保計劃之執行成效。稽查中若發現有任何不利於產品品質之作業缺失，則開立『廠家改正行動要求(Supplier Action Request; SAR)』要求受查廠家提改正措施，並追蹤至改善完成。稽查結果做為：a)判定受查廠商是否仍為合格供應商，b)未來該廠商受稽查的頻度。另稽查報告將公佈於NUPIC網站上供NUPIC會員下載參閱，NUPIC會員將依據此一稽查

報告的內容來評定受稽查廠家的表現(Performance)，並判定受稽查廠家是否可被該公司評定為『合格供應廠家(ASL; Approved Supplier)』。

二、United Controls International 公司簡介

美國UCI公司為一家商業級產品檢證公司，主要業務有將商業級產品檢證成核能同級品、提供各項機電設備檢修與性能測試，以及販售核能級設備或核能同級品設備；該公司除提供設備檢證與維修服務外，也自產一些核能級的設備和零組件。UCI屬小公司，專職員工僅有11位，兼職員工1~2位，業務須要時也會顧用臨時員。

UCI雖是小公司，但檢證需要之測試設備購置充分，其專職檢證技術人員的核能工作經驗也都在20~30年以上。UCI為電力公司提供的設備服務及產品以控制盤、儀控設備、馬達控制器、馬達檢修或翻新、UCI自產的核能級膠帶最為長見。至於更詳盡的產品與服務項目請參見下表：



Limitorque	Terminal Blocks	Inverters & Rectifiers	Glues
Control Switches: Electroswitch GE SBM/SB1m & CR2940 Telemechnique Westinghouse	Protective Relays	Control & Timing Relays: MDR's P&B Schrack Tyco GE Allen Bradley Cutler Hammer	Sealants
Batteries	Electrical Tapes & Insulators	Lubricants	Gaskets, Seals & O rings
Discreet Electronic Components: Capacitors Diodes Potentiometers Resistors Transistors	Wire/Cable & Lugs/Splices	Greases	Metals & Piping/Tubing
Fuses & Blown Fuse Indicators	Contactors & Thermal Overloads	Oils	Thermostats
Fuse Blocks	Pressure Switches	Refrigerants	Circuit Breakers: Cutler Hammer ABB GE
	Panel Meters/Gauges	Epoxies	Cyberex Parts: UPS Battery Chargers Transfer Switches
	Indicator Lights		
	Light Bulbs		
	Control Transformers		
	Key Switches		

三、聯合稽查做法與稽查結果摘要

1、聯合稽查做法

NUPIC 聯合稽查實施要領為依據美國 10CFR50 附錄 B、ANSI 45.2、ASME NQA-1 等核能品質保證法規、標準及方案，並使用 NUPIC 正式文件中之『稽查核對項目表(Audit Check List)』，對受稽查廠家之所有作業事項執行『績效基準(Performance-based)』的查證，就稽查發現之不符合事項開立『供應商改正行動要求(SAR, Supplier Action Request)』，提送廠家並要求廠家限期改正，以確保廠家供應之核能設備之品質。

本次 NUPIC 聯合稽查由美國南加州電力公司主導，故由該公司指派其設備採購部門主管擔任稽查領隊；此外，聯合稽查團隊尚有四位稽查員及一位技術專家，整個稽查團隊成員所任職之公司及其職務如下表示：

團 隊 成 員	所 屬 公 司	在 公 司 職 務
Mike Jasurda (稽查領隊)	San Onofre NPG, Southern California Edison	Lead Auditor, Vendor Oversight Division.
Herbert Mayes (稽查員)	Southern Nuclear Operating Company	Senior Engineer, Corporate Quality Assurance
Roy Gaudet (稽查員)	PSEG Nuclear, LLC	Lead Auditor, Vendor Oversight Division.
Thomas Lee (稽查員)	San Onofre NPG, Southern California Edison	Lead Auditor Nuclear Oversight Division.
Yun-Fu Wu (稽查員)	Taiwan Power Company	Lead Auditor; Deputy Director, Nuclear Safety Department.
Johnson (技術專家)	San Onofre NPG, Southern California Edison	Lead Auditor, Vendor Oversight Division.

稽查團隊之稽查作業方式則依NUPIC文件『聯合稽查作業程序書(NUPIC Joint Audit Procedure)』執行。稽查員就『稽查核對項目表』這一文件中之十

五個章節做分工(如下表示)並進行查核；稽查領隊則隨時就稽查之重點發現與受稽查廠家對口人員進行溝通，並彙總所有稽查員之稽查報告。

稽 查 核 對 事 項 章 節	指 定 稽 查 員	備　註
1. Contract Review	Roy Gaudet	
2. Design	Herbert Mayes	註(1)
3. Commercial Grade Dedication	Herbert Mayes	註(1)
4. Software Quality Assurance	Yun-Fu Wu	
5. Procurement	Herbert Mayes	
6. Fabrication / Assembly Activities, Material Control and Handling, Storage and Shipping	Herbert Mayes	
7. Special Processes	Roy Gaudet	
8. Test, Inspections and Calibrations	Roy Gaudet	註(1)
9. Document / Control Adequacy	Yun-Fu Wu	
10. Organization / Program	Tom Lee	
11. Nonconforming Items / Parts	Tom Lee	
12. Internal Audits	Tom Lee	
13. Corrective Actions	Tom Lee	
14. Training, Certification	Yun-Fu Wu	
15. QA Records	Yun-Fu Wu	
註(1)：與技術專家一齊查證		

2、稽查結果摘要

本次聯合稽查之進行，白天主要是現場作業觀察、測試設備與量測工具驗證、文件(含技術資料、作業程序書和品質記錄等)審查、以及就發現的缺失與受查廠家對口人做溝通澄清；晚間則就白天查證結果依NUPIC所規定之格式撰寫稽查報告。

