

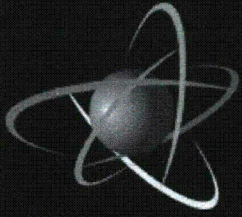
Release In Entirety



***CRANE COLLAPSE –  
STATOR DROP  
Arkansas Nuclear One***

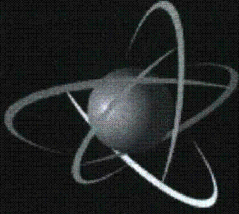
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**DRP Counterpart Meeting  
Alfred Sanchez  
May 14, 2013**



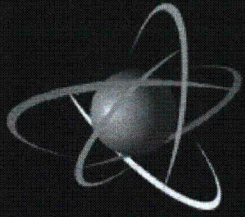
# *Agenda*

- **Background**
- **Event Description**
- **Site Priorities**
- **Resident Inspector Response**
- **Augmented Inspection Team**
- **Parting Thoughts**
- **Pictures**



# ***Background***

- **ANO Unit 1 Stator Replacement Project**
- **To Rewind (1R23) or Not to Rewind (1R24)**
- **Began Loading Crane in Turbine Building  
Late February 2013**
- **Construction Complete March 31, 2013**
- **----Animation Video here----**



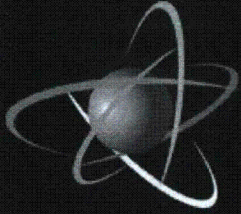
# ***ANO Plant Status – March 31***

## **Unit 1**

- 1R24, Mode 6
- Green Risk
- RCS > 23' in Cavity
- Ready to Offload
- Ready for Green Train Maintenance Window
- A3/A4 Power Supplied via A1

## **Unit 2**

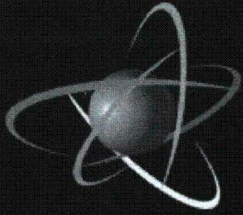
- Mode 1, 100%
- Green Risk



# **Crane Collapse – Stator Drop**

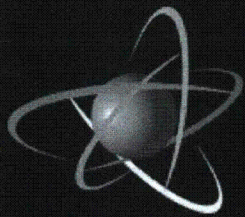
**March 31, 2013**

- **Structural Failure of Crane Support and Stator is Dropped**
- **Immediate Loss of Offsite Power to Unit 1**
- **Immediate Unit 2 Reactor Trip**
- **Breaker Explosion & Partial Loss of Offsite AC Power on Unit 2 (1.5 Hours After Trip)**
- **Notice of Unusual Event**



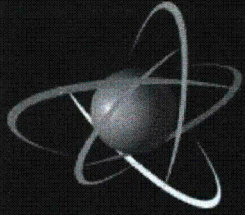
# ***Structural Failure of Crane***

- **Collapse Occurs with NO WARNING!**
- **Offsite Responders Notified (Fire and Ambulance)**
- **1 Fatality and 8 Injured**
- **Emergency Response Organization Activated**
- **Loss of Blackout Diesel to Both Units**
- **Crushed and Severed 8” Fire Header**
- **3 - B.5.b Pumps and London Fire Truck in PA**



## ***Unit 1 Loss of Offsite Power***

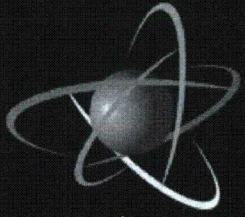
- **A1/A2 Busses Located Directly Beneath Turbine Deck and Impact Area—A1 Locks Out/ A2 Bus was De-energized Previously**
- **Loss of Decay Heat Removal**
- **EDGs Function as Designed**
- **Loss of Instrument Air**
- **Loss of Spent Fuel Pool Cooling**



