COMPLIANCE INVESTIGATION REPORT

DIVISION OF COMPLIANCE

REGION V

Subject: U. S. Nuclear Corporation
801 N. Lake Street
Burbank, California
License No. SNM-1002

Type A exposure to personnel, and shutdown of facility from a Plutonium 238 release on January 18, 1968.

Period of Investigation: January 2[illegible] - 30, 1968.

Investigator: John J. Ward 3/22/68
John J. Ward (Date)

Investigator: J. R. Metzger 3/22/6[illegible]
J. R. Metzger (Date)

Reviewer: Herbert E. Book 3/22/68
Herbert E. Book (Date)

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REASON FOR INVESTIGATION

An anonymous telephone call was received by Region V on January 22, 1968. The caller reported extensive contamination at the licensee's facility, caused by cutting into a source capsule. It was decided to conduct an investigation.

SUMMARY OF FACTS

On January 18, 1968, the active portion of a 35-curie Pu-Be neutron source was cut into when two licensee employees attempted to remove its outer encapsulation. The operation was performed in a clean, open machine shop area on the licensee's premises with no provision for containment of the contamination, and with inadequate health and safety procedures. The incident resulted in extensive contamination to the operating portion of the facility, machine shop, and the shipping dock, as well as spotty contamination throughout the office area of the facility, the rooftop of the building and sidewalks in the vicinity of the building. Contamination was picked up on employees' shoes, cars, and clothing and was tracked to three of their homes. Although plutonium contamination was exhausted through a forced air vent in the roof to the outside of the facility, there was no alpha contamination in air samples collected at a State sampling station two miles distant. Vegetation and soil samples taken within a two-block radius of the plant showed no significant dispersion of alpha activity to the environment. One licensee employee who cut into the capsule ingested by aspiration between 150 and 230 nanocuries of Pu-238, as determined by whole body counting. This represents approximately 12 lung burdens. The health physicist and two other persons involved received less than one lung burden each as determined by whole body counting. An AEC medical consultant assisted the licensee's physician in evaluating the exposures. Publicity consisted of one factual local news story resulting from a release made by the licensee. Items of noncompliance determined during the investigation, all of which contributed to or were caused by the incident, are as follows:

10 CFR 20.403(a) and (b) - Reporting Requirements

- in that the licensee did not notify the Atomic Energy Commission either immediately or within 24 hours, although the loss of the facility was for more than a week (see paragraph 3, Details).

License No. SNM-1002 - Authorized Use

- The licensee performed operations not authorized by the license in that, plutonium-beryllium sources were fabricated in quantity greater than the 12 authorized under the license and in strength different from the 400-curie sources authorized by the license (see paragraphs 1, 2, 17, and 44, Details).

- in that a location in a machine shop area, not authorized by the license was used for work on a plutonium source (see paragraphs 11, 13 and 18, Details).

- in that a cutting operation, not authorized by the license, was performed on the source (see paragraphs 1, 9, and 10, Details).

- in that U. S. Nuclear administrative procedures submitted by USN application letter of March 22, 1967, were not followed in regard to the specific responsibilities of the corporate Radiological Safety Officer (see paragraphs 6 and 46, Details).

10 CFR 20.201(b) - Surveys

- in that surveys, i.e., adequate evaluations of radiation hazards, were not made incident to the use of radioactive materials. Most of the evaluations subsequent to the incident were made at the insistence of the AEC investigators (see paragraphs 8, 10, 36, 37, 40, and 41, Details).

10 CFR 20.401 - Records of Surveys

- in that no records of surveys were made of the radiation exposures of the individuals involved in the Pu-238 incident (see paragraph 21, Details).

10 CFR 20.103(a) - Exposure of Individuals

- in that the licensee used licensed material in such a manner that individuals in restricted areas were caused to be exposed to airborne Pu-238 concentrations in excess of Part 20 limits (see paragraphs 30, and 37, Details).

10 CFR 20.401 - Records of Surveys

- in that no records of air sample surveys had been maintained by the licensee of operations conducted prior to the incident, but subsequent to the AEC inspection of December, 1967 (see paragraph 21, Details).

DETAILS

Background

1. License No. SNM-1002, issued April 6, 1967, authorized U. S. Nuclear Corporation to receive 12 metal pellets of Pu-238 of 24 grams each for the preparation of Pu-Be sources. Each source was to have been approximately 400 curies in strength, and to have been doubly encapsulated in stainless steel. The license does not authorize removal of this encapsulation. Twelve Pu-Be sources were fabricated under a Westinghouse Bettis Atomic Power Plant contract for the U. S. Navy, Order No. 73-DY-373024-M, (Exhibit A). The 12 sources were completed on schedule, tested according to the license and specifications, and had been shipped.

2. Westinghouse then contracted with the licensee to fabricate seven additional smaller sources under Order No. 73-Y-377762, (Exhibit B). These sources are similar in design to the larger ones and were to be approximately 45 curies in strength, and to have been made from another 24 grams of metal in one plutonium pellet provided by the Westinghouse Company. These seven sources also were to have been doubly encapsulated in stainless steel, tested, and shipped to the Bettis Plant. The order had been received on October 16, 1967, and the 24-gram Pu metal pellet for the order was received on November 17, 1967.

Introduction

3. On January 22, 1968, Region V received an anonymous telephone call which reported that in the evening of January 18, 1968, three employees of the licensee, including a [redacted] had been involved in an incident wherein a source had been cut open, which resulted in general contamination of the licensee's facility. On January 22, 1968, Herbert E. Book, Senior Radiation Specialist, Region V, attempted to clarify the matter in telephone calls to Frank Collins, the licensee's Health Physicist, and George Harwood, the licensee's Radiological Safety Officer. These persons admitted to a contamination incident at the facility which they minimized, and stated it was not a reportable incident. No written report of the incident was made until the investigation was under way (see paragraph 44, and Exhibit M). EX. 6

4. As a result of these conflicting reports, and in view of the potential hazards from plutonium contamination, an investigation of the incident was decided upon, and the State Health Department was informed. Investigation commenced on January 23, and continued through January 30, 1968. J. R. Metzger, Radiation Specialist, Region V, and J. J. Ward, Investigation Specialist, Region IV, conducted the investigation. James Heacock of the State Division of Industrial Safety assisted with the initial surveys. AEC Medical Consultant, Dr. Kenneth McCormack, and the Director, Division of Information, SAN, Rodney Southwick, assisted the licensee in a medical evaluation of the exposures and in its press release. The investigation consisted of interviewing personnel involved, making independent surveys of the premises and environment, and auditing of surveys and bioassays made and contracted for by the licensee.

5. Subsequent to the initial period of investigation, Region V Radiation Specialists revisited the facility on February 5-9, February 15, 20-21, 1968, for the observation of decontamination procedures, verification of areas decontaminated, and for observation of radiographic testing of the remaining sources to be shipped on the Westinghouse order. Interim reports of those activities, with appropriate enclosures, were submitted to Compliance Headquarters by memoranda dated March 8 and March 11, 1968. Some of the enclosures are duplicated as exhibits to this report.

Investigation, January 23-30, 1968

Interview with George E. Harwood, Radiological Safety Officer, Vice President and General Manager, U. S. Nuclear

6. George E. Harwood was the first person contacted at the facility the afternoon of January 23, 1968. He was informed that the investigators were there because of the advice to Region V that there had been a contamination incident at the facility. Harwood stated that there had been a contamination incident at the

facility. Harwood stated that there had been an incident which occurred the evening of January 18, 1968. He stated the two individuals who had been contaminated were [redacted] and [redacted] and that fecal and urine samples had been obtained from them. He stated [redacted] was out that very afternoon buying a large vacuum cleaner for decontamination of the building. Harwood stated that after the incident had occurred contamination had been tracked from the operations area of the building into the office area, and that some had actually been found in Harwood's office, apparently tracked in by [redacted] when he made several telephone calls to Harwood the evening of January 18. When asked what caused the contamination, Harwood stated it had been caused by [redacted] cutting into the outer capsule of a double sealed plutonium-beryllium source. Harwood stated that on January 18 at about 5:30 p.m. as he was making a final tour of the plant before going home that evening he observed [redacted] back in the health physics office and made some joke about them not being on overtime and stating that it was time to go home. Harwood stated that he did not know they were planning to cut into the capsule that evening. He stated he had not known or approved of any plans for cutting into it. Harwood stated that the Isotope Committee of the licensee was essentially disbanded, had not met for several months, and had not been consulted in regard to the cutting operations. (The licensee's March 22, 1967, application letter states that detailed procedures will be approved by the Isotope Committee prior to work. Attached to that letter are ICN procedures. Section 3 of these procedures specify the specific responsibilities of the Corporate Radiological Safety Officer /Harwood/. These procedures were not followed.) Harwood stated the source had not come up to specifications as a neutron source, and that the Materials Testing Laboratory's X-ray of the capsule (which was a required testing procedure) had showed the outer capsule to have a hairline crack. Harwood stated the contractor, Westinghouse, had wanted the outer capsule replaced. However, when [redacted] and [redacted] attempted to do this they ruptured the inner capsule. He stated [redacted] had done the cutting and [redacted] had been watching the procedure, and that the cutting was done on a lathe. Harwood stated that a mechanical air sampler was operating at the time, and it showed only low levels of about 10^{-13} or 10^{-14} uc/ml on a Whatman filter paper. Harwood stated that other work had been done on the same lathe at least as late as January 11.

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7. Harwood stated that the source was one of seven little reactor standardization sources with a neutron emission of 10^8 neutrons per second or approximately 400 curies Pu-238. (Harwood at that point did not realize, or did not want to admit, that an unauthorized smaller source was involved.) He stated they were all done for Westinghouse and the capsule was one of two types of sources built for Westinghouse. Harwood stated that the contamination from the incident had been tracked around and several other individuals were involved. He stated that spots of contamination were smeared and showed 50 to 70,000 cpm/100 cm^2. Harwood stated that he was in the area on January 23 for a re-run of the air samples. He stated that [redacted] had taken some nose wipes the night of the incident. Harwood indicated that capsules may have been cut open before (without contamination having occurred). He described the encapsulation procedure as consisting of sealing the matrix in an inner capsule which is then decontaminated. The inner capsule is then put into a storage container to be taken to the "outer facility" where the outer capsule is welded on. X-rays and leak testing are also done there. Harwood stated that there has been no other rupture of a capsule to his knowledge. He stated contamination was general throughout the facility, and that approximately 2 to 300 cpm/100 cm^2 had been found on the floor in the office area.