NUPIC聯合稽查之稽查報告須在聯合稽查結束後一個月內函寄給受稽查廠家，並被公佈在NUPIC網站上供NUPIC會員下載閱讀，NUPIC會員

則依據此一稽查報告的內容來評定受稽查廠家的表現(Performance)，並判定此廠家是否仍可列在該公司之『合格供應廠家名列(ASL; Approved Supplier List)』上。

由於NUPIC會員是參閱此一稽查報告的內容來評定受稽查廠家的表現(Performance)，因此，稽查報告的內容相當詳細。報告內容不僅載明受查廠家不利於品質之作業缺失，對受查廠家的作業方式也都有詳細的描述(詳見稽查報告部份章節，附錄一)。每位稽查員於稽查結束前就自己所負責的部份撰寫稽查報告，完成之初稿(附錄一)由領隊於稽查結束後帶回自己公司彙總成稽查報告，並於限期內函寄受稽查廠家。

本次聯合稽查團隊發現有潛在影響設備品質之缺失並開立『供應商改正行動要求(SAR)』有兩件：

(1) 文件管控缺失：所有舊版設備檢證規範(Commercial Grad Dedication Specifications; CGDS)均未銷毀，也未依規定蓋『已被新版取代(superseded)』的識別章，容易被誤用；CDGS內容已做變更，但未依規定先開立Engineering Change Request (ECN)並經正常程序審查核準，影響變更的正確性。

(2) CAR結案程序不確實：先前公司內部稽查發現缺失所開立之「改正行動要求」(Corrective Action Request; CAR)未經查證是否已改正完成即予以結案，容易導致缺失未確實改正。

參、結　語

NUPIC聯合稽查可稱得上是相當有制度和有紀律的稽查，它除規範了稽查員的資歷條件外，考量對所有廠家稽查之週延性與公平性，NUPIC事先備妥內容詳盡的稽查核對項目表(Audit Check List)供所有稽查團隊使用，並對稽

查報告的撰寫格式與內容也做嚴謹的規範，因此，不同任務(指到不同廠家做稽查)的稽查團隊其稽查的品質也能趨於一致，這一特點讓所有受稽查的核能設備供應廠家感到放心，也最為信服。

UCI公司雖是一個小公司，但因擁有專精的技術人力、設備和市場(檢證業務)需求，因此經營相當成功。該公司之核心資產除技術人員、檢證與檢修相關測試設備外，還有經年累月所建立的設備檢證規範(約有三、四百份，檢證規範詳範例，附錄二)。

本公司履行NUPIC 會員義務，參與聯合稽查，將可分享NUPIC 執行廠家聯合稽查之所有結果，以及NUPIC 所建立之資料庫內之核能設備供應廠家資訊，從而建立本公司的合格廠家名單，確保購得的核電廠安全相關設備之品質無虞。

附錄一：稽查報告部份章節初稿（吳永富部份）

SECTION 4 – SOFTWARE

METHOD OF VERIFICATION
4.1 Within the assessment/summary section of each checklist question, record the procedures/instructions/drawings including the revision/date used to verify implementation.
4.2 (a.) Verify documented measures are established and implemented to control software quality. Assure the measures include provisions for the acquisition, development, operation, maintenance, and retirement of software, as applicable. (b.) Verify that measures are established and implemented to assure that the life cycle activities are adequately and effectively reviewed. A systematic life cycle includes activities such as requirements, design, acceptance testing, maintenance, configuration management and retirement. The life cycle activities should proceed in a traceable, planned, and orderly manner. The number of activities and relative emphasis placed on each activity will depend on the nature and complexity of the software. (c.) Assure that individuals other than those who designed the software review the design activities. These activities generate documentation that should be considered a quality assurance record. NOTE: This includes firmware. (Document O.E. on Figure 4) Appendix B/ANSI N45.2 Ref: (3/4) ASME Section III NQA-1a-1999 Subpart 2.7 Vendor Quality Manual Ref.: Vendor Quality Manual Ref: N/A

RESULTS: N/A

ASSESSMENT/SUMMARY:

UCI does not develop any software. Software of STARDYNE was procured as commercial grade and dedicated (V&V) for use in safety related applications. Software of Vibration VIEW 5.0.11was procured with a hardware device (a software-based instrument). This section is N/A

METHOD OF VERIFICATION
4.3 Verify that measures are established and implemented to assure that acceptance testing for the software/firmware is performed to demonstrate that the software/firmware adequately and correctly performs its intended function (i.e., specified software design requirements). (Document O.E. on Figure 4) Appendix B/ANSI N45.2 Ref: (4/5, 7/8) ASME Section III NQA-1a-1999 Subpart 2.7 Vendor Quality Manual Ref.: Special Procedure SSA , QCI 12.12 and Vibration Research Corporation Vibration VIEW Manual

RESULTS: Satisfactory

ASSESSMENT/SUMMARY:

UCI owned two software programs. One is stand-alone software, STARDYNE version 4.10. This software is for structural analysis. The other, Vibration VIEW version 5.0.11, came with and performed on the Vibration Research Corporation Vibration VIEW 5.0.11 utilized with the Vibration Research Corporation Vibration Controller M/N: VR8500-4 (a software-based instrument) on the UCI Seismic Simulator.

