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NRDC Statement

at the

Environmental Protection Agency

Public Hearings

on

Plutonium and the Transuranium Elements

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December 10, 1974

We appreciate the opportunity to participate in these hearings. The nuclear industry's proposal to make plutonium into the principal nuclear reactor fuel in the years ahead has implications for our society that deserve the widest possible public airing. We hope these hearings will contribute to that goal.

Our presentation will be in two parts. Today we will discuss briefly the basic issue of the acceptability of plutonium as a commercial fuel. The key question here is whether the promised benefits of proceeding into what the Atomic Energy Commission (AEC) has called the "plutonium economy" are worth the tremendous risks to the health and safety of the public associated with such a course. We conclude, emphatically, that they are not.

Our presentation tomorrow will include a more detailed treatment of the "hot particle issue" -- the question whether minute, insoluble particles of plutonium have uniquely high cancer-producing potential. We raised this issue before the EPA and the AEC ten months ago when we petitioned that the radiation protection standards applicable to plutonium and other hot particles be tightened by a factor of about 100,000. Since our views on the hot particle issue have been published and available for some time, we hope that at the session tomorrow we can concentrate on responding to questions from the panel and to issues raised in the testimony of other speakers.

I. Introduction and Summary

First with the initiation of plutonium recycle and then with the introduction of the fast breeder reactor, the AEC and the nuclear industry hope to transform plutonium from its current status as a troublesome by-product of the fission process into the principal fuel for future nuclear power plants. If these plans are consummated, the commercial plutonium industry at the turn of the century could involve hundreds of reactors fueled with plutonium, a score of fuel reprocessing and fabricating plants, and perhaps thousands of interstate and international shipments containing hundreds of tons of plutonium.

To appreciate the implications of having one of our most important industries based upon plutonium, certain characteristics of the element must be understood. First, plutonium is one of the most toxic respiratory carcinogens known. Lung burdens on the order of one-millionth of a gram (the weight of a grain of pollen) have been shown capable of producing lung cancer in animals with virtual certainty. And one of the purposes of these hearings is to shed light on whether plutonium is several orders of magnitude more toxic than the AEC believed when it set current radiation exposure standards. Concern is amplified by the fact that plutonium-239, the principal isotope of the element, has a half-life of 24,000 years. Its radioactivity is undiminished within human time scales.

Such considerations led the International Commission on Radiological Protection to conclude that:

> "in terms of amounts available, projected usage, extent of anticipated accidental human exposure, and radiotoxicity, plutonium is the most formidable

radionuclide in the periodic table."[1]

This ICRP statement addresses the toxicity of plutonium. But plutonium's toxicity is only part of the problem; the least of its two evils many would suggest. An amount of plutonium the size of a softball is enough for a nuclear explosive capable of the destruction we witnessed in Nagasaki. Scientists now widely recognize that the design and manufacture of a crude nuclear explosive is no longer a difficult task technically, the only real obstacle being the availability of the plutonium itself. The successful theft of this material by organized crime or terrorists, as Willrich and Taylor note, "could enable a small group to threaten the lives of many people, the social order within a nation, and the security of the international community of nations."[2]

Given the facts about plutonium, the widespread reliance upon it contemplated by the industry and the AEC would give rise to three problems, each of the utmost gravity:

- A major public health problem. As we move into the plutonium economy, exposure of industry employees and members of the public to plutonium will become increasingly widespread. Experiences at existing plutonium facilities provide frightening examples of what the future holds.
- An unprecedented public safety problem. If plutonium is permitted to become a major commercial

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1/ ICRP Publication 19, The Metabolism of Compounds of Plutonium and Other Actinides, Pergamon Press, New York, (1972), p. 1.

2/ Willrich, Mason and Theodore B. Taylor, Nuclear Theft: Risks and Safeguards, a Report to the Energy Policy Project of The Ford Foundation, (Ballinger Publishing Co., Cambridge, Mass., (1974), p. 1.

fuel, current realities are such that plutonium will most likely be stolen, a plutonium black market will most likely appear, illicit nuclear bombs will most likely be made and used both here and abroad.

- An intractable civil liberties problem. The drastic nature of the nuclear terrorists' threat will be used to justify a drastic police response. Extensive intelligence gathering, security surveillance measures will most likely become commonplace since they are among the cheapest and easiest safeguards.

In sum, our judgment is that the proposed use of plutonium as a commercial fuel would give rise to unprecedented social risks and costs. We do not believe that a fully informed public would be willing to accept these risks, certainly not in light of the unconvincing benefits. Plutonium recycle, for example, would reduce light water reactor fuel costs by about 10-15%. But fuel costs represent less than 20% of the costs of nuclear power, and by 1985 nuclear power is expected to account for only about 15% of total domestic energy. In other words, plutonium recycle involves an economic savings of less than one-half of one percent.

In the longer term, the economic incentive to use plutonium may become substantial but only if one assumes a high and sustained reliance upon nuclear fission, a prospect which is increasingly uncertain. Developments in solar, geothermal and fusion energy, in more efficient and clean means of consuming fossil fuels and in energy conservation generally suggest that alternatives to prolonged reliance upon increasingly controversial fission-based power do

exist. A major part of the problem of assuring the timely availability of these alternatives to plutonium is the fact that the AEC's fast breeder reactor development program continues to drain off a major share of federal energy R&D funding. This is a classic case of misplaced priorities.

It is imperative that our society develop the ability to say no to technologies that are too risky and too demanding. We can no longer assume that each new innovation accompanied by major financial backing should be permitted to proceed, even with regulation. Some should simply be halted for the reason that their advantages bear no reasonable relationship to the possibility of tremendous social harm they present. The use of plutonium fuel falls into this category. There is something fundamentally insane about the widespread commercial use of a material which is both fiendishly toxic and capable of being easily fashioned into atomic weapons.

