

**ENGINEERING CHANGE NOTICE**

1. ECN **654499**  
 Proj. ECN

2. ECN Category (mark one) Supplemental <input type="checkbox"/> Direct Revision <input checked="" type="checkbox"/> Change ECN <input type="checkbox"/> Temporary <input type="checkbox"/> Standby <input type="checkbox"/> Supersedure <input type="checkbox"/> Cancel/Void <input type="checkbox"/>	3. Originator's Name, Organization, MSIN, and Telephone No. C.E. Swenson, MHM Design Authority, CSB Engineering, S8-07, 376-0288	4. USQ Required? <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No <i>10/10/00</i>	5. Date 0-12-00
	6. Project Title/No./Work Order No. CSB Sub-Project	7. Bldg./Sys./Fac. No. 212H/200E/MHM	8. Approval Designator Q, SN
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) SNF-6448, Rev. 0	10. Related ECN No(s). N/A	11. Related PO No. N/A

12a. Modification Work <input type="checkbox"/> Yes (fill out Blk. 12b) <input checked="" type="checkbox"/> No (NA Blks. 12b, 12c, 12d)	12b. Work Package No. N/A	12c. Modification Work Complete N/A Design Authority/Cog. Engineer Signature & Date	12d. Restored to Original Condition (Temp. or Standby ECN only) N/A Design Authority/Cog. Engineer Signature & Date
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13a. Description of Change  
 13b. Design Baseline Document?  Yes  No

Results from the field verification walkdown for the Multi-Canister Overpack Handling Machine (MHM) has been added.

Note: The walkdown results were peer-reviewed and incorporated into the drawings converted from vendor to Hanford drawings on EDT-629048.

*USQ CSB-00-1315  
 10/10/00*

14a. Justification (mark one)

Criteria Change <input type="checkbox"/>	Design Improvement <input type="checkbox"/>	Environmental <input type="checkbox"/>	Facility Deactivation <input type="checkbox"/>
As-Found <input type="checkbox"/>	Facilitate Const <input type="checkbox"/>	Const. Error/Omission <input type="checkbox"/>	Design Error/Omission <input checked="" type="checkbox"/>

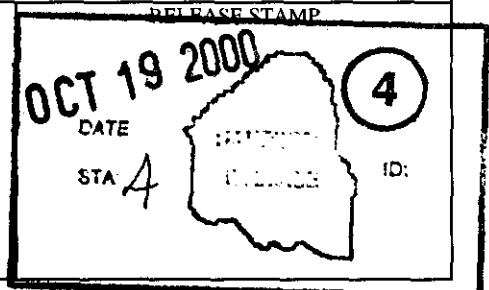
14b. Justification Details

Required by AP EN-6-012 and verification/correction of vendor as-built drawings required before conversion to Hanford H-2 drawings.

Design Verification by independent review per AP EN-6-027 *[Signature]* 10/6/00  
 Name Date

15. Distribution (include name, MSIN, and no. of copies)

Bazinet, G. D.	S8-06	CSB Engineering Records (2)	S8-05 (H)
Garrison, R. C.	S8-07		
Garvin, L. J.	S8-07		
Medford, D. W.	X4-01		
Moss, S. S.	S8-07		
Swenson, C. E.	S8-07		



