

JUNE 1993
QUARTERLY 10 CFR 50.59 REPORT OF CHANGES, TESTS AND EXPERIMENTS
FOR FSV DECOMMISSIONING

Background:

The following is a brief discussion of 10 CFR 50.59 changes to the Fort St. Vrain (FSV) facility or procedures as described in the Decommissioning Plan (DP) and tests and experiments not described in the DP, in the time period from February 16, 1993 to May 15, 1993.

While this report is similar to past reports of changes, tests and experiments submitted in accordance with 10 CFR 50.59, the quarterly decommissioning reports are submitted pursuant to Paragraph (b)(2) of the FSV Decommissioning Order (issued in NRC letter dated November 23, 1992, Erickson to Crawford (G-92244)), which states:

"The licensee shall submit, as specified in 10 CFR 50.4, a report containing a brief description of an changes, tests and experiments, including a summary of the safety evaluation of each. The report must be submitted quarterly."

Changes to the FSV Facility or its Procedures as Described in the Decommissioning Plan

There were no procedure changes during this reporting period which represented changes to procedures as they are described in the DP. Descriptions of changes to the facility as described in the DP are as follows:

1. Top Head Concrete Cutting

DP Section 2.3.3.7, PCRV Top Head Concrete and Liner Removal, describes the plan for removal of concrete sections from the top of the PCRV. This section indicates that the concrete would be removed in approximately 10 large sections. DP Figure 2.3-8 depicts a planned top head concrete cutting configuration, consisting of 6 rectangular opening sections and 4 triangular sections, resulting in a hexagonal opening in the top of the PCRV. DP Section 2.3.3.7 states:

"the number and shapes of these sections may change based on detailed engineering evaluation during the planning phase"

The final plan calls for removal of 12 pie-shaped wedges, which will result in a hexagonal shaped opening in the top of the PCRV, identical to that shown in DP Figures 2.3-8 and 2.3-10. Each pie-

shaped wedge is about 15 ft. high, 10.8 ft wide and 18.8-21.6 ft. long, weighing approximately 110 tons. These large wedges will be sectioned into 3 smaller segments of approximately equal size on the refueling floor, prior to packaging and lowering down the truck bay onto a transport trailer.

DP Section 2.3.3.7 states:

"The second phase consists of removal of the final thin (2 to 3 inches thick) concrete layer and the top of the PCRV carbon steel liner."

The horizontal concrete cut was, for the most part, within one inch of the top head liner. This raised the question as to whether the bounding concrete drop accident would involve drop of concrete removed from the thin layer adjacent to the PCRV top head liner, as evaluated in DP Section 3.4.3, or drop of a large concrete segment. Therefore, drop of a concrete wedge in the truck bay was analyzed.

For this accident scenario, it was conservatively assumed that a concrete segment approximately 5 ft. high, weighing 38.3 tons, cut from the most highly activated (bottom) portion of a 15 ft. high wedge, is dropped in the truck bay. This segment was assumed to include concrete down to the liner. Dose consequences were calculated using the same assumptions as for the concrete drop accident evaluated in DP Section 3.4.3, with 1% of the total activity inventory contained in the concrete segment assumed to become airborne.

A new source term was used, however, because concrete sample data indicated concrete activity levels greater than those calculated in the Activation Analysis. Source terms for this analysis were computed using recent data from the most radioactive core bore (near the radial center of the core) taken for radiological characterization of the top head concrete. It was conservatively assumed that radionuclide concentrations throughout the approximately 5 ft. high segment had the same axial profile as measured in the most radioactive core bore, even concrete at the outer perimeter of the segment. Since the core bore extended to 2 ft. above the top head liner, concentrations of nuclides below 2 ft. were conservatively extrapolated. Activation levels extrapolated in the top head concrete from the radiological characterization data indicated concrete activation deeper than that calculated by the Activation Analysis (Appendix II of the DP), primarily due to the fact that the Activation Analysis did not model neutron streaming through the top head penetrations. The extrapolated radiological characterization data at the PCRV liner is in fairly good agreement with the activation levels in the first 6 inches of concrete calculated in the Activation Analysis.