## ***Unit 2 Reactor Trip – Partial LOOP***

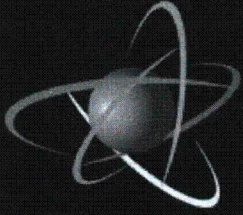
- **Trip of RCP B Breaker due to Vibration**
- **Reactor Protection System Trip**
- **Feeder Breaker Explosion and SU#3 Lockout**
- **2A1Bus Fast Transfer to SU#2**
- **2A2 Bus De-energizes and EDG-2 Functions as Designed to load 2A4**
- **NOUE Declared for Explosion in PA**





## ***Unit 2 Reactor Trip – Partial LOOP***

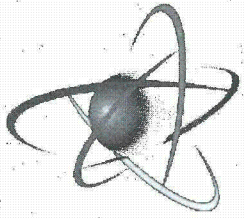
- **Electrical Power Arrangement Results in Degraded Instrument Air Pressure**
- **Water Hammer In Feedwater Heaters**
- **Loss of Letdown, SDBCS, and Pressurizer Spray**
- **Natural Circulation Cool Down (First Time)**



# ***Licensee Priorities***

## **UNIT 1**

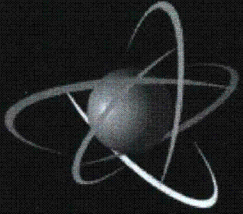
- **Restore Offsite Power to Unit 1 Safety Busses from SU#1 Transformer via a Temporary Modification**
  - **SU#1 to Temporary Field Breaker to Blackout Diesel Electrical Feeder Lines**
  - **Required Complete De-energization of A3 Vital Bus...Only 1 EDG from Station Blackout**
- **Establish Temporary Modifications to Restore Non-Safety Related Power via Mobile Diesel Generators**



# Licensee Priorities

## Unit 1 (cont.)

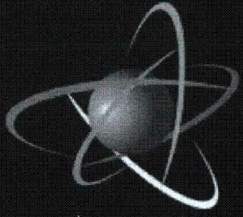
- **Reestablish Fire Suppression System**
- **Establish Redundant Offsite Power via Temporary Switchgear Powered by SU#2**
- **Defuel Unit 1 and Complete Portions of 1R24 in Reactor Building**



# ***Licensee Priorities***

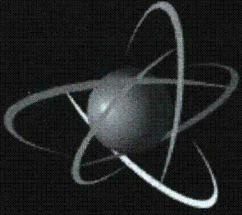
## **Unit 2**

- **Assess Physical Damage**
- **Repair & Replace Damaged Components**
- **Review Post Transient Report**
- **Forced Outage List**
- **Re-Start Checklist Items (On-Line April 28)**
- **Plant Start-Up Monitoring Plans**



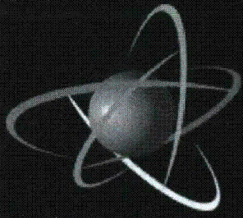
## ***Resident Inspector Response***

- **Responded to the Site in Approx 1 Hour**
- **Control Room is Small & Very Crowded**
- **Ongoing Events in Control Room Made it Difficult to Break Away to Call Region**
- **Understanding Roles**
- **“Eyes-In-The-Field”**
- **Follow-Up Inspection (Temporary Modifications and Unit 2 Start-up)**



# ***Augmented Inspection Team***

- **Onsite Week of April 8<sup>th</sup>**
- **10 Unresolved Items**
- **Most Significant Items**
  - **Risk Assessment for Stator Move**
  - **Evaluation of Vendor Engineering Products**
  - **Timeliness of Securing Temporary Fire Pump (SU#3 Transformer Lockout and Flooding)**



# ***Augmented Inspection Team***

- Compensatory Measures for Fire Suppression System (Truck-B.5.b)**
- Unit 1 Nozzle Dams**

**Bradley, Dan**

---

**From:** Miller, Geoffrey  
**Sent:** Monday, May 13, 2013 8:49 AM  
**To:** Bradley, Dan  
**Subject:** RE: Reminder to send the AIT slides  
**Attachments:** AIT\_pres\_ANO.ppt

Release

Dan,

Attached is the slide show we used at the meeting. Please let me know if you need more info.

