



**Documents on Degraded Status of H-Canyon Exhaust Tunnel**

**August 21, 2018**

**Characterization of Concrete Exposed to the H-Canyon Exhaust**

January 2018

SRNL-TR-2017-00356, Revision 0

FOIA document obtained by SRS Watch

**FOIA cover letter:**

[http://www.srswatch.org/uploads/2/7/5/8/27584045/foia\\_response\\_letter\\_july\\_5\\_2018\\_on\\_exhaust\\_tunnel\\_document.pdf](http://www.srswatch.org/uploads/2/7/5/8/27584045/foia_response_letter_july_5_2018_on_exhaust_tunnel_document.pdf)

**Report:** [http://www.srswatch.org/uploads/2/7/5/8/27584045/srnl-tr-2017-00356\\_rev\\_0.pdf](http://www.srswatch.org/uploads/2/7/5/8/27584045/srnl-tr-2017-00356_rev_0.pdf)

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**Back-up information on H-Canyon exhaust tunnel problems – DNFSB & DOE:**

**DOE Reports:**

**Characterization of Concrete Exposed to the H-Canyon Exhaust**

January 2018

SRNL-TR-2017-00356, Revision 0

FOIA document obtained by SRS Watch – see links above

**H-Canyon Recovery Crawler**

August 2015

SRNL-STI-2015-00355, Revision 0

<https://sti.srs.gov/fulltext/SRNL-STI-2015-00355.pdf>

**H-Canyon Ventilation System Exhaust Tunnel Inspection at the Savannah River Site**

SRNS-STI-2017-00457

<https://sti.srs.gov/fulltext/SRNS-STI-2017-00457.pdf>

**Defense Nuclear Facilities Safety Board (DNFSB) on H-Canyon Exhaust Tunnel - letters and reports**

DNFSB cover letter Dec. 16, 2015 & report of September 25, 2015 (“H-Canyon Seismic Performance and Condition”)

[https://www.dnfsb.gov/sites/default/files/document/10077/sir\\_20151216\\_29036\\_116.pdf](https://www.dnfsb.gov/sites/default/files/document/10077/sir_20151216_29036_116.pdf)

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DNFSB letter to DOE, May 17, 2018 – on H-Canyon Exhaust Tunnel

<https://www.dnfsb.gov/sites/default/files/document/14876/H-Canyon%20Exhaust%20Tunnel%20at%20SRS.pdf>

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**DNFSB weekly reports, 2017-2018:**

<https://www.dnfsb.gov/sites/default/files/document/14386/Savannah%20River%20Week%20Ending%20February%2016%202018.pdf>

**DEFENSE NUCLEAR FACILITIES SAFETY BOARD**

February 16, 2018

**TO:** S. A. Stokes, Technical Director

**FROM:** M. T. Sautman and Z. C. McCabe, Resident Inspectors

**SUBJECT:** Savannah River Site Resident Inspector Report for Week Ending Feb. 16, 2018

**H-Canyon:** SRNL issued their “Characterization of Concrete Exposed to the H-Canyon Exhaust” report. The report states that two concurrent chemical alteration mechanisms of the hydrated Portland cement matrix coupled with wind erosion and scouring of damaged material are responsible for the observed physical features in the concrete exposed to the canyon exhaust. Furthermore, SRNL concluded that while several depth-dependent material changes were observed, there is no firm case to conclude that these material changes were manifested in an increase or a decrease from the bulk concrete compressive strength.

[**Note:** This weekly report was the basis for FOIA request the mentioned document: ““Characterization of Concrete Exposed to the H-Canyon Exhaust”]

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<https://www.dnfsb.gov/sites/default/files/document/13896/Savannah%20River%20Week%20Ending%20December%201%202017.pdf>

**DEFENSE NUCLEAR FACILITIES SAFETY BOARD**

December 1, 2017

**TO:** S. A. Stokes, Technical Director

**FROM:** Z. C. McCabe, Resident Inspector

**SUBJECT:** Savannah River Site Resident Inspector Report for Week Ending Dec. 1, 2017

**H-Canyon Exhaust (HCAEX) Tunnel:** DOE-SR approved the justification for continued operations for H-Canyon while the ability of the HCAEX Tunnel to perform its safety class safety function is indeterminate (see 10/27/17 and 6/30/17 reports).