Special procedure SSA, Rev. 2, dated 12/15/02, Section 7.0, describes the validation and verification that UCI uses to qualify the software. This software has a series of representative example problems, which have been processed through STARDYNE, documented and compared with theoretical or industry accepted results. UCI has chosen three example that are closely associated with the static and natural frequencies analysis to verify and validate that the STARDYNE software provides the expected results before each use of the software. A review was performed of the results of the last validation of the software which was found listed in the STARDYNE Verification Manual Log. The review of the V&V results was found to be within the expected ranges as specified. This proved the software was adequately and correctly performing its intended function. This area is acceptable.

Software Vibration VIEW 5.0.11 verification and validation was performed utilizing a Vibration Research Corporation Vibration Controller M/N VR8500-4 running Vibration VIEW 5.0.11. The initial software V&V was performed by the seller of the program based on the vendor manual. This software will never be unloaded from Vibration Controller 8500-4. Therefore future program V&V will be incorporated with the calibration of the Vibration Controller VR8500-4 annually per QCI 12.12 Rev.0, dated 6/03/06.

Revision of the above procedures was verified to be the current revision.

METHOD OF VERIFICATION
4.4 Verify that measures are established and implemented to assure that the changes to software are formally documented, evaluated and approved by the organization responsible for the original software development. Verify the changes are controlled commensurate with those applied to the original software development. Assure the change is appropriately reflected in software documentation and configuration management is maintained. NOTE: Configuration management includes backups, maintenance, disaster recovery, and virus protection. (Document O.E. on Figure 4) Appendix B/ANSI N45.2 Ref: (3/4) ASME Section III NQA-1a-1999 Subpart 2.7 Vendor Quality Manual Ref.: N/A

RESULTS: N/A

ASSESSMENT/SUMMARY:

UCI does not develop any software. Software of STARDYNE was procured as commercial grade and dedicated (V&V) for use in safety related applications. Software of Vibration VIEW 5.0.11 was procured with a hardware device (a software-based instrument). UCI does not have any intention to make any changes to the software programs. This section is N/A

METHOD OF VERIFICATION

4.5 Verify measures are established and implemented for the procurement of software either safety related or commercial grade.

a) When software is procured as safety related, verify adequate controls are in place (i.e. acceptable supplier qualification, procurement practices and receipt inspection) to ensure that the supplier is providing software that meets the specified technical and quality requirements. The purchaser's audit of the software supplier shall ensure that reviews and acceptance testing are controlled, documented, and adequate when considering the intended function of the software.

b) For software procured as a commercial grade item, assure that dedication activities such as reviews and acceptance testing are performed and documented to ensure the software functions as intended.

NOTE: Verification of controls shall be evaluated during procurement and test and inspections for safety related software.

NOTE: Verification of dedication activities for commercial grade software shall be encompassed in Section 3.

(Document O.E. on Figure 3, 5A and 5B as appropriate)

Appendix B/ANSI N45.2 Ref: (3/4, 4/5, 7/8)

ASME Section III

NQA-1a-1999 Subpart 2.7

Vendor Quality Manual Ref.: Special Procedure SSA and QCI 12.12

RESULTS: Satisfactory

ASSESSMENT/SUMMARY:

a) UCI does not develop any software. Software of STARDYNE was procured as commercial grade and dedicated (V&V) for use in safety related applications. Software of Vibration VIEW was procured this year with a hardware device (a software-based instrument). This section is N/A.

b) STARDYNE was procured as commercial grade and is dedicated through the V& V specified in UCI Procedure SSA, Rev. 2, dated 12/15/02. Section 7.0 of this procedure describes the validation and verification that UCI uses to qualify STARDYNE. The software is a series of representative example problems, which have been processed through STARDYNE, documented and compared with theoretical or industry accepted results. UCI has chosen three examples that are closely associated with the static and natural frequencies analysis to verify and validate that the STARDYNE software. The software is verified to provide the expected results before each use of the software. A review was performed of the results of the last validation of the software which was found listed in the STARDYNE Verification Manual Log. The review of the V&V results was found to be within the expected ranges as specified. STARDYNES dedication is reverified prior to every use. Software VIEW verification and validation was performed utilizing a Vibration Research Corporation Vibration Controller M/N VR8500-4 running Vibration VIEW 5.0.11. The initial software V&V was performed by the seller of the program and found acceptable. Program V&V in the future has been specified in QCI 12.12 Rev.0 dated 6/03/06 as an annual program. This area is acceptable.

Revision of the above procedures was verified to be the current revision.

METHOD OF VERIFICATION
4.6 Verify that measures are established and implemented to assure that the software errors and failures from both internal and external sources are identified, documented, resolved, evaluated, assessed for impact on past and present applications, and resolved. Verify this problem reporting system assures methods of notification are identified. Verify that problems and the significance of the problems on that customer are promptly reported to affected organizations, including users. NOTE: Corrective actions should be forwarded to the users in a timely manner. (Document O.E. on Figure 4) Appendix B/ANSI N45.2 Ref: (15/16) ASME Section III NQA-1a-1999 Subpart 2.7 Vendor Quality Manual Ref.: QCP 15.2

RESULTS: Satisfactory

ASSESSMENT/SUMMARY:

UCI addresses software errors through the corrective action program. This program is documented in UCI procedure QCP-15.2, Non-Conformities Report Procedure, Rev. 3 dated 6/30/06. If during the V&V process controlled by UCI Procedure SSA, that is implemented to verify acceptable performance of STARDYNE software, or during the use of the program, unacceptable results were achieved a Non-Conformities Report would be generated. To date there has been no software errors associated with the STARDYNE software at UCI and no software errors identified by external sources.

Revision of the above procedure was verified to be the current revision. This area is acceptable.