II. Dimensions of the Plutonium Economy

Plutonium is almost unknown in nature: the entire present-day inventory is man-made, produced in nuclear reactors.[3] Most of this inventory has been used to construct nuclear weapons for national defense purposes. Much lesser amounts have been used for civilian reactor research and development.

The fuel currently used in present-day commercial reactors is uranium. Unlike plutonium, this uranium fuel is not extremely toxic, and it is not sufficiently rich in the fissionable isotope uranium-235 to be fashioned into nuclear weapons.[4] While present-day reactors are operating, however, they are also producing as a by-product substantial amounts of plutonium, principally plutonium-239. A typical large reactor produces about 200 to 250 kilograms (400 to 500 pounds) of plutonium each year. Since this plutonium is easily fissioned, it can be used as reactor fuel.

Sometime in the coming year the new Nuclear Regulatory Commission (NRC) will decide whether to authorize "plutonium recycle" -- the use of this plutonium as a fuel in nuclear power plants around the country. The AEC Regulatory staff (which will constitute the NRC staff when it is formed) has recently prepared a draft environmental statement on plutonium recycle.[5] Its view is that "plutonium

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3/ Plutonium occurs in nature but in such small amounts that it does not constitute a practical source of the element. The ratio of the concentrations of plutonium-239 to uranium in ores varies from 4×10^{-13} to 1.5×10^{-11}. Katz, J.J., Chapter IV, The Chemistry of Actinide Elements, Methuen and Co., Ltd., London, (1957), pp. 239-330.

4/ Only with extremely sophisticated technology not available to the public, notably gaseous diffusion or gas centrifuge plants, can uranium be enriched to weapons grade.

5/ DRAFT GESMO: U.S. Atomic Energy Commission, "Draft Generic Environmental Statement Mixed Oxide Fuel (Recycle Plutonium in Light Water-Cooled Reactors)," WASH-1327 (August, 1974).

recycle would result in a small reduction in the already negligible radiological exposure to the general population from the present LWR [light-water reactor] industry," that "plutonium can be adequately safeguarded [from theft] in a plutonium recycle economy,"[6] and therefore that plutonium recycle should be authorized. NRDC has taken strong exception to the Regulatory staff's position in the appended report, "The Plutonium Decision: A Report on the Risks of Plutonium Recycle,"[7] and in NRDC's additional comments on DRAFT GESMO.[8]

The next escalation in the availability of plutonium is projected to come with the introduction of the fast breeder reactor. According to the AEC's schedule the breeder reactor will replace today's reactors after about 1990. The breeder reactor is designed to convert uranium to plutonium faster than the plutonium is consumed as fuel. In other words, the breeder reactor breeds more fuel than it burns.

A nominal size (1000-megawatts) breeder will contain two to four tons of plutonium at any given time. Annually, approximately one-half this amount, one to two tons, will be removed for reprocessing and will be circulated through the fuel cycle. The AEC has proposed that we build between 1987 and 2020 some 2,200,000 megawatts of breeder reactor capacity. Over the lifetimes of these plants, we can project

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6/ AEC Regulatory Staff Response to Questions on Pu Recycle, addressed to Senator Walter F. Mondale, signed by L. Manning Muntzing, Director of Regulation, U.S. Atomic Energy Commission (7 October 1974), p. 1.

7/ Speth, J.G., A.R. Tamplin and T.B. Cochran, "The Plutonium Decision: A Report on the Risks of Plutonium Recycle," Natural Resources Defense Council, Washington, D. C. (September 1974), printed in The Bulletin of the Atomic Scientists, Vol. XXX, No. 9, (November 1974), pp. 15-22.

8/ These comments were submitted to the AEC on October 30, 1974.

a cumulative flow of some 100,000 tons of plutonium through the nuclear fuel cycle. This would correspond to about 10^{17} (100 billion billion) lung cancer doses if the lower risk estimates are correct.[9] One hundred thousand tons of plutonium also corresponds to about 10 million atomic bombs of the size dropped on Nagasaki. We present these numbers not as a procedure for calculating risk, but only to show that the plutonium economy offers a potential for social harm that is truly awesome.

In order to appreciate the significance of the plutonium economy from a somewhat different perspective, we suggest that you consider what the public response would be if our government leaders proposed that we base our energy system on botulin toxin. There can be little doubt that the public would be properly skeptical of an energy strategy centered around using a biological warfare agent as a fuel in thousands of plants, each containing several tons of this material and each generating more of this material than it consumes. Certainly one would hope that we would consider the "botulin breeder" only as a last resort. However, an examination of our present energy strategy demonstrates that with our fast breeder reactor program, we are actively pursuing a course which in relevant respects closely parallels the botulin breeder.

9/ For reference purposes the AEC has estimated that of the plutonium activity released routinely, one can expect that one part in 10^5 to be inhaled into someone's lungs of which 15 to 25 percent would be deposited in the deep respiratory tissue.

III. The Present State of Affairs

Lest it be thought that our concerns are only for the future, we turn now to the present state of affairs with respect to plutonium safeguards and accidental exposures to plutonium.

A. Plutonium Safeguards

In the language of the nuclear industry, the various programs and techniques to prevent nuclear theft and recover stolen nuclear material are called "safeguards." There have been a series of major studies on the adequacy of the present safeguards program within the last year, including the study by Willrich and Taylor for the Ford Foundation Energy Policy Project,[10] the AEC's "Special Safeguards Study" (the Rosenbaum Report),[11] and a series of reports by the General Accounting Office.[12] All of these have concluded that our present safeguards program is totally inadequate. In fact, the most disturbing routine releases from the nuclear power industry are the continuous flows of documents pointing out the inadequacies of our present safeguards program. The AEC's own Rosenbaum Report states:

> "Even though safeguard regulations have just been revised, two factors have appeared in recent months which make necessary a new and fundamental look at the problem.

10/ Willrich and Taylor, op. cit.

11/ Rosenbaum, Dr. David M., et al., Special Safeguards Study, safeguards study made for the Atomic Energy Commission (1974), referred to herein as the "Rosenbaum Report."