Thank you,

Geoff

---

**From:** Bradley, Dan  
**Sent:** Monday, May 13, 2013 10:43 AM  
**To:** Miller, Geoffrey  
**Subject:** Reminder to send the AIT slides


Release

Thank you,  
Dan

Dan Bradley  
Project Engineer - Division of Reactor Projects Branch E  
U.S. NRC Region IV  
[dan.bradley@nrc.gov](mailto:dan.bradley@nrc.gov)  
817-200-1506




Release In Entirety



U.S.NRC  
United States Nuclear Regulatory Commission  
*Protecting People and the Environment*

NRC Augmented Inspection Team  
Exit Meeting  
Arkansas Nuclear One

Nuclear Regulatory Commission - Region IV  
Russellville, AR  
May 3, 2013



Agenda

- Introduction
- Purpose of an AIT
- Event Description
- Inspection Results
- Licensee Comments
- NRC Closing Remarks
- Question and Answer

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## *Augmented Inspection Team*

- **Fact-finding inspection**
- **Identify issues for follow up inspection**
- **Identify generic safety concerns**

3

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## *March 31 Dropped Stator Event*

- **Unit 1 RFO Stator Replacement**
- **Structural Failure of Lifting Rig**
- **Loss of Offsite Power to Unit 1**
- **Unit 2 Reactor Trip**
- **Partial Power Loss/Breaker Failure on Unit 2**
- **Notice of Unusual Event**

4

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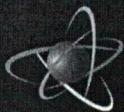


## Inspection Results

- **Reactor plant safety systems responded as designed**
- **Entergy took appropriate actions to recover plant equipment on Units 1 and 2 and has initiated an extensive root cause evaluation effort**

5

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## Summary of Charter Items

- **Event Chronology**
- **Operator Response**
  - **Control of Temporary Modification**
- **Equipment Impact**
  - **Structural Impact to Units 1 and 2**

6

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## Summary of Charter Items

- **Plant Response to the Event**
  - Control of Steam Generator Nozzle Dams
  - Main Feedwater Regulating Valve Maintenance
  - Flood Barrier Effectiveness
- **Compensatory Measures**
  - Compensatory Actions for Fire Suppression
- **Event Classification and Reporting**
  - Timeliness of Emergency Declaration

7

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## Summary of Charter Items

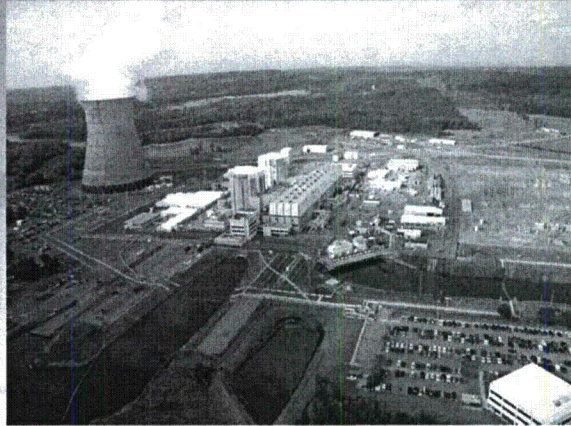
- **Heavy Lift Preparations**
  - Shutdown Reactor Equipment Risk
  - Implementation of Material Control Procedure
- **Status of Cause Evaluation Efforts**
  - Review of Causes/Corrective Actions
- **Operating Experience**

8

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## Licensee Response and Remarks



9

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## Contacting the NRC

- **Report an emergency**
  - (301) 816-5100 (call collect)
- **Report a safety concern**
  - (800) 695-7403
  - Allegation@nrc.gov
- **General information or questions**
  - [www.nrc.gov](http://www.nrc.gov); Select “What We Do” for Public Affairs
  - Victor Dricks, (817) 200-1128

10

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- To discontinue receiving electronic distribution, you may unsubscribe at any time by visiting the same web address above.

