

Part 21 (PAR)

Event # 49904

<b>Rep Org:</b> VALCOR ENGINEERING CORPORATION		<b>Notification Date / Time:</b> 03/12/2014 18:24 (EDT)	
<b>Supplier:</b> VALCOR ENGINEERING CORPORATION		<b>Event Date / Time:</b> 01/11/2014 (EDT)	
		<b>Last Modification:</b> 03/12/2014	
<b>Region:</b> 1	<b>Docket #:</b>		
<b>City:</b> SPRINGFIELD	<b>Agreement State:</b> Yes		
<b>County:</b>	<b>License #:</b>		
<b>State:</b> NJ			
<b>NRC Notified by:</b> JIMMY SHIEH		<b>Notifications:</b> KATHLEEN O'DONOHUE	R2DO
<b>HQ Ops Officer:</b> CHARLES TEAL		PART 21 GROUP	EMAIL
<b>Emergency Class:</b> NON EMERGENCY			
<b>10 CFR Section:</b>			
21.21(a)(2) INTERIM EVAL OF DEVIATION			

## PART 21 - AP-1000 SOLENOID OPERATED VALVES LEAKAGE

The following was excerpted from a fax received from Valcor Engineering Corporation:

"Background:

"Valcor was chosen by WEC [Westinghouse Electric Corporation] as a supplier to the AP-1000 for the ASME Section III Class 1, 2 and 3 Solenoid Operated Valves. As part of the specification requirements Valcor is required to perform qualification testing in accordance with the requirements of IEEE-323-1974, IEEE-344-1987 and IEEE-382-1996.

"Discovery:

"On Saturday January 11th, 2014, Valcor's lab technician discovered that the hard faced seat of an AP-1000 Solenoid Operated qualification valve had a crack through the thickness of the valve seat to the outlet port that caused the valve to leak in the closed position beyond its Technical Specification requirement (WEC Specification APP-PV13-ZOD-101). The subject valve had undergone heat rise testing to determine actuator temperatures during its specified design basis conditions. As part of the qualification process (IEEE-323) and in accordance with the test procedure the subject valve is given a factory acceptance test (FAT) at each stage of the qualification program.

"The valve design is unique to the model (V526-5631-36/40) in that the dimensional constrain resulted in a web thickness of the hard faced seat that is thinner than our standard historical valve designs. A total of eight (8) valves of this configuration (four (4) for Valve Model Number V525-5631-36 and four (4) for Model number V526-5631-40) have been delivered to Westinghouse for installation in the Sanmen and Haiyang nuclear power plants located in

IE19  
HRO

the People's Republic of China. Neither of these plants have loaded fuel or are operational.

"The investigation, failure analyses, and stress analyses completed to-date have not provided a firm conclusion of the root cause of the crack. Westinghouse, the purchaser who imposed 10CFR21 on the procurement document of the valve models identified in question, has been informed of the condition and current status of investigation."

Submitted by Jimmy Shieh Quality Assurance Director.

\*\*\*\*\*

**VALCOR****VALCOR ENGINEERING CORPORATION**

2 Lawrence Road, Springfield, N.J. 07081, U.S.A.

(973) 467-8400

FAX (973) 467-9391

**FACSIMILE MESSAGE**DATE: 3-13-2014TOTAL NUMBER OF PAGES 9**TO:****FROM:**NAME Operations CenterNAME Jimmy SHIEHCOMPANY NRCDEPT Quality Assurance

CITY/STATE \_\_\_\_\_

FACSIMILE 1-301-816-5151**MESSAGE:**Revised interim report. See attached for detail.

If you do not receive all pages, please call (973) 467-8400

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**Jimmy Shieh**

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**From:** Jimmy Shieh  
**Sent:** Thursday, March 13, 2014 5:02 PM  
**To:** 'Patel, Raju'  
**Cc:** Al LaMastra; Steven Gatcomb  
**Subject:** Revised Submittal. RE: Please hold Interim Part 21 report from being released to the NRC Part 21 report Webpage  
**Attachments:** RevisedSubmittal\_140313.pdf

Mr. Patel,

The attached file includes:

Letter stating reason for request to revise the interim report  
Revised interim report cover letter correcting referenced report number from ER041 to SKA23651  
Report SKA23651 that is extracted from ER041 with proprietary information deleted.

I am sending the same file to NRC Operations Center by fax.

Thank you for your assistance and guidance.

Regards,

Jimmy

**From:** Patel, Raju [mailto:Raju.Patel@nrc.gov]  
**Sent:** Thursday, March 13, 2014 3:28 PM  
**To:** Jimmy Shieh  
**Subject:** FW: Please hold Interim Part 21 report from being released to the NRC Part 21 report Webpage

Mr. Jimmy,

Valcor will also have to provide a request for withholding for the currently submitted document per 10 CFR 2.390.

See <http://www.nrc.gov/reading-rm/doc-collections/cfr/part002/part002-0390.html>

Thank You

Regards,



Raju B Patel  
Reactor Operations Engineer  
Construction Mechanical Vendor Branch  
Office of New Reactors

**VALCOR ENGINEERING CORPORATION®**

2 Lawrence Road • Springfield, New Jersey 07081 USA • 973-467-8400

To: NRC Operations Center  
Fax 301-816-5151

Date: March 13<sup>th</sup>, 2014

Subject: Revision to Valcor's Interim Report ER-041 for a potential defect and Cover Letter

Reference:

1. ER-041 Engineering Cracked Seat Investigation for DC Process Solenoid Valve Model Number V526-5631-36
2. U.S. NRC 10 CFR 2.390
3. US 10 CFR 21
4. SKA23651 Interim Report on Valcor Valve Cracked Seat.

