INL/MIS-21-62572-Revision-0

Summary of Public Outreach by DOE for the Special Isotope Separation Project

February 1987

Thomas Cochran

Changing the World's Energy Future

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SUMMARY OF PUBLIC OUTREACH ACTIVITIES BY DOE
REGARDING SIS PROJECT

PUBLIC NOTICES

Federal Register Notice of Oct. 31, 1986.

Federal Register Notice of Feb. 9, 1987.

Legal Notices published in Idaho Falls, Boise, Twin Falls, Blackfoot, and Pocatello newspapers on Feb. 15 and Feb. 18, 1987.

PRESS CONFERENCES

Idaho Falls - Jan. 23, 1987, 2:00 p.m.

Boise - Jan. 27, 1987, 2:30 p.m.

Aug. 13, 1986 - DOE Press Briefing at the INEL by Troy E. Wade II and Carl Gertz.

Dec. 10, 1986 - Press Conference by John Emmett on lasers.

PRESS RELEASES

Numerous press releases have been issued by the Department, including the announcement of the INEL as the preferred alternative on Aug. 13, 1986, as well as the recent press releases during the week of Feb. 16, 1987 and on Feb. 23, 1987. In addition there have been numerous press interviews with DOE personnel on the SIS Project.

PUBLIC COMMENT PERIOD

The public comment period for submitting written comments to the Department opened with the Federal Register Notice of Intent published on Oct. 31, 1986, and was extended with the Federal Register Notice of Feb. 9, 1987 through Mar. 2, 1987. This represents a 4-month public comment period.

PRESENTATIONS TO COMMUNITY, CIVIC AND BUSINESS GROUPS

Troy E. Wade II

Dec. 9, 1986 - presentation to School District 91 School Board.
Dec. 14, 1986 - presentation to the Association of General Contractors of America, Inc.
Dec. 19, 1986 - SIS presentation to the Idaho Board of Realtors.
Jan. 7, 1987 - presentation to the Idaho Falls Rotary.
Jan. 14, 1987 - presentation to School District 93 School Board.
Jan. 26-28, 1987 - presentation to the State of Idaho Legislature in Boise, ID

Carl Gertz

Oct. 22, 1986 - presentation to the Blackfoot Chamber of Commerce.
Jan 7, 1987 - presentation to the Rupert Rotary Club.
Feb. 16, 1987 - presentation to the Idaho Falls Civitans.

LaMar Trego

Feb. 12, 1987 - presentation to the Kiwanis in Idaho Falls

John Emmett

Dec. 10, 1986 - American Nuclear Society presentation on lasers.

Bill Jensen

Sep. 24, 1986 - presentation to Idaho Falls Rotary

RESPONSES TO LETTERS FROM THE PUBLIC

The Department received several letters specifically requesting answers to questions, and responded by preparing correspondence addressed to Ms. Liz Paul, Groundwater Alliance, Box 4090, Ketchum, ID 83340 on Dec. 9, 1986; and to Dr. A. J. Burns, P.O. Box 170, St. Anthony, ID 83445 on Feb. 13, 1987. In addition, all persons or organizations who submitted written comments received a letter dated Jan. 26, 1987 acknowledging receipt of their comments and enclosing an information packet on the SIS Project. The letter also notified them of DOE's intent to hold public scoping meetings.

On Jan. 26, 1987 a letter was sent to all petitioners, notifying them of DOE's intent to hold public scoping meetings and the availability of information packets. All of the above interested people were sent a copy of the Notice of Public Meetings as it appeared in the Federal Register on Feb. 6, 1987.

STATE OF IDAHO
OFFICE OF THE LIEUTENANT GOVERNOR
BOISE 83720

C. L. "BUTCH" OTTER
LIEUTENANT GOVERNOR

TELEPHONE:
(208) 334-2200

February 26, 1987

Mr. Chairman:

It is with pride and anticipation that I come before you tonight to speak in favor of locating the Special Isotope Separation Project here in Idaho.

First, if I may, let me congratulate yourself, your committee, the Defense Department, and the Government in general for holding the hearings.

It is a process which reaffirms our belief in the Republic form of Government as well as a recognition of the sovereignty of the State of Idaho and the concept of states' rights.

Idaho has a history, especially the last 38 years, which has shared in and promoted the growth of the Nuclear Industry.

The INEL as an extensive research, development, and engineering force, has turned the focus of the world toward Idaho as a contributing leader in the State of the Art of Nuclear Technology.

So with a sense of comfort and encouragement, I ask that your review on the impact of SIS sites not only include the assessment according to the dictates of scope of the EIS, but give added weight to the facts that:

(1) Idaho has matured with this Industry -- we have a mutual respect and trust.

(2) Idaho has always made her contribution to the cause of our nations defense -- be it her sons and daughters who marched off to war in our Nation's time of need, or the advancement of the Industrial Complex to support those "over there."

(3) Idaho lays in the heart of a region punctuated with support of our National Defense;

WASHINGTON:	Airplanes Submarines Shipyard
OREGON:	Computers Electronic Guidance Electronic Detection
UTAH:	Missile Components Missile Parts & Support Hill Air Force Base

The resulting mutual support and advanced infrastructure have helped us all to intelligently, confidentially, and logically deal with this presence and their necessity.

(4) Idaho has always been successful in requesting that INEL, DOE, and the Department of Defense be open and honest in providing information to State and Local inquiries, relative to projects. I encourage the continuation of this practice.

(5) Idaho, therefore, has the infrastructure needed for the support of SIS----Idaho has the intellectual environment needed for the support of SIS.

And may I add that in my dual capacity of being the Lt. Governor of the State and as an Executive Officer of of one of Idaho's largest Native businesses, I stand ready to provide the support and leadership necessary to shore up any short comings you may find.

So I encouraged the Department of Energy to complete, with despatch, their tasks as outlined by the EIS in the Federal Register, as it covers adequately the areas of concern to Idaho.

I further encourage the Department to begin construction as soon as possible, because I recognize the economic value such a project will have for Idaho, but I further recognize and even champion the extended use of SIS's potential for:

1. Medical advancement;
2. Safety and Health in Industry; and
3. State of the Art Technology for application to all aspects of a competitive world.

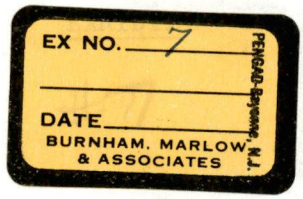
In conclusion, let me say that Idaho is proud of its citizens--all of them. Among them we number the many contractors of the INEL. It is my hope that as Idaho moves forward to gain the Super Conducting Super Collider, we will be fortunate enough to point with pride to the newest of Idaho's citizens--the Special Isotope Separator.