12/ U.S. General Accounting Office, Improvements Needed in the Program for the Protection of Special Nuclear Material, Report to the Congress, B-164105 (November 7, 1973); Protecting Special Nuclear Material in Transit: Improvements Made in Existing Problems, Report of the Joint Committee on Atomic Energy, B-164105 (April 12, 1974); and Letter Report on Security Systems at Commercial Nuclear Power Plants, addressed to Dixy Lee Ray, Chairman, USAEC and signed by Henry Eschwege, Director, Resources and Economic Development Division, USGAO, B-164105 (October 16, 1974).

> The first of these is the widespread and increasing dissemination of precise and accurate instructions on how to make a nuclear weapon in your basement. While such information may have always been available in the unclassified literature it was masked by a great deal of irrelevant and incorrect information, also readily available. There is a slow but continuing movement of personnel into and out of the areas of weapons design and manufacturing. These moves are sometimes forced and can create very strong resentments in the people involved. As a result, larger and larger numbers of people with experience in processing special nuclear materials and with varying psychological attitudes are dispersed in the overall industrial community. In addition, the psychological effect on terrorist groups of widespread dissemination of such information should not be overlooked.
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> "The second new factor is the recent start of political kidnappings within the United States. It is our opinion that the kidnapping of Patricia Hearst does not represent an isolated and passing incident, but is rather the precursor of a wave of such incidents. If not firmly and competently met, these kidnappings may lead to a risk of urban terrorist groups in this country of a sort without precedent in our history. These groups are likely to have available to them the sort of technical knowledge needed to use the now widely disseminated instructions for processing fissile materials and for building a nuclear weapon. They are also liable to be able to carry out reasonably sophisticated attacks on installations and transportation. We believe these new factors necessitate an immediate and far reaching change in the way we conduct our safeguards programs."[13]

In "The Plutonium Decision" (appended hereto), we reviewed the steps the AEC suggests might be taken to correct present safeguards inadequacies. We discussed why an "adequate" system of safeguards may be impossible to achieve and why such a system would probably be unacceptable. One of the recommendations of the AEC's Rosenbaum Report gives us a flavor of the type of corrective measures required of an adequate system:

13/ Rosenbaum, Dr. David M., et al., op. cit., pp. 2-3.

"The Need for Better Intelligence"

> "The first and one of the most important lines of defense, against groups which might attempt to illegally acquire special nuclear materials to make a weapon, is timely and in-depth intelligence. Such intelligence may involve electronic and other means of surveillance, but its most important aspect is infiltration of the groups themselves. It is not the AEC's business to conduct this sort of intelligence, but it is the AEC's business to see that those agencies of the United States Government which have intelligence gathering responsibilities including the FBI, CIA, and NSA, focus their attention upon this particular threat to our national defense and security."[14]

This is not the Houston Plan, rather it is part of the "Blueprint for Plutonium Recycle."

In reply to a recent letter from Senators Mondale and Hart questioning the wisdom of a commitment to plutonium recycle at this time, the AEC's Director of Regulations wrote:[15]

> "The AEC safeguards program has as its objective achieving a level of protection against such acts [as unauthorized possession and sabotage of nuclear facilities] to insure against significant increases in the overall risk of death, injury, or property damage to the public from other causes beyond the control of the individual." [emphasis added]

and elsewhere:

> ". . . studies are required to determine the additional specific safeguards measures or combinations thereof that will be required to meet the Commission's safeguard objective. Until these are completed the Commission will not be in a position to judge the exact nature of the measures that should be established to protect plutonium and other special nuclear materials."

In other words, not only are the present safeguards inadequate, the AEC staff has not even developed an adequate program on paper.

Moreover, the nuclear industry is not even complying with the currently inadequate safeguards regulations. On October 31, 1974,

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14/ Ibid.

15/ Letter of Regulatory Staff Response to Questions on Pu Recycle, op. cit.

the AEC announced it was fining the General Electric Company (plants at Vallecitos, California) and Nuclear Fuel Services (West Valley facility) $12,500 and $4,000, respectively, for safeguards violations involving failure to have required intrusion monitoring and alarm systems and physical barriers to protect against industrial sabotage.[16]

B. Plutonium Exposure

Occupational as well as public exposure to plutonium has already become commonplace. Robert Gillette, in the first of a three part series in Science, describes the present state of the industry:

> "Increasingly, and with a frequency that seems disproportionately high, incidents of plutonium inhalation are being recorded from a small group of privately owned and operated facilities engaged not in weapons work but in reclaiming plutonium from reactor fuel and recycling it in new reactor fuel. . . .
>
> "The record reveals a dismal repetition of leaks in glove boxes; of inoperative radiation monitors; of employees who failed to follow instructions; of managers accused by the AEC of ineptness and failing to provide safety supervision or training to employees; of numerous violations of federal regulations and license requirements; of plutonium spills tracked through corridors, and, in half a dozen cases, beyond plant boundaries to automobiles, homes, at least one restaurant, and in one instance to a country sheriff's office in New York."[17]

In recent months in two separate incidences production workers have come to Washington to complain to AEC officials about the health and safety practices at the fuel fabrication facilities where they worked. These workers were accompanied by officials of their union, the Oil, Chemical and Atomic Workers (OCAW). The first case involved a meeting on August 13, 1974, with workers from

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16/ AEC News Releases, November 6, 1974, p. 2.

17/ Gillette, Robert, Science 185 (20 September 1974), pp. 1030-1031.

the Nuclear Fuel Services' (NFS) Erwin, Tennessee facility;[18] the second meeting on September 27, 1974, involved employees of Kerr-McGee's Cimarron Facility near Crescent, Oklahoma.

The employees from the NFS-Erwin facility had five areas of specific concern, the following three of which were verified by subsequent AEC inspections.[19]

- The company has failed to reduce exposures to meet the "as low as practicable" (ALAP) requirement expressed in the AEC regulations.
- The company has failed to provide adequate radiation surveys.
- The company has failed to perform adequate biological monitoring, i.e., determination of uptake of radioactive materials by workers.

