

# Review of S-1030 Scrubber Event Columbia Fuel Fabrication Facility

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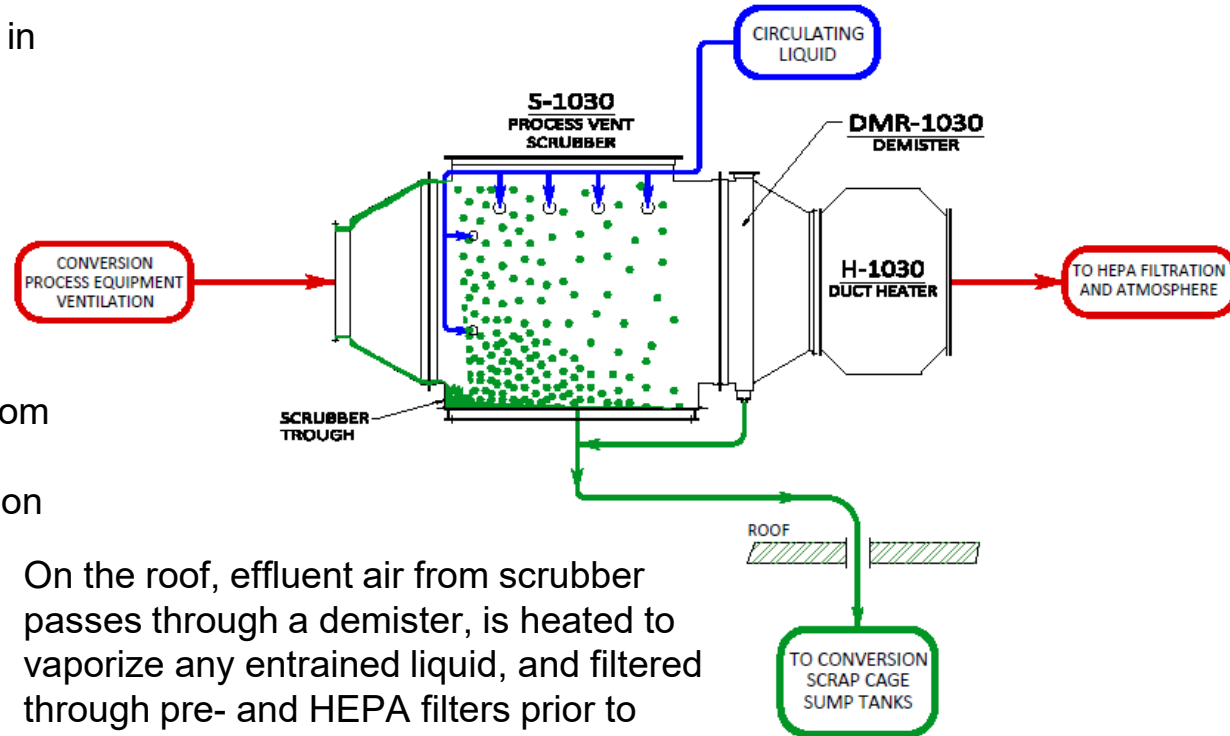


# Agenda

- S-1030 Scrubber – How it Works
- Event History
- Westinghouse Leadership Accountability
- Recovery Status to Date
- Root Cause Analysis, Lessons Learned
- Customer Communications
- Next Steps to Resuming Conversion Area Operations
- Lessons-Learned Sharing

# S-1030 Ammonia Scrubber – How it Works

- 30,000-CFM system ventilates hoods, vessels, cleaning operations, and scrap recovery in Conversion and UF6 areas to remove fumes and particulates from effluent air.
- Ventilation from process equipment pulled through S-1030 packed bed scrubber, where it is contacted via spray nozzles with circulating liquid from system sump tanks. City water added to make up for evaporation losses.



- On the roof, effluent air from scrubber passes through a demister, is heated to vaporize any entrained liquid, and filtered through pre- and HEPA filters prior to discharge to atmosphere. Bag filters in liquid recycle loop collect any solids entrained from process effluent or resulting from possible precipitation of salts from acid/base reactions.

# Event History

- May 2016 – During annual inspection and clean-out of S-1030 scrubber, material containing approximately 87 kg (192 lbs) of uranium was removed from the inlet transition
- Subsequent analyses determined uranium mass limit was exceeded; area operations stopped and U.S. NRC notified
  - No injuries and no impact to public/employee health, environment or actual safety consequences resulted from this event
- U.S. NRC Augmented Inspection Team (AIT) conducted review beginning in early August; Confirmatory Action Letter (CAL) issued August 11
- Transitioned to NRC CAL team oversight following AIT review
- Conversion operations have been shut down since late July

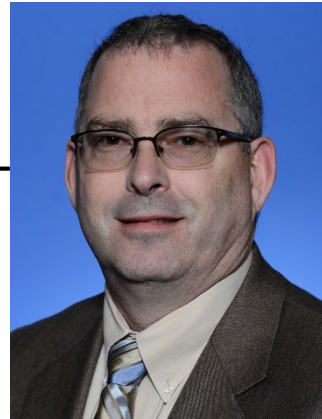
# Westinghouse Leadership Accountability