Thank you!!!

Sincerely,

C. L. "Butch" Otter
Lt. Governor of Idaho

CLO/gmf



Natural Resources Defense Council

1350 New York Ave., N.W.
Washington, DC 20005
202 783-7800

TESTIMONY OF

THOMAS COCHRAN, PH.D.

AND

DAN W. REICHER, ESQ.

TO THE

DEPARTMENT OF ENERGY

CONCERNING

THE SCOPE OF THE

ENVIRONMENTAL IMPACT STATEMENT

ON THE

SPECIAL ISOTOPE SEPARATION FACILITY

February 26, 1987
Boise, Idaho

New York Office:
122 East 42nd Street
New York, New York 10168
212 949-0049

Western Office:
25 Kearny Street
San Francisco, CA 94108
415 421-6561

New England Office:
850 Boston Post Road
Sudbury, MA 01776
617 443-6300

Toxic Substances Information Line:
USA: 1-800 648-NRDC
NYS: 212 687-6862

My name is Thomas B. Cochran. I am a Senior Staff Scientist with the Natural Resources Defense Council (NRDC). I hold a Ph.D in Physics from Vanderbilt University, and was a member of the Department of Energy's (DOE) Energy Research Advisory Board (ERAB) from 1978-1982; DOE's Nuclear Proliferation Advisory Panel (1977-79); and the Nuclear Regulatory Commission's Advisory Panel for the Decontamination of the Three Mile Island Unit 2 (1980-1986). While on the ERAB I was a member of the Advanced Isotope Separation Study Group (1982) which reviewed the DOE Advanced Isotope Separation Program including the Laser Isotope Separation (AVLIS) Process. Consequently, I have some knowledge of the Special Isotope Separation (SIS) technology. I am also editor and co-author of the Nuclear Weapons Databook, Volume II, "U.S. Nuclear Warhead Production," and Volume III, "U.S. Nuclear Warhead Facility Profiles," which will be released by Ballinger Publishing Co. in April. Therefore, I am quite familiar with the DOE programs for providing plutonium to meet perceived nuclear weapons needs. Accompanying me this evening is Dan W. Reicher, an NRDC attorney. Mr. Reicher holds a J.D. from Stanford University Law School and was a staff member of the President's Commission on the Accident at Three Mile Island.

The Natural Resources Defense Council is a national non-profit environmental organization with almost 70,000 members. NRDC has been working for the past 15 years to ensure the safety of DOE's nuclear weapons production facilities, prevent the proliferation of nuclear weapons, and halt the use of weapon-

usable plutonium in civilian commerce. We are pleased to have this opportunity to present our views to the DOE concerning the scope of the Environmental Impact Statement on the Special Isotope Separation facility.

DOE currently advances two reasons for full-scale deployment of SIS. The primary reason is to produce weapon-grade plutonium from DOE's current inventory of fuel-grade plutonium, most of which is at DOE's Hanford Nuclear Reservation. A secondary reason is to separate plutonium isotopes -240 and -241 from existing weapon-grade plutonium to reduce radiation exposure of personnel who handle the weapons. Neither of these uses for SIS justifies its almost $1 billion price tag, the risks the facility poses to human health and the environment, and the damage SIS would do to efforts to prevent the spread of nuclear weapons to nations currently without them.

DOE's use of SIS to convert fuel-grade plutonium to weapon-grade plutonium is not cost effective and therefore cannot be justified. As shown in Tables 1 and 2, by the time the facility comes on line in 1995 or later, DOE will have at most about 6 MT of fuel grade plutonium available for SIS enrichment. This constitutes only a two-year supply of feed material were the SIS facility to operate at full capacity (approximately 3 MT/yr). This could be stretched to four years if the plant operated at a reduced capacity during start-up. This can be seen by the following analysis.

DOE's fuel-grade plutonium inventory was 16 metric tons (MT) in 1983. Of this, some 4 MT was obtained from the United Kingdom

under a barter agreement. The British government was given assurances that this 4 MT would not be used for weapons. Each year since 1983 on average about 0.5 MT of the remaining 12 MT of this material is available for blending with supergrade plutonium (3% Pu-240) from the Savannah River Plant, South Carolina to produce weapon-grade plutonium. (See Table 1). This is based on the assumption that the Savannah River Plant C-Reactor remains permanently shutdown. So each year the stockpile of fuel-grade plutonium available to feed the SIS declines significantly leaving about 6 MT in 1995.

If DOE were simply to continue its blending process rather than develop SIS to produce weapon-grade plutonium, we estimate that the fuel-grade plutonium stockpile at Hanford would be exhausted by about 2006. (See Table 1.) The time of depletion would be moved forward to about 2002 if the C-Reactor were restarted by 1990. If the SIS plant comes on line in 1995 and operates at 25% capacity in the first year, 50% in the second and 75% in the third, the 6 MT inventory will be exhausted in 1998. (See Table 2). Consequently, at most, the SIS plant will accelerate the availability of the fuel-grade stocks for weapons by 4 to 8 years. This is based on the assumption that development of the SIS plant does not continue to slip. This is an extraordinarily optimistic assumption considering development has already been delayed at least five years.

In sum, the question which must be addressed in the EIS is not whether DOE will be able to produce additional weapon-grade plutonium from existing stockpiles of fuel-grade plutonium, but

Table 1

INVENTORY OF DOE FUEL GRADE PLUTONIUM FOR BLENDING

FY	SRP Reactors Producing Supergrade Pu[a]	Annual Supergrade Pu Produced[b] (Kg)	Annual Supergrade Pu Separated[c] (Kg)	Annual Fuel Grade Pu Required[d] (Kg)	Available Fuel-Grade Pu Inventory[e] (Kg)
1981	0.6	250			
1982	1.0	540	400	200	
1983	2.0	1,070	800	400	12,000
1984	2.0	1,100	1,085	540	11,460
1985	2.0	1,010	1,055	530	10,930
1986	2.8	1,425	1,220	610	10,320
1987	2.1	1,075	1,250	625	9,695
1988	2.0	1,030	1,050	525	9,170
1989	2.0	1,000	1,015	510	8,660
1990	1.7	860	930	465	8,195
1991	1.1	550	1,410	705	7,490
1992	1.3	650	600	300	7,190
1993	1.6	820	735	370	6,820
1994	1.5	770	795	400	6,420
1995	1.7	725	750	375	6,045
1996	1.6	820	770	385	5,660
1997	2.2	1,125	970	485	5,175
1998	2.3	1,170	1,150	575	4,600
1999	2.2	1,125	1,150	575	4,025
2000	2.2	1,125	1,125	575	3,450
2001	2.2	1,125	1,125	575	2,875
2002	2.2	1,125	1,125	575	2,300
2003	2.2	1,125	1,125	575	1,725
2004	2.2	1,125	1,125	575	1,150
2005	2.2	1,125	1,125	575	575
2006	2.2	1,125	1,125	575	0