METHOD OF VERIFICATION
4.7 Verify measures are established and implemented to assure that software is adequately packaged, marked, stored, and shipped. NOTE: Verify when duplicate copies are generated, that methods are in place to ensure exact duplication. Appendix B/ANSI N45.2 Ref: (13, 14/14, 15) ASME Section III NQA-1 Supplement 13S-1 Vendor Quality Manual Ref.: N/A

RESULTS: N/A

ASSESSMENT/SUMMARY:

UCI does not develop any software. Software is procured as commercial grade and dedication (V&V) for use in safety related applications. Therefore this section is N/A

SOFTWARE PROGRAM (NAME, NO., REV./DATE) *4.2, 4.4	METHOD OF ACCEPTANCE TESTING AND DATE *4.2, 4.3	ERROR NOTICE/DATE AND STATUS (OPEN/CLOSED) *4.6
STARDYNE Rev. 4.10 3/1/94	Procedure SSA - STARDYNE Structural Analysis, Rev. 2 Dated 12/15/02 STARDYNE Verification Manual Dated July 1984 Verification Log Entry Dated 1/14/05	N/A

*Refers to applicable question.

SECTION 9 – DOCUMENT CONTROL/ADEQUACY

METHOD OF VERIFICATION	
9.1	Within the assessment/summary section of this checklist question, record the procedures/instructions/drawings including the revision/date used to verify implementation.
9.2	Verify that measures are established and implemented to control the issuance of documents (i.e., procedures, instructions, drawings, work orders, etc.) including changes. These measures shall assure that documents are: a) Reviewed for adequacy; b) Approved for release by authorized personnel; c) Distributed to applicable workstation; d) Adequately controlled if maintained electronically. Evidence obtained from Sections 1- 16 shall be evaluated when assessing this item. Appendix B/ANSI N45.2 Ref: (5, 6/6, 7) ASME Section III NQA-1 Supplement 6S-1 Vendor Quality Manual Ref.: QAM 6

RESULTS: Unsatisfactory

ASSESSMENT/SUMMARY:

QAM 6, Rev.10 dated 10/15/06, establishes the controls in place for the control and issuance of design documents, drawings and instructions which prescribe activities affecting quality. QCP 6.1, Rev. 4 dated 6/30/06, Document Control Procedure, and QCP 6.2, Rev.5 dated 6/30/06, QA Document Control Procedure, are the implementing procedures. The procedures establish measures for the review, approval, distribution, and control of documents.

a) b) c) QCP 6.1 refers to design documents. Design documents include drawings, Summary of Materials, dedication specifications, and etc. These documents are controlled by a document control log maintained in the applicable file. The log contains the history of the document, including all the routings of all revisions. If a revision is made to the document, an Engineering Change Order (ECO) is completed. The ECO documents the change that was made and contains the applicable approval signatures. The log is updated and new copies are distributed by the quality department to the departments on the document control log. In the event that a new revision is made, the previous revision will be recalled. If the previous revision is not practical to recall the previous revision may remain in use for reference provided it is stamped SUPERSEDED. The audit found that all the old revisions of Commercial Grade Dedication Specification without a stamp of SUPERSEDED existed with current revision in the same file. Part of this area is unacceptable

a) b) c) QCP 6.2 refers to QA documents. QA documents include Quality Assurance Manual (QAM), Quality Control Procedures (QCP), Quality Control Inspections (QCI), Qualified Suppliers List (QSL), and QA Forms. Changes to documents have been reviewed and approved by the same organization that performed the original review and approval, using the same process as that which was applied to the original document. When quality implementing procedures are revised, the quality department issues a new copy to the impacted employees, briefs them on the changes, and has the employee sign a procedure training record. The previous revision will be recalled by the quality department and then be discarded. The auditor had checked the revision and issue date of all quality implementing

procedures (QCP and QCI) used in the field against the master copies kept by quality department and found there are consistent. This area is acceptable.

d) QCP 17.1, Rev. 7 dated 6/30/06, specifies that the following QA duplicate records shall be maintained on diskettes: Nuclear Qualification Reports (NQRs), Nuclear Qualification Test Plans (NQTPs), Engineering Evaluation Reports (EERs) and UCI prepared as built drawings. The auditor checks with quality engineer and the answer is that the strategy had been changed and they are all microfilmed. In other words, there is no controlled document in electronic form. The QAM has been revised. This area is N/A.

Procedures used in this section have been checked to have the current revision.

SECTION 14 - TRAINING/CERTIFICATION

METHOD OF VERIFICATION	
14.1	Within the assessment/summary section of this checklist question, record the procedures/instructions/drawings including the revision/date used to verify implementation.
14.2	Verify that measures are established and implemented to ensure quality program indoctrination and training of personnel who perform activities affecting quality. (Document O.E. on Figure 14) NOTE: Evidence to be obtained from Sections 2, 3, 5, 7, 8, and 12. Appendix B/ANSI N45.2 Ref: (2/2) ASME Section III NQA-1 Supplement 2S-4 Vendor Quality Manual Ref.: QAM 2

RESULTS: Satisfactory

ASSESSMENT/SUMMARY:

QAM 2 Section 4.1.5 states that the quality program provides for the indoctrination and training of personnel performing activities affecting quality to assure that suitable proficiency is achieved and maintained. UCI has qualification procedures for Welding Inspectors (QCP 10.1), Receiving Inspectors (QCP 10.2), Electrical Test Inspectors (QCP 10.3), and Seismic Technicians/Engineers (QCP 11.6), Auditors/Lead Auditors (QCP 18.1, QCP 18.2). The qualifications of inspectors and auditors/lead auditors were verified in Figure 14.