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<https://www.dnfsb.gov/sites/default/files/document/13581/Savannah%20River%20Week%20Ending%20October%2027%202017.pdf>

**DEFENSE NUCLEAR FACILITIES SAFETY BOARD**

October 27, 2017

**TO:** S. A. Stokes, Technical Director

**FROM:** M. T. Sautman and Z. C. McCabe, Resident Inspectors

**SUBJECT:** Savannah River Site Resident Inspector Report for Week Ending Oct. 27, 2017

**HCAEX Tunnel:** SRNS submitted a justification for continued operations (JCO) of H-Canyon while the ability of safety class HCAEX Tunnel to perform its safety function is indeterminate (see 6/30/17 report). Upon DOE-SR approval, the JCO would allow the receipt and processing of two specific spent fuel types. The proposed JCO compensatory measures are preventative with the exception of administratively controlling the release from the transfer line rupture and subsequent spray of process solution during an earthquake by tasking an operator to manually shut down select transfers if seismic activity is detected.

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<https://www.dnfsb.gov/sites/default/files/document/12291/Savannah%20River%20Week%20Ending%20June%2030%202017.pdf>

**DEFENSE NUCLEAR FACILITIES SAFETY BOARD**

June 30, 2017

**TO:** S. A. Stokes, Technical Director

**FROM:** M. T. Sautman and Z. C. McCabe, Resident Inspectors

**SUBJECT:** Savannah River Site Resident Inspector Report for Week Ending June 30, 2017

**H-Canyon Exhaust (HCAEX) Tunnel:** In a letter dated 12/16/15, the Board described multiple concerns with the ability of the degraded HCAEX Tunnel to perform its safety class (SC) function after a design

basis earthquake (DBE). Specifically, one of the Board's concerns was the lack of justification for the SRNS assumption that degradation was limited to the exposed surface of the concrete. In response, DOE directed SRNS to take concrete samples from a part of the H-Canyon Facility that shares a wall that is also exposed to HCAEX environment (see 3/10/17 report). SRNS personnel declared a potential inadequacy in the safety analysis (PISA) which resulted in a positive unreviewed safety question based on preliminary test results from Savannah River National Laboratory (SRNL). In addition to the degradation already accounted for in the existing analysis, the SRNL test results suggest that an additional portion of concrete closest to the surface exposed to the HCAEX environment may be degraded to an extent that would affect the concrete strength. Therefore, the ability of the HCAEX tunnel to perform its SC safety function is indeterminate. SRNL plans to perform additional tests that will provide more information on the concrete exposed to the HCAEX environment. The final SRNL report is scheduled to be issued in September. SRNS is also planning to perform a non-linear structural analysis to determine if the HCAEX Tunnel is able to perform its safety function.

The scope of the PISA is limited to the ability of the HCAEX Tunnel to function during and following a DBE. SRNS engineers have determined that the tunnel can continue to provide its safety function under normal static loading conditions. In response to the PISA, H-Canyon personnel have identified multiple compensatory measures to reduce the risk after a seismic event if the tunnel failed concurrent with a radiological release. H-Canyon and HB-Line have halted all receipts of nuclear material in order to limit the material at risk. Additionally, because a significant contributor to the calculated dose consequence comes from a release from a ruptured transfer line during an active transfer, an operator will be positioned to manually shut down future transfers if the HCAEX Ventilation system fails. HB-Line personnel have limited the amount of concurrent resin column operations and now require an inspection to limit transient combustibles prior to performing plutonium oxide packaging activities.

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<https://www.dnfsb.gov/sites/default/files/document/11291/Savannah%20River%20Week%20Ending%20March%2010%202017.pdf>

**DEFENSE NUCLEAR FACILITIES SAFETY BOARD**

March 10, 2017

**TO:** S. A. Stokes, Technical Director

**FROM:** M. T. Sautman and Z. C. McCabe, Resident Inspectors

**SUBJECT:** Savannah River Site Resident Inspector Report for Week Ending March 10, 2017

**H-Canyon Exhaust (HCAEX) Tunnel:** SRNS completed compressive strength testing of 16 additional concrete cores from the north wall of the personnel tunnel (see 1/13/17 and 1/20/17 reports). The test results yielded low compressive strengths similar to the north wall cores previously examined (average of roughly 2200 psi). SRNS personnel are still planning to remove concrete cores for compressive testing from one additional location, as well as remove the last 12 inches of concrete from the 6 core drills in the north wall separating the personnel tunnel and the H-Canyon crossover tunnel, which is exposed to the HCAEX air. Additionally, SRNS plans to have the concrete from the last 12 inches which have been exposed to the HCAEX air examined by SRNL and the US Army Corps of Engineers to better understand the degradation. Once all of the evaluations are complete, currently scheduled for June 2017, SRNS

plans to evaluate what impacts this new information will have on the structural analyses of the H-Canyon structure and the exterior HCAEX Tunnel.