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a Assumes C-Reactor permanently shutdown in FY 1986. P-, K-, and L-Reactors available for tritium and supergrade plutonium (3% Pu-240) production. For FY 1986-99 the number of reactors dedicated to tritium production is given in J. S. Allender and L. M. Macafee, "Economic Analysis of the Fuel Production Facility," OPST -84, -420, pp. 5, 24 and based on the projected tritium requirements given in the 1984 Nuclear Weapons Stockpile Memorandum.

b See Nuclear Weapons Databook, Volume II, U.S. Nuclear Warhead Production, Ballinger Publ. Co., 1987 (in press), p. 63.

c Assumes 6 month cooling period.

d Assumes blending 2 parts supergrade Pu (3% Pu-240) and 1 part fuel-grade Pu (12% Pu-240).

e Assumes 31 March 1983 inventory of 16.13 MT, of which some 4 MT is of British origin and unavailable for weapons. See Nuclear Weapons Databook, Volume II, p. 77.

Table 2

INVENTORY OF DOE FUEL-GRADE PLUTONIUM FOR SIS

FY	Annual Fuel Grade Pu Required[a] (Kg)	Available Fuel-Grade Pu Inventory[b] (Kg)
1995	750	5,670
1996	1,500	4,170
1997	2,250	1,920
1998	3,000	0

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a Assumes plant capacity of 3 MT. Start-up capacity of 0.25, 0.5, 0.75, full in years 1 through 4 respectively.

b Inventory in FY 1994 from Table 1.

whether the slightly higher rate at which the existing stockpile of fuel-grade plutonium is processed is justifiable in view of: (1) the higher cost of SIS compared to blending; and (2) the grave health, environmental and proliferation risks posed by SIS. To place this in perspective, the 6 MT fuel grade inventory in 1995 will represent about 5 percent of the some 120 MT plutonium inventory in the U.S. weapons stockpile. DOE can increase this inventory incrementally at a rate of 1.4%/yr. using SIS or 0.5%/yr. by blending. There is no conceivable national security argument that can be made in 1987 for favoring the higher rate.

We believe that in view of these factors SIS cannot be justified. We find support for this conclusion in a 1985 report by President Reagan's Office of Management and Budget which seriously questioned the need for SIS saying:

> The SIS process has the highest cost (in total dollars and in dollars per gram of additional plutonium) of the various methods of increasing productivity. The SIS process also requires the most lead time and is the most technologically uncertain.1/

As we noted earlier, DOE's secondary reason for development of SIS is to remove certain isotopes from existing supplies of weapon-grade plutonium to reduce radiation exposure incurred by workers who handle nuclear weapons. DOE claims that without SIS, military personnel will be unnecessarily exposed to radiation. However, DOE fails to consider whether a reduction in the dose can be justified under the As Low As Reasonably Achievable

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1/ Nuclear Weapons Databook Vol. II, at 97, note 233.

(ALARA) principle and, assuming it can, the fact that reduced exposure can be achieved at a much lower cost through shielding.

Our analysis and that of the Office of Management and Budget lead, then, to the conclusion that SIS is not justifiable on the bases currently offered by DOE. Aside from these bases and pressures brought by a large cadre of scientists and engineers who have built their careers around SIS, why is DOE spending almost $1 billion to develop SIS? A careful reading of testimony DOE has given to Congress on SIS reveals that DOE's real reason for full-scale deployment of SIS is to be able to provide rapidly a large-scale plutonium production capability -- a so-called "surge capacity" -- which could be called upon in the event of a rapid buildup in Soviet nuclear weapons. Since there will be little in the way of DOE fuel-grade plutonium to satisfy this surge capacity, DOE clearly has its eyes on the only other large source of plutonium for the weapons program, namely spent fuel from commercial nuclear reactors. As early as 1981, then-Secretary of Energy Edwards endorsed the use of commercial spent nuclear fuel as a source of plutonium for the weapons program in a speech before the DOE Energy Research Advisory Board. The Secretary stated that such a move would provide the plutonium needed for both the weapons program and the breeder reactor program. He also claimed that it would solve the nuclear industry's waste disposal problem.

SIS, then appears to be part of a larger plan to provide surge capacity using commercial spent fuel. Critical to this

plan is the PUREX processing plant at Hanford which can extract plutonium from spent fuel for later enrichment in the SIS. DOE renovated and reactivated PUREX in 1983 and is currently making an extensive additional modification which will allow spent fuel rods from the Fast Flux Test Facility, and therefore from commercial power reactors as well, to be cut into small segments for processing. Conveniently, DOE will also become the owner of all the commercial spent fuel in the United States in 1998, pursuant to a series of contracts it has entered into with nuclear utilities. DOE is also developing plans to build a Monitored Retrievable Storage (MRS) facility to store spent fuel.

So by 1998, when we estimate DOE will begin to exhaust its supply of fuel-grade plutonium to feed the SIS facility, the DOE will hold title to virtually all the commercial spent fuel in the U.S., and will have in place all the technology it needs to mine plutonium from commercial nuclear power plants for the bomb program.

All that will stand in DOE's way is the Hart-Simpson-Mitchell amendment to the Atomic Energy Act which was enacted by Congress in 1982 and prohibits the use of spent commercial fuel for the production of nuclear weapons. But, as of the late 1990's, with the technology in place to reprocess commercial spent fuel, and a likely reduction in plutonium production capacity as a result of the inevitable closure of the Hanford N-Reactor and delayed development of a New Production Reactor, Congress may feel irresistible pressure to repeal the Hart-Simpson-Mitchell amendment. As one of DOE's own physicists has

commented:

> [r]egardless of the law, there will be a strong incentive to use the spent fuel rods from power plants to obtain plutonium for weapons. The Reagan administration has proposed a great increase in [the] number of nuclear warheads. This will require a large amount of plutonium. This is a scarce material. If a cheaper source of it is found, I'm quite sure they will make every effort to get at it. Seattle Post-Intelligencer, Aug. 28, 1983 at A1, A10.

So what's wrong with the use of SIS to mine commercial spent fuel for plutonium? In a word, everything. If implemented it would end almost four decades of careful separation of military and civilian nuclear programs. By essentially turning our commercial nuclear power plants into bomb factories, the U.S. would encourage other nations to use their civilian nuclear programs for military purposes. Using SIS to dismantle the wall between the peaceful and the military use of the atom would be an international tragedy of great proportions.