Besides of above 3 types of inspector, UCI specified another type of inspector called Source Inspector. The auditor found that the Source Inspector has no procedure to define the activity and give the criteria for maintaining the qualification. The source inspector qualification is documented using Form 22, which verifies that the individual has had an eye exam and has been trained to QCP 15.2, Non Conformity Reports, and QCP 21.1, Reporting of Defects and Non-compliances. The QA Manager explained that source inspection assignments are made based on the individual's qualification (QCP training matrix) to UCI procedures and based on the individual's area of expertise. But this qualification basis is not given in a written procedure. The auditor therefore would like to suggest that a procedure includes the above qualification basis for the Source Inspector should be prepared. Besides, Form 22 is not mentioned in any procedures. Since procedures like QCP 10.1, 10.2, and 10.3 take Form 22 as an evidence of eye sight capability, the auditor also would like to suggest that Form 22 should be mentioned in the above procedures. A sampling of source verifications was reviewed. The individuals assigned were qualified to perform that particular verification.

Revision of the above procedures was verified to be the current revision. This area is acceptable.

METHOD OF VERIFICATION
14.3 Verify that inspection/test personnel, auditors, calibration, repair personnel and similar specialists (i.e., ASME Code work design personnel to ASME Section III, Appendix XXIII) are qualified and have certifications, as applicable, on file in accordance with industry and/or supplier program requirements. (Document O.E. on Figure 14) NOTE: Evidence to be obtained from Section 2, 3, 5, 7, 8, and 12. Appendix B/ANSI N45.2 Ref: (2, 9, 10, 11, 18/2, 10, 11, 12, 19) ASME Section III NQA-1 Supplement 2S-1, 2S-2, 2S-3 Vendor Quality Manual Ref.: QAM 2

RESULTS: Satisfactory

ASSESSMENT/SUMMARY:

UCI personnel qualifications for source inspectors, receiving inspectors, electrical test inspectors, seismic engineers and lead auditors were reviewed and found satisfactory. The training/qualification records for the UCI personnel listed in Figure 14 were reviewed and found to be in compliance with procedural guidelines. This area is acceptable.

SECTION 14 – TRAINING/CERTIFICATION

(FIGURE 14 PERSONNEL INDOCTRINATION/TRAINING/QUALIFICATION)

NAME, STAMP, AND JOB TITLE *14.2, 14.3	INDOCTRINATION AND TRAINING COMPLETED (Yes/No) *14.2	QUALIFICATION/CERTIFICATION CERT. TYPE AND LEVEL *14.3
David Jarrow Contractor	Yes	Leader Auditor
Daryl Montie Contractor	Yes	Leader Auditor
Greg Amsden Contractor	Yes	Leader Auditor
John Poston Contractor	Yes	Leader Auditor
Richard Kellemon Contractor	Yes	Leader Auditor
Luis Sanches	Yes	Source Inspector
Debbie Butler	Yes	Source Inspector
Bill Allen Engineering Manager	Yes	Receiving Inspector, Source Inspector, Seismic Engineer, Electrical Test Inspector Level-III
Gerald J. Gredrick Technician	Yes	Receiving Inspector, Electrical Test Inspector Level-II
Micheal J. Albrigh Techniciant	Yes	Receiving Inspector, Seismic Engineer, Electrical Test Inspector Level-II
Albert C. Kemp Project Engineer	Yes	Receiving Inspector, Source Inspector, Seismic Engineer, Electrical Test Inspector Level-III
Joseph Bradley	Yes	Receiving Inspector, Source Inspector, Seismic Engineer, Electrical Test Inspector Level-II
Clint Asher	Yes	Seismic Engineer, Electrical Test Inspector Level-II

SECTION 16 – RECORDS

METHOD OF VERIFICATION	
16.1	Within the assessment/summary section of this checklist question, record the procedures/instructions/drawings including the revision/date used to verify implementation.
16.2	a) Verify that adequate measures are established and implemented to assure that all QA records not transferred to the member are maintained in facilities that provide storage, retention requirements and protection against environmental effects, damage and loss. b) Verify that records are legible, identifiable, and retrievable. Records should include the following, as applicable: Inspection and test records; Audit reports; Quality related procedures/instructions/drawings; Qualifications and certifications; Material Analysis records; Certifications of Compliance/Conformance; Laboratory/Engineering/Manufacturing Operating Logs; Calibration Records; Nonconformance Documents. Appendix B/ANSI N45.2 Ref: (17/18) ASME Section III NQA-1 Supplement 17S-1, 6S-1 Vendor Quality Manual Ref.: QAM 2

RESULTS: Satisfactory

ASSESSMENT/SUMMARY:

QCP 17.1, Rev. 7 dated 6/30/06, QA Records Procedure, establishes guidelines for the maintenance of quality records. The quality records include all applicable documents listed above. The record storage methods at UCI include a fire proof safe having a NFPA class “A” for four hour minimum fire rating, office file cabinets and book shelves, and file cabinets in the warehouse. Duplicates of the items in the office files and in the warehouse are kept either electronically or on microfilm. The fire proof safe houses all microfilm, diskettes, and the original copy of items that are not duplicated. A document log is maintained to aid in the retrieval of documents on microfilm. The record storage locations are adequate in that they protect the documents from environmental effects, damage and loss. The records reviewed during the audit were found to be legible and readily retrievable. Revision of the above procedure was verified to be the current revision. This area is acceptable.

UCI

COMMERCIAL GRADE ITEM DEDICATION SPECIFICATION

CGDS-051

REVISION: 3

MANUFACTURER: **Crompton**

PART NAME: **Switchboard Instruments**

PART NUMBER(S): **Various**

Prepared By: _____ Date: 11/8/00
Engineering

Reviewed By: _____ Date: 11-8-00
Engineering

Approved By: _____ Date: 11-8-00
Quality Assurance

Revision History:

Date	Revision	Description
9-26-91	0	Initial Issue
1-6-93	1	Revised to add additional functional test to attachment A.
2-15-93	2	Revised to correct errors identified on attachment A.
11-8-00	3	Revised to make generic for all types of Crompton switchboard instruments. Incorporated new format.