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8. Harwood stated there had been no thought of a medical examination for the persons involved since there had not appeared to be that much of a problem. Harwood stated that the reason the lathe in the outer facility was used was because the lathe in the inside glove box was out of order. (At this point Harwood did not know the lathe used was the one in the machine shop, according to his later statement to the investigators.)

Interview with [redacted]

9. [redacted] stated that he is the [redacted] He stated that he had opened two outer capsules on previous occasions. He stated that, in addition to [redacted] had also been in the immediate vicinity and had been contaminated when the capsule was ruptured. [redacted] stated that he started cutting into the capsule between 5:30 p.m. and 6:00 p.m. He stated he had worn a comfo air mask and that an air sampler had been operating. He stated that there was a small amount of contamination on the inner capsule. When the outer capsule had been checked, a flaw had been found which consisted of a small, minute crack. He stated that he had set the capsule up in the lathe, and had cut all of the way through the outer capsule using a hacksaw with a three-foot extension on the handle so that he could stand behind a water tank during this operation. He stated that he noticed a change in the color of the filings coming from his operation. At about the same time, [redacted] said that he was getting some alpha readings, and that they should all back off. He stated he had been surveyed by [redacted] and had showered. He stated he took a nose smear with a "Q-tip", and had taken a bottle home for a urine sample. He stated that he had a fecal sample the following day. [redacted] stated that the air sampler was two or three feet away from their operation. [redacted] stated that he had not gone to a doctor nor had he been told to go to a doctor as a result of the incident. However, on Monday, January 22, he had been examined by a Dr. Raymond Whalley, who is his family physician. (Dr. Raymond Whalley, 6777 Hollywood Boulevard, telephone number 463-0966). [redacted] stated that he had gone for a routine yearly physical that day and had made the appointment for it approximately two weeks prior to that. He stated blood samples were taken and a routine physical was given him. He stated he did not tell Dr. Whalley of the incident of the preceding Thursday night. [redacted] stated that no nose smears had been taken of him Friday morning, but that a nose smear had been taken on January 23 which was negative.

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Interview with [redacted]

10. [redacted] is the [redacted] for the licensee. He was interviewed after he returned to the plant the afternoon of January 23 with the vacuum cleaner. [redacted] stated that he, [redacted] and [redacted] had been engaged in the cutting operation. [redacted] had been called immediately after the incident, and had returned to the plant for decontamination procedures. [redacted] stated that he had a Gelman air sampler working at the time of the incident, and that he later counted the filter from this air sampler which showed about 1.9×10^{-11} uc/ml. He stated that this was a late count, however, and this count was from memory as he had not made a written record of it. He stated he first realized something had gone wrong when [redacted] was cutting into the capsule when he saw rust-colored filings dropping from it. When he saw this, he knew it was plutonium. He alerted the others and they "went to mask." He then notified Mr. Harwood by telephone. [redacted] stated that he knew people were still in the building when the incident occurred. He stated Mr. Fallis had stuck his head in the door, but [redacted] had told him to keep out, there was a contamination problem. (Mr. Fallis is the General Director, Chemical and Radioisotopes Division, ICN.) [redacted] stated that he had found some contamination on the floor of the office, but the shop had been hit harder. He stated there was a blower in that shop. [redacted] stated that the contaminated people had taken showers before returning to their homes. He stated he had found contamination which he remembered to be in the order of 20 to 30,000 cpm in the hair of [redacted], and himself. He stated the nose smears registered 500 to 1,000 cpm on a portable alpha counter. He said later smears were negative. He stated after the incident he and [redacted] closed up the lathe area that night and made a survey of the front office area. They checked the office from top to bottom. They found a rug in the sales office with 2,000 to 3,000 cpm. They found 50,000 cpm in places in the shop area. [redacted] stated that [redacted] was standing eight to nine feet back from the lathe waiting to take [redacted] home. [redacted] stated that none of them had any protective clothing on, except for lab coats. He stated they wore no masks. He stated that fecal and urine samples taken from himself and [redacted] had not yet been sent in for analysis. [redacted] stated that he had turned these over to his assistant, Chuck Mitchell, and he didn't know who Mitchell had gotten further samples from. [redacted] stated he had not checked the fecal samples with a portable alpha counter for a rough estimate of contamination because his stomach was too upset for such a chore.

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11. [redacted] stated he had been told the inner capsules were clean. He intimated that the one involved may not have been clean and the contamination occurred when the outer capsule was cut into without cutting into the inner capsule. [redacted] stated he has played the incident down because of the possibility of panic. He stated that he did not know who might have alerted the AEC, but that it could have been Merv Pointer, the machinist who ordinarily worked on the lathe. [redacted] explained that he called Pointer that Thursday night, and he wanted him to work at Technical Associates the next day, since the lathe area was contaminated. [redacted] stated that Merv Pointer is afraid of radiation and, therefore, not fully understanding the situation, could have made the report to AEC, which [redacted] stated was not necessary since the situation was under control. He stated the other possibility is that the report was made by the Fire Department inspectors who had been in the office on Friday. [redacted] stated that it was important to keep people in the front office under control. EX6

12. [redacted] stated that he and [redacted] had worked closely together on the capsule. He stated the lathe in the inner facility was mechanically gone, and that the cutting work had to be done outside the inner facility. He said that this particular capsule was a rework from the Westinghouse order, and a crack had appeared when it was helium leak tested. He stated the capsule had been brought to the outer facility for outer encapsulation. They had supposedly been checked for contamination and had been welded on Friday, the week before (January 12). [redacted] explained the Navy neutron sources had been completed, and that all of the smaller Westinghouse sources had been helium tested, but they were not required to leak test the little ones. He explained the little ones had been made up from one plutonium slug which was crushed to provide material for seven sources of about 24 curies each under another contract. He stated they were standard neutron capsules, similar to those produced under the Navy contract. He stated that the capsule which had been cut into was in the inner facility glove box in a glass jar with a lid on it. EX6

13. [redacted] stated that a nemosphere had been used on the job which had detected a neutron radiation of approximately 2 mrem/hr during the operation of cutting the capsule. [redacted] stated that he had pulled the badges for [redacted] and himself which were provided by Radiation Detection of Mountain View, but that he had not turned them in yet. He stated [redacted] did not have a badge and was standing in the back. [redacted] stated that about 5 to 10 mrem was recorded on the neutron personnel dosimeters that he and [redacted] wore, but that he had made no written record of this. [redacted] stated that 14 to 15 inner capsules had been fabricated. Seven of them had been earmarked for Westinghouse. [redacted] then led the way to the machine shop area where the lathe was located. At this point, George Harwood contacted the investigators and stated he didn't know until then that [redacted] and [redacted] had opened the capsule on the machine shop lathe. (A review of the license and application reveals that only the plutonium lab and "outer facility" are described and authorized as locations where work with plutonium can be conducted.) EX6

14. [redacted] stated that his urine and fecal and [redacted] urine and fecal samples would be sent in on January 24 to U. S. Testing. He stated no urine or fecal had been received from [redacted]

Interview with [redacted]

15. [redacted] stated that he normally worked in the C-14 labs and had been present when the capsule was cut into only because he was to take [redacted] home. He stated that he had been in the machine shop only a couple of minutes when [redacted] told him that something was wrong, and asked him to go back to the health physics office. [redacted] stated he wore no mask or protective clothing and can't recall that an air sampler was present. [redacted] stated that [redacted] made a survey of him back in the health physics office and had him take off all of his clothes. He stated he had a nose wipe before the shower. He did not know what the count was. He stated he had a film badge and a dosimeter in his pants pocket, but they were picked up with the clothing which he did not get back. He said he showered after removing his clothing, and was surveyed after the shower. He stated he took a urine sample bottle home the night of the 18th, and combined the sample for 24 hours. He stated a man had been sent out to pick up the samples from him on January 24. He stated the fecal sample picked up on the 24th was from a voiding of the 19th. [redacted] stated that he had come to work the next day, January 19, and that he told Fallis he wanted to quit on January 19. He stated he had made this decision prior to the incident of the night of January 18. He stated the reasons were [redacted] and had no bearing on the contamination incident. He stated that he had voluntarily quit, and this had been no action on the part of the licensee EX6

because of his having been involved in the incident. [redacted] stated that he did not think that [redacted] had a mask on at the time of the incident. He didn't think that they had lab coats on, and he could not see what they were cutting.

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Interview with [redacted]

16. [redacted] stated he is a technician and he was called back to work between approximately 7:00 p.m. and 8:00 p.m. the evening of January 18. He stated [redacted] had called him and asked him to bring soap for decontamination. [redacted] stated he wore a comfo mask, a lab coat, shoe covers, a personnel's dosimeter, and a film badge. He stated they first had made surveys and then started cleaning up. He stated he was asked to fill a urine bottle on Monday, January 22, but not before, and that he had furnished a fecal sample on January 24. [redacted] stated that he had a nose blow sample, but no sputum sample was taken until that Monday, January 22. He stated that the source involved was one of seven regular plutonium slugs. He stated he didn't know where the incident occurred; he saw no shield and he knew nothing about the incident, except that it was one of the seven small slugs. [redacted] stated that he, [redacted] and [redacted] worked until approximately midnight decontaminating the place.

Interview with other employees

17. At this point in the investigation, Bill Bradley, the USN Sales Manager, contacted the investigator in Mr. Fallis' office to provide information on the sources prepared for Westinghouse. He stated they had been manufactured according to Westinghouse engineering drawing No. 9118786, of which he furnished a copy of a change order (Exhibit C) showing the configuration of the capsule. He provided for inspection a copy of the contract, Westinghouse Order No. 73-Y-377762, dated October 6, 1967, which specified that the seven sources were to be fabricated from a 24-gram pellet of Pu-238 metal supplied by Westinghouse. Except for the first two sheets of the contract (Exhibit B, above), the rest of the contract was a standard form, No. 73495K. Article No. 32 of this form covers Health and Safety requirements and states "All government agency regulations will apply." Bradley stated the failed source was No. SN-W424, as noted on the engineering change drawing. He produced a copy of the radiographic test report dated January 12, 1968, which reported "crack opposite welded end." (Exhibit D). Bradley stated the order did not specify the number of curies each source contained, but specified a neutron emission rate. Bradley stated the final assay for the failed source was recorded as 5.1×10^7 n/s emission rate. George Harwood, who was present then, performed the following calculations to show this emission rate was equivalent to 35.3 curies.