A decision to direct American civilian nuclear fuel to weapons use would also raise serious questions as to whether we will ever be able to put a lid on the nuclear arms race. The current U.S. inventory of weapon-grade plutonium now in or available for use in nuclear weapons is about 100 MT. By mining the plutonium in spent commercial nuclear fuel, DOE would be able to increase rapidly the plutonium inventory in the U.S. weapons stockpile by over 50 percent.

Because plutonium can be used for the manufacture of nuclear weapons, it is a prime target for diversion by people from both within and without an SIS facility. It is, therefore, imperative

that we minimize the number of facilities and people who handle plutonium. Thus, SIS should not be built unless it is absolutely necessary and, as we have demonstrated, SIS is not necessary to further DOE's publicly stated objectives.

Additionally, DOE simply does not have a track record which demonstrates its capability to safeguard SIS plutonium production adequately, that is: to strictly control the plutonium production process; to account for all quantities of plutonium at each stage in the process; and to ensure the physical security of the site. Just five months ago the plutonium reprocessing plant at Hanford was shutdown for, among other things, serious violations of rules designed to prevent theft of plutonium by terrorists. The facility for assembling complete nuclear devices at the Los Alamos National Laboratory was permanently closed a few years ago because of DOE's inability to provide adequate safeguards. And recently the security forces at the Savannah River Plant were shown to be inadequate to repel even a mock terrorist raid on the facility. These and numerous other lapses demonstrate that DOE has serious and continuing problems in safeguarding plutonium. The question, then, is whether we should be adding an unnecessary and economically unjustifiable facility to this troubled system.

The EIS must also consider carefully the highly toxic nature of plutonium. In recent statements DOE has attempted to minimize the health and environmental risks posed by plutonium. However, DOE's own documents recognize that plutonium's long-lived radioactivity and its radiotoxicity combine to make it an exceedingly "potent cancer producer."[2/] DOE-funded experiments

with beagle dogs demonstrate that inhalation of less than one microcurie of Pu-239 oxide result in an incidence of lung cancer approaching 100%.[3/] In an SIS production facility able to vaporize 2 to 3 tons of Pu a year (several hundred billion microcuries), there is the potential for severe health effects.[4/]

DOE stresses that through "proper actions" the health and environmental risks of plutonium can be minimized. However, DOE's operation of its facilities does not leave us with much faith that the Department is capable of assuring that these proper actions are taken. It would take the rest of the evening to begin to describe the patent disregard DOE has shown for human health and the environment at its facilities around the nation. Much of this history of abuse and neglect stems from the unregulated status of the DOE facilities. Unlike commercial nuclear plants which are licensed and overseen by the Nuclear Regulatory Commission, DOE runs its own show. Thus the same agency which produces plutonium and disposes of some of the most toxic materials known to man also oversees the safety of its facilities. As Congressman Wyden of Oregon put it, this is akin to letting Dracula guard the blood bank. We believe that if DOE is permitted to go forward with development of SIS, the facility

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2/ Rocky Flats FEIS, DOE/EIS-0064, Vol. 2, G-3-1.

3/ J. F. Parks, "Inhaled Plutonium Oxide in Dogs," Pacific Northwest Laboratory Annual Report for 1985 to the DOE Office of Energy Research, Part 1, Biomedical Sciences, February 1986, pp. 3-17.

4/ There are 16 micrograms of Pu-239 per microcurie.

must be subject to full licensing and oversight by the Nuclear Regulatory Commission.

In summary, the SIS facility is uneconomical, unnecessary and poses serious health and proliferation risks. It should not be built. If it is built, it should be licensed and overseen by the Nuclear Regulatory Commission.

• Inhaled Plutonium Oxide in Dogs

Principal Investigator: J. F. Park

Other Investigators: G. A. Apley, R. L. Buschbom, G. E. Dagle, D. R. Fisher, K. M. Gideon, E. S. Gilbert, J. D. Kashmitter, G. J. Powers, H. A. Ragan, R. E. Weller, and E. L. Wierman

Technical Assistance: J. C. Chapman, K. H. Debban, R. F. Flores, B. G. Moore, C. O. Romsos, R. P. Schumacher, and D. H. Willard

This project is concerned with long-term experiments to determine the lifespan dose-effect relationships of inhaled $^{239}PuO_2$ and $^{238}PuO_2$ in beagles. The data will be used to estimate the health effects of inhaled transuranics. Beagle dogs given a single exposure to $^{239}PuO_2$ or $^{238}PuO_2$ aerosols to obtain graded levels of initial lung burdens (ILB) are being observed for lifespan dose-effect relationships. Mortality due to radiation pneumonitis and lung tumor increased in the four highest dose-level groups exposed to $^{239}PuO_2$ during the 14-year postexposure period. During the 11½ years after exposure to $^{238}PuO_2$, mortality due to lung and/or bone tumors increased in the three highest dose-level groups. Chronic lymphopenia, occurring 0.5 to 2 years after exposure, was the earliest observed effect after inhalation of either $^{239}PuO_2$ or $^{238}PuO_2$ in the four highest dose-level groups that had ILB of ≥80 nCi. Other plutonium-exposure-related effects include sclerosis of the tracheobronchial lymph nodes, focal radiation pneumonitis, adenomatous hyperplasia of the liver, and dystrophic osteolytic lesions in the skeleton.

To determine the lifespan dose-effect relationships of inhaled plutonium, 18-month-old beagle dogs were exposed to aerosols of $^{239}PuO_2$ (mean AMAD, 2.3 μm; mean GSD, 1.9), prepared by calcining the oxalate at 750°C for 2 hours; or to $^{238}PuO_2$ (mean AMAD, 1.8 μm; mean GSD, 1.9), prepared by calcining the oxalate at 700°C and subjecting the product to $H_2{}^{16}O$ steam in argon exchange at 800°C for 96 hours. This material, referred to as pure plutonium oxide, is used as fuel in space-nuclear power systems.

One hundred thirty dogs exposed to $^{239}PuO_2$ in 1970 and 1971 were selected for long-term studies; 22 will be sacrificed to obtain plutonium distribution and pathology data; 108 were assigned to lifespan dose-effect studies (Table 1). One hundred thirteen dogs exposed to $^{238}PuO_2$ in 1973 and 1974 were selected for lifespan dose-effect studies (Table 2). Twenty-four additional dogs were exposed for periodic sacrifice. The Appendix (following the entire Annual Report) shows the status of the dogs on these experiments.