# ENGINEERING CHANGE NOTICE

<b>16. Design Verification Required</b>  <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<b>17. Cost Impact</b>  <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; text-align: center;">ENGINEERING</td> <td style="width: 50%; text-align: center;">CONSTRUCTION</td> </tr> <tr> <td>Additional <input type="checkbox"/> N/A</td> <td>Additional <input type="checkbox"/></td> </tr> <tr> <td>Savings <input type="checkbox"/></td> <td>Savings <input type="checkbox"/></td> </tr> </table>	ENGINEERING	CONSTRUCTION	Additional <input type="checkbox"/> N/A	Additional <input type="checkbox"/>	Savings <input type="checkbox"/>	Savings <input type="checkbox"/>	<b>18. Schedule Impact (days)</b>  Improvement <input type="checkbox"/> N/A Delay <input type="checkbox"/>
ENGINEERING	CONSTRUCTION							
Additional <input type="checkbox"/> N/A	Additional <input type="checkbox"/>							
Savings <input type="checkbox"/>	Savings <input type="checkbox"/>							
<b>19. Change Impact Review:</b> Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 13. Enter the affected document number in Block 20.								
SDD/DD <input type="checkbox"/> N/A Functional Design Criteria <input type="checkbox"/> Operating Specification <input type="checkbox"/> Criticality Specification <input type="checkbox"/> Conceptual Design Report <input type="checkbox"/> Equipment Spec. <input type="checkbox"/> Const. Spec. <input type="checkbox"/> Procurement Spec. <input type="checkbox"/> Vendor Information <input type="checkbox"/> OM Manual <input type="checkbox"/> FSAR/SAR <input type="checkbox"/> Safety Equipment List <input type="checkbox"/> Radiation Work Permit <input type="checkbox"/> Environmental Impact Statement <input type="checkbox"/> Environmental Report <input type="checkbox"/> Environmental Permit <input type="checkbox"/>	Seismic/Stress Analysis <input type="checkbox"/> Stress/Design Report <input type="checkbox"/> Interface Control Drawing <input type="checkbox"/> Calibration Procedure <input type="checkbox"/> Installation Procedure <input type="checkbox"/> Maintenance Procedure <input type="checkbox"/> Engineering Procedure <input type="checkbox"/> Operating Instruction <input type="checkbox"/> Operating Procedure <input type="checkbox"/> Operational Safety Requirement <input type="checkbox"/> IEPD Drawing <input type="checkbox"/> Cell Arrangement Drawing <input type="checkbox"/> Essential Material Specification <input type="checkbox"/> Fac. Proc. Samp. Schedule <input type="checkbox"/> Inspection Plan <input type="checkbox"/> Inventory Adjustment Request <input type="checkbox"/>	Tank Calibration Manual <input type="checkbox"/> Health Physics Procedure <input type="checkbox"/> Spares Multiple Unit Listing <input type="checkbox"/> Test Procedures/Specification <input type="checkbox"/> Component Index <input type="checkbox"/> ASME Coded Item <input type="checkbox"/> Human Factor Consideration <input type="checkbox"/> Computer Software <input type="checkbox"/> Electric Circuit Schedule <input type="checkbox"/> ICRS Procedure <input type="checkbox"/> Process Control Manual/Plan <input type="checkbox"/> Process Flow Chart <input type="checkbox"/> Purchase Requisition <input type="checkbox"/> Tickler File <input type="checkbox"/>						

**20. Other Affected Documents:** (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision
N/A		

**21. Approvals**

	Signature	Date	Signature	Date
CSB Design Authority	C. E. Swenson	10/6/00		
Cog Eng	N/A			
Cog Mgr	G. D. Bazinet	10/12/00		
QA	S. S. Moss	10/9/00		
Safety	L. J. Garvin	10/10/00		

**DEPARTMENT OF ENERGY**  
 Signature or a Control Number that tracks the Approval Signature N/A  
  
ADDITIONAL

# As-Built Verification Plan Spent Nuclear Fuel Canister Storage Building MCO Handling Machine

Project No: W-379  
C. E. Swenson  
FH

Document Type: RPT

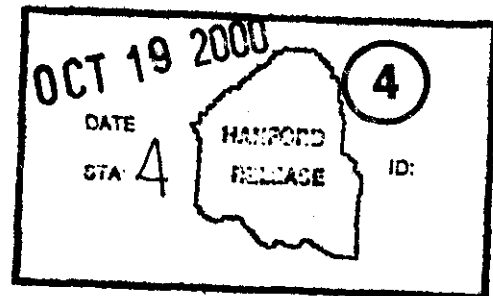
Division: SNF  
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Date Published  
October 2000

Prepared for the U.S. Department of Energy  
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the  
U.S. Department of Energy under Contract DE-AC06-96RL13200

**Fluor Hanford**  
P.O. Box 1000  
Richland, Washington



  
Release Approval  
10/18/00  
Date

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<b>RECORD OF REVISION</b>	(1) Document Number SNF-6448, Rev. 1	Page 1
(2) Title As-Built Verification Plan Spent Nuclear Fuel Canister Storage Building MCO Handling Machine		