24 g * Pu-238 in original pellet
16.2 * c/g of Pu-238
5.63×10^8 n/s * emission rate of total matrix
5.1×10^7 n/s = emission rate of source
$\frac{5.1 \times 10^7 \times 24 \times 16.2}{5.63 \times 10^8} = 35.3$ curies plutonium in source

18. [redacted] was briefly reinterviewed on January 26 after he had been whole body counted and after his house had been checked for contamination. [redacted] stated that he had taken two showers at the plant immediately after the incident on January 18. He stated he and [redacted] had surveyed each other and that he had taken off all his clothing and put it in a bag. He stated he had other clothing and shoes in a locker which he put on to wear home. [redacted] stated that on two other occasions he had successfully cut off the outer capsules of the larger (400 curie) sources which were about 12 inches long. He stated that had been done in the inner facility. He stated the cutting could not be done on the outer facility lathe since that lathe was set up for welding only and would automatically turn when something was put in the chuck. [redacted] stated the larger capsules had been cut open by using a pipe cutter placed on the end of the capsule which was placed on end in a paraffin block for shielding. [redacted] further explained this procedure later, saying that they used a long handle on the pipe cutter and crouched down to avoid exposure from the top of the source, and turned the pipe cutter by walking in a circle around the sour[illegible]n the paraffin block.) On January 18, [redacted] stated he attempted to [illegible]pe cutter on the smaller source which measured about 9/16 inch diameter, [illegible] found that the cutter was too large for it to grip the source. He stated that he and [redacted] then decided to use the chuck of the machine shop lathe as a vise to grip the source while they cut the end off with a hacksaw. He stated he had used a body shield to protect him for this operation. He described it as a wooden frame filled with paraffin blocks which is on rollers and can be rolled up to the work by the man behind it. [redacted] stated again that he had worn a paper coat, no gloves, no head cover, and no shoe covers. He stated again that he had worn a comfo mask. He stated his lung deposition had probably occurred when he inhaled as he was taking the mask off.

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19. R. M. Haslett, the Technical Sales Director of the licensee and former Hot Lab Supervisor, was briefly interviewed on January 25 concerning the information furnished on the two orders by Bill Bradley (see paragraph 17, above). Haslett stated that while the Navy order had called for 12 pellets (which would total the 288-gram limitation of the license), the licensee had actually received more than this number over the period of the contract since some had been exchanged and sent back to Westinghouse. In toto, however, Haslett stated the licensee had received only 12 pellets except for the additional one, making 13, from which the seven smaller sources were fabricated. Haslett provided copies of the two orders, engineering drawing and test sheet, appearing as Exhibits A, B, C, and D of this report.

20. Mery Pointer, the machinist whose lathe had been used by [redacted] and [redacted] the night of January 18 and who had been told by [redacted] to report for work at Technical Associates the following morning, was interviewed at that company on January 25. Pointer stated that he had not reported to 801 Lake Street after the 18th and had not been able to get his tools out of the facility. He stated [redacted] had informed him that they were contaminated. He stated the company had bought him a new tool box and would buy him a new set of tools if they could not adequately decontaminate the ones he left behind in the machine shop. EX6

Survey Records

21. According to [redacted] no records were maintained of surveys performed during and after the incident. The air sample log book showed that the last entry was made on December 12, 1967. (The last day of the last routine AEC inspection.) A few air sample results, taken after the incident, were calculated from data written on bits of scratch paper. These ranged from 1.4×10^{-13} uc/cc to 5.4×10^{-12} uc/cc, covering the days January 18-24. Also, no dose rate surveys of the capsule and no nasal wipe results of the employees involved in the incident were recorded. [redacted] recalled that nose wipes revealed 500 to 1,000 cpm alpha and hair contamination from 20,000 to 30,000 cpm alpha, using an Eberline PAC-3G alpha detector, but had not the time to make records of this. There were no records available on clothing and skin contamination, nor on the extent of contamination spread following the incident. Some of these survey requests were recorded (evidently from memory) in the 30-day report required by 20.405(a), submitted by the licensee on February 17, 1968. EX6

Decontamination Efforts

22. The licensee had effected some decontamination by the time of the investigators' arrival on January 23. According to [redacted] and Harwood, decontamination of the building began immediately after the incident on January 18 and continued through that night. This included mopping and painting surfaces to hold down the remaining contamination. The licensee began using spray foam on vertical surfaces on Wednesday, January 24, with some success in one office room. Attempts at using this technique on the "bay" floor were unsuccessful since the contamination had worked down into the rough-finished concrete. A vacuum blaster was purchased by the licensee on February 5, and its use proved effective for decontamination of the concrete sidewalks and floors. EX6

Independent Surveys

Extent of Contamination Spread

23. Independent surveys were made by AEC inspectors during the days of January 23, 24, 25, 26, 30, and February 5, 6, 7, 8, and 9 on various areas to check the extent of contamination and progress of decontamination. Photographs of the survey operation and equipment involved were taken January 24-30. (Exhibit E). Plot plans and sketches showing results of these independent surveys are attached (Exhibit F, Annexes A, B, C, and D). The contamination found was particulate in nature, except in areas very close to the machine shop incident area where the contamination was general.

Surveys Outside of Building

24. Surveys were conducted outside of the building on the public sidewalks and the building roof by the AEC investigators. Surveys were made by the licensee in two U. S. Nuclear employees' homes with the investigators observing. James H. Heacock of the California State Division of Industrial Safety helped in conducting surveys of the building and sidewalks. Further surveys were made subsequently by the licensee on the sidewalk to check cleaning progress and in five additional employees' homes.

25. Particulate contamination was found outside the building (see Annex A). Specks of contamination reading as high as 30,000 cpm alpha were found near the entrance doors, tapering off to < 500 cpm near Victory Street and towards the Environmental Sciences building on Lake Street. Additional contamination was found in the U. S. Nuclear parking lot in the pathway from the side entrance door. Additional surveys in the streets and away from the building revealed no contamination. A large amount of contamination had been washed underneath the large roll-up door to the sidewalks on Lake Street from a decontamination operation inside. Decontamination of the public areas outside the U. S. Nuclear building was completed on February 7, 1968. The method of decontamination was vacuum blasting. The AEC inspectors checked the decontaminated areas and resurveyed the entire sidewalk and found no contamination above AEC criteria for release.

Surveys of the Building Roof

26. A survey of the roof revealed minor spots of contamination in the form of specks except on one exhaust vent which had general contamination on four sides of the wire screen around the outlet to 50,000 cpm alpha. A smear of the screen revealed 2,500 cpm alpha (see Annex C). The exhaust was operating during the incident and was open to the building via a 10-inch diameter hole in the side of the squirrel-cage blower housing located on top of the lower roof over labs 6 and 7 (see photograph, Exhibit E and Exhibit F, Annex A - "Waste Room"). The hole in the housing was located about 60 feet from the shop where the incident occurred and overlooks the shop walls (the shop has no ceiling). After the roof survey, the licensee was asked to secure all exhaust fans that did not have an absolute filtering system. This was done. Mr. Fallis obtained a wipe sample of the exhaust vent contamination to have it analyzed to determine whether the contaminant was plutonium or actually polonium, which the licensee had used years before. The result of that analysis (NSEC No. E8-11-78) indicates 50% Pu-238, 27% polonium, and 23% of unknown alpha emitters, as noted in the licensee's report (Exhibit G).

Building Surveys

27. The extent of the contamination was as shown in Annexes A, B, and D of Exhibit F. The contamination was mostly particulate, except on the inside of the "Outer Facility" and in the immediate area of the shop lathe. The highest speck density was found to be in the dock "bay" area (see Annex A). (No painting had been done in the bay. The contamination had been painted over in other places.) Several specks of contamination were still detectable on the painted surfaces of the floor and walls (see Annex B). The high roof rafters were not surveyed by the investigators because of inaccessibility.

28. The highest levels of contamination were found on the Outer Facility surfaces. [redacted] stated this was caused when the source, which had been cut into, was brought from the machine shop to the Outer Facility to be put into the glass jar there on the night of January 18. (The glass jar was later placed in the remote control box of the inner facility.) Surveys prior to cleaning were not conducted inside the outer facility because of the potential hazard of spreading the contamination. The top of an "aquarium" (a glass water-filled enclosure used for neutron shielding) which sets in front of the facility (see Exhibits E and F) showed an indication of 400,000 cpm α direct. After the facility was cleaned and painted, the contamination on the inside (vertical) surface of the aquarium revealed 800,000 cpm per 500 cm^2 removable. Both the top and vertical sides of the aquarium were cleaned to < 100 cpm alpha, removable, by February 15. The health physics office (the only office located in the work area) was contaminated as shown in Exhibit F. The licensee was asked to move the office records and equipment (after decontaminating) to another office in the office area. This was done on January 25. On February 5, it was observed that the licensee had moved back into the health physics office where considerable contamination was still remaining, especially in the adjacent supply room (see Annex A).

EX 6

Air Sampling

29. According to [redacted] an air sampler was operating during the capsule cutting operation at a distance of four feet away from the lathe. He said that the sample was removed and counted, revealing the concentration to be 9.34×10^{-12} uc/cc of alpha (decay from 1.9×10^{-11} uc/cc). No records were available to substantiate this and the sample was thrown away counting, according to [redacted] EX6

30. Other samples were removed from labs 4, 6, and 7 (see Annex A) on Thursday, January 25, eight days after the incident, but which included the day of the incident. The eight-day (192 hr.) diluted samples showed 1.7×10^{-10} uc/cc alpha, 2×10^{-10} uc/cc alpha, and 5.9×10^{-10} uc/cc alpha for labs 4, 6, and 7, respectively. Recounts of these samples after suitable time intervals showed no change. (The 40-hour average concentration limit for Pu-238 is 3×10^{-11} uc/cc.) An air sample from the stack exhaust (which showed contamination on the outlet as mentioned above) showed 6×10^{-13} uc/cc. The tygon hose sample line runs from the stack, across the lower lab roofs, and to the sample head in lab 22. The long hose may have prevented much of the airborne contamination to be picked up by the stack sampler. The stack sampler, which monitors the exhaust from lab 22, showed a concentration of 2.6×10^{-11} uc/cc alpha.

31. Air samples taken during decontamination and other operations after the incident showed an average of 10^{-13} uc/cc with some samples falling into the 10^{-12} uc/cc range. The licensee began operating three air samplers after the incident outside of the lab areas, one near the Outer Facility area, one in the shop where the incident took place, and one in the bay area, in addition to the lab and stack samplers.