Table 3 summarizes, by dose-level group, the mortality and lesions associated with deaths through 14 years after exposure to $^{239}PuO_2$. During this period, all of the dogs in the highest-level dose group and in Dose-Level Group 5, 20 in Group 4, 14 in Group 3, 15 in Group 2, 17 in Dose-Level Group 1 and 16 in the control group were euthanized when death was imminent.

Table 1. Lifespan Dose-Effect Studies with Inhaled $^{239}PuO_2$ in Beagles.[a]

Dose Level Group	Number of Dogs		Initial Lung Deposition[b]	
	Male	Female	nCi[c]	nCi/g Lung[c]
Control	10	10	0	0
1	10	10	3.5 ± 1.3	0.029 ± 0.011
2	10	10	22 ± 4	0.18 ± 0.04
3	10	10	79 ± 14	0.66 ± 0.13
4	10	10	300 ± 62	2.4 ± 0.4
5	10	10	1100 ± 170	9.3 ± 1.4
6	3	5	5800 ± 3300	50 ± 22
	63	65		

[a] Exposed in 1970 and 1971

[b] Estimated from external thorax counts at 14 and 30 days post-exposure and estimated lung weights (0.011 x body weight)

[c] Mean ± 95% confidence intervals around the means

Table 2. Lifespan Dose-Effect Studies with Inhaled $^{238}PuO_2$ in Beagles.[a]

Dose Level Group	Number of Dogs		Initial Lung Deposition[b]	
	Male	Female	nCi[c]	nCi/g Lung[c]
Control	10	10	0	0
1	10	10	2.3 ± 0.8	0.016 ± 0.007
2	10	10	18 ± 3	0.15 ± 0.03
3	10	10	77 ± 11	0.56 ± 0.07
4	10	10	350 ± 81	2.6 ± 0.5
5	10	10	1300 ± 270	10 ± 1.9
6	7	6	5200 ± 1400	43 ± 12
	67	66		

[a] Exposed in 1973 and 1974

[b] Estimated from external thorax counts at 14 and 30 days post-exposure and estimated lung weights (0.011 x body weight)

[c] Mean ± 95% confidence intervals around the means

Table 3. Summary of Lesions in Dogs Euthanized During the 14-yr Period After Inhalation of $^{239}PuO_2$.

	Dose Group						
	6	5	4	3	2	1	Control
Number of Dogs/Group	8	21	22	20	21	24	20
Number of Dead Dogs/Group	8	21	20	14	15	17	16
Mean Survival Postexposure, yr	2	6	10	12	13	12	12
Condition[a]							
Radiation Pneumonitis	7	1					
Radiation Pneumonitis and Lung Tumor	1						
Lung Tumor		20	14	5	1		4
Malignant Lymphoma and Lung Tumor				2			
Bone Tumor					1	2	
Hemangiosarcoma (Heart, Spleen, Liver)						3	2
Malignant Lymphoma				1		1	3
Pituitary Tumor, Cushing's			1			1	
Reticulum Cell Sarcoma			1				
Ovarian Tumor					1		
Oral Tumor							1
Round Cell Sarcoma						1	
Hemangioma (Spleen)					1		
Malignant Melanoma					1		1
Pheochromocytoma					1		
Urinary Bladder Tumor				1	2		
Neurofibrosarcoma				1			
Meningioma						1	
Pneumonia			2	1	3	2	
Epilepsy					1	1	1
Thromboembolism				1			1
Pyometra			1	1			
Unknown					1	1	
Liver Cirrhosis			1				
Septicemia						1	
Cardiac Insufficiency				1			
Peritonitis					1		
Adrenalitis							1
Kidney Failure						1	
Nephrosclerosis							1
Chronic Nephropathy					1	1	1
Glomerulosclerosis						1	

[a]Number of dogs with lesion associated with death

Mean survival time was decreased in the three highest dose-level groups compared to that in the other groups. Fourteen dogs were sacrificed for comparison of plutonium tissue distribution. Table 4 shows the primary causes of death and the distribution of ^{239}Pu in the tissues of these animals as percent of final body burden. Figure 1 shows the plutonium tissue distribution as percent of initial lung burden.

Table 4 indicates that, as survival time increased, the fraction of plutonium in the lung decreased to ~18% of the final body burden by 13 to 14 years after exposure. During the first year after exposure, plutonium was translocated primarily to the thoracic lymph nodes; little plutonium was translocated to other tissues. Plutonium content of the thoracic lymph nodes increased to ~67% of the final body burden at 13 to 14 years after exposure; the abdominal lymph nodes, principally the hepatic nodes, contained ~4%. The fraction of plutonium in liver increased, accounting for ~27% of the final body burden at 13 to 14 years after exposure in the higher ($\geq$75 nCi final body burden) dose-level groups. The organ distribution of plutonium in the periodically sacrificed dogs was generally similar to that of the high-dose-level dogs euthanized when death was imminent during the first 2 years after exposure. The lower-dose-level ($\leq$75 nCi final body burden) dogs sacrificed or

Table 4. Tissue Distribution of Plutonium in Beagles After Inhalation of $^{239}PuO_2$.