18/ This facility is presently fabricating enriched uranium fuel rods and has not fabricated any plutonium fuel in the past 18 months. However, the allegations and subsequent violations cited by the AEC involved practices occurring both during and prior to the last 18 months.

19/ Internal memorandum to N.C. Moseley, Director, Region II from John G. Davis, Deputy Director for Field Operations, "Allegations Against NFS, Erwin -- Meeting with OCAW Representatives," with attached Note to Files, "Nuclear Fuel Services, Erwin, Tennessee, License No. 70-143 -- Meeting with Representatives of the Oil, Chemical, and Atomic Workers International Union," dated August 29, 1974.

Letter to Mr. William Manser, Jr., Plant Manager, Erwin, Tennessee from N.C. Moseley, Director, Directorate of Regulatory Operations, U.S. AEC [RO:II:FJL 70-143/74-01] dated October 11, 1974.

Letter to Mr. William Manser from N.C. Moseley, U.S. AEC [RO:II:FJL 70-143/74-01] dated October 18, 1974.

Two allegations of willfulness were not verified but are still indispute. These include: â) The company has failed to permit OCAW representatives to accompany AEC inspectors as required by 10 CFR 19; and b) The company has failed to notify workers of overexposures as required by AEC regulations.

The following is a sample of the information presented in support of the employee concerns cited above:

Failure of the company to meet ALAP.

° Lunchrooms. The company provides two lunchrooms. Workers are permitted to enter the lunchroom after washing hands and donning shoe covers over shoes worn in the production area. The clothing worn in the production area is worn in the lunchroom. A monitor is provided for use by the workers. The sink provided for washing hands also is used to wash parts from vending machines. Workers state that these parts have shown contamination. One of the lunchrooms is immediately adjacent to a production area. A taped closed door serves as a wall. The workers contend that radiation, i.e., radioactive material, enters the lunchroom as evidenced by contamination on food dispensing machines. The workers state that up to 40,000 dpm have been measured on a beverage vending machine. In excess of 20,000 dpm were measured inside the machine. Several vending machines were removed from service and replaced because of contamination. The current location of the machines was not known.

Failure to provide adequate radiation surveys.

° With regard to surveys for removable contamination, there are no instructions on how this is to be done and no established frequency for surveys.

- Previously, there had been routine surveys of workers by health physics technicians. Those no longer are performed.

A complete summary of the NFS-Erwin allegations is contained in an AEC "Note to Files," dated August 29, 1974,[20] which is appended to our testimony. After investigating these allegations, the AEC cited NFS for two licensing violations which required immediate action and subsequently cited NFS for five licensing violations.[21] The letters reflecting these citations are also appended here.

The employees from the Kerr-McGee Cimarron facility alleged among other things that:

- Employees were not educated as to the hazards of plutonium. One employee, Karen Silkwood, related that she had worked at the facility one and one-half years before learning that pltuonium exposure could cause cancer. She also said that she never received a respirator that fit her face which was narrow, although the company had promised to order her a respirator that fit over a year earlier.
- Employees coming on board were often sent directly to production work before receiving classroom health

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20/ Internal memorandum to N.C. Moseley, Director, Region II from John G. Davis, Deputy Director for Field Operations, "Allegations Against NFS, Erwin -- Meeting with OCAW Representatives," with attached Note to Files, "Nuclear Fuel Services, Erwin, Tennessee, License No. 70-143 --"Meeting with Representatives of the Oil, Chemical, and Atomic Workers International Union," dated August 29, 1974.

21/ Letter to Mr. William Manser, Jr., Plant Manager, Erwin, Tennessee, from N.C. Moseley, Director, Directorate of Regulatory Operations, U. S. AEC [RO:II:FJL 70-143/74-01] dated October 11, 1974. Letter to Mr. William Manser, Jr., Plant Manager, Erwin, Tennessee from N.C. Moseley, Director, Directorate of Regulatory Operations, fr U.S. AEC [RO:II:FJL 70-143/74-01] dated October 18, 1974, Enclosure 1.

and safety training. One worker, unaware of the hazards of plutonium exposure, was purportedly badly contaminated, and quit work the next day before he received any health and safety training.

- o Production workers have been required to wear respirators for an entire week due to high activity air concentration levels (above MPC) in the production area, the emphasis being on meeting production schedules as opposed to locating the source of contamination.
- o Plutonium was stored in unapproved areas (e.g., desk drawers).
- o There was no routine procedure for changing filters on respirators.

These are but some of the allegations still being investigated by the AEC, and as of this date the AEC has not issued a report or cited the company for licensing violations pertaining to these allegations.

On November 7, 1974, some five weeks after meeting with the AEC officials, Karen Silkwood, upon reporting to work at the Kerr-McGee facility, was found to be externally contaminated with plutonium. Plutonium alpha contamination levels up to several thousand disintegrations per minute were found on her clothing and body.[22] Subsequently, her roommate, also a Kerr-McGee employee, and their apartment were found to be contaminated. Isolated areas

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22/ Directorate of Regulatory Operations Notification of an Incident or Occurrence, at Facility: Kerr-McGee Nuclear Corporation - Crescent, Oklahoma Cimarron Plutonium Facility, License No. SNM-1174 Docket No. 70-1193, dated 11/11/74, No. 134.

of contamination ranging up to a few hundred thousand disintegrations per minute were found in the kitchen, bathroom and bedroom areas.[23] Less than two weeks later Ms. Silkwood was killed in an automobile accident on the way to a meeting with a union official and a New York Times reporter to provide background information in support of an allegation that the facility was manufacturing faulty plutonium fuel rods and falsifying quality assurance inspection reports. There have been several as yet unsubstantiated allegations pertaining to this incident, including that her death was the result of foul play,[24] and that she smuggled plutonium from the plant and deliberately contaminated herself.[25] The entire bizarre incident related to her exposure and death is still under investigation. It is known from fecal and urine samples taken when she was alive, and an autopsy after her death, that Ms. Silkwood ingested a very large amount of plutonium.

