



Presentation to the NRC On the Causes and Corrective Actions of the AREVA NP Mount Athos Road Shipment of Fuel Cleaning Equipment to the Watts Bar Plant Exceeding Transportation Radiation Limits

Ron Land
VP Manufacturing Operations

Dominique Grandemange
Plant Manager

Valerio Dunn
Fuel Services Project Manager

Geoffrey Wertz
EHS&L Manager

Presentation Agenda

- > **Background**
- > **Fuel Cleaning Equipment Overview**
- > **Timeline / Risk Assessment**
- > **Causal Analysis/Corrective Actions**
- > **Conclusions**

Background

On February 4, 2008, WB received a shipment of fuel cleaning equipment sent from the AREVA NP Inc, Mount Athos Road (MAR) facility. The receipt radiation survey indicated that Box 455 had a localized “hot spot” which exceeded the transportation requirements of 10 CFR 71.47.



Fuel Cleaning Equipment Overview

Purpose/Use:

- Ultrasonic cleaning system used to remove material deposits from the fuel cladding to reduce Axial Offset Anomaly improving thermal performance
- Secondary benefit to reduce plant source term – dose reduction

System Design Considerations:

- Underwater components electro polished to support decontamination due to potential contamination
- Specific container design incorporates shipping restraints and shielding of anticipated high dose components

Primary Underwater Components:

Filtration Unit

Ultrasonic Transducer Housing for Two Fuel Assemblies

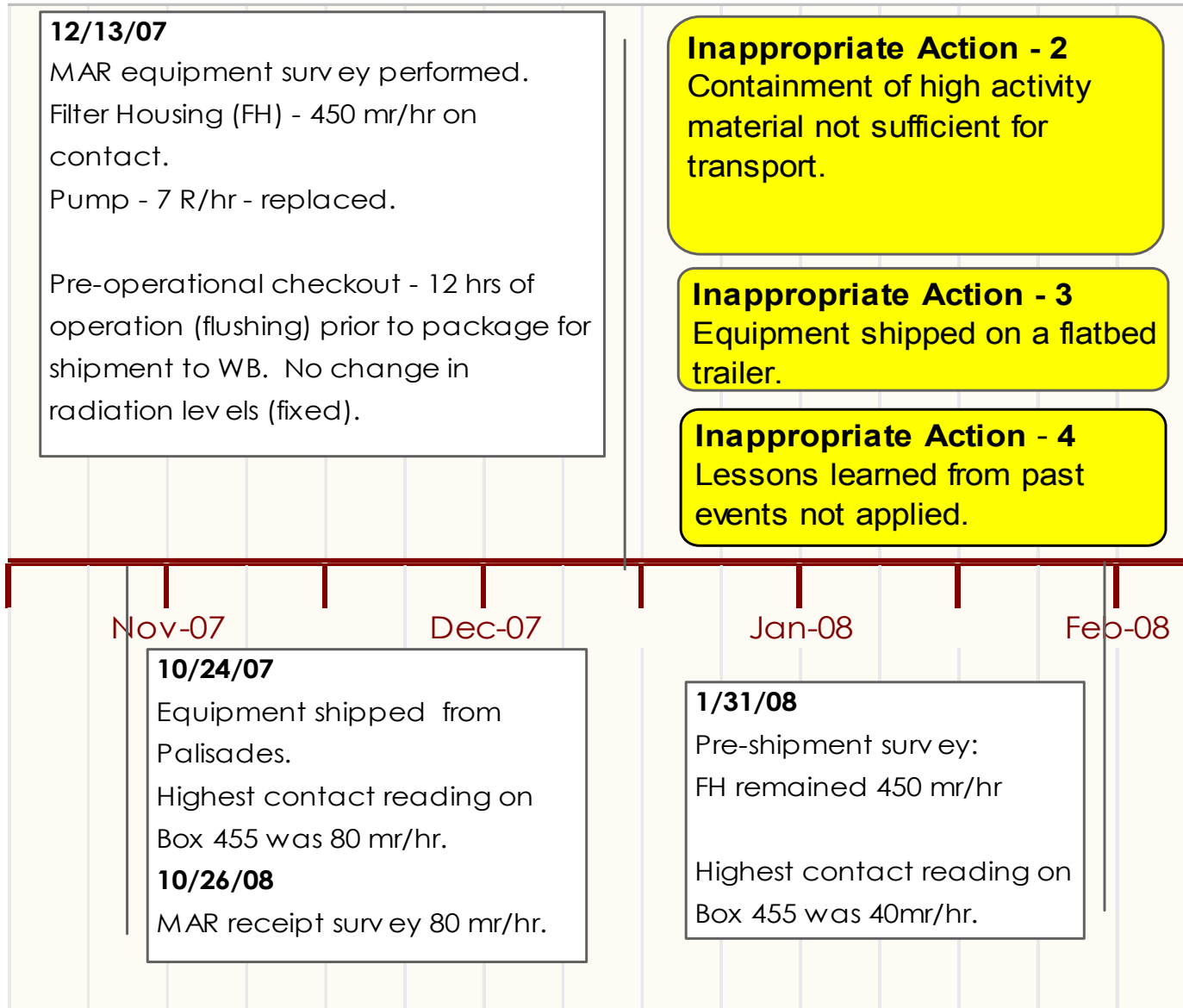


Fuel Cleaner Filtration Unit

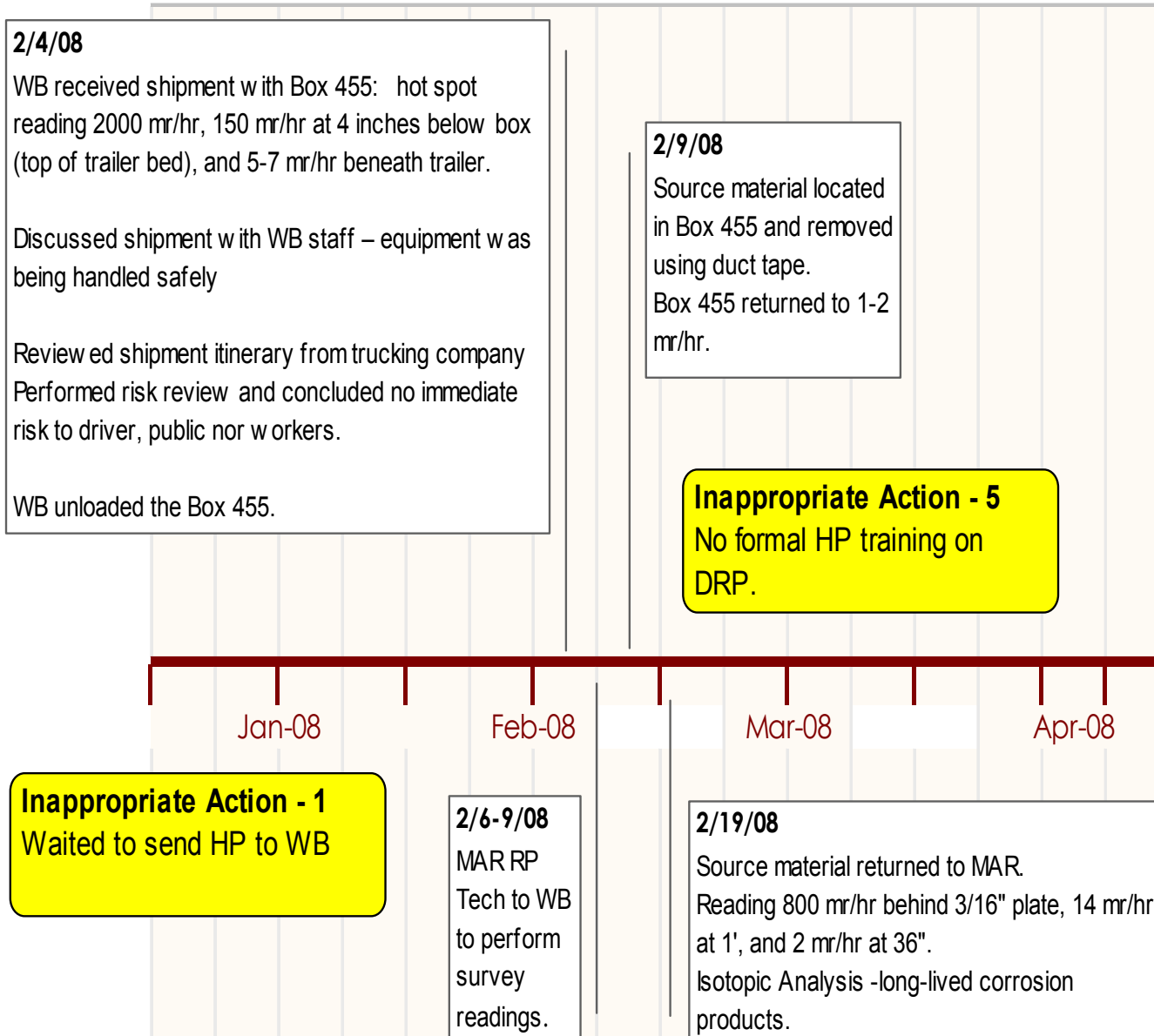