Dog Number	Time After Exposure, mo	Final Body Burden, μCi	Percent of Final Body Burden					Cause of Death
			Lungs	Thoracic Lymph Nodes[a]	Abdominal Lymph Nodes[b]	Liver	Skeleton	
478M	0.25	0.293	98	0.15	0.02	0.24	0.18	Sacrifice
435F	0.25	3.841	99	0.11	0.01	0.00	0.03	Sacrifice
816M	0.50	0.399	99	0.12	0.01	0.00	0.03	Sacrifice
918M	1	0.074	99	0.82	0.02	0.11	0.08	Sacrifice
920F	1	0.011	94	0.47	0.03	0.08	0.61	Sacrifice
913M	1	4.849	98	1.1	0.00	0.03	0.05	Sacrifice
702F	5	1.682	94	5.7	0.00	0.01	0.09	Sacrifice
709M	5	1.726	97	2.2	0.00	0.00	0.05	Sacrifice
734M	5	0.914	96	3.4	0.00	0.01	0.05	Sacrifice
739F	5	1.511	95	4.7	0.03	0.00	0.00	Sacrifice
910M	11	12.229	84	15	0.01	0.06	0.05	Radiation Pneumonitis
747F	12	5.434	71	29	0.03	0.07	0.07	Radiation Pneumonitis
906F	12	6.154	88	12	0.00	0.03	0.05	Radiation Pneumonitis
849F	13	0.0007	80	15	0.20	0.04	1.6	Sacrifice
896F	15	4.115	81	15	0.92	0.23	0.12	Radiation Pneumonitis
817M	21	3.794	64	34	0.13	1.4	0.19	Radiation Pneumonitis
815M	25	0.074	64	32	--	0.08	0.10	Sacrifice
829M	26	3.198	75	19	0.79	4.2	0.45	Radiation Pneumonitis
760M	31	0.978	71	23	0.57	3.7	0.28	Radiation Pneumonitis
890F	31	2.012	55	28	2.2	13	0.26	Radiation Pneumonitis
804M	37	1.101	62	29	0.19	7.9	0.36	Radiation Pneumonitis, Lung Tumor
798F	43	0.0056	55	44	0.02	0.17	0.43	Sacrifice
772M	53	1.821	42	22	0.88	29	0.69	Lung Tumor
759M	53	0.707	43	27	12	15	0.65	Lung Tumor
796F	55	0.671	40	31	4.1	21	1.0	Lung Tumor
783M	59	1.377	59	11	1.8	26	0.67	Lung Tumor
873M	62	1.746	45	27	6.4	16	0.76	Lung Tumor
753F	69	1.171	35	31	0.09	24	0.64	Lung Tumor
761M	69	1.064	36	37	6.3	19	0.53	Lung Tumor
727M	72	0.585	39	24	12	23	0.78	Lung Tumor
762M	72	0.0017	51	42	0.34	0.71	0.66	Sacrifice
837M	72	1.034	42	38	0.70	14	0.46	Lung Tumor
863F	76	0.617	33	12	1.3	47	1.4	Lung Tumor
852F	77	1.067	33	35	0.88	26	0.94	Lung Tumor
803M	79	0.415	20	46	11	20	1.4	Interstitial Pneumonitis
875M	83	0.0026	24	66	0.34	0.64	6.3	Malignant Lymphoma, Kidney
754M	84	0.0046	29	66	0.23	0.39	1.2	Status Epilepticus
835F	86	0.099	27	65	0.95	3.1	1.7	Reticulum Cell Sarcoma
880F	86	0.468	19	31	13	34	0.37	Lung Tumor
769F	90	0.019	36	57	0.32	1.7	1.8	Ovarium Tumor
888M	93	0.179	32	40	10	12	2.1	Lung Tumor
856F	94	0.306	40	45	0.78	9.0	3.9	Lung Tumor
889F	94	0.613	14	27	6.9	41	8.1	Lung Tumor
787M	95	0.473	24	19	12	39	2.7	Lung Tumor
820F	96	0.387	14	40	7.6	29	1.4	Lung Tumor
834F	97	0.025	30	46	17	3.5	0.91	Pyometra
752M	98	0.055	24	62	1.2	7.7	0.98	Lung Tumor
864F	100	0.616	18	22	2.9	50	2.9	Lung Tumor
908F	101	0.0073	14	72	0.049	0.56	0.93	Unknown
778M	102	0.065	11	85	1.3	1.0	0.52	Pulmonary Thromboembolism
812M	103	0.288	15	36	29	16	2.2	Lung Tumor
814F	104	0.054	49	33	4.1	10	1.6	Lung Tumor
840F	107	0.389	17	35	5.8	37	2.0	Lung Tumor
777M	109	0.392	11	52	7.8	24	1.7	Lung Tumor
857M	109	0.333	20	39	9.4	27	2.4	Lung Tumor

(a) Includes tracheobronchial, mediastinal and sternal lymph nodes
(b) Includes hepatic, splenic and mesenteric lymph nodes

Table 4. Continued.

Dog Number	Time After Exposure, mo	Final Body Burden, μCi	Percent of Final Body Burden					Cause of Death
			Lungs	Thoracic Lymph Nodes[a]	Abdominal Lymph Nodes[b]	Liver	Skeleton	
898F	111	0.333	10	34	28	21	3.4	Lung Tumor
899F	113	0.0066	7.5	87	0.14	0.27	1.6	Hemangiosarcoma, Heart
697M	114	0.141	15	64	8.1	9.9	1.4	Cardiac Insufficiency
909M	115	0.444	16	46	11	25	1.2	Lung Tumor
824F	116	0.178	21	75	0.50	2.3	0.70	Pneumonia
891M	116	0.0023	11	84	0.064	0.48	1.5	Septicemia
836M	117	0.333	12	63	15	7.4	0.97	Lung Tumor
892M	120	0.348	10	47	18	20	3.7	Lung Tumor
794M	120	0.397	13	33	14	31	3.5	Pituitary Tumor, Cushing's
781F	122	0.034	37	59	0.25	1.1	0.72	Lung Tumor, Kidney Tumor
809F	123	0.120	12	36	18	28	3.3	Liver Cirrhosis, Thyroid Tumor, Addison's
854M	124	0.435	12	66	15	3.8	1.3	Lung Tumor
807F	125	0.0021	10	71	0.55	1.2	1.3	Pituitary Tumor, Cushing's
810F	126	0.219	5.9	43	20	22	1.8	Lung Tumor
900M	126	0.0016	13	60	2.3	9.0	2.9	Round Cell Sarcoma
748F	127	0.0015	10	50	0.87	0.33	1.2	Unknown
860M	133	0.335	8.2	68	8.0	11	2.5	Lung Tumor
805F	134	0.169	5.8	55	8.9	21	2.8	Esophageal Leiomyoma, Lung Tumor
780F	135	0.0074	28	69	0.37	0.02	0.79	Pheochromocytoma
905F	135	0.080	13	50	10	19	1.7	Malignant Lymphoma
825F	137	0.0020	9.5	85	0.74	0.54	2.7	Hemangiosarcoma, Spleen
764F	139	0.081	15	75	3.9	4.9	0.73	Lung Tumor
808F	139	0.206	11	30	1.8	53	3.0	Lung Tumor
806F	140	0.010	11	78	1.8	5.1	2.3	Malignant Melanoma, Palate
850F	140	0.00062	12	82	0.61	0.11	2.0	Bone Tumor
833F	143	0.157	3.1	40	22	31	1.1	Metritis, Adrenal and Thyroid Carcinoma
862M	145	0.0026	21	56	0.85	4.4	6.9	Peritonitis
904F	145	0.0013	8.9	87	0.30	0.88	1.0	Chondrosarcoma
756M	147	0.0016	15	75	1.0	1.6	4.1	Epilepsy
782M	148	0.043	12	72	4.9	9.0	0.86	Neurofibrosarcoma
886F	149	0.00085	13	51	15	3.6	13	Meningioma
795F	152	0.030	24	26	8.3	38	1.5	Lung Tumor
771F	153	0.019	20	71	1.0	5.8	1.1	Lung Tumor
813F	153	0.036	22	44	4.7	27	1.1	Multilobar Sarcoma, Skull
826F	153	0.0033	8.1	88	0.37	0.94	1.2	Hemangioma, Spleen
859M	154	0.048	19	31	29	7.3	0.79	Urinary Bladder Tumor
870F	154	0.00062	8.2	70	4.9	9.6	4.8	Pneumonia
879M	154	0.00093	19	75	0.52	0.81	1.6	Hemangiosarcoma
884M	155	0.077	13	45	9.4	30	1.6	Lung Tumor
831F	155	0.0087	24	71	0.65	3.3	1.0	Pneumonia
866M	156	0.145	15	41	9.3	34	0.20	Lung Tumor
823M	157	0.072	7.3	83	1.8	6.0	1.5	Urinary Bladder Tumor
838M	157	0.044	18.0	73	0.77	5.4	1.4	Malignant Lymphoma, Lung Tumor
788M	158	0.0022	22	70	2.0	1.8	0.11	Chronic Nephropathy
845F	158	0.012	28	69	0.25	1.5	0.63	Urinary Bladder Tumor
853M	158	0.0081	13	77	2.2	5.4	0.54	Bronchopneumonia
750M	161	0.071	20	51	13.0	9.5	2.4	Lung Tumor, Malignant Lymphoma
847M	163			-----Processing-----				Kidney Failure
776M	163	0.0020	29	67	0.11	1.2	1.1	Bronchopneumonia
802M	164			-----Processing-----				Pneumonia
827F	164	0.075	4.5	49	17	27	1.5	Acute Pneumonia
874M	165			-----Processing-----				Chronic Nephropathy
842M	166			-----Processing-----				Lung Tumor, Chronic Nephropathy
770F	166			-----Processing-----				Glomerulosclerosis

