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HW--38427

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August 22, 1955

To File:

RADIOLOGICAL SCIENCES DEPARTMENT INVESTIGATION
RADIATION INCIDENT CLASS I, NO. 494-C

Nature of Incident

Internal deposition of Plutonium possibly in excess of the maximum permissible limit (MPL), but adjudged at this time to probably not exceed the MPL by a Separations Maintenance employee at the T-Facility, 200 West during February or March 1955.

Description of Incident

A routine bioassay urine sample obtained from the employee on May 9, 1955 revealed results above the detection limit. Extensive resampling has confirmed the initial indication of a deposition of soluble plutonium of about 90% of the MPL.

A review of the assigned work schedule for the man between the date of the first high sample and his previous below detection limit sample (obtained on January 17, 1955) did not reveal his association with any known incident which at the time was thought to have resulted in any intake by him. None of the radiation exposure records on file for this employee indicate that he was ever involved with a large amount of plutonium contamination. However, recent interrogation of the employee by supervision of the Manufacturing Department revealed for the first time that he had some trouble with the fit of his assault mask while working on one particularly difficult and plutonium contaminated job in the 224-T Building in February 1955. The position in which he had to work on occasion on this job was awkward and seemed to cause his mask to come loose as he recalls having to tighten up the head straps on his mask several times during the job.

This particular job, which took place on February 16, 1955, was the one which was discussed in a previous radiation incident investigation report, Class I, No. 425

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(HW-36034) and which also resulted in another significant internal deposition case⁽¹⁾. The employee was surveyed following this job and was found to have a spot of contamination of 5,000 d/m on his T-shirt and 1,000 d/m on his chin. Though a nasal smear was not taken, no other facial or skin contamination was detected on the employee.

Aside from the job on the 16th of February there is only one other specific job which now appears to have much potential for being the source of this deposition. This job which occurred on March 5, 1955 involved the replacement of the D-2 centrifuge motor. It also took place in the 224-T building and involved work in considerable plutonium contamination. All the masks of individuals working on this job became contaminated with the maximum contamination level reported as > 40,000 d/m. It is not known how much contamination was on this employee's mask though no skin contamination was detected on any of the people on the job.

Discussion of Dosimetry

The incident of 2-16-55 appears at this time as the most logical source of intake in this case. On this basis the bioassay sample results to date indicate a deposition of soluble plutonium of about 90% of the MPL. Though the deposition may possibly be 10-15% less than this (assuming the March 5th incident as the source), many months of additional sampling will be necessary before sufficient data is available to determine this. The interpretation of the results of this further sampling will be published in accordance with the standard procedure for transmittal of bioassay data.

Comment on the Incident

Twelve people worked in one capacity or another on the 224-T job of 2-16-55. In summary three of these people have been subsequently found to have a measureable deposition of plutonium. One was a Millwright (the employee concerned in this report), the second was a Pipefitter (the employee referred to in the radiation incident report, Class I, No. 425 - HW-36034), and the third was a Rigger. Sufficient data has not yet been obtained on this last case to enable a radiation incident report to be issued. However, the employee was not observed to have any skin or personal clothing contamination following this job. His deposition is estimated to be about 10% of the MPL. Further investigation may reveal that his deposition was received in association with another incident though there is no evidence of this at this time.

The Pipefitter referred to above was found with extensive facial contamination and his assault mask was also highly contaminated whereas the Millwright in this report had only one minor spot of contamination on his chin and apparently his mask was not unduly contaminated. However, the internal deposition in the case of the Pipefitter is estimated to be only about one half of that in the case of the Millwright in this report. The observable circumstances and results in these cases are not consistent, but they do serve as a reminder that one cannot accurately estimate the probable degree of exposure by external survey alone.

(1) Reference Interpretation of Bioassay Results report number E-434 issued by this office.

In the case of the incident involving the Pipefitter nose smears were taken and their high activity resulted in early recognition of the possible extent of the deposition. Of course, the taking of nose smears in that case was prompted somewhat by the extensive external contamination that was found. However, in view of the present incident the importance of taking nose smears (in the approved manner⁽¹⁾) following work in which extensive plutonium contamination has been involved should not be under-estimated even though little or no facial contamination may be detected.

Cause of the Incident

Since the time and circumstances of the intake are not specifically known an exact cause can not be given though it does appear that the poor facial fit of an assault mask may have contributed to the incident. (1 - 2)

Recommendations

1. Re-emphasize to all radiation zone workers the importance of always maintaining a tight fit between mask and face and that they should leave the zone immediately if malfunction of a mask is suspected.
2. Instruct all radiation zone workers to promptly report to their supervision any malfunction of a mask so that proper followup personnel surveys can be made.
3. Expand the nose smear program in surveying personnel particularly following work in excessively contaminated locations.

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- (1) Reference the procedure entitled "Assaying the Possible Internal Exposure Associated with a Radiation Incident" issued by the Radiological Standards Unit on June 11, 1954.

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02 / 12 / 91