There have been several recent cases where members of the public have inadvertently been exposed to plutonium. Moreover, it is well known that the area east of the Rocky Flats plant in Colorado is contaminated with plutonium. Recently the Environmental Protection Agency indicated that cattle grazing in this area show

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23/ Ibid.

24/ The New York Times, November 19, 1974 and November 20, 1974.

25/ The Washington Post, December 8, 1974, p. A3. This same report stated: "Kerr-McGee sources say their internal investigation has determined that a fuel rod inspection report was falsified at least 20 times over the summer months by William Scott Dotter, a former employee. That prompted a search by Kerr-McGee and Westinghouse Corp., the contractor, for the affected rods, either in Oklahoma or at Richland.

"Dotter says he did nothing deliberately, although he may have included erroneous information in reports because he does not feel he was adequately trained for the job."

a high degree of plutonium in their lung.[26] The implication of this for humans in the area is obvious. These recent events follow a history of serious public exposure and offsite contamination, including but not limited to the exposure of Edward Gleason, a stevedore in a trucking terminal,[27] the fire and explosion at Gulf-United's plutonium facility in Pawling, New York,[28] the burnup of a SNAP reactor over the Indian Ocean, plutonium found at the bottom of the Erie Canal next to Mound Laboratory, and surface contamination near Palomares, Spain and Thule, Greenland resulting from the non-nuclear detonation of strategic weapons.

Aside from highlighting the deplorable state of affairs presently existing in the fledgling plutonium industry, these most recent plutonium exposures are evidence of the need to take urgent action to insure that the present radiation standards applicable to plutonium exposure are adequate. This brings us to the final chapter of our presentation -- the adequacy of the present plutonium exposure standards.

26/ The Washington Post, December 6, 1974, p. 3.

27/ Tamplin, A.R. and T.B. Cochran, "Radiation Standards for Hot Particles," op. cit., Appendix B.

28/ Gulf United Nuclear Fuels Corporation, "Report of Incident at Gulf United's Plutonium Facility at Pawling, New York," Elmsford, New York (January 19, 1973).

Hot Particle Petition

Beginning in 1969, the existing radiation exposure standards came under strong public criticism. As a consequence, an Advisory Committee on the Biological Effects of Ionizing Radiation (the BEIR Committee) of the National Academy of Sciences was convened to review the biological data on the effects of radiation as they relate to the exposure standards. In November, 1972, three years after the debate began, the committee issued its report and stated the existing standards were unnecessarily high.[29] It is now two years later and the EPA has not reduced these standards. While they may have seriously considered this matter, and perhaps even performed some additional studies, nevertheless the same discredited exposure standards are in the Code of Federal Regulations.

It was ten months ago that NRDC petitioned the EPA and AEC relative to the plutonium standards. Just recently EPA asked the BEIR Committee of the NAS to study the question. If history repeats itself, five years from now EPA will have done nothing about the plutonium standards.

In the meanwhile, nuclear industry employees and members of the public are being exposed to plutonium, many at or above the standards we have urged. We would hope that one of the strong recommendations of this panel is to tell EPA that it is time to take the steps that are required. EPA has a strong ethical and legal obligation to take action without delay on the hot particle issue. Given the immediacy

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29/ NAS-NRC, "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation," (BEIR Report), NAS-NRC, Washington, D.C., November, 1972.

of the problem, the lapse of 10 months between the filing of our petition and the initiation of these hearings and the National Academy of Sciences review is simply deplorable.

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

August 29, 1974

N. C. Moseley, Director, Region II

ALLEGATIONS AGAINST NFS, ERWIN - MEETING WITH OCAW REPRESENTATIVES

Please note the attached information concerning items of concern expressed by OCAW representatives at a meeting in Headquarters on August 13. We believe these matters to be of priority concern. Please note that the allegations include two allegations of willfulness. Note also, that OCAW has specifically requested that an order be issued directing the licensee to perform whole body counting of workers.

In your investigation of this matter, please determine, specifically, the correctness of each allegation. In developing the specifics of the allegations you should contact the alleger - OCAW representatives in Erwin.

OCAW has requested to be allowed to be present at the management interview following this investigation. We will inform you of the position to be taken by you.

The brief history of NFS compiled by the OCAW attorney and the existing conditions at the plant (if as alleged) raise rational questions about the effectiveness of our enforcement actions against NFS, Erwin. Please comment on this.

I will appreciate from you, your estimated date for submittal of your report.

If you desire to discuss this, please contact me.

John G. Davis, Deputy Director
for Field Operations

Enclosure:
Note to Files dtd 8/29/74

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

August 29, 1974

Note to Files

NUCLEAR FUEL SERVICES, ERWIN, TENNESSEE, LICENSE NO. 70-143 - MEETING WITH REPRESENTATIVES OF THE OIL, CHEMICAL, AND ATOMIC WORKERS INTERNATIONAL UNION

In response to a telephone call from Steven Wodka, Legislative Assistant, Citizenship - Legislative Department, OCAW, a meeting was held on August 13, 1974, with representatives of the OCAW to discuss working conditions relative to radiation exposure at the NFS, Erwin facility. Attendees at this meeting are shown on Enclosure 1.

Wodka generally was the spokesman for the OCAW, although there was active - and, at times, emotional - participation by many of the OCAW contingent.

Wodka opened his presentation by remarking:

1. The OCAW was highly concerned with worker exposure at fuel cycle plants - both those unionized and those not unionized - and will devote effort to see that the exposures are reduced.

2. He had reviewed the file on NFS, Erwin, in the Public Document Room and had noted many instances of worker overexposures reported over the years.

3. His review of the file was incomplete since he had been unable to locate the basic license in the PDR and, consequently, could not accurately determine the requirements placed on the licensee.