Surveys of Autos and Homes

32. On Wednesday, January 24, automobiles belonging to U. S. Nuclear employees were surveyed by the AEC inspectors. Two autos were found to be contaminated. The auto belonging to [redacted] U. S. Nuclear employed laborer, had 8,000 dpm on the floor mats and 2,000 dpm on the seat. The auto belonging to [redacted] showed 500 dpm on the floor mat. No contamination was found in other autos.

33. On Thursday, January 25, the licensee surveyed [redacted] home at [redacted] in the presence of the AEC inspector. No contamination was found on any surfaces inside the home or on the walkway outside. However, one pair of trousers belonging to [redacted] which were hanging in the closet and which had been worn on Monday, January 22 for decontamination work at U. S. Nuclear prior to the AEC visit, revealed 8,000 dpm general on the front of the trousers. The trousers were placed in a plastic bag and taken back to U. S. Nuclear. EX6

34. On the night of Thursday, January 25, [redacted] home at [redacted] was surveyed by the licensee in the presence of the AEC investigators. Two specks reading 2,500 dpm and 1,100 dpm were found on the rug at the base of the sofa in the living room. In addition, one speck of 500 dpm was found on the back of the sofa. The specks were removed with masking tape. A bath towel with general contamination of 1,100 dpm was removed from a bathroom towel rack, placed in a plastic bag, and taken back to U. S. Nuclear by Mr. Fallis. No other contamination was found in [redacted] house.

35. On the same day (January 25), it was suggested to Mr. Fallis by the inspectors that the licensee survey the homes of [redacted] This was done on Monday, January 29, by the licensee. The licensee reported that one speck of contamination was found on [redacted] rug and removed. According to Mr. Fallis, no other contamination was found in either of the two homes, and on Monday, February 19, the licensee reported that five additional homes were surveyed with no contamination found. EX6

Bioassay

36. According to [redacted] the three employees associated with the incident and others on the decontamination crews submitted urine samples on January 18, 1968, after the incident. The samples were not sent in until Thursday, January 25, to U. S. Testing Company, Richland, Washington. Some fecal samples from [redacted] were also submitted. The licensee was asked to continue with urine and fecal samples. The AEC medical advisor, Dr. K. McCormack, advised U. S. Nuclear that the four employees associated with the incident should provide "complete voiding" samples. This was done until February 9 when, except for [redacted] they were stopped by Dr. Oneal, the licensee physician. Dr. Oneal had been advised by the AEC consultant, Dr. McCormack, that as of that date samples were no longer necessary on [redacted] and [redacted] beyond the usual periodic samples; but that continued studies and complete voiding were necessary on [redacted] (see Exhibit K). EX 6

37. On Wednesday, January 24 [redacted] were sent to Battelle Northwest Laboratories for whole body counting at the request of the AEC investigators. Final results were reported on Friday, January 26. The whole body count of [redacted] showed that he had 150 to 200 nanocuries of Pu-238 in his lungs (maximum allowable by ICRP Committee II report is 16 nanocuries) or 10 to 14 lung burdens. A count of [redacted] showed that he had < 10 nanocuries (10 is minimum detectable) or as high as 20 manocuries since the Cs-134 and Co-60 components in his lungs may have masked out some of the plutonium. [redacted] were sent for whole body counting on January 29. The counts for [redacted] and [redacted] revealed < 10 manocuries. EX 6

38. On February 5, [redacted] was sent back to Battelle Northwest for a recount. The count showed 170-225 nanocuries, which was higher than the first count. The Battelle people said that the plutonium had worked deeper into the lungs, making it closer to the detectors, so that a higher reading would be obtained; they said it really meant that there was no change. Mr. Fallis said that counts of [redacted] on a quarterly basis were being started on February 19, 1968.

39. Urine sample results (described as preliminary and incomplete) were available for samples submitted prior to the whole body count. [redacted] sample revealed 1.07 dpm plutonium per 100 ml (corresponding to the 150-200 nanocuries in the lung by whole body counting) and [redacted] sample revealed 0.61 dpm per 100 ml, corresponding to 10-20 nanocuries in the lung from whole body counting results. EX 6

Environmental Sampling

40. The licensee was asked by the AEC inspectors to propose a plan for taking environmental samples. On Friday, January 26, Dr. Darnell of Environmental Sciences (a U. S. Nuclear subsidiary) said that they had found out that, at the time of the incident, the wind was blowing from the northeast at five knots. He said that they had taken seven vegetation samples and one soil sample in the southwest windrow and sent the samples back to Pittsburgh, Pennsylvania, for analysis. Results of the soil and vegetation analyses showed no significant contamination (Exhibit G). The inspector called Jules Zarchin, California State Bureau of Radiological Health, regarding environmental air samplers which had been operating during the incident. He said that one, located two miles west of the U. S. Nuclear plant on Beverly Boulevard, Hollywood, showed 0.03 pc/l, 0.01 pc/l, and 0.01 pc/l for the days January 17, 18, and 19, respectively, and further said that these were statistically insignificant. Also, the Atomics International environmental air sampler at Santa Susana, 20 miles west of U. S. Nuclear, showed no indication during the same period.

Personnel Dosimetry

41. The film badges of the employees involved in the incident were removed but not sent in for analysis until Thursday, January 25. Results were received on February 19, 1968 by the AEC and the report from the vendor (Radiation Detection Company, Mountain View, California) inspected on February 21, 1968. [redacted] badge revealed a dose of 110 mrem, all neutrons, while [redacted] badge showed 100 mrem neutron. A copy of this report is attached (Exhibit H). As required by 10 CFR 20.405(b), notices of exposure were sent by the licensee to the employees involved in the incident [redacted] on February 21, 1968. Copies of these notices are attached (Exhibit I). EX 6

Medical Evaluations

42. At the request of the Director, Region V, Dr. Kenneth R. McCormack, Chief of the Nuclear Medicine Section, Mount Zion Hospital, San Francisco, acted as medical consultant in the case. Dr. McCormack was present at the licensee's facility on January 24 and on January 25 conferred with the licensee's physician, Dr. William J. Oneal of the Los Angeles Tumor Institute, who is treating the exposed individuals. Dr. McCormack has furnished a preliminary report to the AEC (Exhibit J), and furnished written advice to Dr. Oneal (Exhibit K).

Publicity

43. Mr. Rodney S. Southwick, Assistant to the Manager for Public Information, SAN, was at the facility on January 24 and 25, and arranged with J. C. Brantley, ICN Vice President, for the preparation of a news release on the incident. The release was made to the Burbank Daily Review and the Glendale Press on January 26, 1968. One article appeared in the Burbank Daily Review on January 26, 1968 (Exhibit L).

Discussions with Management

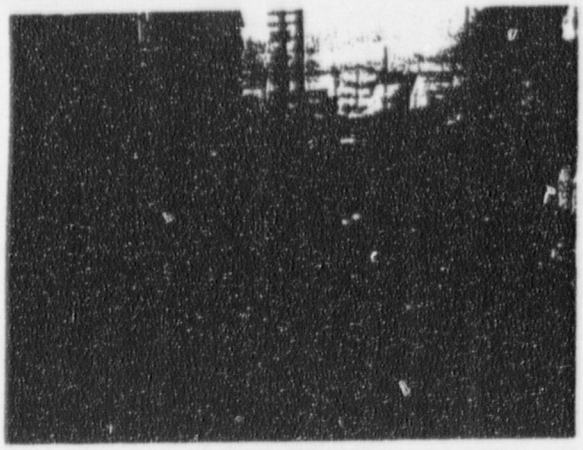
44. Throughout the investigation and subsequent thereto, there were and have been discussions with licensee's management. In the first phase of the investigation, these persons were J. C. Brantley, Vice President, International Chemical and Nuclear Corporation, and Richard M. Fallis, General Director, Chemical and Radioisotopes Division, ICN. On January 24, Mr. Fallis was first informed of the requirement to report the incident which, as evident at the time the incident occurred, should have been done at most within 24 hours. He was told he should submit an immediate report to AEC stating his plans to make a competent evaluation of the contamination to the facility and exposure to personnel, and that he should stop operations at the facility until it was decontaminated and surveys confirming safe limits had been performed by AEC. Fallis stated he concurred and subsequently submitted a report by telegram dated January 24. A responding telegram from AEC Compliance Division of the same date confirmed salient points omitted from the licensee's telegram (Exhibit M). In subsequent discussions during the decontamination phase of the AEC operations at the facility, an inventory of plutonium material on hand was obtained from the licensee (Exhibit N). It lists plutonium metal received in excess to the 12 pellets for which authorization was originally applied for, and it indicates sources have been or were intended to be fabricated for three customers other than Westinghouse. This information reinforces that found during the investigation as to the use of material not authorized by the licensee.

45. Mr. James Heacock, State Division of Industrial Safety, also held a discussion on January 26 with Messrs. Brantley and Fallis at which the AEC investigators were present upon request of Mr. Heacock. Mr. Heacock advised Brantley and Fallis that the California State licensed operations at the facility would have to be terminated until further notice because of the general contamination. Heacock stated the licensee could do this voluntarily but, if not, a "cease and desist" order would be issued. The licensee stated it would cease operations until decontamination was completed. This was confirmed by State letter of January 26, 1968 (Exhibit O).

46. At the conclusion of the investigation on the afternoon of January 30, 1968, a discussion of the results of the investigation was held in the office of Mr. Milan Panic, President, International Chemical and Nuclear Corporation, with Mr. Panic present, as well as Messrs. Fallis, Harwood, Heacock, Dr. R. C. Koch, assistant to Mr. Panic, and the two AEC investigators. Mr. Panic was informed of the items of noncompliance as determined from the investigation. After considerable discussion on each point, Mr. Panic stated that he recognized their applicability and that corrective action had been or would be taken. Subsequent to the investigation, upon review of the licensee's application letter of March 22, 1967, the fact that the licensee's administrative procedures furnished with that letter had not been followed, at least in respect to isotope committee review and the specific responsibilities of the corporate RSO (George Harwood), was noted and the citation for procedure was added to the violations of license conditions. Mr. Fallis was informed of this item in a subsequent telephone call.