CHANGE CONTROL RECORD			
(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release	
		(5) Cog. Engr.	(6) Cog. Mgr.
	(7)		
0	<b><u>EDT-628718</u></b>		
1 RS	<b><u>ECN-654499</u></b>  <i>Results from the field verification walkdown for the Multi-Canister Overpack Handling Machine (MHM) has been added.</i>		G. D. Bazinet <i>G. D. Bazinet</i> 12/12/00

# **As-Built Verification Plan Spent Nuclear Fuel Canister Storage Building MCO Handling Machine**

Prepared for the U.S. Department of Energy  
Assistant Secretary for Environmental Management

Project Hanford Management Contractor for the  
U.S. Department of Energy under Contract DE-AC06-96RL13200

**Fluor Hanford**  
P.O. Box 1000  
Richland, Washington

***AS-BUILT VERIFICATION PLAN***

***SPENT NUCLEAR FUEL***

***CANISTER STORAGE BUILDING***

**MCO HANDLING MACHINE**

Rev 0  
February 11, 2000

Approved:

C.E. Swenson *Craig Swenson* 3/6/08  
A.S. Daughtridge, Jr. *A.S. Daughtridge*

## ***CSB MHM AS-BUILT VERIFICATION PLAN***

### 1.0 INTRODUCTION

This as-built verification plan outlines the methodology and responsibilities that will be implemented during the as-built field verification activity for the Canister Storage Building (CSB) MCO HANDLING MACHINE (MHM). This as-built verification plan covers the MECHANICAL construction (MOWAT) portion AND THE ELECTRICAL PORTION of the CONSTRUCTION PERFORMED BY POWER CITY UNDER CONTRACT TO MOWAT.

The as-built verifications will be performed in accordance Administrative Procedure AP 6-012-00, *Spent Nuclear Fuel Project As-Built Verification Plan Development Process, revision 0*. The results of the verification walkdown will be documented in a verification walkdown completion package, approved by the Design Authority (DA), and maintained in the CSB project files.

### 2.0 AS-BUILT VERIFICATION PROCESS

The as-built verification process will be performed in accordance with AP 6-012-00 and this plan. The purpose of the as-built verification activity is to verify that the contractor (MOWAT)/(POWER CITY) red-line drawings reflect the actual completed field installation within specified tolerances. The MHM Design Authority will conduct an initial meeting with the field walkdown team to assure a successful as-built verification process.

The walkdown team will use a sampling of the MOWAT redlines AND FCR'S that reflect the of the DESIRED CONSTRUCTION CONDITION OF THE CSB MHM.

At the completion of the field data collection process, the field data will be compared to the contractor red-line drawings to verify that the red-line drawings reflect the as-installed field conditions.

When a discrepancy between the design documents and the as-constructed condition is identified, the discrepancy will be verified and a Nonconformance Report (NCR) or other appropriate documentation will be prepared. This may also result in a Design Change Notice (DCN) or Request for Information (RFI). Discrepancies in the red-line drawings will be also be brought to the attention of FW and the CSB Project Manager.

### 3.0 FIELD WALKDOWN TEAM

The field walkdown team is appointed by the CSB Design Authority and consists of the following CSB Project personnel:

Team Lead – M.K. MAHAFFEY (MHM Support)

Quality Assurance – T.Z. (KING) ANDERSON

INSTRUMENTATION AND CONTROL - R. GARRISON



**CONSTRUCTION - R. KELMEL**

**OPERATIONS - JOHN MOLNAR**

Walkdown personnel are responsible for:

1. Field walkdowns and data collection.
2. Coordinating with the Construction Manager (John Koberg) to arrange assistance and clearance to the facility as required to support data collection.
3. Performing work in strict compliance with this plan.
4. Complying with all applicable Health Protection, and Safety procedures required to perform this task.
5. Ensuring that they understand all information contained in this plan prior to performing their assigned tasks.

Craft personnel will provide access to closed panels, electrical cabinets, or other enclosures as needed, and function as walkdown personnel when assigned.

At no time is the field verification team to perform any actions which would endanger personnel safety. These include:

- Climbing on structures to observe SSCs that are not accessible at floor level. **NOTE: CURRENT LADDER TRAINING REQUIRED FOR MHM ACCESS.**
- Opening or collecting data from inside electrical cabinets, or other enclosures prior to having the system locked out by authorized personnel in accordance with applicable lock and tag procedures.
- Standing on piping insulation, ducting, struts, snubbers, conduits or raceways.