4. The OCAW had, over the years, made several complaints on activities at NFS, Erwin to the AEC and, although the AEC looked into the complaints, OCAW was not satisfied that working conditions at NFS, Erwin had improved. Because of this, the OCAW concern was being elevated to OCAW International Headquarters level.

With regard to the specific situation at NFS, Erwin, Wodka stated the OCAW had five areas of specific concern:

1. The company has failed to reduce exposures to meet the "as low as practicable" requirement expressed in the AEC regulations.

2. The company has failed to permit OCAW representatives to accompany AEC inspectors as required by 10 CFR 19.

3. The company has failed to notify workers of overexposures as required by AEC regulations.

4. The company has failed to provide adequate monitoring.

5. The company has failed to perform adequate biological monitoring, i.e., determination of uptake of radioactive materials by workers.

The approximately two and a half hour meeting consisted of providing details supporting the five areas of concern. In the discussion, OCAW representatives specifically alleged that the licensee willfully failed to comply with requirements in two of these areas of concern:

1. Failure to permit worker representatives to accompany AEC inspectors.

2. Failure to notify individuals of exposures.

In addition, the OCAW specifically requested, due to continuing significant differences in bioassay and whole body counting results, that the AEC immediately order NFS, Erwin, to whole body count all workers for plutonium, thorium, uranium 235 and uranium 233.

The following is an account of the substance of the information and remarks presented by OCAW in support of the five areas of concern:

1. Failure of the company to meet ALAP.

a. Lunchrooms. The company provides two lunchrooms. Workers are permitted to enter the lunchroom after washing hands and donning shoe covers over shoes worn in the production area. The clothing worn in the production area is worn in the lunchroom. A monitor is provided for use by the workers. (The sink provided for washing hands also is used to wash parts from the vending machines.) Workers state that these parts have shown contamination.

One of the lunchrooms is immediately adjacent to a production area. A taped closed door serves as a wall. The workers contend that radiation, i.e., radioactive material, enters the lunchroom as evidenced by contamination on food dispensing machines. The workers state that up to 40,000 dpm have been measured on a beverage vending machine. In excess of 20,000 dpm were measured inside the machine. Several vending machines were removed from service and replaced because of contamination. The current location of the machines was not known.

The workers state that the smearable contamination limit is 500 dpm on eating table services. The only action required by the licensee is to decontaminate to below 500 dpm alpha. The opinion was expressed forcefully by Cochran, the health physics consultant, that he could not relate a 500 dpm limit, at a plant authorized to possess plutonium, with ALAP.

The OCAW representatives strongly expressed the opinion that the location of the lunchroom in proximity to the work area contributed in exposures to individuals that violated ALAP. This is evidenced by contamination detected in the lunchroom.

b. Exposures of people. Wodka stated that his review of the docket in the PDR showed, since 1969, there had been reported over-exposures of 53 individuals. In addition, whole body counting currently shows six individuals where the measurements indicate the uptakes are increasing although the licensee is supposed to have removed those workers from radiation work. Wodka stated, also, that the information on exposures in the PDR is very difficult to relate to specific exposures to individuals. These repeated instances of exposures show, according to OCAW, failure to meet ALAP.

c. Contamination. The company, according to OCAW, has shifted from a practice of some years ago of removing contamination to a practice of fixing - by paint - contamination. Fixed contamination on floor surfaces reading up to 500,000 dpm exist. In addition, shipments are made within containers showing 100,000 dpm fixed contamination.

d. Respiratory protection. Rather than provide confinement, respirators are routinely worn on some jobs to prevent over-exposure. OCAW alleged no program of control of the respirators. There is no program for changes of filtering elements or monitoring of the respirators. Training in the use of respirators is not formalized. The washing machine used for washing the respirators shows 20,000 dpm on the inside.

e. Confinement. OCAW alleges that there is general work area contamination in excess of that which would result from good practice. In general, the scrap recovery building has areas capable of confinement - and it would be practicable to do so - which are not now confined. In the plutonium line, bags leak.

f. Air effluents. Previously, the company monitored for particles on the roof. This no longer is done. Process areas operate with open building doors and with fans drawing air from the process work areas (not process lines) directly outside without filtering.

Stack sampling on the 302 and 303 buildings previously was performed daily, it now is performed weekly. A recently installed stack for process line air discharge is not sampled. It is filtered.

2. Failure to permit OCAW representative to accompany on AEC inspections.

After 10 CFR 19 became effective, OCAW alleges that in 1973 and 1974, two AEC inspections were conducted and Union representatives were denied, by the company, the right to accompany AEC inspectors. OCAW alleges that the company was fully aware of the 10 CFR 19 requirements - although the local OCAW representatives were not - and willfully denied OCAW representatives accompaniment rights. The OCAW is particularly disturbed regarding this since a local wildcat strike occurred which included this issue. OCAW states that it is the workers representative; has been so designated and recognized; and the company clearly understands the long standing desire on the part of the workers to be represented on AEC inspections; and that the local president is this workers representative.

OCAW requested that their representative be allowed to attend the management interview following the inspection as well as accompany during the performance of the inspection.

3. Failure to notify workers of exposures.

OCAW alleged that NFS, Erwin does not notify workers of exposures as required. For example, Franklin Tifton was exposed on August 23, 1973, and was only told the week of August 4, 1974, of the exposure. The notification was verbal. The company states that in the case of Gerald Webb, his exposure records have been lost. There are cases where there have been no notification. Where notification does occur, it may be as long as three to five months after the exposure. OCAW contends that this failure to notify employees of exposures is a willful act on the part of the licensee. OCAW alleges that this failure to notify applies to both notification of exposures in excess of limits and routine exposures.