I. Intended Use and Basis of Qualification:

This CGDS is intended to provide reasonable assurance that the subject Crompton switchboard instruments are acceptable for use in mild environment safety-related applications.

II. Applicable Industry Standards:

1. IEEE 323, Guide for Qualification of Class 1E Electric Equipment for Nuclear Power Generating Stations.
2. IEEE 344, Recommended Practices for Seismic Qualification of Class 1E Electric Equipment for Nuclear Power Generating Stations.
3. EPRI NP-5652, Guideline for the Utilization of Commercial Grade Items in Nuclear Safety Related Applications.
4. EPRI TR-102260, Supplemental Guidance for the Application of EPRI Report NP-5652 on the Utilization of Commercial Grade Items.
5. EPRI NP-6406, Guideline for the Technical Evaluation of Replacement Items in Nuclear Power Plants.
6. ANSI/ASQC Z1.4-1993, Sampling Procedures and Tables for Inspection by Attributes (MIL-STD-105).
7. EPRI NP-7218, Guideline for the Utilization of Sampling Plans for Commercial Grade Item Acceptance.

III. References:

1. UCI Qualification Report 40798-1.
2. Crompton Instruments Catalog 43-300E, 1982 and later editions.

Maximum environmental conditions defined in the above qualification:

Parameter	Requirement
Temperature Range	60 - 122 deg F
Pressure	atmospheric
Humidity Range	50 - 100 %
Radiation:	1 x 10E3 RADS

IV. Purchase Order Requirements:

The Crompton switchboard instruments are ordered by catalog number only. The manufacturer retains the responsibility to provide components that comply with catalog specification requirements. Purchase Orders may be placed with an authorized Crompton representative or the factory. No Certificate of Conformance is required.

V. Technical Evaluation:

The original specification requirements imposed for the qualification report, define the functional characteristics that must be met by the current design of Crompton switchboard instruments.

1. General Description/Function:

These switchboard instruments are used extensively for indication from outputs of safety related field equipment. This includes all types of Crompton switchboard instruments, (ammeter, voltmeter, wattmeter, etc.).

V. Technical Evaluation: (cont.)

2. Safety-Related Function:

The safety-related function of a meter is to maintain the input signal during all phases of plant operation (i.e. during normal, abnormal and accident conditions). Therefore, the safety-related function of the meter is to maintain circuit integrity and maintain structural integrity during a design basis seismic event.

Failure Modes: short circuit, open circuit, fracture and loss of material property

3. Maintaining Equipment Qualification:

A mild environment is defined in IEEE 323-1983 as an environment expected as a result of normal service conditions and extremes (**abnormal**) in service conditions where seismic is the only design basis event of consequence. 10CFR50.49 of the federal register volume 48, no. 15, dated January 21,1983 states that "the commission has concluded that general quality and surveillance requirements applicable to electric equipment as a result of other commission regulations, including 10CFR50, Appendix B is sufficient to ensure adequate performance of electric equipment important to safety located in mild environments. Since it has been concluded that no further environmental qualification requirements are needed for such equipment provided they fully satisfy all other applicable regulations, the commission has concluded that no additional requirements are necessary." NUREG 0800, Rev, 2 dated July 1981 (NRC standard review plan) states that the documentation required to demonstrate qualification of equipment in a mild environment are the "Design/Purchase" specifications. The SRP also states that a well-supported maintenance/surveillance program in conjunction with a good preventative maintenance program will suffice to assure that equipment meets the design/purchase specifications and is qualified for the designed life.

The Crompton switchboard instruments were seismically tested as documented in Section III, References. The operation of the meters was not affected by the seismic event. For those orders that require, the meter will be compared to the control sample to verify that the there have been no changes that might affect the seismic qualification of the meter.

VI. Critical Characteristics:

Based on the safety-related function of the subject meters, the critical characteristics have been determined to be: Markings (i.e. manufacturer and part number), Configuration of meter and movement, Weight, Dimensions, Scale, Function and Insulation Resistance. Delineated below are each critical characteristic and its associated acceptance test with acceptance criteria.

1. Markings:

Verify that each item is identified with the manufacturer name (Crompton) and manufacturer part number as specified per the Bill of Material

2. Configuration:

Visually verify that all meters received are of like configuration and that all meters are of like configuration to the control sample (if required). Note, that this is for external configuration only. This comparison shall verify that the meter has an identically designed mounting configuration and meter movement. The mounting configuration is important to maintain the rigid mounting of the meter to the panel during a seismic event. The pointer movement is the only moving part of the meter. Any change in the form of the movement could effect the seismic qualification of the meter.

3. Weight:

Verify, using the appropriate calibrated test equipment, that all meters received are of similar weight as that of the control sample (if required). Tolerance assigned is ±5%.

4. Dimensions:

Verify, using the appropriate calibrated test equipment, that all meters received are of similar dimensions as that of the control sample (if required) or in accordance with the provided published dimensions. Tolerance assigned is ±5%.

VI. Critical Characteristics: (cont.)

5. Scale:

The scale of all meters received will be checked to verify that they meet the requirements as specified on the bill of materials.

6. Function:

The function of all meters received shall be verified at 0, 50 and 100 % of input. Accuracy shall be within 2.0% of full scale value unless otherwise specified by the Crompton data sheet for the instrument under test.