#### **4.0 ITEMS TO BE FIELD VERIFIED**

The SSCs have been selected for as-built verification based on a graded approach i.e. **SAFETY CLASS**, Safety Significant (SS) and General Service (GS) SSCs are represented in the list of

items to undergo as-built verification. The overall acceptance/rejection criteria will be conformance to the applicable drawings and design documents.

**CONSTRUCTION OF THE MHM IS COMPLETE AND TESTING IS ALSO COMPLETE. NO CONSTRUCTION OR TESTING HOLD POINTS ARE REQUIRED.**

A list of the MHM SSCs that will undergo as-built verification in accordance with this plan is shown below.

- BRIDGE ASSEMBLY - D35205, SHT 1, REV C
- TROLLEY INSTALLATION AND ASSEMBLY - D34942, SHT 1, REV F
- TURRET ASSEMBLY INCLUDING SHIELD SKIRT 362A0551, SHT 1, REV F, SHT 2, REV D
- JOHNSON BRIDGE CLAMPS - C-35640, SHT 1, REV B
- HOIST ASSEMBLY & RIGGING - 362A0578, SHT 1, REV B
- EXTRACT SYSTEM - 362A0863, SHT 1, REV D
- INSTRUMENTATION AND CONTROL PANEL INSTALLATION ON TROLLEY, D-34960, Rev B

Additional items may be added to the list at the discretion of the walk-down team OR BY THE DESIGN AUTHORITY either prior to or during the walkdown.

**DESIGN MEDIA USED SHALL BE THE CONSTRUCTION PACKAGE DRAWINGS AND FIELD CHANGE REQUESTS (FCR'S) GENERATED IN RESPONSE TO SDR'S AND RFI'S.**

**MHM Walkdown Checklist**  
**March 14, 2000**

	Yes	No	NCR	Remarks
<b><u>Turret Assembly 362A0551, sheet 1</u></b>				
1. Collision Avoidance Bumper installed	X			
2. Shield Skirt in place	X			
3. Personnel screens in place	X			
4. Ladders installed	X			No Permanent Safe Access to platform ladder under trolley turntable provided by MHM Supplier for maintenance activities. NOTE: maintenance access by step-ladder.
<b><u>Turret Assembly 362A0551, Sheets 1 &amp; 2</u></b>				
1. Plug Hoist Hand wind locked out	X			
2. Plug hoist jack screw seal visibly intact	X			
<b><u>MCO Hoist Assembly 362A0578, Sheet 4</u></b>				
1. MCO Hoist Hand wind locked out	X			
2. Dual rope reeving complete	X			
3. Shock absorbers installed	X			Not able to visually verify. Access restricted Mowat installation work package verified shock absorbers when wire rope was installed.
4. Maintenance covers installed		X		Note: Drum & drive assy covers since replaced.
		X		Missing sight glass. Note: Sight glass later replaced by Installer.
5. MCO Hoist Couplings made up	X		FFS:NCR W379-5	Extra bushing. Deferred to JCS WP 1S-00-076
<b><u>Extract System 362A0863, Sheet 1</u></b>				
1. Component labels in place (BF1, BF2, BF3)	X			Removed for test-present Note: Replaced later.
2. DOP Test connection in place	X			
3. Fan Ducting in place and guards installed	X			
4. Sample monitoring connection installed	X			

	Yes	No	NCR	Remarks
<b><u>Johnson Clamp System C-35640</u></b>				
1. Hydraulic fluid installed	X			
2. Hydraulic piping per drawing	X			
3. Reservoir not leaking	X			
4. Shim on clamps in place	X			
5. Lubrication fitting accessible	X			
6. Uplift restraints engaging rail	X			
<b><u>Bridge D-35205</u></b>				
1. Personnel ladders in place		X		West end trolley maintenance platform. Note: deleted by FCR 1015 and dwg H2-828583 Rv.0
2. Bridge festoon installed on wall	X			
3. Limit switches on East End truck	X			Not per Ederer Drawing – see FDI DCN-297
4. X-restraint pockets welded on A and B Girders (25each)	X			
5. Trolley festoon installed on South side	X			
<b><u>Trolley Assembly and Control Panel Installation D34942 &amp; D-34960</u></b>				
1. Turret festoon installed	X			
2. Control panels located per drawing	X			
3. Handrails and personnel platforms in place	X			
4. Uplift restraints in place and overlapping beam	X			