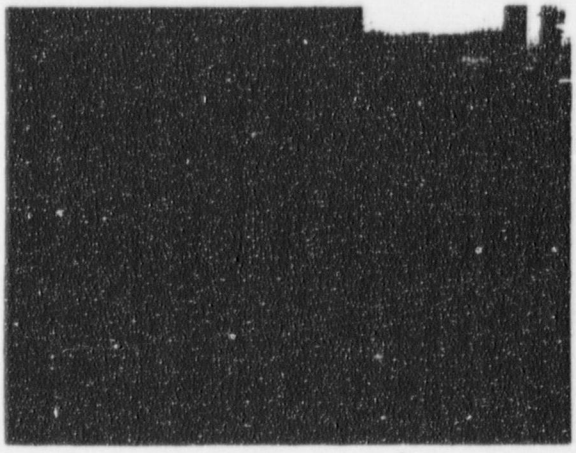
Attachment:
Exhibits A - O

INDEX OF EXHIBITS

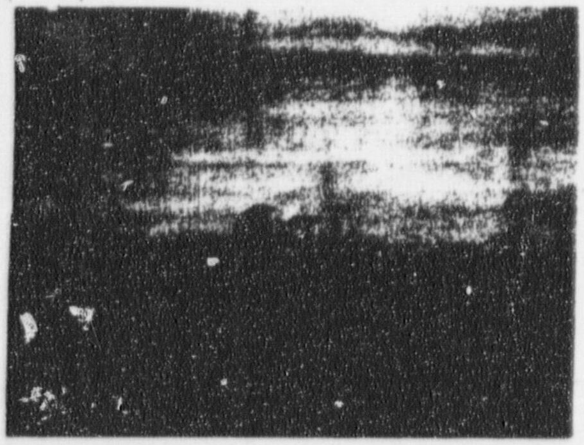


Front of U. S. Nuclear facility, 801 N. Lake Street. James Heacock, State Inspector, using a PAC in foreground. U. S. Nuclear personnel decontaminating sidewalk in background.

Rear view of building showing ACE Salvage Company shed abutting rear wall, and the number of vent stacks on the U. S. Nuclear building.



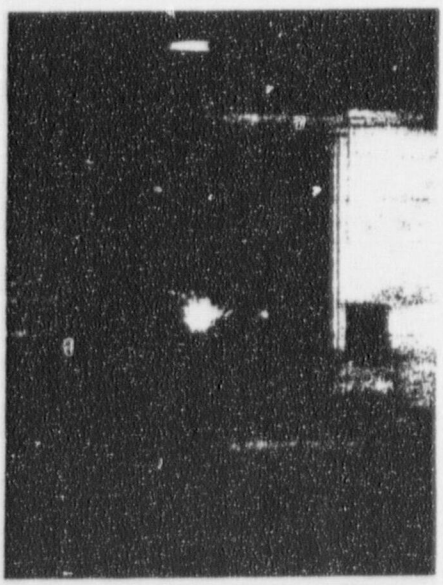
[redacted] a U. S. Nuclear employee, at work decontaminating sidewalk in front of loading dock. Vacuum cleaner in foreground.



[illegible] stacks by R. [illegible] S. [illegible] and J. Metzger, [illegible] January 28, [illegible].

The rectangular [illegible] by Metzger in top [illegible] and [illegible] second from the left [illegible] pictures is the one [illegible] the bulk of the plutonium [illegible] the environment. [illegible] 80,000 and [illegible] of this [illegible].

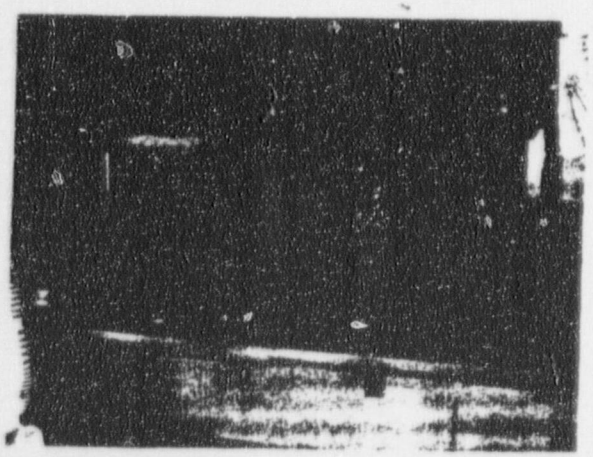
Interior shot [illegible] machine shop, showing open space [illegible] 8-foot shop partitions.



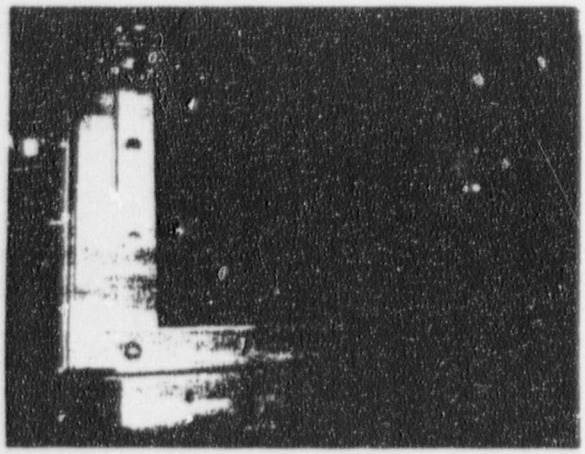
Shot through a partition in the "annex facility". Partition seen through window is the front of cell where the exhaust stack is located.

This shot shows the stack which effectively exhausted the Pu particulate from the machine shop area. Notice the open hole in the side of the squirrel cage blower.

Shot through door of machine shop showing the lathe used to hold the source capsule, wrapped in plastic sheeting. Notice the two heater-blowers overhead.



Shot through "aquarium" front of the "outer Pu" facility showing the lathe used to weld on the outer capsules. Four of the seven small (~ 35 Ci) double encapsulated sources for the Westinghouse order are in the glass jar at left center. Two are behind it.



Shot through the glass front of remote control box in inner facility. The seventh Westinghouse encapsulated source, which was cut into, is in the jar being held up by the tongs.

MIFFLIN (PSHD.), PA. | DATE 3/23/67 | ORDER NO. * 73-DY-573024-14

SPECIAL INSTRUCTIONS
FOR SHIPPING INSTRUCTIONS REFER TO SECTIONS IX AND X

RECEIVED
MAR 27 1967

. . . NUCLEAR CORPORATION
. . . BOX 200
CORLANK, CALIFORNIA 91503

PLEASE SUPPLY THE FOLLOWING

ITEM NO.	QUANTITY	DESCRIPTION (NAME OF PART, STYLE NO., DWG. & ITEM, SPEC. & SUB, HEAT NO., ETC.)	UNIT PRICE	TOTAL PRICE

CONFIRMING VERBAL, MR. W. J. BRADLEY, 3/23/67 - DO NOT DUPLICATE

6 SETS PLUTONIUM-BERYLLIUM NEUTRON SOURCES IN ACCORDANCE WITH THE SPECIFICATIONS AND REQUIREMENTS OF THE ATTACHED PAGES 2 THRU 15

WESTINGHOUSE FORMS 73850C AND 73849C APPLY TO THIS ORDER.

WESTINGHOUSE BETTIS AND GOVERNMENT INSPECTION REQUIRED AT PLACE OF MANUFACTURE. MIL-Q-9858, AS SUPPLEMENTED BY QRC-62C, AND THE MANUAL FOR SOURCE INSPECTION AND ADMINISTRATION OF NAVY PROCUREMENT (NAVEXOS-P-1034, APPENDIX A) IS HEREBY INCORPORATED IN AND PART OF THIS ORDER.

WESTINGHOUSE BETTIS AND GOVERNMENT INSPECTION IS REQUIRED PRIOR TO SHIPMENT FROM SUPPLIER'S PLANT. UPON RECEIPT OF THIS ORDER, PROMPTLY NOTIFY THE GOVERNMENT REPRESENTATIVE WHO NORMALLY SERVICES YOUR PLANT SO THAT APPROPRIATE PLANNING FOR GOVERNMENT INSPECTION CAN BE ACCOMPLISHED.

DO E2 APPLIES CERTIFIED FOR DEFENSE USE UNDER DMS REG. #1.

FAIR LABOR STANDARDS AMENDMENTS OF 1966 APPLY.

FORM 73495 K ART. 1 THRU 53 APPLY
FORM 73634G APPLIES - APPENDIX I APPLY TO THIS ORDER

Paul OK 3-27-67 WJB

ATTACHMENT(S)

$166,704.00 SHALL APPLY IN THIS ORDER.

F.O.B.	TRANSP. CHARGES (SEE INST. 5)	CASH TERMS	ADDRESS CORRESPONDENCE TO (BUYER)
DESTINATION	PPD. & ALLD.	N30	S. W. DIETRICH/MJC/MO

SHIPPING DATE	SHIP VIA	AUTHORIZED BY (PURCHASING AGENT)
REFER TO SECTION IX	TRUCK	J. J. DUKER

WRITTEN BY & DATE | DELIVER TO

[X] YES [ ] NO

BUDGET NAME & NO.	A.E.C. OR NAVY CONTRACT NO.	GOV'T APPROPRIATION NO.	CHARGE NO.	COMM. CODE
	AT-11-1-GEN-14 AEC			

INSTRUCTIONS TO SUPPLIER

ORDER IDENTIFICATION. Show our order number on all invoices, bills of lading, express receipts and containers.
SHIPPING NOTICE. Mail shipping notice for each shipment, on the day shipment is made, to the Buyer at above address giving our order number, contents of containers, quantity and weight.
PACKING LIST. Include packing list with all shipments, giving our order number, contents of containers, quantity and weight.
INVOICE. All invoices must carry certification by seller that the goods or services covered by the invoice were produced in compliance with the Fair Labor Standards Act of 1938, as amended. Submit separate invoice for each shipment under each purchase order showing shipment details. IF SHIPMENT IS NOT TO PAYING POINT, FURNISH ONE ADDITIONAL COPY OF INVOICE FOR EACH SHIPMENT INDICATING CONSIGNEE. In the event that invoicing is by a company other than the seller, notify the Buyer in writing.
TRANSPORTATION CHARGE. (a) Deduct from your invoice any partial transportation costs to be paid by Buyer which are chargeable to seller. (b) Attach receipted transportation bill to invoice when prepaid costs are chargeable to Buyer. (c) When charges are collect, expenditures for insurance must be borne by the seller.
SHIPPING. If not specified, Buyer reserves the right to furnish routing instructions later.
TERMS. Subject to terms and conditions, specifications, and drawings referred to herein and/or attached hereto.
TAXES. Do not bill sales and use tax. Purchaser is covered by direct pay permit.

FAILURE TO SIGN AND RETURN THE ATTACHED ACKNOWLEDGMENT WITHIN 10 DAYS AFTER DATE OF ORDER MAY BE CAUSE FOR CANCELLATION

* NOTE: ORDER NO. MUST APPEAR ON OUTSIDE OF ALL SHIPPING CONTAINERS, PARCELS, ETC., & ON ALL PACKING LISTS & COMMUNICATIONS.