7. Insulation Resistance:

The insulation resistance of all meters received shall be verified. Utilizing a megger set at 1000 volts, measure between all terminals and ground, values indicated shall be greater than 1 megohm.

VII. Acceptance Method:

All of the above critical characteristics testing will be performed by United Controls. Characteristics 1, 2 and 5 will be a 100% visual verification. Characteristics 3, 4, 6 and 7 shall utilize the appropriate calibrated test equipment. Characteristics 3, 4 and 7 shall be sampled in accordance with ANSI/ASQC Z1.4-1993, General Inspection Level II. Characteristic 6 shall be performed on 100% of the items received.

VIII. Acceptance Documentation:

The results of all of the critical characteristics verified by United Controls will be documented on the appropriate Functional Test Data Sheet (attachments 1 thru 8) for the meter type being dedicated. The form shall reference this specification, and will be assigned against the job number in which the item was purchased.

IX. Conclusions:

Successful completion of the verification testing delineated above, provides reasonable assurance that the subject meters are of the appropriate physical and electrical characteristics as specified by the meter manufacturer. It is therefore concluded that the meter being provided is the meter requested, that it is capable of performing its intended safety-related function and that it meets the technical requirements of the published manufacturer's data sheet.

X. Attachments:

Attachment 1: Frequency Meter Functional Test Data Sheet

Attachment 2: Voltmeter Functional Test Data Sheet

Attachment 3: Ammeter Functional Test Data Sheet

Attachment 4: AC Wattmeter Functional Test Data Sheet

Attachment 5: Varmeter Functional Test Data Sheet

Attachment 6: Synchroscope Functional Test Data Sheet

CGDS-051
ATTACHMENT 1
FUNCTIONAL TEST DATA SHEET
CROMPTON FREQUENCY METER

Customer: _____ Customer P.O. _____
Job Number : _____ Mark Number: _____
UCI Serial No.: _____ Part/Model No.:_____
Scale Reading: _____ Input: _____

TEST PROCEDURE	TEST DATA	TEST REQUIREMENT
Applied Voltage	_____	120 V ± 2 VAC
Applied Frequency	_____	Applied Frequency ±1 Hz
Meter Reading	_____	Low Scale Reading
Applied Frequency	_____	Applied Frequency ±1 Hz
Meter Reading	_____	Half Scale Reading
Applied Frequency	_____	Applied Frequency ±1 Hz
Meter Reading	_____	Full Scale Reading

Insulation Resistance:

Terminal 1 to Ground	_____	1 Megohm or greater
Terminal 2 to Ground	_____	1 Megohm or greater

Approvals:

_____	_____	_____
Quality Control/Date	Engineering/Date	Quality Assurance/Date

CGDS-051
ATTACHMENT 2
FUNCTIONAL TEST DATA SHEET
CROMPTON VOLTMETER

Customer: _____ Customer P.O. _____
Job Number : _____ Mark Number: _____
UCI Serial No.: _____ Part/Model No.:_____
Scale Reading: _____ Input: _____

TEST PROCEDURE	**TEST DATA**	**TEST REQUIREMENT**
Apply voltage to terminals 1 and 2.		
Applied Voltage	_____	Applied Voltage ± 1.5% full scale
Meter Reading	_____	0% of full scale
Applied Voltage	_____	Applied Voltage ± 1.5% full scale
Meter Reading	_____	50% of full scale
Applied Voltage	_____	Applied Voltage ± 1.5% full scale
Meter Reading	_____	100% of full scale
Insulation Resistance:		
Terminal 1 to Ground	_____	1 Megohm or greater
Terminal 2 to Ground	_____	1 Megohm or greater

Approvals:

_____	_____	_____
Quality Control/Date	Engineering/Date	Quality Assurance/Date

CGDS-051
ATTACHMENT 3
FUNCTIONAL TEST DATA SHEET
CROMPTON AMMETER

Customer: _____ Customer P.O. _____
Job Number : _____ Mark Number: _____
UCI Serial No.: _____ Part/Model No.:_____
Scale Reading: _____ Input: _____

TEST PROCEDURE	TEST DATA	TEST REQUIREMENT
Applied Current	_____	0 % ± 1.5% full scale
Meter Reading	_____	0 % of full scale
Applied Current	_____	50 % ± 1.5% full scale
Meter Reading	_____	50 % of full scale
Applied Current	_____	100 % ± 1.5% full scale
Meter Reading	_____	100 % of full scale

Insulation Resistance:

Terminal 1 to Ground	_____	1 Megohm or greater
Terminal 2 to Ground	_____	1 Megohm or greater

Approvals:

_____	_____	_____
Quality Control/Date	Engineering/Date	Quality Assurance/Date

CGDS-051
ATTACHMENT 4
FUNCTIONAL TEST DATA SHEET
CROMPTON AC WATTMETER

Customer: _____ Customer P.O. _____
Job Number : _____ Mark Number: _____
UCI Serial No.: _____ Part/Model No.:_____
Full Scale Calibrating Watts: _____ Input: _____

1. Connect the meter to rated voltage as required by Crompton calibration drawings.

2. Connect amp load as required by the Crompton calibration drawings.

3. Increase the voltage and current load to produce 0%, 50% and 100% full scale deflection.

TEST PROCEDURE	**TEST DATA**	**TEST REQUIREMENT**
Current	_____	As required for 0 % scale deflection.
Voltage	_____	
Meter reading	_____	0 % of full scale.
Watt input	_____	Within 1.5% of the required full scale value.
Current	_____	As required for 50 % scale deflection.
Voltage	_____	
Meter reading	_____	50 % of full scale.
Watt input	_____	Within 1.5% of the required full scale value.
Current	_____	As required for 100 % scale deflection.
Voltage	_____	

CGDS-051
ATTACHMENT 4
FUNCTIONAL TEST DATA SHEET
CROMPTON AC WATTMETER

Job Number : _____ Mark Number: _____
UCI Serial No.: _____

Meter reading	_____	100% of full scale.
Watt input	_____	Within 1.5% of the required full scale value.