***AS-BUILT VERIFICATION PLAN***

***SPENT NUCLEAR FUEL***

***CANISTER STORAGE BUILDING***

**MCO HANDLING MACHINE**

**Electrical**

**Rev 0A  
April 5, 2000**

**Approved:**

**C.E. Swenson**

*C.E. Swenson* 4/5/00

**A.S. Daughtride, Jr.**

*A.S. Daughtride, Jr.* 4/6/00

## ***CSB MHM AS-BUILT VERIFICATION PLAN***

### 1.0 INTRODUCTION

This as-built verification plan outlines the methodology and responsibilities that will be implemented during the as-built field verification activity for the Canister Storage Building (CSB) MCO HANDLING MACHINE (MHM). This as-built verification plan covers THE ELECTRICAL PORTION of the CONSTRUCTION PERFORMED BY POWER CITY UNDER CONTRACT TO MOWAT.

The as-built verifications will be performed in accordance Administrative Procedure AP 6-012-00, *Spent Nuclear Fuel Project As-Built Verification Plan Development Process, revision 1*. The results of the verification walkdown will be documented in a verification walkdown completion package, approved by the Design Authority (DA), and maintained in the CSB project files.

### 2.0 AS-BUILT VERIFICATION PROCESS

The as-built verification process will be performed in accordance with AP 6-012-00 and this plan. The purpose of the as-built verification activity is to verify that the contractor, Foster Wheeler, as-builts, (MOWAT)/(POWER CITY) red-line drawings and unincorporated FCR's 1002, 1005, 1006 and 1010 reflect the actual completed field installation within specified tolerances. The MHM Design Authority will conduct an initial meeting with the field walkdown team to assure a successful as-built verification process.

The walkdown team will use a sampling of the electrical as-builts, FCR's and MOWAT redlines that reflect the DESIRED CONSTRUCTION CONDITION OF THE CSB MHM.

At the completion of the field data collection process, the field data will be compared to the contractor red-line drawings to verify that the red-line drawings reflect the as-installed field conditions.

When a discrepancy between the design documents and the as-constructed condition is identified, the discrepancy will be verified and a Nonconformance Report (NCR) will be prepared. This may also result in a Design Change Notice (DCN) or Request for Information (RFI). Discrepancies in the red-line drawings will be also be brought to the attention of FW and the CSB Project Manager.

### 3.0 FIELD WALKDOWN TEAM

The field walkdown team is appointed by the CSB Design Authority and consists of the following CSB Project personnel:

Team Lead – M.K. MAHAFFEY (MHM Support)

Quality Assurance – Scott Moss

**INSTRUMENTATION AND CONTROL - R. GARRISON, M. FAIRCHILD**  
**OPERATIONS - JOHN MOLNAR**

Walkdown personnel are responsible for:

1. Field walkdowns and data collection.
2. Coordinating with the Construction Manager (John Koberg) to arrange assistance and clearance to the facility as required to support data collection.
3. Performing work in strict compliance with this plan.
4. Complying with all applicable Health Protection, and Safety procedures required to perform this task.
5. Ensuring that they understand all information contained in this plan prior to performing their assigned tasks.

Craft personnel will provide access to closed panels, electrical cabinets, or other enclosures as needed, and function as walkdown personnel when assigned.

At no time is the field verification team to perform any actions which would endanger personnel safety. These include:

- Climbing on structures to observe SSCs that are not accessible at floor level. NOTE: CURRENT LADDER TRAINING REQUIRED FOR MHM ACCESS. A temporary ladder is also required for access to the plug hoist maintenance area
- Opening or collecting data from inside electrical cabinets, or other enclosures prior to having the system locked out by authorized personnel in accordance with applicable lock and tag procedures.
- Standing on motor housings, piping insulation, ducting, struts, snubbers, conduits or raceways.

**4.0 ITEMS TO BE FIELD VERIFIED**

The SSCs have been selected for as-built verification based on a graded approach i.e. SAFETY CLASS, Safety Significant (SS) and General Service (GS) SSCs are represented in the list of

items to undergo as-built verification. The overall acceptance/rejection criteria will be conformance to the applicable drawings and design documents.