The analysis assumed that 1% of the activity in the concrete and rebar of the 38.3 ton concrete segment became airborne in the

Reactor Building, a concrete dust loading of 767 lbs. All of this activity was assumed to be released from the Reactor Building at ground level, unfiltered. Applying the same assumptions used in the concrete rubble drop accident in DP Section 3.4.3, the whole body and lung doses to an individual standing 100 meters from the Reactor Building were calculated to be 8.03 mrem and 125.2 mrem, respectively. This concrete wedge drop accident serves as the bounding accident involving activated concrete. The consequences of this accident are less than a small fraction of the one rem whole body and five rem organ doses of the EPA Protective Action Guidelines, and are also less than consequences of a fire (121 mrem whole body and 215 mrem lung), which is the bounding decommissioning accident. Since an activated concrete drop accident is already evaluated in the DP, this does not constitute a new accident. No margins of safety in the basis for any Technical Specifications are affected by this accident reanalysis. Therefore, it was determined that handling of the top head concrete segments as is currently planned, including consideration of the higher than predicted activity levels, does not constitute an unreviewed safety question.

2. Decision not to Re-reeve the Reactor Building Crane and not to Enlarge the Refueling Floor Equipment Hatch or Truck Bay Door for Removal of PCRV Top Head Concrete

Section 2.3.3.7 of the DP describes removal of the PCRV top head concrete. The method described in this Section, and Figures 2.3-5 through 2.3-8, involves removal of about 10 concrete segments. Each of these segments would weigh between 100 to 150 tons, with approximate dimensions of 15 ft. by 15 ft. by 6 ft. It was planned that these concrete segments would be lowered through the equipment hatch down the truck loading bay, without further sectioning to reduce their size. Due to the limited vertical travel of the Reactor Building crane's 170 ton main hook, the crane would need to be re-reeved to facilitate lowering these PCRV top head slabs down the truck bay, as indicated in DP Section 2.3.3.7. The refueling floor equipment hatch and truck bay door would need to be enlarged to enable passage of the PCRV top head slabs through these openings. This is discussed in Section 2.3.3.2 of the DP, which states the following:

"Preliminary plans involve enlarging the refueling deck equipment hatch and truck bay door to allow passage of larger items. Plans also include re-reeving of the Reactor Building crane to provide additional vertical travel which will allow the 170-ton main hook to travel from the refueling floor to ground level."

Section 3.4.5 of the DP states:

"The Reactor Building crane will be re-reeved to allow the 170

ton main hook to travel from the refueling floor to ground level."

It is no longer planned to re-reeve the Reactor Building crane, enlarge the equipment hatch on the refueling floor, or enlarge the truck bay door, to enable removal of PCRV top head concrete. Large concrete segments will be lifted out of the PCRV top head by means of the 170-ton main hook and set down on the refueling floor, where the concrete segments will be further sectioned. The resulting smaller concrete segments will weigh less than 50 tons, and can be lowered down the truck bay by means of the 50-ton hook of the Reactor Building crane, which is designed for this distance of travel. By sectioning the concrete segments removed from the PCRV top head, the resulting segments will fit through the refueling floor equipment hatch and truck bay door, without the need to enlarge these openings.

DP Section 3.4.5 discusses probabilities of load drop accidents due to crane failures. Since the planned loads will be within the rating of the 50 ton hook of the Reactor Building crane, the probability of load drop accidents is not increased by not re-reeving the crane. The consequences of concrete drop accidents are not affected by the decision not to re-reeve the Reactor Building crane for handling PCRV top head concrete, and are bounded by the postulated drop of a concrete segment, summarized in the preceding section of this report. Decommissioning Technical Specification 3.1 requires the truck bay door(s) to be closed whenever activated graphite blocks have been removed from the PCRV and remain inside the Reactor Building. The truck bay doors are not being modified to enable handling of PCRV top head concrete, and this requirement is not affected. It was determined that the change in plans concerning re-reeving the Reactor Building crane and enlarging the refueling floor equipment hatch and truck bay door for handling PCRV top head concrete does not involve an unreviewed safety question.

Tests or Experiments not Described in the Decommissioning Plan

No tests or experiments have been conducted this reporting period that are not described in the DP.