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By Authority of *Dr. Carl Berg* 11-21-91

Dr. Carl Berg 11-21-91

By *PM Eick* 11-21-91

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- cc #1, #2 - WE Johnson
- #3, #4 - AB Greninger
- #5, #6 - HM Parker
- #7 - RS Bell
- #8 - CA Priode - HA Carlberg
- #9 - TW Hauff
- #10 - JE Maider
- ~~#11 - Yellow File~~
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April 9, 1954

W. E. Johnson
General Manager
HANFORD ATOMIC PRODUCTS COOPERATION

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REDOX PLANT - RUTHENIUM CONTAMINATION CONTROL

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- References:
- (1) Our memos to you dated February 11, March 2, and March 24, describing major plant problems.
 - (2) H. A. Carlberg's memo to A. B. Greninger dated March 22, relative to Redox building ventilation.

Yesterday Dr. Greninger, Mr. Parker, and I met to discuss this major plant problem, and to firm up plans for its alleviation. Others participating in the discussion were: R. H. Beaton, R. S. Bell, H. A. Carlberg, V. R. Cooper, O. H. Greager, T. W. Hauff, P. D. Lee, C. A. Priode, and J. M. Smith. Both phases of the problem were covered; i.e., (1) the canyon and crane contamination, and (2) the stack emission and consequent outside air, ground, and vehicle contamination. This memorandum will acquaint you with the principal points developed, and the agreements reached.

The canyon and crane contamination results from inherent inadequacies in the main ventilation system, particularly during periods when cell covers must be off. Contaminated air and vapor from opened cells rise into the canyon, thereby causing general contamination. This has resulted in very unsatisfactory operating conditions, particularly with the main crane, and two extensive shutdowns for decontamination have been necessary. These have been only partially effective, with personnel working limits for crane maintenance extended only from 2 - 5 minutes to 15 - 30 minutes. However, updrafting from opened cells has been reduced significantly by process vessel cooling, cell spray washing, and the recently-developed portable cell ventilation equipment. Two more of these auxiliary exhausters are being procured. No relief has yet been obtained from the gross contamination of canyon air which attends the removal and disposition of cell equipment.

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SPECIAL RE-REVIEW

FINAL DETERMINATION

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BY *J.P. DeRosa* DATE *6-11-81*
BY *J.W. Jordan* DATE *6-15-81*

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W. E. Johnson

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April 9, 1954

Redox stack emission of ruthenium is of three distinct types: (1) particulate ruthenium oxide, (2) ruthenium bearing ammonium nitrate crystals, and (3) gaseous ruthenium oxide (or, if not gaseous, too finely divided to be distinguishable as particulate). The large (260 curies) Type 3 discharge on January 2 - 3 quite definitely resulted from a caustic circulation stoppage in the H-5 scrubber, upon which ruthenium fixation and disposition in the head-end treatment depends. Accordingly, steps were initiated to provide a second caustic scrubber in series. In addition to its role as back-up, this second scrubber should improve routine ruthenium removal by a factor of 10, based on Technical calculations. The required project proposal is now being circulated in rough draft form. At the same time, to alleviate the particulate problem, it was decided to re-route the scrubber exhaust filter (J-1) and the vessel vent filter (J-5) from direct discharge into the main stack, to passage first through the sand filter. The J-1 re-routing is included in the dual scrub project. The J-5 work (which includes filter replacement) is covered by a work order, and is delayed only by a jet being obtained.

If the foregoing steps effectively prevent ruthenium from ever reaching the stack, then stack emission of ammonium nitrate crystals presumably would be of little concern. However, such complete ruthenium removal cannot be assumed, and ammonium nitrate fall-out can cause serious ground contamination, even though carrying only fractional-curie amounts of ruthenium. Two methods for preventing ammonium nitrate formation are under active consideration: (1) total dissolution of the canned slugs in nitric acid, with a mercury catalyst, thereby avoiding ammonia release, and (2) a Design Section proposal (HW-30935) that absorbers be installed to remove ammonia from the dissolver and waste neutralizer off-gases. Meanwhile, periodic stack flushing is being continued.

Following thorough discussion, and in light of Mr. Parker's confirmation that immediate corrective action with respect to stack emission is highly desirable, it was agreed to proceed as follows:

- (1) The project proposal covering dual scrub and J-1 filter re-routing will be given emergency status and expedited accordingly.
- (2) Measures for eliminating ammonium nitrate formation (and stack emission) are of somewhat secondary importance to the above item, but are to be evaluated and carried out promptly.
- (3) The Design Section will give immediate attention to the matter of improving Redox canyon and cell ventilation, as requested in Reference 2. Meanwhile, Manufacturing will continue its efforts to devise better methods for handling equipment removed from cells.

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- (4) Recognizing the structural and air volume problems involved in (3), the Technical Section will pursue Dr. Greager's suggestion that experiments might be devised to utilize T Canyon to advantage in studying ruthenium release in the canyon, and for developing means of preventing ruthenium release within the cells.
- (5) Radiological Sciences, Manufacturing, and Technical will continue their improvement and utilization of stack and in-plant monitoring and sampling devices at Redox, to the end that the source points of ruthenium release will be located and better understood.
- (6) Additional data on the stack emission of rare earth and other elements will be accumulated by the Radiological Sciences Department.
- (7) Technical will continue its efforts to attempt to develop more satisfactory means of eliminating ruthenium at the source, by means of process changes, with primary emphasis given to the chemistry of ruthenium.

Another meeting of this group will be held toward the end of next week to review the progress made.

JE Maider
MANAGER - MANUFACTURING

JE Maider:TWB:klr

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