**CONSTRUCTION OF THE MHM IS COMPLETE AND TESTING IS ALSO COMPLETE. NO CONSTRUCTION OR TESTING HOLD POINTS ARE REQUIRED.**

A list of the MHM SSCs that will undergo as-built verification in accordance with this plan is shown below.

- GEC wiring as shown on 363A0033 Sheet 1, Rev C
- MHM Power distribution system shown on 363A0030 Sheets 1-2
- Turret festoon shown on EB-35907, Sheet 1, rev D
- Control Console wiring as shown on EC-35900 sheet 6, Rev G, Sheet 11, Rev E
- X-Channel Power Panel as shown on ED-33065, Sheet 1, Rev J
- Trolley and Turret Rotate control panel as shown on ED-33068, sheet Rev J and EB-33056, Sheet 19, Rev K
- TV Camera system as shown on EB-33056, Sheet 2A, Rev K and 363A0033 Sheet 6, Rev E
- MCO Weight System as shown on EB-33056, Sheet 11, Rev N and EC-35900, sheet 10, Rev D

Additional items may be added to the list at the discretion of the walk-down team OR BY THE DESIGN AUTHORITY either prior to or during the walkdown.

**DESIGN MEDIA USED SHALL BE THE AS Built ELECTRICAL DRAWINGS PROVIDED BY GEC AND EDERER FROM FOSTER WHEELER.**



**Electrical As-Built Verification Walk-down**  
**MHM**

**Conclusions**

Two electrical walk-downs were conducted of the MHM systems. The error rate on the as-built drawings was found to be on the order of 1-2% based on the number of electrical connections with the exception of the Ederer depiction of the GEC interconnections. Results and discrepancies identified in the two reviews are presented below.

**Electrical Walk-down I April 13, 2000**

An electrical walk-down was performed on April 13, 2000. Mike Mahaffey, Rick Garrison and Marion Fairchild participated with Steve Connor, Electrician. The review included opening various junction boxes and control panels and verifying wire numbers. In accordance with the approved verification plan, areas were selected where a drawing review had shown inconsistencies in the various as-built drawings. In general, with the exception of the Ederer interconnection diagrams, the drawings were found to match the as-built conditions with an estimated 1-2% accuracy. Deviations and suggested resolutions are listed below.

**363A0033, Wiring Diagram Tube Plug Hoist and EB-33056 Sheet 16**

**Condition 1: Labeling of wiring for Tube Plug Hoist Brake, Location of Brake Rectifier**

Wiring for the tube plug hoist brake was examined in JB 25X, JB05X and JB19x as well as the turret festoon. The GEC drawing shows PHB1 and PHB2 for wiring to the rectifier. The elementary shows 1601X and 102X through the festoon to the rectifier and PHB1 and PHB2 to the brake with PHB2 grounded. In the field examination of JB25X, which contains the rectifier, we found no labels on the wire from the rectifier to the brake. The wires going from JB25X to JB05X are labeled PHB1 and PHB2. The wires from JB05X to JB19X are labeled PH1 and PH2. In JB 19X PHB is changed to 1601X and PHB2 is changed to 102X. At the other end of the festoon in JB253P 1601X changes back to PHB1. It is recommended that the field wiring numbers (JB25X, JB05X and JB19X) and GEC drawing be revised to match the elementary. Also the MCO Hoist and Plug Hoist control panel as-built shows the rectifier in the panel and this should be deleted from the panel.

**EB-35411 Mainline Festoon System, EB-33056 Sheet 1**

**Condition 2: Drawing Errors on Mainline Festoon**

It was verified by opening the main disconnect that the incoming festoon power is labeled LL1, LL2 and LL3 instead of L1, L2 and L3 shown on the drawing. It is recommended that the festoon drawing and elementaries be revised to show the LL1, LL2 and LL3.

**EC-35907 Turret Rotate Festoon System**

**Condition 3: Turret Festoon Drawing Not As-Built**

JB253 C, I and P were opened to attempt to ascertain which wires went through each conductor. The P box was relatively open and the wire terminations were readable, however it was not possible to identify the source of the wires from the various conductors. Of the approximately 60 terminations, two problems were noted. 1601X changed to PHB1 and PHB2 originated in the junction box but did not continue through the festoon. This appeared to be erroneous. The C panel was reviewed to find 2A08X and 2A09X. The wires were found but congestion made tracing the wires impossible. The junction box was extremely congested and wire identification was not possible. It is recommended that the turret festoon drawing be updated using the wire termination list provided by Power City and appropriate wire numbers be changed. A map should be made of the control and instrument terminal strips in the junction boxes to identify where the wires are landed. This may require some temporary wire de-termination. The I box is really too small for the number of wires it contains.

