SEC Petition Evaluation Report Supplement
Petition SEC-00006-1

Rev. # 0 Submittal Date: 03-31-2005

Petition Administrative Summary			
Petition Under Evaluation			
Petition #	Petition Type	Submittal Date	DOE/AWE Facility Name
SEC-0006	83.13	06-15-2004	Iowa Army Ammunition Plant

Initial Class Definition
Facility: Iowa Ordnance Plant (also known as the Iowa Army Ammunition Plant), Burlington, Iowa *Locations:* Line 1 (which includes Yard C, Yard G, Yard L, Firing Site Area, Burning Field "B", and Storage Sites for Pits and Weapons including Buildings 73 and 77) *Job Titles and/or Job Duties:* All Technicians (Laboratory, Health Physics, Chemical, X-ray, etc.), Production Personnel, Physical Security Personnel (hourly and salaried), Engineers, Inspectors, Safety Personnel, Physical Security Personnel, and Maintenance Persons. *Period of Employment:* 1947-1974

Proposed Class Definition
NA

Related Petition Summary Information			
SEC Petition Tracking #(s)	Petition Type	DOE/AWE Facility Name	Petition Status
SEC-00007	83.13	Iowa Army Ammunition Plant	Merged with SEC-00006
SEC-00014	83.13	Iowa Army Ammunition Plant	Merged with SEC-00006
SEC-00015	83.13	Iowa Army Ammunition Plant	Merged with SEC-00006

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Supplement to IAAP SEC Petition Evaluation Report
(SEC-0006-1)

Discussion of Issues Related to the Advisory Board's Deliberation of the IAAP Evaluation Report on 2/09/2005 in St. Louis

Introduction

During the Advisory Board on Radiation and Worker Health's review of the SEC Petition Evaluation Report (SEC-00006-1) for the Iowa Army and Ammunition Plant (IAAP), the revised site profile (revision 1) for the IAAP had not yet been reviewed for classified material content by the Department of Energy (DOE). Since the time of the Board meeting, the DOE completed its review of the profile and NIOSH has approved revision 1 for use in dose reconstructions. In addition, several issues were raised by petitioners at the February Board meeting that were not specifically addressed in NIOSH's evaluation[1]. This supplement to the IAAP Evaluation Report provides an evaluation of the effect the release of the revised site profile and the issues raised by petitioners might have on the proposed designation contained in the original Evaluation Report presented at the Board meeting.

Issues

1. Revision 1 of the IAAP site profile was reviewed by DOE and found to contain no classified information. How does this affect the transparency issues raised by NIOSH in the evaluation report?

2. The special exposure cohort evaluation relies on data from Pantex workers who were exposed between 1993 and 2003. The recent data collected at Pantex can not be considered as representative coworker data for IAAP workers. This information is from a different time period which employed different work processes

3. Workers recalled situations where the beryllium outer shells of the pits came off and would have to be glued back on the pit. This proves that workers handled bare plutonium pits which created the potential for internal exposure.

4. Workers smeared the inside of a hollow sphere which consisted of what was known as "hot material." This has implications regarding exposure to unshielded ionizing radiation and internal dose.

[1]Written comments on the SEC petition evaluation report, prepared by Dr. William Field of the University of Iowa, were provided to the Advisory Board by Dr. Laurence Fuortes during the meeting. Upon review, these comments were found to be substantially the same as those provided on pages 2 though 8 of the original petition. As such, these comments were previously considered during preparation of the SEC Evaluation Report.

5. Even after 1962, a very low percentage of the workforce was monitored for radiation exposure. This does not provide enough data to make accurate exposure estimates.

Issue 1

Revision 1 of the IAAP site profile was reviewed by DOE and found to contain no classified information. How does this affect the transparency issues raised by NIOSH in the evaluation report?

When NIOSH presented the IAAP SEC petition evaluation report at the Board meeting in St. Louis on February 9, 2005, NIOSH advised the Board that the IAAP site profile document had been revised and was, at that time, undergoing classification review by DOE. NIOSH also indicated that the revised document (revision 1) would be provided to the Board and the public when this review had been completed and the document had been internally approved within the Office of Compensation Analysis and Support. NIOSH had access to all the information used to complete IAAP revision 1 at the time the SEC evaluation report was presented to the Board on February 9, 2005, but could not be certain that the manner in which this information was presented in revision 1 was not, itself, classified. Since the DOE review did not redact any information in the profile, NIOSH now believes that the profile, as it currently exists, allows for the transparent completion of dose reconstructions after 1962 for workers at IAAP.

Issue 2

The special exposure cohort evaluation relies on data from Pantex workers who were exposed between 1993 and 2003. The recent data collected at Pantex can not be considered as representative coworker data for IAAP workers. This information is from a different time period which employed different work processes.