4. Failure to provide adequate monitoring.

   a. At one time, the company used trained health physics technicians to provide adequate monitoring of work areas. More recently, the company has moved into the practice of "self-monitoring". OCAW contends that this practice does not provide adequately trained personnel to evaluate exposures.

   b. OCAW contends that monitoring equipment is not adequately maintained.

   c. Work station air samplers are not located as to accurately measure the exposure of workers. Also, results of room air samples are averaged. Because of locations, this averaging produces results lower than the concentration level to which workers actually are exposed.

   d. The volumes used for calculations of air concentrations are not correct. Sample buildup severely changes the air flow through the filtering medium. Consequently, the reduced volume makes the concentration calculations erroneous in a non-conservative manner.

   e. Air samples, in some cases, are not changed for a period up to 48 hours. This permits excessive buildup on the sampling medium and renders inaccurate the results. Also, samplers are permitted to run the entire weekend without changing of samples. The long cycle of samples would permit small time periods of high concentrations without detection.

   f. With regard to surveys for removable contamination, there are no instructions on how this is to be done and no established frequency for surveys.

   g. Previously, there had been routine surveys of workers by health physics technicians. Those no longer are performed.

   h. When a criticality alarm sounds and evacuation occurs, there is no monitoring within the work areas prior to reentry to assure that actual criticality did not occur. On at least one occasion, workers have been ordered to reenter the plant with the alarm sounding. Difficulty had been experienced in resetting the alarm. Under this circumstance, if criticality had occurred, there would have been no alarm associated with the criticality event.

5. Failure to provide adequate biological monitoring.

   a. OCAW expressed concern on the present method of urine sample collection - collected at employee's home and first collection on second day after exposure. The OCAW was concerned on lack of discipline in the method and about 10% of those who have been selected for sampling do not actually submit the samples.

   b. OCAW was concerned that cases exist where urinalysis does not show uptakes while a whole body count of the same individual does show an uptake. OCAW believes that the reliability of the NFS, Erwin urinalysis is doubtful. This lack of confidence is reinforced by the company practice of denying OCAW members assignment to perform, or assist in performing, analyses. OCAW contends that worker representatives should assist in the analysis or the samples should go to a disinterested outside supplier.

   c. OCAW is concerned, due to the differences in results, in the small number of employees whole body counted. Also, due to those differences in results, OCAW requests the AEC to order whole body counting for plutonium, thorium, uranium 235 and uranium 233 for all workers.

   d. Nasal smears, which formerly were taken ~~routinely~~, no longer are taken.

Other specific matters, outside the five areas of concern, discussed by OCAW representatives are:

1. NFS, Erwin apparently is aware of each AEC inspection and devotes considerable effort to preparing for each inspection. The AEC does not have the opportunity to inspect typical activities due to those preparation efforts.

2. Previously, during criticality alarm test evacuations, the employees evacuated through gates to areas distant from the plant. Now, they are not permitted to exit through those emergency gates. NFS, Erwin attributes this change to new AEC security regulations.

3. Employees use "Oven-off", an oven cleaner, as a means of removing contamination from their hands. The company supplies the "Oven-off" and has not objected to its use.

4. OCAW believes there is a beryllium hazard associated with a portion of work at NFS, Erwin. OCAW is unsure of the interface between AEC and OSHA on this matter.

The OCAW representatives do not desire to have their identifies protected. They have no objection to these comments and allegations being specifically identified to NFS, Erwin as to source.

On August 27, this summary information was discussed by telephone with Mr. Wodka. He confirmed the substance expressed the OCAW concerns.

John G. Davis

Enclosure:
As Stated

Enclosure 1

Meeting with Oil, Chemical and Atomic Workers International Union

Attendees, August 13, 1974

Atomic Energy Commission
Directorate of Regulatory Operations

J. G. Davis, Deputy Director for Field Operations
G. C. Gower, Regional Coordinator
G. H. Smith, Regional Coordinator
P. R. Guinn, Radiation Specialist, Region II
G. P. Coryell, Fuel Facilities Inspector, Region II

Oil, Chemical and Atomic Workers International Union

S. Wodka, OCAW - Legal Department
T. Mazzocchi, OCAW (Rep., Int'l Pres.)
E. D. Swisher, Int'l V.P., OCAW-AFL-CIO
H. A. Adkinson, OCAW, Int'l. Rep.
T. Harris, OCAW, V.P. Local 3677, Erwin
J. Williams, OCAW Representative
E. Gesmer, OCAW
R. Lewis, NFS - Health Physics Technician
D. Masters, NFS - Operator
L. Tolley, NFS, Operator
T. B. Cochran, OCAW - Health Physics Consultant

UNITED STATES
ATOMIC ENERGY COMMISSION
DIRECTORATE OF REGULATORY OPERATIONS
REGION II - SUITE 818
230 PEACHTREE STREET, NORTHWEST
ATLANTA, GEORGIA 30303

TELEPHONE: (404) 526-4503

In Reply Refer To:
RO:II:FJL
70-143/74-01

OCT 11 1974

Nuclear Fuel Services, Inc.
ATTN: Mr. William Manser, Jr.
Plant Manager
Erwin, Tennessee 37650

Gentlemen:

This letter refers to the investigation conducted at your facility regarding alleged excessive contamination and unsafe working conditions. Two of the items substantiated by our inspectors are of more immediate concern to us.

The two items which are in violation of conditions of your license and which involve failure to meet the "As Low As Practical" criteria are:

1. Lunchroom Contamination:

   - Lunchrooms continue to be contaminated in excess of limits established in Section 3.3.5 of the "Contamination Survey Program" procedures.

2. High Enriched Scrap Recovery Building

   The high enriched scrap recovery building continues to be contaminated in excess of the limits established in Section 3.3.5 of the "Contamination Survey Program" procedures.

Based on a telephone conversation between Mr. Long and Mr. Coryell of this office, and Mr. Manser on October 9, 1974, it is our understanding that immediate action is being taken to assure that contamination levels in the two areas of immediate concern are reduced and maintained at levels compatible with AEC requirements. Specifically, we understand that in addition to corrective actions already taken you will:

1. Institute rigorous enforcement of the self-monitoring procedure for personnel entering the lunchroom.

2. Require that all personnel working in known or suspected contamination areas wear smocks over work clothes when in the lunchroom.