ED-33068 Trolley and Turret Rotate Control Panel**Condition 4: Drawing Errors on Trolley and Turret Rotate Control Panel Drawing**

The missing TSR relay was found in the panel with the expected wiring. The relay appears on the redline but was apparently inadvertently deleted during the as-building process. Three wiring changes were noted on the trolley drive, TSEL2 and TSJEX1. It is recommended the drawing to be revised to show the as-found condition, which is consistent with the elementaries. Spot checks of other components showed that the drawing in general reflects the as-built condition.

X-Channel Power Panel**Condition 5: Labeling Missing and Drawing Errors on X Channel Power Panel Drawing**

The panel was found to contain unlabeled fuses MCFLU1, 2 and 3 and the fuse capacity was found to match that specified on the elementaries. The capacity of the lighting transformers LTX1, 2 was found to be 250VA versus 300VA shown on the drawing. There were wiring number discrepancies found on relays L1, L2, PSF1R and CF1STR1, which is shown on the drawing as a 2. The drawing should be revised to correct these discrepancies which were consistent with the elementaries. Spot checks of other component wiring showed the drawing to be in general consistent with the as-built condition.

EC-35900 Sheet 11 MHM Console Back-sheet 2**Condition 6: Drawing Errors for MHM Console**

The Ronan Power supply was found connected to the x input rather than the y consistent with the elementaries. The camera power supply (CAMPS) was also found in this panel and is not shown on the drawing. The drawing should be revised to show the as-found condition. Spot checks of the wiring for other components showed the wiring to be consistent in general with the drawing.

EC-35900 Sheet 6 MHM Alarm Indication Wiring**Condition 7: Drawing Errors and Omission on the MHM Alarm console**

The Mode selection solenoid switch (MSSS) was found and wired as expected. The drawing should be revised to show the device. Wires to the camera focus and zoom were found to be 720X rather than 2A01X which appears on the elementaries. The elementary should be revised. Spot checks of other wiring showed the drawing in general reflected the as found condition.

EC-35900 Sheet 10 MHM Console Backsheet #1**Condition 8: Drawing Errors on Elementary and MHM Console**

The 1111BX on Trip Point relay 8X should be 1111B as shown on the elementaries. The console drawing should be revised. The CAMPS (Camera Power Supply) was not found in the console as shown on the drawing. The power supply was subsequently located by Rick Garrison in the right side of the console rather than the left. The terminal review of the wires confirmed the 720X and 2A06X were the correct numbers rather than those shown on the elementary. The elementary (sheet 2A) should be revised. Spot checks of the wiring on other components found the Panel drawing in general to be consistent with the as-built condition.

EB-33056 Sheet 2A, 363A0033 Sheet 6 Wiring Diagram Turret CCTV**Condition 9: Drawing Errors on Camera Control Circuitry**

Junction Boxes JB19X and JB14X were examined in the field against applicable drawings. All of the connections in JB14X were found to be per the drawing with two exceptions.

Wire 707X was found to be 2A06X. This does not appear on the GEC drawings or the elementaries. It does show up on the interconnection diagrams and is part of the turret rotate festoon wire list. The GEC drawings and elementaries should be revised to show 2A06X. The coaxial connections were found to be per the elementaries. The elementary did not show the focus and zoom wires routed to the camera. The elementary also shows 2A01X rather than the 720X found on the control console. The elementary and GEC drawing should be revised to show the as-found condition.

**MHM Electrical Walk-down II April 20, 2000**

A second electrical walk-down was conducted of the MCO hoist wiring and the Y-Channel wiring at the request of Project Management. New areas were selected from those not previously walked down in a somewhat random fashion without consideration of the results of the drawing review. The same error rate of approximately 1-2% was found. Mike Mahaffey performed the walk-down assisted by an electrician with the following results:

**363A0033, Sheet 2 Wiring Diagram - Tube Plug Hoist****Condition 11: Drawing Error on GEC Connection Drawing for Tube Plug Hoist**

The contents of JB20Y were reviewed against this drawing. All 9 wire numbers were correct. Wire terminal 48 was jumpered to 59 rather than 56 as noted on the drawing. Ederer spare wires were not terminated on terminals 51 through 55 but were coiled and wrapped in the panel. The GEC spare wires were terminated. The drawing should be revised to show terminal 59 rather than 56.