The area monitoring devices at IAAP could not measure low energy neutrons which necessitated the use Monte Carlo N-Particle (MCNP) transport code calculations to reconstruct the low-energy (<800 keV) portion of the spectrum. Because of this, the recommended approach to estimating potential neutron doses for IAAP workers is to utilize the ratios of neutron-to-photon doses obtained from Pantex dosimeters during the period of 1993 through 2003. These dose ratios, represented as a distribution in the site profile, were calculated using data from the Pantex 809-812 dosimetry system which had gone through a formal accreditation program. Although these dosimeters were worn by workers, the absolute values of the measured doses, which depend to a large extent on work practices, were not used as part of this analysis. Rather, NIOSH used these devices to establish the ratio of neutron to photon doses from a given source term (i.e, the pits).

Based on MCNP transport code calculations and Nuclear Track dosimeter Type A (NTA) measurements at IAAP, the measured Pantex neutron to photon ratio from 1993 through 2003 is greater by a factor of approximately three than the actual IAAP neutron to photon

ratio. This difference is primarily due to the use of lead aprons at Pantex, which minimally affects the neutron dose but substantially reduces the total photon dose, thereby increasing the overall neutron to photon ratio. As a result, using the neutron-to-photon dose ratios based on the Pantex dosimeter measurements is more claimant-favorable than using the data measured at IAAP.

Issue 3

Workers recalled situations where the beryllium outer shells of the pits came off and would have to be glued back on the pit. This proves that workers handled bared plutonium pits which created the potential for internal exposure.

As noted on page 25 of the SEC Petition Evaluation Report, all pits were clad, thus precluding the potential for internal exposure. This cladding is in addition to any beryllium outer shell material that may have encapsulated the pit. Therefore, if the beryllium cladding were removed, the radioactive pit material would still be encapsulated. At times, the cladding material may have been thin and warm to touch, giving workers the impression that they were handling bare radioactive metal while re-attaching (gluing) other "cladding" materials. While this activity of reattaching the outer shells could increase the low energy external photon dose to the workers, the generic pit assumption outlined in the revised site profile more than compensates for such exposure potential. This is because the profile assumes there was no cladding at all on the pits and that the pits were in such a bare state 100 percent of the time, not simply that the outer shell was removed and re-attached on occasion.

Issue 4

Workers smeared the inside of a hollow sphere which consisted of what was known as "hot material." This has implications regarding exposure to unshielded ionizing radiation and internal dose.

During the Advisory Board on Radiation and Worker Health meeting an exposure potential was discussed in which workers would have to turn a component a certain way in order to reach inside the "hot material" and wipe out metal fragments. This is possible during final assembly of some In-Flight-Insertable (IFI) weapons systems. The operation involves removal of the explosive component from the ball to allow the capsule to be placed inside. During assembly operations, the fissile material (capsule) is <u>not</u> present. The "hot material" of the ball, if radioactive at all, would be composed only of non-enriched uranium. If the ball were uranium, the beta dose to the skin on the hand and forearm could be significant from this operation. The section on skin dose in the site profile is currently listed as reserved and NIOSH is continuing further research to estimate skin dose from this operation. The external dose to the other organs of the body from this operation, however, would be very low and the generic pit assumption in which dose is estimated from fissile materials is much greater (orders of magnitude) than the photon dose that would have been received from this potential non-enriched uranium source.

Issue 5

Even after 1962, a very low percentage of the workforce was monitored for radiation exposure. This does not provide enough data to make accurate exposure estimates.

At IAAP, the primary production process was the melting, casting, and testing of high explosives which did not involve the use of radioactive materials. Consequently, most workers at the plant would not have been monitored for radiation exposure. At most facilities throughout the AEC complex, only workers with a potential for radiation exposure have been monitored. While one could argue the robustness of this practice in that, by modern standards, some intermittent workers would probably have been monitored, dose reconstruction can be completed using co-worker data when the data represent a greater potential for exposure (higher potential dose levels) than would have been received by the unmonitored worker.

In addition to the conventional explosives work at IAAP, the site was involved with the final assembly of the nuclear weapons. The radioactive components that constitute a nuclear weapon were made at other AEC facilities, including Rocky Flats, Y-12, LANL, LLNL, Sandia, Kansas City, Pinellas, and Mound. The IAAP simply assembled these components into the final configuration with the explosives. At IAAP, workers who routinely handled the most radioactive components (fissile materials) were routinely monitored post 1963. Based on a review of the records, workers who conducted other jobs (non-assembly) around the fissile materials generally were not monitored until about 1968. As a result, at IAAP, the dose distribution developed from a moderate number of workers with the highest potential for exposure is considered claimant favorable, especially when applied to non-assembly Line 1 workers.