Fuel Cleaner Fuel Assembly
Ultrasonic Transducer Housing

Activity Timeline Pre-Shipment



Activity Timeline Post-Shipment

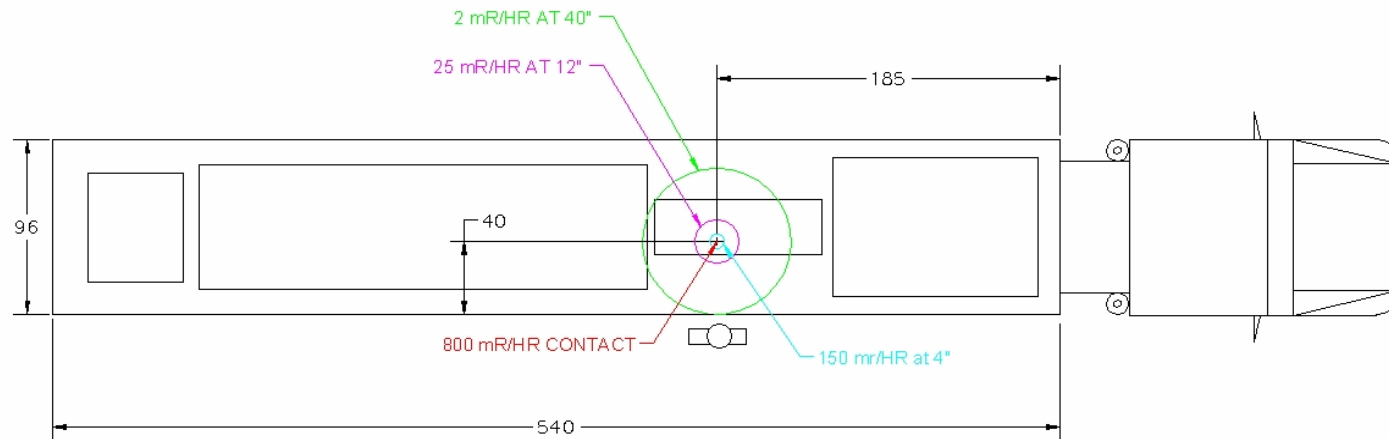
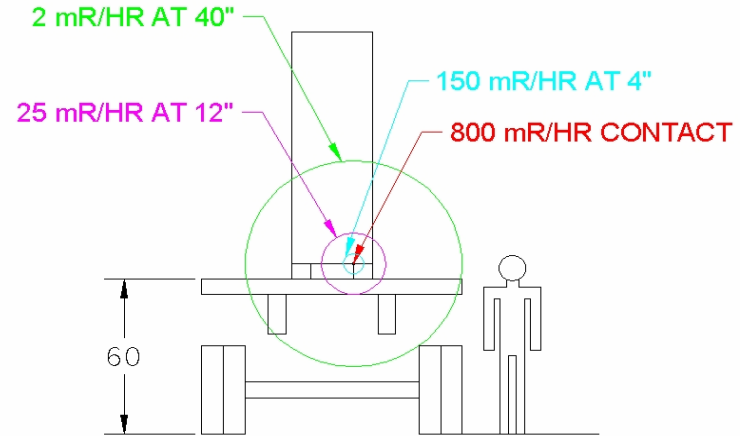