Background: On March 11<sup>th</sup>, 2014 Valcor submitted a notification to the NRC Operations Center identifying a potential defect and its associated interim report. Upon subsequent review of the submittal Valcor realized the report contained information that was considered proprietary, had trade secrets and violated our Nondisclosure Agreement (NDA) with our customer (Westinghouse Electric) and supplier.

Discussion: Valcor is requesting that the submitted Interim Report identified in Reference 1 above be withheld from the public domain. This request is being made under the guidance specified in U.S. NRC 10 CFR 2.390 (a.4).

In lieu of this report Valcor has prepared an interim report (Reference 4 attached) that is suitable for release and does not contain proprietary information, trade secrets and will not violate our NDA with our customer.

With very best regards,

VALCOR ENGINEERING CORPORATION

Jimmy Shieh  
Quality Assurance Director

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NRC Operations Center

Fax 301-816-5151

Subject: Interim Report of a potential defect

**Background:**

Valcor was chosen by WEC as a supplier to the AP-1000 for the ASME Section III Class 1, 2 and 3 Solenoid Operated Valves. As part of the specification requirements Valcor is required to perform qualification testing in accordance with the requirements of IEEE-323-1974, IEEE-344-1987 and IEEE-382-1996.

**Discovery:**

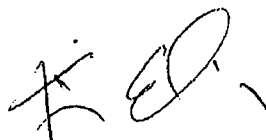
On Saturday January 11<sup>th</sup>, 2014, Valcor's lab technician discovered that the hard faced seat of an AP-1000 Solenoid Operated qualification valve had a crack through the thickness of the valve seat to the outlet port that caused the valve to leak in the closed position beyond its Technical Specification requirement (WEC Specification APP-PV13-ZOD-101). The subject valve had undergone heat rise testing to determine actuator temperatures during its specified design basis conditions. As part of the qualification process (IEEE-323) and in accordance with the test procedure the subject valve is given a factory acceptance test (FAT) at each stage of the qualification program.

After the FAT testing the valve was disassembled to discern what would cause the leakage observed. The valve seat area and internal components showed discoloration suggesting the valve had been subjected to temperature profiles well above its design basis/intended range.

The valve design is unique to the model (V526-5631-36/40) in that the dimensional constrain resulted in a web thickness of the hard faced seat that is thinner than our standard historical valve designs. A total of eight (8) valves of this configuration (four (4) for Valve Model Number V525-5631-36 and four (4) for Model number V526-5631-40) have been delivered to Westinghouse for installation in the Sanmen and Haiyang nuclear power plants located in the People's Republic of China. Neither of these plants have loaded fuel or are operational.

The investigation, failure analyses, and stress analyses completed to-date have not provided a firm conclusion of the root cause of the crack. Westinghouse, the purchaser who imposed 10CFR21 on the procurement document of the valve models identified in question, has been informed of the condition and current status of investigation.

An interim report (SKA23651) summarizing our current understanding of the issue is attached. We anticipate to complete our investigation in 90 days.



Jimmy Shieh  
Quality Assurance Director

Initially issued 3-12-2014. Revised 3-13-2014 to correct the attached report number from ERO41 to SKA23651.



VALCOR ENGINEERING CORPORATION®  
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SPRINGFIELD, NJ 07081 USA

# INTERIM REPORT ON VALCOR® VALVE CRACKED SEAT

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## SKA23651



**1.0****SCOPE**

This document chronicles the development of the investigation into the cracked seat discovered on Valcor Process Solenoid Valve Model V526-5631-36 during qualification testing in support of the Westinghouse AP1000 program.

This Engineering Report shall describe the condition, results of a metallurgical analysis and ongoing investigation. The cause of the crack is indeterminate at this time. However Valcor® is currently having a Computer Fluid Dynamics Analysis (CFD) and a Finite Element Analysis (FEA) performed which will help to identify if the part was thermally stressed.

**2.0****SUMMARY**

On January 11<sup>th</sup>, 2014, during the performance of Post-Heat Rise Test Function Testing in accordance with QP526-5688-26-2, Rev. E, Para. 3.3.1, on Process Solenoid Valve Part Number SKD21990 (Model V526-5631-36 with flanges welded onto the ports), Serial Number 1Q, while investigating the cause of excessive seat leakage, Valcor® lab technicians discovered that the hard-faced seat had a crack through the thickness to the outlet port that caused the valve to show substantial seat leakage in the closed position. The valve seat area and internal components also showed discoloration suggesting the valve had been subjected to temperature above the intended range.

The valve design is shared by Model V526-5631-36 and V526-5631-40. Both valve designs share a common geometry resulting in a thin seat-to-outlet port cross-section at the crack location. The affected valve designs that have been shipped include the following:

**Table 1: List of Affected Valves**

PART NUMBER	MODEL NUMBER	QUANTITY	WESTINGHOUSE ITEM NUMBER	INSTALLED LOCATION
418867301	V526-5631-36	2	APP-PV13-Z0D-101	HAIYANG UNIT 1 NUCLEAR POWER PLANT
418867301	V526-5631-36	2	APP-PV13-Z0D-101	SANMEN UNIT 1 NUCLEAR POWER PLANT
418867304	V526-5631-40	2	APP-PV13-Z0D-111	HAIYANG UNIT 1 NUCLEAR POWER PLANT
418867304	V526-5631-40	2	APP-PV13-Z0D-111	SANMEN UNIT 1 NUCLEAR POWER PLANT

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The investigation, metallurgical analysis and stress analysis completed to-date have not provided a firm conclusion of the root cause of the crack. Westinghouse, the purchaser who imposed 10CFR21 on the procurement document of the valves Part Number 418865301/418865304 in question, has been informed of the condition and current status of investigation.

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