Release

**Bradley, Dan**

---

**From:** Lusk, Rustin  
**Sent:** Friday, May 10, 2013 12:23 PM  
**To:** Howell, Art; Lewis, Robert; Kennedy, Kriss; Scott, Michael; Blount, Tom; Clark, Jeff; Sanchez, Alfred; Schaup, William; Fairbanks, Abin; Allen, Don; Azua, Ray; Melfi, Jim; Bradley, Dan; Hatfield, Gloria; Dricks, Victor; Uselding, Lara; Kalyanam, Kaly; Kellar, Ray; Herrera, Marisa; Williams, Loretta; Fuller, Karla; Weil, Jenny; OEMAIL Resource; ROPreports Resource; Huyck, Doug; R4DRP\_AA  
**Subject:** ANO 2013002 IR  
**Attachments:** ANO 2013002-RP-AS ML13130A329.pdf — Public ADAMS Document

Good Afternoon,

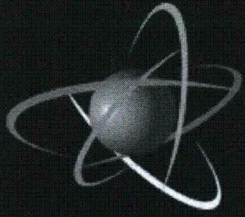
Please see the attached report. Thank you.

Respectfully,

Rustin "Russ" Lusk  
Division of Reactor Projects, Division Admin Assistant  
U.S. Nuclear Regulatory Commission, Region IV  
Phone: (817) 200-1184  
Fax: (817) 200-1278



"Faith is being sure of what we do not see & certain of what we hope for."  
\*\*\*R.I.P. Rick "Rypper" Rypien\*\*\*



# ***Parting Thoughts***

- **Real (Human) Risk at Operating Nuclear Power Plants**
- **Just Because it is a Secondary System, Not Safety-Related, or Shutdown Doesn't Mean That There is No Risk!**
- **When Observing Heavy Lifts...Always Consider Failure of Lifting Rig and Ensure You Are Out of Harms Way**
- **Keep Detailed Notes w/ Dates & Times**
- **Verify Information**

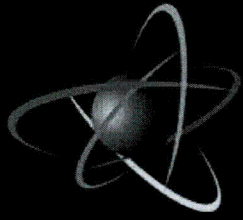




***NRC Augmented Inspection Team  
Exit Meeting  
Arkansas Nuclear One***

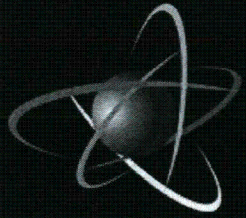
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**Nuclear Regulatory Commission - Region IV  
Russellville, AR  
May 9, 2013**



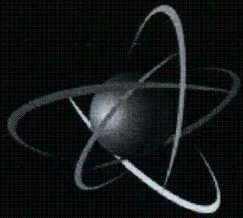
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- **Introduction**
- **Purpose of an AIT**
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- **Licensee Comments**
- **NRC Closing Remarks**
- **Question and Answer**



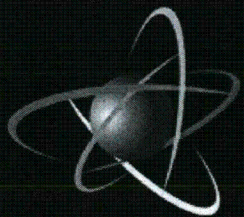
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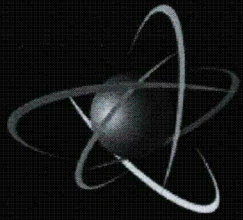
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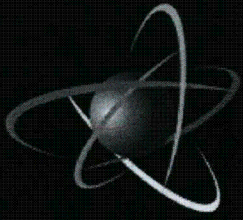
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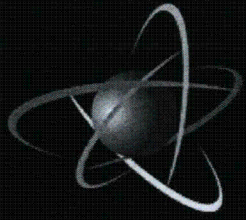
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  - **Structural Impact to Units 1 and 2**



