

Specialty Chemicals

Honeywell
Route 45 North
P.O. Box 430
Metropolis, IL 62960
618 524-2111
618 524-6239 Fax

September 29, 000

Certified Mail:
7083-4383

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Re: Written Report 10 CFR Part 20.2203 for Occupational Dose Limits
for Adults (Part 20.1201)
Event/Unusual
Occurrence: PNO – III – 00 – 030

Dear Sirs:

The individual occupational dose limits for soluble uranium weekly intake must be less than 10 mg in consideration of chemical toxicity to the kidney. On August 7, 2000 one employee's bioassay sample analyzed in the facility's fluorometry lab indicated a higher than normal concentration of uranium in urine.

> Description of Event

On August 7, 2000 day shift employees began removing wet prepared feed from the "A" Reductor Feed Hopper on the sixth floor of the Feed Materials Building. A water solution had caused the prepared feed to agglomerate in the hopper to the point it was no longer flowable. Prepared feed was removed from the hopper bottom through the reductor feed leg and a hole cut in the west side of the "A" Reductor Feed Hopper. The prepared feed was removed from the hopper using an air sparge on the 6th floor and flexible hose on the reductor feed leg on the 5th floor into 55-gallon drums with a vacuum source to help control dusting. All employees wore half-face respirators with HEPA cartridges. As an added precaution, the 5th and 6th floor respiratory red lights were activated to ensure all personnel wore respirators while this work was ongoing. It took approximately six (6) shifts to complete the clean-out.

> Dose Estimates

The special urinary uranium results from one employee initially indicated a weekly intake greater than 10 milligrams soluble uranium. The bioassay program consists of analyzing the special urinary samples using a fluorometer in conjunction with the computer program "INDOS" to calculate the dose. The "INDOS" program requires classifying the mixed solubility of the uranium into three classes "D", "W", and "Y". The in-house lung fluid solubility procedure is used to make this determination for the "INDOS" computer program.

Employee work restrictions are imposed if results indicate a weekly intake limit (10 mg) for Class "D" uranium or the ALI has been exceeded.

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The initial results indicated the employee had exceeded the 10 mg regulation and the employee was placed on work restriction on the morning of August 8th. The solubility used for the initial dose calculations were 40% Class "D" and 60% Class "W" which indicated a dose of 27 mg or a weekly exposure. The major concern was the urinary uranium excretion data would not fit an acute intake exposure. The excretion data would go up and down over a short time span, which did not fit any known urinary uranium curves in the "INDOS" program.

Raw data (Addendum No. 1) was sent to the NRC Region III, Lisle, IL and to REAC/TS (Radiation Emergency Assistance Center/Training Site), Oak Ridge, TN for the purpose of checking our dose calculations and to check for inhalation fit modeling. Refer to Addendum No. 2 for the REAC/TS report. Verbal information received from USNRC Region III indicated they were also unable to get the excretion data to fit their modeling program.

➤ Cause of Exposure

An in-depth investigation was performed, fluorometry procedures were checked, and several INDOS programs were analyzed.

The employee's excretion pattern was extremely erratic while he was on restrictive work which did not allow him to work in any area that processed radioactive materials. Refer to Addendum No. 3 for sequence of events. Interviews with the employee during this time span did not produce any explanation for the excretion pattern. The employee stated he remembered that one of the two respirator cartridges was loose on August 7th. He was unable to explain any other event that would cause an inhalation.

The fluorometric laboratory uranium standards were prepared using water instead of urine for calculating urinary uranium results. This caused the higher uranium urinary results to be elevated, which we corrected using uranium standards in urine for a corrected employee urinary uranium.

The employee also submitted urine and blood samples with his personal physician on August 16, 2000. These samples were sent to an independent laboratory and the urine results were in agreement with Honeywell's fluorometric laboratory for August 16. The employee also submitted a blood sample and urine samples at Honeywell for Bun/Creatinine analyses. The results were normal; which indicate there was no toxicity to the kidney. Refer to Addendum No. 4 for the medical notes report.

Honeywell requested a time extension from the NRC on August 14, 2000 to complete a lung fluid solubility study on the prepared feed material. This study was completed on September 27, 2000 which indicates this material is 41% Class "D" and 59% Class "W". Originally we had used historical data of 40% Class "D" and 60% Class "W". This current lung fluid solubility study was used to calculate the final INDOS Intake Evaluation Report, Addendum No. 5.

It is apparent that the water solution and dryer temperature does change the solubility of the material. The ore concentrates prior to this process indicates the presence of Class "D", "W", and "Y".

➤ Corrective Actions

The in-depth investigation listed several recommendations. Several of these have already been completed or will be completed prior to November 15.

> In-depth Team Recommendations


1. Promulgate a plant notice warning personnel of the effects of heat, position and duration on the reliability of the respirator systems employed in the plant. Suggest that employees check the seal regularly while in use and maybe even replace their respirators during a lengthy job.
Target Date: Complete
2. Form a team to discuss better ways to cleanup major spills or other incidents, so as to minimize employee exposure.
Target Date: November 15
3. Alert supervision to the need to involve Safety, Health Physics, and others before commencing with the mitigation of an unusual event.
Target Date: Ongoing
4. Health Physics will review the bioassay analysis procedures and priorities for special samples. When should we be sampling? When should the samples be analyzed? Etc.?
Target Date: November 15
5. Management should consider identifying experts in radiation toxicity that are available and willing to assist us quickly when an over-exposure occurs.
Target Date: Complete
6. Alert all personnel to better communicate any activity occurring in an area, even those not requiring formal documentation.
Target Date: Ongoing

> Summary

After reviewing all the employee excretion data, medical data, the Radiation Internal Dose Information Center report, and INDOS intake evaluation we have arrived at the following conclusion:

The Honeywell INDOS program is the only report that indicates the weekly occupational uranium chemical toxicity for this employee is 26 mg. The employee's urinary uranium excretion data does not fit any known curve for bioassay modeling for an acute exposure. Furthermore, there cannot be a chronic inhalation due to the employee work restrictions. It is our conclusion that the urine samples were contaminated and, therefore, this employee did not exceed the weekly 10 mg uranium intake.

Sincerely,


J. William Lessig
Plant Manager

JWL/sm

cc: M. L. Shepherd
H. C. Roberts
Honeywell Employee

Mr. Pat Hiland
NRC, Region III
801 Warrenville Road
Lisle, IL 60532-4351 (Certified Mail: #7083-4390)