[a] Includes tracheobronchial, mediastinal and sternal lymph nodes
[b] Includes hepatic, splenic and mesenteric lymph nodes

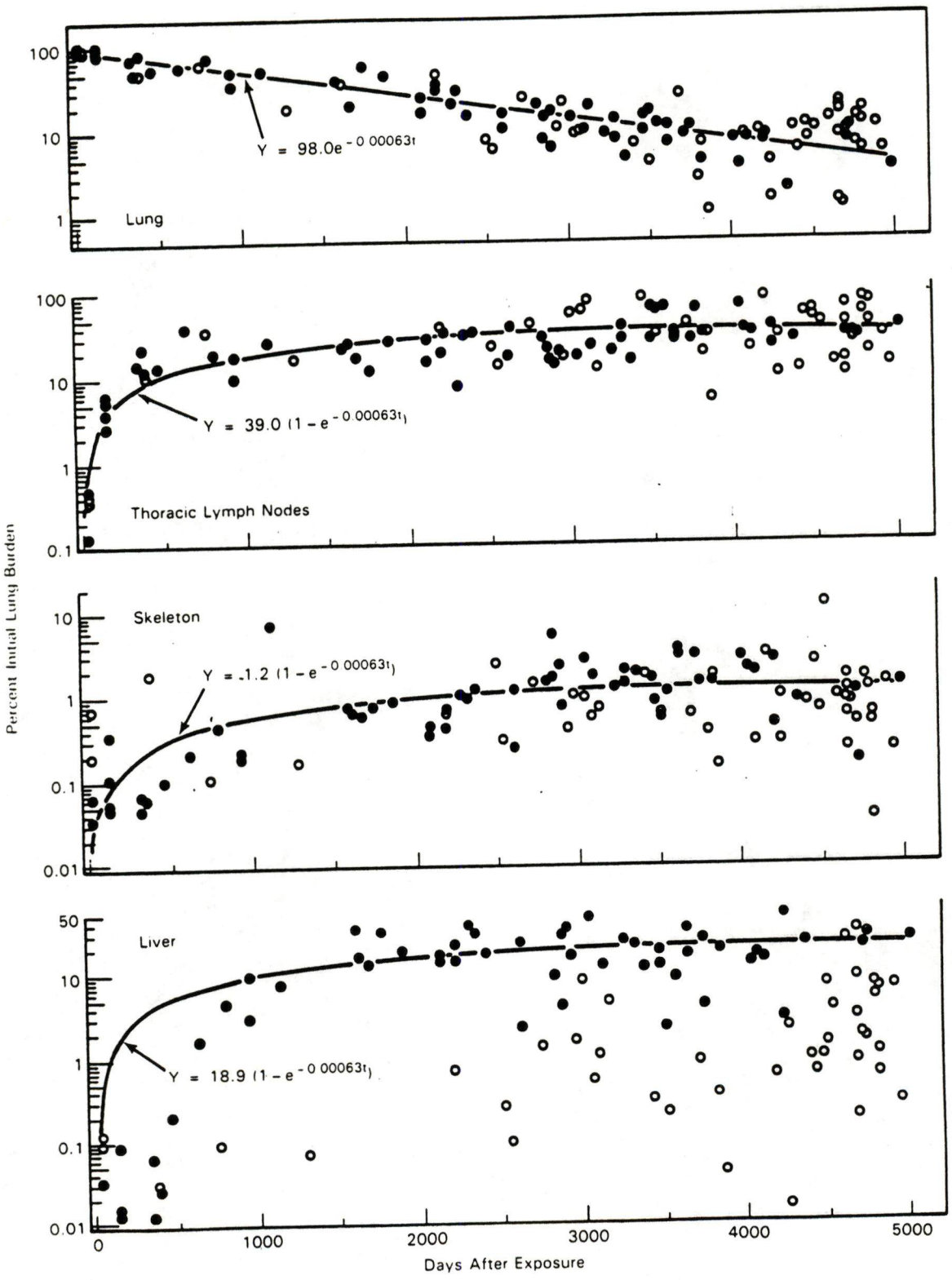

Figure 1. Plutonium in Tissues of Dogs After Inhalation of $^{239}PuO_2$. Points represent data from individual dogs (● = ≧ 75 nCi, ○ = ≦ 75 nCi final body burden). The uptake and retention curves and function were based on dogs in which initial lung burdens were estimated from external thorax counts at 14 and 30 days after exposure. The curves for liver were based on dogs with final body burdens ≧ 75 nCi.

euthanized during the 4th to 14th post-exposure years generally had a much smaller fraction of the final body burden in the liver, with a larger fraction retained in the lungs and/or thoracic lymph nodes. About 1% of the final body burden was in the skeleton at 13 to 14 years after exposure. Plutonium analyses are still in progress on five of the dogs.