2

[illegible] of [illegible] Neutron Source [illegible] Drawing [illegible], Rev. 2, [illegible] drawings and specifications are forth [illegible] in this purchase order.

2. Furnish six (6) sets of two (2) [illegible] per Item [illegible] drawing [illegible], Rev. 2 with each source assembly. Package separately [illegible] ship with the shipping container.

Each source shall have an emission rate within the range of 5.5 and 6.3 x $10^{?}$ neutrons/sec. at the time of delivery to the specified destination.

[illegible]

A. Drawings

1. Source Assembly

[illegible] Rev. 2 SSN/[illegible]/[illegible] Pu-Be Refueling Source Final Assembly

97[illegible]9 Rev. 3 [illegible] Pu-Be Refueling Source Lower Subassembly

97[illegible] Rev. 2 [illegible] Pu-Be Refueling Source Adapter Assembly

93[illegible]3 Rev. 3 SSN/[illegible]/SSN Pu-Be Source Capsule

97[illegible] Rev. 2 SSN/[illegible] Pu-Be Refueling Source Adapter Assembly

93[illegible] Rev. 2 SSN/[illegible] Pu-Be Refueling Source Positioning Nut Detail

93[illegible]83[illegible] Rev. 4 SSN/[illegible]/SSN Pu-Be Refueling Source Installation Spring Detail

9[illegible] Rev. 3 SSN/[illegible]/SSN Pu-Be Refueling Source Installation Shaft Detail

93[illegible]F193 Rev. 2 SSN/[illegible]/SSN Pu-Be Refueling Source Installation Details

2. Shipping Installation and Removal Container for Neutron Source

9[illegible]5 Rev. D Container Assembly

[illegible] Cap Assembly

[illegible] Rev. A Secondary Shield Assembly

9[illegible]76[illegible] Rev. A Cap

I. SPECIFICATION

A. Extent

Seller shall furnish the following in accordance with the requirements and specifications of this purchase order:

1. Two (2) PU-BE neutron sources per Drawing 911D787, Rev. 1
2. Two (2) PU-BE neutron sources per Drawing 911D787, Rev. 1
3. Two (2) PU-BE neutron sources per Drawing 911D786, Rev. 1
4. One (1) PU-BE neutron source per Drawing 911D788, Rev. 1

The sources shall have an emission rate between 6.5 to 7.5 x 10^7 neutrons per second at the time of delivery to Westinghouse.

B. Applicable Specifications and Drawings

1. Westinghouse Drawings

   (a) 911D786, Revision 1
   (b) 911D787, Revision 1
   (c) 911D788, Revision 1

2. [illegible]-364 - Purchase Order Requirements for Welding and Inspection of Plutonium-Beryllium Neutron Sources.

3. Cleaning

   Seller shall perform source cleaning prior to shipment using only acetone and distilled water. Wipe or smear test of the source and shipping container will be taken immediately prior to shipment. The tolerance limit shall be less than 5 [illegible]curie/100 cm^2.

4. Seller shall inscribe the outer source capsule with "Pu-Be" and an identifying number. One copy of Seller's calibration data sheet shall accompany the source in shipment; two copies of such data plus helium leak test report shall be forwarded to Westinghouse Buyer by the Seller at the time of source shipment.

5. Seller shall be responsible for obtaining all necessary approvals and permits for source shipment in accordance with Interstate Commerce Commission regulations.

6. Reports showing acceptable results for all inspections and tests required by specifications or ordering data shall be forwarded to Bettis for approval prior to shipment of the source assembly.

[illegible]

[illegible] material in the form of [illegible] each [illegible] containing [illegible] than 2 [illegible] before the [illegible] this purchase order, and Seller's [illegible] to coordinate all necessary transport [illegible].

[illegible] of Plutonium [illegible] in excess of 25 grams shall be furnished by Westinghouse to the Seller [illegible] the Seller shall in writing [illegible]; the Seller shall [illegible] all costs involved with shipping [illegible] such as [illegible], handling costs, and packaging [illegible] for return of the [illegible] to Westinghouse or the Government.

The Seller shall be [illegible] per gram for each gram of the contained [illegible] of Federal Special Nuclear Material.

c. <u>Seller's [illegible]</u>

(1) The Plutonium furnished to Seller under this order will be used solely in the [illegible] of the [illegible] to be supplied under this order or such other [illegible] as may be approved by Westinghouse and acceptable to the Seller. Title to all Plutonium including material which is unused, partially processed, rejected, and scrap and residues therefrom, shall remain in the Government.

(2) Seller agrees to [illegible] the Westinghouse-furnished Plutonium including such material which is unused, partially processed, rejected, and scrap and residues therefrom, and further to maintain it separate from other materials in the possession of Seller, unless Westinghouse authorized otherwise.

(3) Special measures will be taken by Seller in the protection of and accounting for all Plutonium furnished for the performance of this order, in accordance with the regulations and requirements of the Government and this purchase order.

(4) Seller assumes the risk of, and shall be responsible for, any loss, destruction of or damage to the Government-owned plutonium in its possession under this order, including that caused by any peril while the material is in transit off Seller's premises after initial receipt of the material by Seller, and while the material is on the Seller's premises or on any other premises where such material may properly be located or by removal therefrom after initial receipt of the material by Seller. Seller shall be [illegible] for the value of any Plutonium furnished by Westinghouse at a rate of $[illegible],000.00/gram of contained PU-238 isotope. [illegible] for PU-238 furnished to the Seller shall be for the [illegible] in PU-238 furnished to the Seller [illegible] by Westinghouse and not

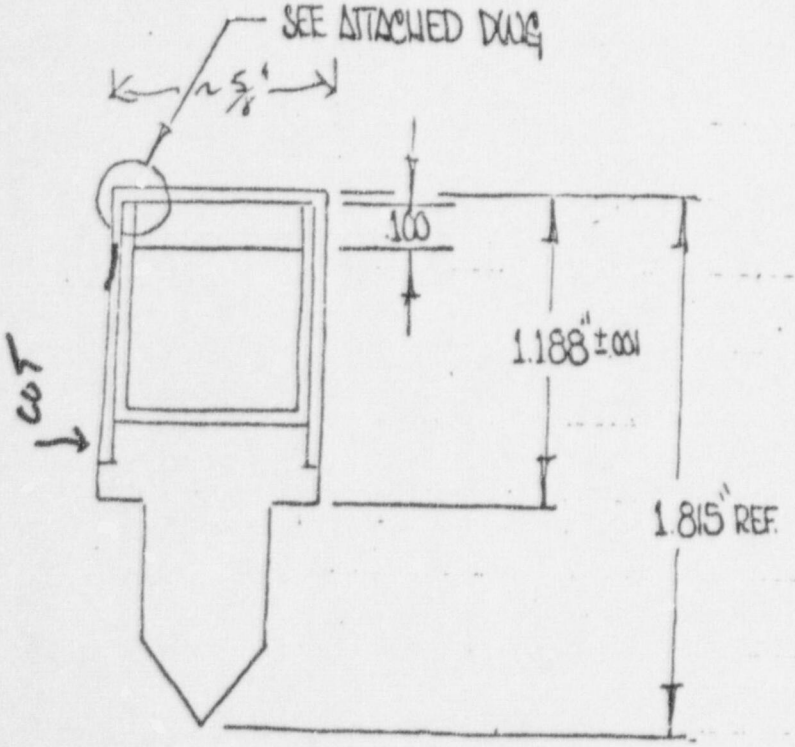
WESTINGHOUSE

ENGINEERING CHANGE REQUEST

DWG 911B786

W-424

~ 45C PO



MAX. OUTPUT 7.5 x 10^7 n/SEC.