Summary of Survey Results

	MAR Survey Data	WB Survey Data
OUTSIDE of box 455 Performed at WB	Detector : TELEPOLE (gamma readings) 800 mr/hr on contact 25 mr/hr at 12 inches No smearable contamination	Detector : TELETENSOR 2000 mr/hr gamma and beta on contact 150 mr/hr at 4 inches No smearable contamination
INSIDE of box 455 Performed at WB	Detector : TELEPOLE 800 mr/hr on contact 70 mr/hr at 12 inches	Detector : RSO-5 1500 mr/hr on contact (open window) 800 mr/hr on contact (closed window)
INSIDE of BOX 455 after removal of "Hot Spot" Performed at WB	Detector : TELEPOLE 1 to 2 mr/hr on contact	
On hot spot removed from BOX 455 Performed at MAR	Detector : TELEPOLE 1100 mr/hr on contact	
On hot spot removed from BOX 455 with 3/16" plate Performed at MAR	Detector : TELEPOLE 800 mr/hr on contact 14 mr/hr at 12 inches	

Good Gamma Survey Data Consistency With No External Beta Contamination Found

**Survey data
illustrated
graphically**



**Conclusion of Risk Assessment :
No Undue Risk to the Public or Truck Driver**

Causal Analysis & Corrective Actions

> Two Apparent Causes

- ◆ **AC #1 – The procedure for pre-shipment surveys did not have an activity threshold for additional consideration of containment of high activity material prior to transport.**
- ◆ **AC #2 – The procedure for pre-shipment surveys did not have any specific requirements for consideration of additional packaging or use of a closed conveyance trailer.**

Causal Analysis & Corrective Actions

> Corrective Action #1

- ◆ Established pre-shipment radiation survey activity thresholds.
 - Thresholds trigger additional management review
 - Applicable to all MAR equipment shipments.

> Corrective Action #2

- ◆ Clarified roles and responsibilities for RP and operations personnel to ensure proper packaging of all radioactive equipment.
 - Enhanced ownership of equipment packaging.

Causal Analysis & Corrective Actions

- > **Corrective Action #3**
 - ◆ Added requirement to perform extensive surveys of highly contaminated equipment, for example:
 - Reactor Cavity
 - Below the Reactor Head
 - Spent Fuel Pool

- > **Corrective Action #4**

Fuel Cleaning Equipment is transported in a closed conveyance.

- > **Above requirements added to SL-1600, “Shipment and Receipt of Radioactive Material.”**

- > **CA’s 1 – 4 are completed**



Contributing Causes & Corrective Actions

- > **CC #1 – Extent of Condition Review had not been performed using previous MAR “receipt” shipments which exceeded transportation limits.**

- > **Corrective Action**
 - ◆ **#1 - Performed an external assessment of RP practices in shipment preparation – complete.**
 - Results matched internal ACA findings.
 - ◆ **#2 – Open CA to perform a Lessons Learned Review.**
 - Implemented through CAP and audit process.

Contributing Causes & Corrective Actions

- > **CC #2 - RP technicians did not have formal training on Discrete Radioactive Particles (DRP).**

- > **Corrective Actions**
 - ◆ **#1 - Procedure SL-1291, “Discrete Radioactive Particle Control” created**
 - ◆ **#2 - RP technicians were trained on the procedure.**
 - ◆ **#3 - Formal DRP Training Program developed.**
 - ◆ **#4 - Initial & Recurring Training added to the RP annual curriculum.**

Contributing Causes & Corrective Actions

- > **CC #3 - There was a 2 day delay in dispatching a MAR RP technician to support the event investigation.**

- > **Corrective Action**
 - ◆ Requirement to dispatch an RP technician immediately if a transportation container exceeds any transportation limit.
 - ◆ Requirement added to procedure SL – 1600.

Corrective Action Summary

- > **Corrective Actions 1 – 4 are complete.**
- > **Subsequent Lessons Learned Review will validate apparent and contributing causes and ensure effectiveness of CA implementation.**

Conclusions

- > MAR recognizes the potential risk this event as important. In this case, the risk to the public or workers was very low.**
- > MAR causal analysis investigation was comprehensive.**
- > Corrective actions were comprehensive and complete.**