Insulation Resistance:

Terminal 1 to Ground	_____	1 Megohm or greater
Terminal 2 to Ground	_____	1 Megohm or greater
Terminal 3 to Ground	_____	1 Megohm or greater
Terminal 4 to Ground	_____	1 Megohm or greater
Terminal 5 to Ground	_____	1 Megohm or greater
Terminal 6 to Ground	_____	1 Megohm or greater
Terminal 7 to Ground	_____	1 Megohm or greater
Terminal 8 to Ground	_____	1 Megohm or greater

Approvals:

_____	_____	_____
Quality Control/Date	Engineering/Date	Quality Assurance/Date

CGDS-051
ATTACHMENT 5
FUNCTIONAL TEST DATA SHEET
CROMPTON VARMETER

Customer: _____ Customer P.O. _____
Job Number : _____ Mark Number: _____
UCI Serial No.: _____ Part/Model No.:_____
Scale Reading: _____ Input: _____
PT RATIO: _____ CT RATIO: _____
K factor: _____

$$Wm = \frac{\text{SCALE VALUE}}{\text{PT RATIO x CT RATIO x K factor}}$$

Wt = TEST VOLTAGE x TEST AMPERAGE

1. Connect the meter to rated voltage as required by Crompton calibration drawings.
2. Connect amp load as required by the Crompton calibration drawings.

TEST PROCEDURE	TEST DATA	TEST REQUIREMENT
Current	_____	As required for 0% scale deflection
Voltage	_____	
Meter reading	_____	0 % of full scale
Watt input	_____	Within 1.5% of the required full scale value.
Current	_____	As required for 50% scale deflection
Voltage	_____	
Meter reading	_____	50 % of full scale
Watt input	_____	Within 1.5% of the required full scale value.
Current	_____	As reqd. for 100% scale deflection.
Voltage	_____	
Meter reading	_____	100 % of full scale
Watt input	_____	Within 1.5% of the required full scale value.

Insulation Resistance:
All Terminals to Ground _____ 1 Megohm or greater

Approvals:

_____ _____ _____
Quality Control/Date Engineering/Date Quality Assurance/Date

CGDS-051
ATTACHMENT 6
FUNCTIONAL TEST DATA SHEET
CROMPTON SYNCHROSCOPE

Customer: _____ Customer P.O. _____
Job Number : _____ Mark Number: _____
UCI Serial No.: _____ Part/Model No.:_____
Scale Reading: _____ Input: _____

1. Connect 120 VAC power supply to terminals 1 and 3.

2. Jumper terminals 1 and 2, 3 and 4

3. Verify that pointer is:

TEST PROCEDURE	**TEST DATA**	**TEST REQUIREMENT**
Centered between fast and slow	_____	Pointer centered between fast and slow

4. Remove Jumpers. Connect second 120 VAC variable frequency power supply to terminals 2 and 4.

5. Decrease the variable frequency to a level just above the fixed frequency (approximately .2 Hz)

Verify pointer moves toward slow	_____	Pointer moves towards slow.

6. Increase the variable frequency to a level just below the fixed frequency (approximately .2 Hz)

Verify pointer moves toward fast	_____	Pointer moves towards fast.

Insulation Resistance:

All Terminals to Ground	_____	1 Megohm or greater

Approvals:

_____	_____	_____
Quality Control/Date	Engineering/Date	Quality Assurance/Date

RECEIVING INSPECTION ACCEPTANCE CRITERIA

Document Number: CGDS-051
Revision No.: 3 Date 11-8-00

Job Number : _____ Mark Number: _____ UCI Serial No.: _____
Manufacturer: _____ Part/Model No.: _____ Description: _____

CRITICAL CHARACTERISTIC	ACCEPTANCE CRITERIA	ACTUAL OBSERVATION	INSPECTOR	DATE
1. Markings: Manufacturer and Part Number	Crompton; Per Bill of material	Manufacturer: _____ ☐ Sat ☐ Unsat		
2. Configuration	Verify that all meters received are of like configuration and that all meters are of like configuration to the control sample.	Configuration ☐ Sat ☐ Unsat		
3. Weight Tolerance assigned is ±5%.	Verify, using the appropriate calibrated test equipment, that all meters received are of similar weight as that of the control sample (if required).	Weight: _____ ☐ Sat ☐ Unsat		
4. Dimensions Tolerance assigned is ±5%.	Verify, using the appropriate calibrated test equipment, that all meters received are of similar dimensions as that of the control sample (if required) or in accordance with the provided published dimensions.	Dimensions: Width: _____ Height: _____ Depth: _____ ☐ Sat ☐ Unsat		

RECEIVING INSPECTION ACCEPTANCE CRITERIA

Job Number : _____ Mark Number: _____ UCI Serial No.: _____

CRITICAL CHARACTERISTIC	ACCEPTANCE CRITERIA	ACTUAL OBSERVATION	INSPECTOR	DATE
5. Scale	The scale of all meters received will be checked to verify that they meet the requirements as specified on the bill of materials.	Scale ☐ Sat ☐ Unsat		
6. Function	See functional test data sheet for specific instrument under test.			
7. Insulation Resistance	See functional test data sheet for specific instrument under test.			

Control Sample No.: _____ (If required)

Comments:

_____

_____

Approvals: _____ _____ _____ _____

Quality Control/Date Level II/III/Date Engineering/Date Quality Assurance/Date