## *Summary of Charter Items*

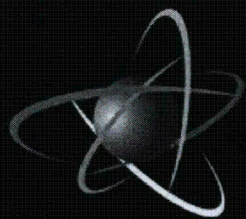
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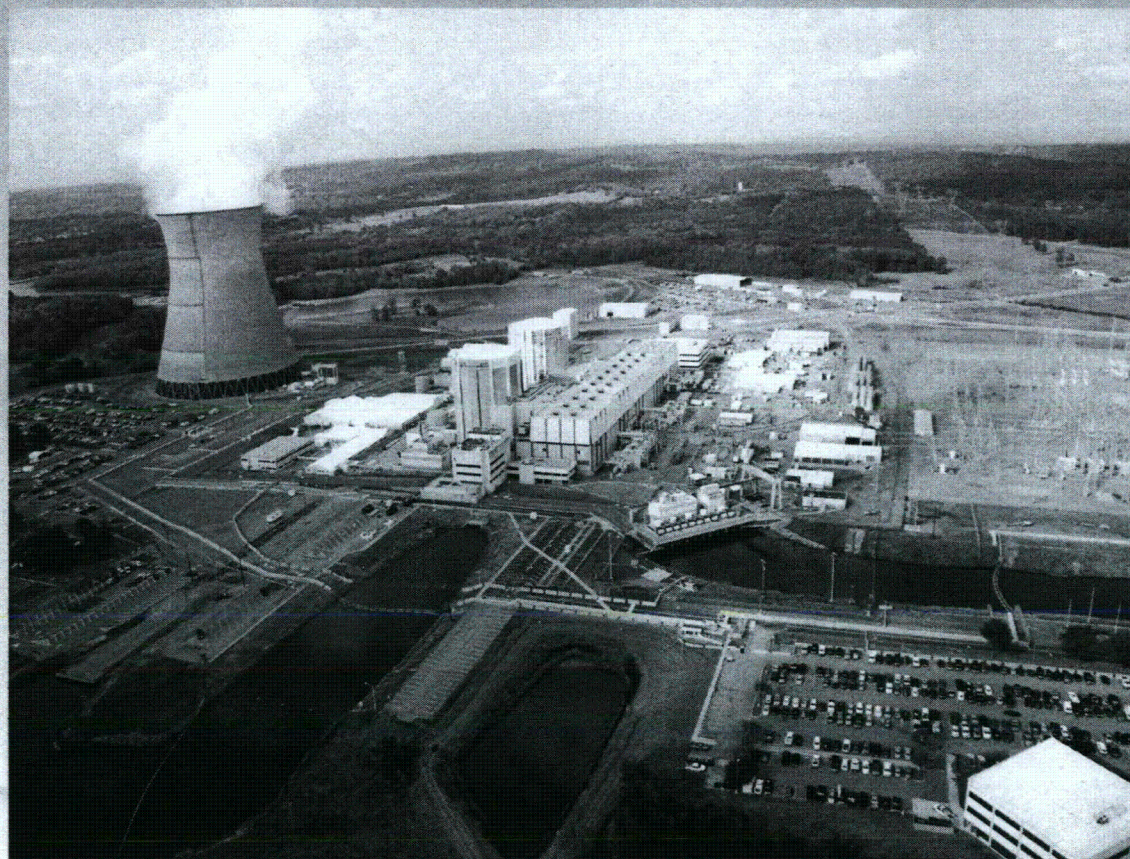
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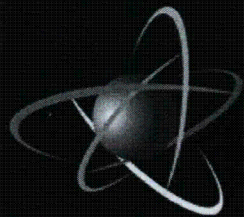
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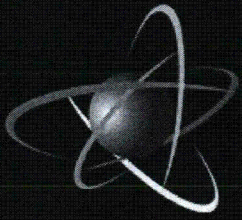
# *Licensee Response and Remarks*





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