3. Increase the frequency of surveys in the high enriched scrap recovery building to assure prompt detection of contamination.

4. Perform immediate cleanup of contaminated areas.

5. Take high volume air samples during cleanup or when airborne contamination is suspected.

6. Require use of masks as a precautionary measure during periods of known or suspected airborne contamination.

7. Shutdown building operations if contamination levels remain above limits for prolonged periods.

8. Revise operating procedures to require use of protective covering around contaminated equipment or product containers prior to handling in open areas.

9. Expedite procurement of material and installation of planned engineering changes to improve containment and building ventilation.

If the above stated understandings are contrary to your actions regarding the two items, we should be informed promptly in writing. You may expect to hear further from us regarding the enforcement aspects of this matter. In addition, other matters identified to you previously regarding the investigation findings will be communicated to you by separate correspondence.

Very truly yours,

N. C. Moseley
Director

UNITED STATES
ATOMIC ENERGY COMMISSION
DIRECTORATE OF REGULATORY OPERATIONS
REGION II - SUITE 818
230 PEACHTREE STREET, NORTHWEST
ATLANTA, GEORGIA 30303
TELEPHONE [illegible]

In Reply Refer To:
RO:II:FJL
70-143/74-01

OCT 18 1974

Nuclear Fuel Services, Inc.
ATTN: Mr. William Manser, Jr.
Plant Manager
Erwin, Tennessee 37650

Gentlemen:

This refers to the investigation conducted by Messrs. G. P. Coryell, J. H. Kahle, and P. R. Guinn of this office on September 17-20 and September 24-26, 1974, of activities authorized by AEC License No. SNM-124, for the NFS, Erwin facility, and to the discussion of our findings held by Messrs. Long, Coryell, Kahle and Guinn with Messrs. Manser, Idecker and Michel subsequent to the investigation on October 7, 1974.

Areas examined during the investigation included allegations of excessive radioactive contamination and unsafe working conditions. Within these areas, the investigation consisted of selective examination of procedures and representative records, interviews with personnel, and observations by the inspectors.

During the investigation, it was found that certain activities under your license appear to be in violation of AEC requirements. The violations and references to pertinent requirements are listed in Enclosure 1 of this letter.

This notice is sent to you pursuant to the provisions of Section 2.201 of the AEC's "Rules of Practice", Part 2, Title 10, Code of Federal Regulations. Section 2.201 requires you to submit to this office, within 20 days of your receipt of this notice, a written statement or explanation in reply including: (1) corrective steps which have been taken by you and the results achieved; (2) corrective steps which will be taken to avoid further violations; and (3) the date when full compliance will be achieved.

One item which remained unresolved at the conclusion of the investigation has been referred to Regulatory Operations Headquarters for further evaluation. The item is discussed in Enclosure 2 to this letter. We will inform you of the results of this evaluation when available.

If you have any question concerning this letter, we will be glad to discuss them with you.

Very truly yours,

N. C. Moseley
Director

Enclosures:
as stated

Enclosure (1)

RO Investigation Report No. 70-143/74-01

OCT 18 1974

NOTICE OF VIOLATIONS

Certain activities under your license appear to be in noncompliance with AEC and license requirements as indicated below.

The following violations are considered to be of Severity Category II:

1. 10 CFR 20.201(b) requires licensees to conduct such surveys as necessary to comply with the Regulations. NFS has chosen to employ urinalysis as a means of compliance with this requirement.

   Contrary to the above, the evaluation of urinalysis results was not adequate to determine compliance with 10 CFR 20.103.

2. License Condition No. 8 incorporating the license application dated June 3, 1963, Section 3.3.5 of procedures entitled "Contamination Survey Program," states in part, "....that smearable contamination less than 500 d/m is considered acceptable in certain areas."

   Contrary to the above, lunch room contamination surveys during the period July through September 1974, including surveys made in the presence of the AEC inspector, revealed contamination levels which exceeded the specified limit. Levels up to 4000 d/m were detected.

3. License condition No. 8 incorporating the license application dated June 3, 1963, Section 3.3.5 of procedures entitled "Contamination Survey Program" states in part, that "....in plant processing areas, smearable contamination to 5000 d/m is considered acceptable."

   Contrary to the above, contamination in the Building 233 processing area has exceeded the specified limit on a continuing basis during the period July through September 1974. Levels up to 30,000 d/m were detected.

4. License Condition No. 8 incorporating license application dated June 3, 1963, Section 3.3.2, "Respiratory Protection," requires in part, that "....employees wash their respirators at the end of each shift and that filters on the respirators be changed once each week or more frequently as determined by the Health and Safety Department."

   Contrary to the above, there was no evidence that respirators were cleaned daily and that respirator filters were changed once each week, prior to initiation of a revised mask and respirator protection program in August 1974.

5. License Condition No. 8 incorporating license application dated June 3, 1963, Section 3.0, "Health and Safety," paragraph 3.5, "Basic Health and Safety Rules and Regulations," item 15, states "Bioassay samples must be submitted by all laboratory, operating and maintenance personnel on designated dates."

   Contrary to the above, bioassay samples were not submitted by 68 persons including laboratory, operating and maintenance personnel. Delinquent periods ranged from three months to two years.

Enclosure (2)

OCT 18 1974

RO Investigation Report No. 70-143/74-01

ITEMS REFERRED TO REGULATORY OPERATIONS HEADQUARTERS

FOR FURTHER EVALUATION

Air Sampling

Investigation findings confirm the allegation that air samples run the entire weekend without changing of samples, versus the normal workweek practice of changes each 24 hours. This weekend schedule has been in effect since initial plant startup. Investigation findings relating to the corollary allegation that the long (72 hour) cycle of samples would permit small time periods of high concentrations without detection is being referred to Regulatory Operations for further evaluation.