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<https://www.dnfsb.gov/sites/default/files/document/11046/Savannah%20River%20Week%20Ending%20February%203%202017.pdf>

**DEFENSE NUCLEAR FACILITIES SAFETY BOARD**

February 3, 2017

TO: S. A. Stokes, Technical Director

FROM: M. T. Sautman and Z. C. McCabe, Site Representatives

SUBJECT: Savannah River Site Weekly Report for Week Ending February 3, 2017

**H-Canyon Exhaust (HCAEX) Tunnel:** SRNS has expanded the original scope of the HCAEX Tunnel concrete evaluation since the compressive strength of multiple concrete cores recently removed from the north wall of the personnel tunnel were significantly lower than expected (see 1/13/17 report). In addition to the expanded scope previously discussed, SRNS is also planning to send samples of the north wall concrete to a third party for petrographic analysis, which will examine the concrete at a microscopic level. SRNS plans to resume concrete coring the week of February 13.

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<https://www.dnfsb.gov/sites/default/files/document/10971/Savannah%20River%20Week%20Ending%20January%2020%202017-1.pdf>

**DEFENSE NUCLEAR FACILITIES SAFETY BOARD**

January 20, 2017

TO: S. A. Stokes, Technical Director

FROM: M. T. Sautman and Z. C. McCabe, Site Representatives

SUBJECT: Savannah River Site Weekly Report for Week Ending January 20, 2017

**H-Canyon Exhaust (HCAEX) Tunnel:** SRNS personnel have recently identified concrete with lower than anticipated compressive strength in a wall that separates the H-Canyon personnel tunnel and the HCAEX crossover tunnel (see 1/13/17 report). SRNS personnel have since documented this nonconformance and determined the low concrete strength does not impact the safety function of the wall and does not require any revision to the H-Canyon safety basis. Therefore, SRNS has concluded that the wall can be used as is. SRNS personnel are still evaluating what impacts this new data will have on the evaluation of the H-Canyon facility and the exterior HCAEX tunnel (subject of 12/16/15 Board letter).

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[https://www.dnfsb.gov/sites/default/files/document/10766/Savannah%20River%20Week%20Ending%20January%2013%202017\\_rev4.pdf](https://www.dnfsb.gov/sites/default/files/document/10766/Savannah%20River%20Week%20Ending%20January%2013%202017_rev4.pdf)

**DEFENSE NUCLEAR FACILITIES SAFETY BOARD**

January 13, 2017

**TO:** S. A. Stokes, Technical Director

**FROM:** M. T. Sautman and Z. C. McCabe, Site Representatives

**SUBJECT:** Savannah River Site Weekly Report for Week Ending January 13, 2017

**H-Canyon Exhaust Tunnel:** In a letter dated 1/16/15, the Board raised an issue concerning the unjustified use of a 20% increase in concrete compressive strength in the structural analysis of the safety class H-Canyon exhaust (HCAEX) tunnel. In response, SRNS is taking concrete cores from the personnel tunnel in order to determine the compressive strength of concrete exposed to the HCAEX air and backfilled soil. The personnel tunnel shares its northern wall with the HCAEX crossover tunnel, which has the same environment as the HCAEX Tunnel. The other side of the southern wall of the personnel tunnel is backfilled with soil. SRNS has removed and tested 20 cores from the southern wall and 11 cores from the northern. The southern wall cores yielded results consistent with SRNS expectations. However, the northern wall (HCAEX air side) core tests have revealed an average concrete compressive strength of approximately 2200psi, which is significantly lower than the assumed strength of 3000psi. At this time SRNS does not consider this new information to invalidate the assumption that the concrete compressive strength of the HCAEX tunnel has increased to 3000psi since the initial placement in the 1950s. SRNS personnel are now planning to remove and test additional concrete cores from the northern wall at varying heights in attempt to better understand the cause of the low strength. Additionally, SRNS is planning to perform a non-linear analysis of the HCAEX tunnel assuming the worst case conditions. It should be noted that SRNS personnel have not yet taken concrete cores through the entire thickness of the north wall, leaving approximately 12 inches of concrete between the personnel tunnel and the HCAEX crossover tunnel which is exposed to the HCAEX environment. SRNS plans to remove the remaining 12 inches for testing once the proper radiological control and fire protection measures are taken. These remaining test results will provide additional data on the concrete compressive strength as well as be used to characterize the effects of the HCAEX air on the concrete and the depth of those effects.