**José Emeterio Gutiérrez**  
Interim President and CEO,  
Westinghouse



**Michele DeWitt**  
Interim Senior Vice President  
Nuclear Fuel and Components Mfg.



**Mike Annacone**  
Vice President  
Columbia Recovery

**WEC NSRB**  
Dr. Bruce Mallet

**WEC Oversight Board**  
Jim Brennan  
Steve Hamilton  
Doug Weaver

**Recovery Team**



# Recovery Status to Date

- Root Cause Analysis (RCA) final report complete
- All physical work complete (7 scrubbers cleaned, reassembled; 7 duct work systems—2200 feet—cleaned)
- Nuclear Safety Culture training conducted for workforce (final training underway)
- Westinghouse Oversight Board (internal) will determine restart readiness
- Final CAL action: Criticality Safety Evaluation (CSE-1-E) required for restart of the S-1030 scrubber made available to NRC
- NRC has been reviewing all readiness documentation as we have completed it; parallel path is streamlining permission to restart process

# Root Cause Analysis

## Two Root Causes:

- Programmatic controls for configuration management did not have the rigor to mitigate increased uranium accumulation in the S-1030 scrubber when design changes were made to the ventilation system and when operational requirements for the scrubber spray system were changed in procedure.
- Management did not scrutinize the content of CSE-1-E and as-found conditions in the S-1030 scrubber with the questioning attitude and conservative bias required for a healthy nuclear safety culture. Contributing to this, the management team did not ensure the organization had sufficient procedures and training to recognize and respond to deviations from the safety basis described in CSE-1-E.

# RCA Contributing Causes

## Two Contributing Causes:

- Operating experience and the corrective action processes were not effectively used to pursue the actions needed to detect, estimate and mitigate deposited uranium in the S-1030 scrubber.
- The scope of audits and assessments performed per the Columbia site license has not provided a comprehensive review of the NCS Program with an appropriate level of intrusiveness applied to higher risk activities.

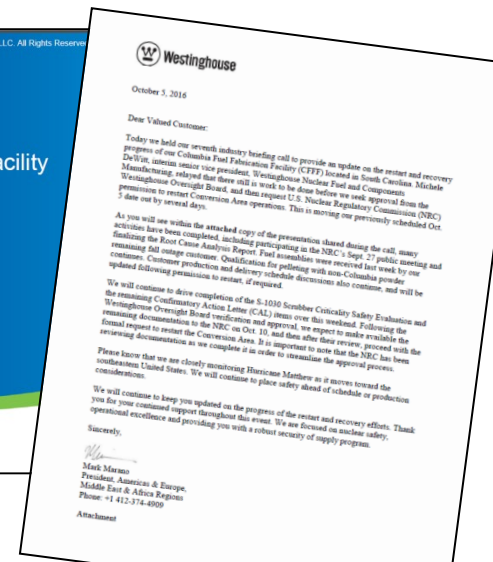
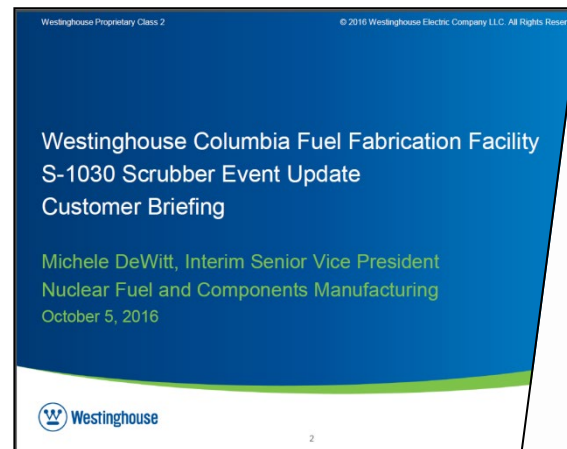


# RCA Lessons Learned

- Corrective actions (improvement themes):
  - Training
  - Policies, Procedures and Critical Safety Evaluations
  - Nuclear Safety Culture
  - Nuclear Criticality Safety
  - Leadership Behaviors, Management Review Meetings
  - Audits
  - Operating Experience

# Customer Communications

- Conducted seven customer update calls during the recovery process (8/8, 8/15, 8/24, 9/8, 9/15, 9/23, 10/5) to keep customers up to date on progress; also distributed letters to Chief Nuclear Officers after each update
- Only one customer impacted for fall outages; their fuel assemblies completed and delivered in time following approval for pelleting restart
- Spring deliveries are being discussed with affected customers



# Next Steps to Resuming Conversion Area Operations

- Receive U.S. NRC feedback on CSE-1-E
- Submit restart permission letter to U.S. NRC; receive restart authorization
- Safely and reliably resume Conversion Area operations in a phased approach
- Implement Columbia Operations leadership change
- Follow-up on post-restart recovery actions; continue Nuclear Safety Culture change management



# Lessons-Learned Sharing

- Columbia event activities and corrective actions are being shared with the global Westinghouse organization for application across our operations to prevent recurrence
  - RCA final report helps define specific actions that may be taken at other facilities
  - Regular global lessons-learned sharing will continue to ensure a more robust Nuclear Safety Culture and renewed focus on operational excellence at all manufacturing facilities
  - Already begun sharing lessons learned to the nuclear industry in general