LASLETT
12-18

MATERIALS TESTING LABORATORIES

Magnaflux Corporation

9440 E. WASHINGTON BOULEVARD

LOS ANGELES, CALIFORNIA 90022

RADIOGRAPHIC TEST REPORT

CUSTOMER U. S. NUCLEAR DATE 1-12-68 LAB NO. 83548-3-1

P.O. 1184 JOB NO. 83548-3-1

AT Burbank, California MATERIAL SS SPEC. NAVSHIPS 250-1500-1

FILM USED

5X7 28 3½X17

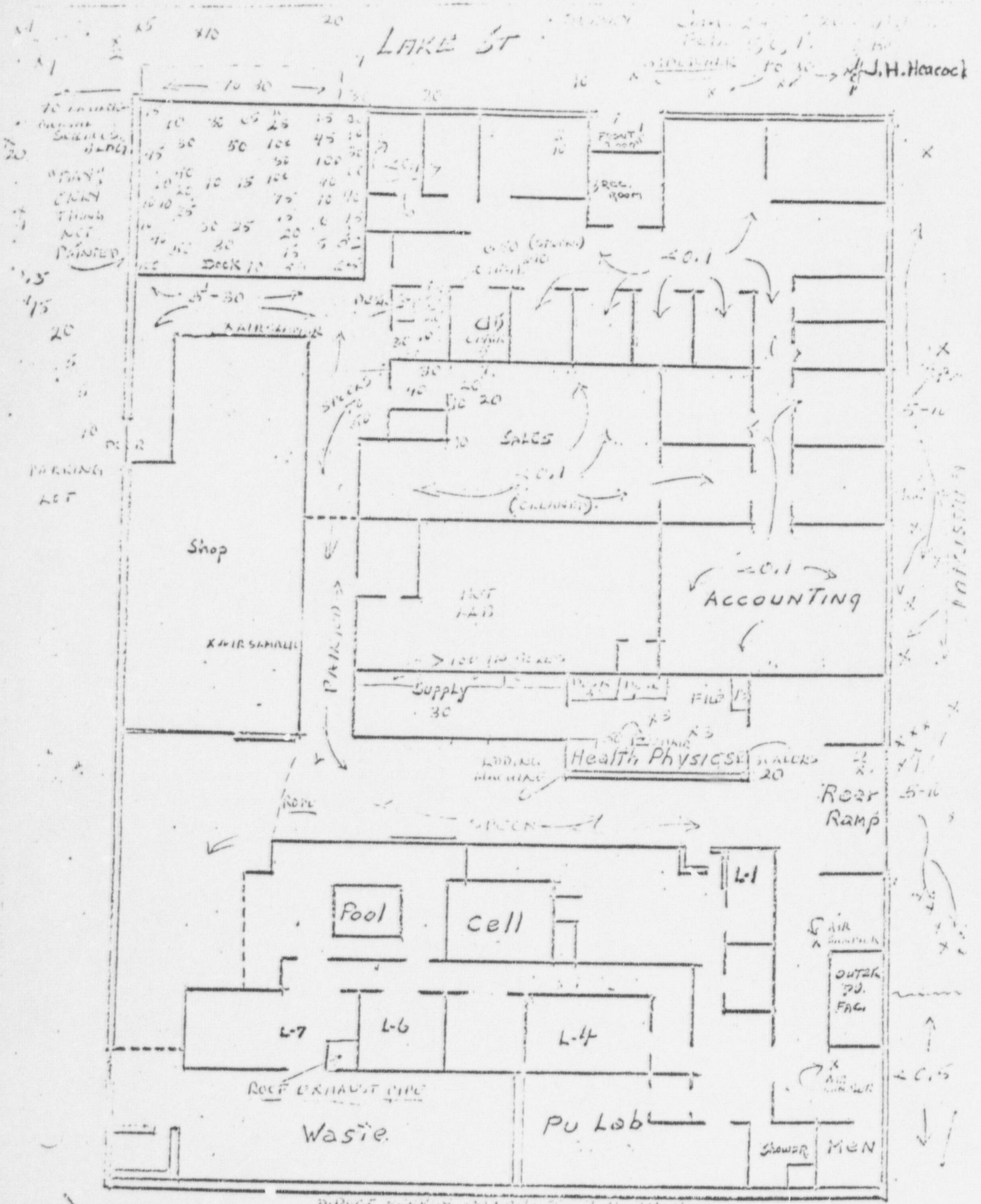
8X10 4½X17

10X12 7X17

14X17 MISC.

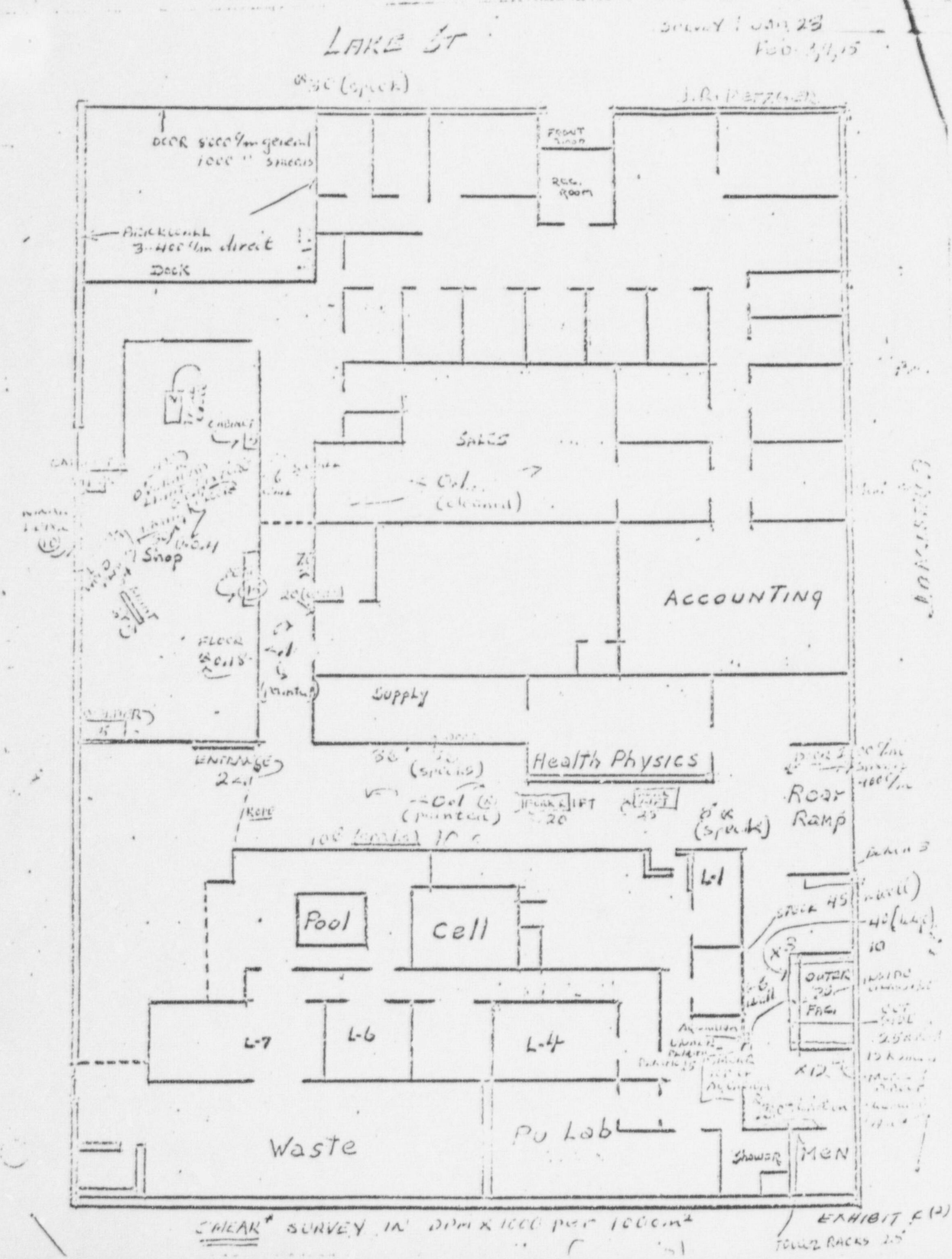
PART NO.	FILM STA. NO.	REPAIR NO.	ACCEPTED	REJECTED	CRACK	INCOMPLETE PEN.	INCOMPLETE FUSION	LINEAR POROSITY	SCATTERED POROSITY	INCLUSION	SLAG	SURFACE	REMARKS
SN-W427	V1		X										
	V1		X										
	V2		X										
	V2		X										
	V3		X										
	V3		X										
SN-W428	V1		X										
	V1		X										
	V2		X										
	V2		X										
	V3		X										
	V3		X										
SN-W429	V1		X										
	V1		X										
	V2		X										
	V2		X										
	V3		X										
	V3		X										
SN-W423	V1		X										
	V1		X										
	V2		X										
	V2		X										
	V3		X										
	V3		X										
SN-W424	V1			X	X								Crack opposite welded end
	V1			X	X								
	V2			X	X								
	V2			X	X								

INSPECTOR



DIRECT SCREEN IN COUNTS PER MINUTE
X 1000 USING EBERLINE ALPHA METER
MODEL PAC-3G

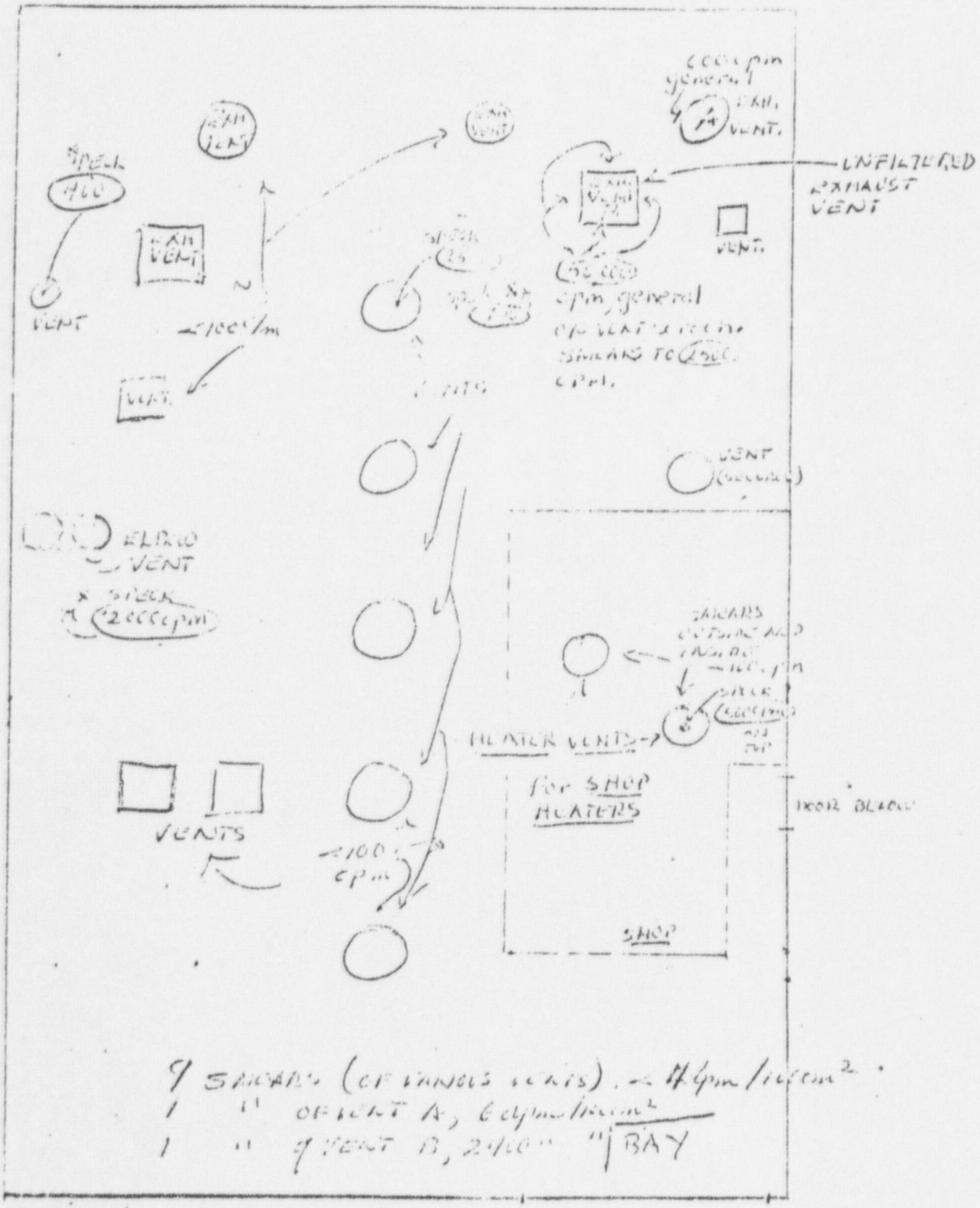
(ANNEX A) EXHIBIT



LAKE ST
Feb
DOCK
SALES
ACCOUNTING
Shop
SUPPLY
Health Physics
ENTRANCE
Roof Ramp
Pool
Cell
L-1
L-7
L-6
L-4
Waste
Pu Lab
Shower
MEN
SMEAR SURVEY IN DPM x 1000 per 100cm²
EXHIBIT F (2)