**363A0033, Sheet 3 Wiring Diagram - Base Locking Pin****Condition 12: Missing Spare Wires on Elementary**

The contents of JB20Y were reviewed against this drawing. Of the five wires shown, one was an unmarked spare. Wire numbers on the other terminals were correct. On the GEC drawing this wire is labeled 30A90Y and is from the unused contact on the proximity switch used to signal base locking pin engagement. The wire is not shown on the elementary drawing. It is recommended the wire be labeled and shown on the elementary (Sheet 30A).

**363A0033, Sheet 5 Wiring Diagram - Tube Plug Grapple****Condition 13: Wire Labels in JB10Y**

The 9 contacts in JB20Y were all checked and found to be correct. The 16 contacts in JB10Y were also checked. Wires on terminal 17 were mislabeled as 1521Y instead of the correct 15A21Y terminated in JB20Y. Wire labels should be changed. The 15 other wires were labeled correctly.

**363A0033, Sheet 8 Wiring Diagram - MCO Hoist Equipment****Condition 14: Connection Drawing Shows Incorrect Resolver Wire Numbers**

Wire numbers for the MCO Hoist Y resolver in JB20Y were found to be consistent with the elementaries. The GEC drawing should be revised to show 12H-72H. The other six wires were found to be correct.

**363A0033, Sheet 11 Wiring Diagram -MCO Grapple****Condition 15: Wire Labels in JB20Y**

Of the 13 wires terminated in JB20Y, 11 were found to be correct. GEC wire numbers on terminals 39 and 40 appear to be reversed in the as-found configuration. The Ederer side is correctly labeled. 39 should be 13B02Y and 40 is a spare 13B90Y. An attempt was made to trace the wiring to JB13XY but it was inside the hoist enclosure, which was buttoned up. The sensor potentially affected is the MCO Grapple Jaws Locked (Y) Limit Switch. Assuming the grapple has functioned correctly, the wire numbers should be reversed.

**363A0033, Sheet 13 Wiring Diagram MCO Hoist Containment****Condition 16: Drawing Errors for Connection Drawing**

Terminals in JB20Y for the weight sensing system were as expected. Wires for the MCO Hoist Containment Lighting system should be labeled on the drawing in accordance with the elementary (Sheet 14).

**ED-3306 MCO Hoist and Plug Hoist Control Panel****Condition 17: Errors on MCO Hoist and Plug Hoist Control Panel Drawing**

Various components in the panel were checked. Of about 60 wires, one was mislabeled on the drawing and one was shown connected to the wrong terminal on the MCO hoist flux vector drive (18 vs 19). The mislabeled wire was also identified during the drawing review. It is 5707X on MHL. The panel drawing should be revised. One of the relays (MHBFC1) has two sets of contacts in series instead of one set. This was found to be necessary due to limitations of the particular relay selected. The Plug Hoist Brake Rectifier is not located in the panel and should be deleted..

**ED-33067 Bridge Control Panel Wiring Diagram****Condition 18: Drawing Errors on Bridge Control Panel Drawing**

About 60 wire terminations were checked including one identified as inconsistent during the drawing review. On relay BFLT2, 2426X was found instead of 2425X on the drawing. 2426X is consistent with the elementary. The panel-wiring diagram should be changed. The two wires (2209X and 2219X) going to the flux vector drive faults for the Bridge drives were found on the normally closed instead of the normally open contact. The as-found condition is consistent with the elementary drawing. The panel drawing should be revised.

**ED-33069 Y-Channel Main Power Panel Wiring Diagram****Condition 19: Labeling Error and Drawing Error on Y-Channel Main Power Panel**

Approximately 60 wiring terminations from various components were checked. No discrepancies were noted. The elementary Sheets 38 and 40 show circuit breakers TSPCB1 and TSJCB1 respectively. On the panel drawing and in the panel the "1" is omitted from the drawing. The panel drawing and field labels should be changed.