SURVEY: Jan 25

J. R. Metzger

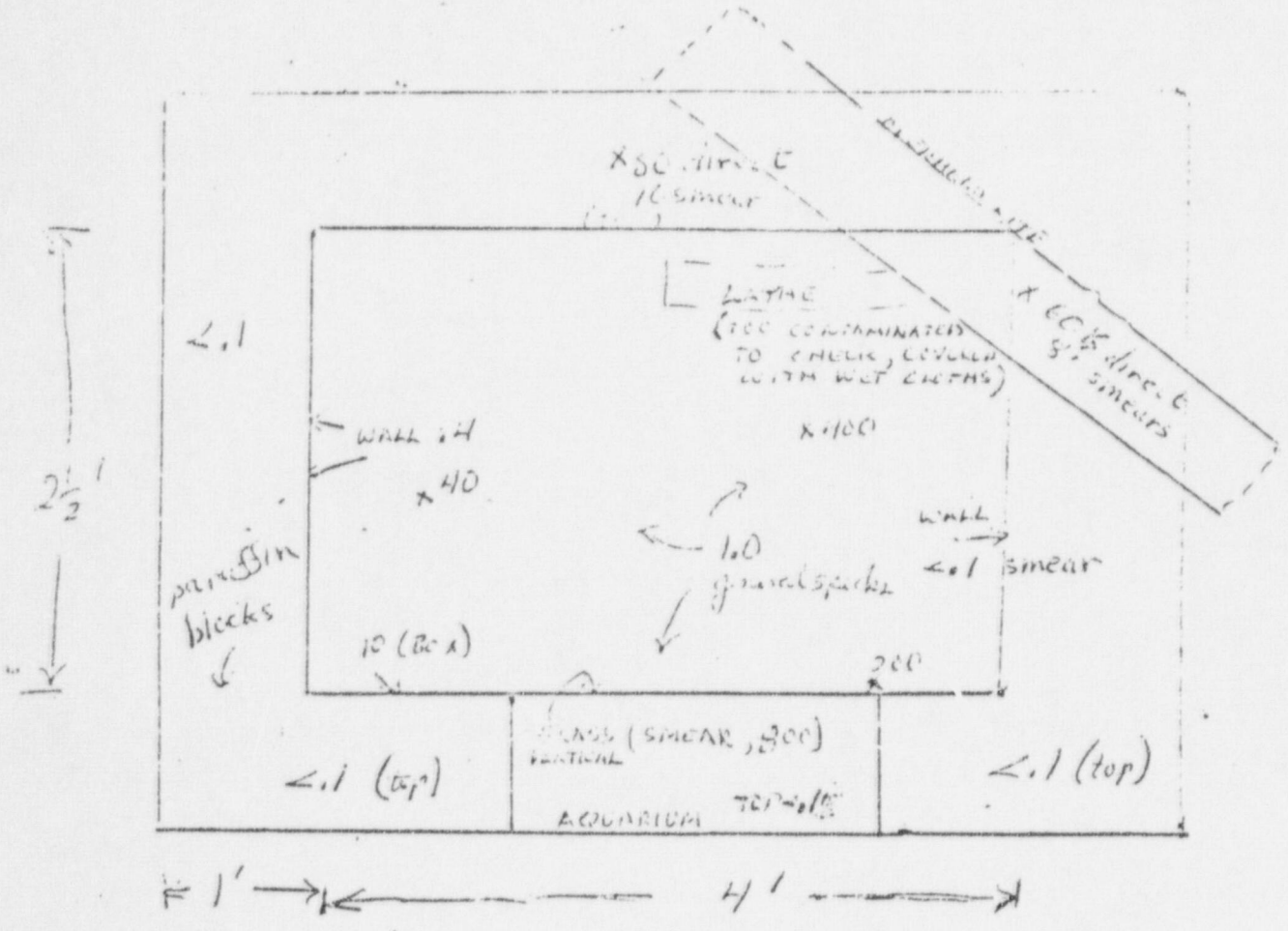


ROOF, SAGARS AND DUCT MEASUREMENT

LAKE STREET (BLOCK C) Exhibit F (3)

SURVEY: [illegible]

J. R. METZNER



TOP VIEW OUTER FACILITY AFTER CLEARING

INSIDE, c/m x1000

(SURVEY MADE FEB 9, 1965)

(ANNEX D) EXHIBIT F (4)

Nuclear Science Division

A Division of International Chemical & Nuclear Corporation
P.O. Box 10901
Pittsburgh, Pennsylvania 15236
Tel: 412-462-4000 XXXXXX

February 16, 1968

RECEIVED
FEB 19 1968

Mr. George Harwood
U. S. Nuclear Corporation
801 North Lake Street
Burbank, California 91503

Dear Mr. Harwood:

The following are the results on the environmental samples submitted to Nuclear Science for analysis by U. S. Nuclear:

Vegetation Samples

NSEC No.	Designation	Gross Alpha μμc/g Ash,	Gross Beta μμc/g Ash
E8-11-70	A	0.0 ± 2.6	88 ± 6
-71	B	0.0 ± 3.6	39 ± 6
-73	D	0.0 ± 3.6	128 ± 9
-74	E	4.5 ± 4.5	110 ± 8
-75	F	0.0 ± 3.6	72 ± 6
-76	G	10.8 ± 5.4	204 ± 10
-77	H	2.7 ± 4.5	126 ± 8

Soil Sample

NSEC No.	Designation	Gross Alpha μμc/g	Gross Beta μμc/g
E8-11-72	C	3.3 ± 0.8	6.9 ± 0.6

The smear sample (NSEC # E8-11-78) dated 1-26-68 contained 280 dpm total alpha. We ran an alpha spectrum on the sample with the following results:

50% of total - Pu-238
27% of total - Po-210 (this figure could include small amount of Pu-238)
23% of total - unidentifiable due to energy degradation.

If you have any questions, please do not hesitate to contact me.

Very truly yours,

Arnold S. Levine
Supervisor of Analytical Services

mll

EXHIBIT G

ANNEX E

Landauer Dosimetry Co.

385 L[illegible] AVENUE, MOUNTAIN VIEW, CALIFORNIA 94042. Phone (415) 967-2837

DOSIMETRY REPORT

MR. DICK COLLINS
U. S. NUCLEAR CORP.
801 N. LAKE STREET
BURBANK, CALIFORNIA
91502

F2028

NO CARBON REQUIRED

TO BE FILLED IN BY CLIENT

REPORT PERIOD FROM	TO	DATE PROCESSED	CONTROL NUMBER
1/18	mthly	2/15/68	6

Film Number (As Printed on Film in Serial Order Only.)	EMPLOYEE NAME	DENSITY N Tracks	Plastic	Cd	Al	O.W.	Pb	EM	MILLIREMS G	X+G	B	N
N 1	[redacted]					.12	.12	3	120	120		0
N 2		22				.12	.12		120	120		100
N 3		25				.12	.12	↓	120	120		110
	Ex 6											
	Results Telephoned											
	2:30 PM 2-15-68 RJ											

EXHIBIT H

ANNEX V

February 21, 1968

[redacted] EX6

Dear [redacted]

Following are the results of the whole body counts taken on 1/25/68 and 2/5/68.

Name	Date	Isotope	Location	Amount	MPD**
[redacted]	1-25-68	Pu	Lung Area	150 to 200 nCi	940 to 1250
	1-25-68	Co-60	Whole Body	160 nCi	1.6
	1-25-68	Cs-137	Whole Body	238 nCi	<1
[redacted] (Re-count)	2-05-68	Pu	Lung Area	170 to 230 nCi	1000 to 1435
	2-05-68	Co-60	Whole Body	72 nCi	<1
	2-05-68	Cs-137	Whole Body	210 nCi	<1

* Detection Limit is 10 nCi
** Maximum permissible burden for location listed

This report is furnished to you under the provisions of the Atomic Energy Commission regulations entitled "Standards for Protection Against Radiation" (10 CFR Part 20). You should preserve this report for future reference.

Very truly yours,

U. S. NUCLEAR CORPORATION

George E. Harwood
General Manager

GEH:dk

EXHIBIT I (1)

February 21, 1968

[redacted]

Dear [redacted]

Following are the results of the whole body counts taken on 1-29-68.

Name	Date	Isotope	Location	Amount	MPB**
[redacted]	1-29-68	Pu	Lung Area	10* to 20 nCi	62 to 125
	1-29-68	Cs-137	Whole Body	581 nCi	1.9

* Detection Limit is 10 nCi
** Maximum permissible burden for location listed

This report is furnished to you under the provisions of the Atomic Energy Commission regulations entitled "Standards for Protection Against Radiation" (10 CFR Part 20). You should preserve this report for future reference.

Very truly yours,

U. S. NUCLEAR CORPORATION

George E. Harwood
General Manager

GEH:dk

EXHIBIT I (a)

February 21, 1968

[redacted]

Dear [redacted]

Following are the results of the whole body counts taken on 1/25/68.

Name	Date	Isotope	Location	Amount	%MPB**
[redacted]	1-25-68	Pu	Lung Area	10 nCi*	62
	1-25-68	Co-60	Whole Body	58 nCi	< 1
	1-25-68	Cs-137	Whole Body	248 nCi	< 1

* Detection Limit is 10 nCi
** Maximum permissible burden for location listed

This report is furnished to you under the provisions of the Atomic Energy Commission regulations entitled "Standards for Protection Against Radiation" (10 CFR Part 20). You should preserve this report for future reference.

Very truly yours,

U. S. NUCLEAR CORPORATION

George E. Harwood
General Manager

CEH:dk

EXHIBIT I (3)

February 21, 1968

[redacted]

Dear [redacted]

Following are the results of the whole body counts taken on 1/29/68.

Name	Date	Isotope	Location	Amount	%MPB**
[redacted]	1-29-68	Pu	Lung Area	< 10 nCi*	< 62
	1-29-68	Cs-137	Whole Body	18 nCi	1

* Detection Limit is 10 nCi
** Maximum permissible burden for location listed

This report is furnished to you under the provisions of the Atomic Energy Commission regulations entitled "Standards for Protection Against Radiation" (10 CFR Part 20). You should preserve this report for future reference.

Very truly yours,

U. S. NUCLEAR CORPORATION

G E Harwood

George E. Harwood
General Manager

GEH:dk

EXHIBIT I (14)