Figure 1 shows the ^{239}Pu tissue distribution as percent of the initial burden for all dogs for which tissue radiochemical analyses are complete. Initial lung burdens for those dogs for which radiochemical analysis of excreta were not complete was estimated from external thorax counts at 14 and 30 days after exposure. For dogs whose analyses were complete, initial lung burdens were estimated from the summation of the tissue burdens of plutonium, plus the plutonium excreted, minus plutonium excreted in the feces during the first 3 days after exposure. The latter was assumed to be deposited in the upper respiratory tract. Uptake and retention functions were fitted to the organ burden data. Based on the premise that the organ burdens were interrelated, the uptake and retention function for all organs were fitted simultaneously instead of fitting isolated functions for each organ. The organs were treated as compartments of a single system, with transfer rates specifying the total amount leaving a compartment per unit time and the fractional distribution of that amount among the other compartments. The transfer rates assumed that plutonium moved through the body in a single pass. The material initially deposited in the lung was either excreted or moved to some other organ, from which it was excreted. It was assumed that there were no feedback loops in the system. Organ systems included lung, thoracic lymph nodes, liver, skeleton, and all other tissues. The functions were estimated using weighted, nonlinear least squares. The weights were estimated by bi-weighting procedures that give the more extreme data values very little weight. The curves for liver were based on dogs with final body burdens $\geq$75 nCi because dogs with <75 nCi had less plutonium translocated to the liver.

The nine dogs euthanized because of radiation pneumonitis during the 3-year post-exposure period had increased respiration rates, and hypercapnia and hypoxemia associated with lesions in the lungs. Intermittent anorexia and body weight loss accompanied the respiratory insufficiency. Histopathologic examination of the lungs showed radiation pneumonitis, characterized by focal interstitial and subpleural fibrosis, increased numbers of alveolar macrophages, alveolar epithelial hyperplasia, and foci of squamous metaplasia. Autoradiographs showed activity primarily composed of large stars, more numerous in areas of interstitial and subpleural fibrosis. Dog 804M also had a pulmonary tumor, classified as a bronchiolar-alveolar carcinoma.

Forty-three of the 87 exposed dogs euthanized 3 to 14 years after exposure had lung tumors. Radiographic evidence of pulmonary neoplasia frequently preceded development of respiratory insufficiency. In dogs with neoplasia in the lung, respiratory insufficiency, when it was observed, was usually a late clinical finding that occurred shortly before euthanasia. All of the exposed dogs with lung tumors were in Dose-Level Groups 2, 3, 4, 5, and 6. Two dogs in Dose Level 1 were euthanized 11.7 and 12.1 years, respectively, after exposure: one had an osteosarcoma involving the nasal cavity and maxilla; the other had a chondrosarcoma involving the nasal cavity. One dog in Dose Level 2, euthanized 12.8 years after exposure, had a multilobular sarcoma of the skull. Four control dogs were euthanized because of lung tumors. Dogs 794M, 803M, 809F, 824F, 833F, and 835F (Dose Level 4), 697M, 778M, 782M, 823M, 827F, 834F and 905F (Dose Level 3), 748F, 754M, 769F, 776M, 780F, 802M, 806F, 826F, 831F, 845F, 859M, 862M and 874M (Dose Level 2), and 756M, 770F, 788M, 807F, 825F, 847M, 853M, 870M, 875M, 879M, 886F, 891M, 899F, 900M and 908M (Dose Level 1) died during the 7- to 14-year postexposure period of causes presently thought to be unrelated to plutonium exposure.

In 19 of the dogs, the lung tumors were classified as bronchiolar-alveolar carcinoma; in six dogs as adenosquamous carcinoma; in eight dogs, adenocarcinoma; in four dogs, epidermoid and adenocarcinoma; in two dogs, epidermoid carcinoma; in one dog, epidermoid and bronchiolar-alveolar carcinoma; in one dog, adenocarcinoma and bronchiolar-alveolar carcinoma; in one dog, epidermoid carcinoma, adenocarcinoma, and bronchiolar-alveolar carcinoma; and in another dog, adenocarcinoma, adenosquamous carcinoma and bronchiolar-alveolar adenocarcinoma. The epidermoid carcinoma metastasized to the skeleton; the bronchiolar-alveolar carcinomas metastasized only to the thoracic lymph nodes in eight dogs, and to several organs (including thoracic lymph nodes, mediastinum, kidney, thyroid, skeleton, heart, adrenal gland, aorta, and axillary, prescapular, cervical, splenic and hepatic lymph nodes) in four other dogs. Three of the adenosquamous carcinomas metastasized to thoracic lymph nodes, mediastinum and thoracic

pleura, and one to the hepatic and tracheobronchial lymph nodes. The adenocarcinomas metastasized to the lungs, tracheobronchial lymph nodes, hepatic lymph nodes, splenic lymph nodes, sternal and axillary lymph nodes, heart, kidney and esophagus in three dogs.

The lung tumors in the control dogs were classified as bronchiolar-alveolar adenocarcinomas in two dogs with metastases to thoracic and abdominal lymph nodes, trachea, esophagus and mediastinum; adenocarcinoma with metastases to the diaphragm and abdominal lymph nodes in one dog; and combined epidermoid and adenocarcinoma with metastases to the thoracic lymph nodes, diaphragm, liver and kidney in another.

Three of the exposed dogs had lesions of secondary hypertrophic osteoarthropathy. Sclerosing lymphadenopathy was associated with the high concentration of plutonium in the thoracic and hepatic lymph nodes of dogs in Dose-Level Groups 2, 3, 4, 5 and 6. There was also a generalized lymphoid atrophy that may be related, in the dogs with respiratory insufficiency, to debilitation or to lymphopenia. Livers of the dogs in Dose-Level Groups 4 and 5, which were euthanized during the 4- to 13-year postexposure period, showed moderate, diffuse, centrilobular congestion. Liver cells in these areas contained fine, granular, yellow pigment resembling lipofuscin, and were frequently vacuolated. Focal aggregation of vacuolated, lipofuscin-containing cells in the sinusoids was associated with alpha stars on autoradiographs.

Lymphopenia developed after inhalation of $^{239}PuO_2$ in dose-level groups with mean initial lung depositions of 79 nCi or more (Figure 2). Through 123 months after exposure, mean lymphocyte values were significantly lower ($P < 0.05$) for Dose-Level Groups 3 and 4 than for the control group. At 127 months after exposure, mean lymphocyte values for Dose-Level Groups 3 and 4 were not significantly different than for the control groups. The reduction in lymphocytes was dose-related, both in time of appearance and magnitude. Over the course of this study, there has been a slight age-related decrease in mean lymphocyte values of control dogs. In addition, mean lymphocyte concentrations in Groups 3 and 4 have tended to increase, making the differences between control dogs and these groups less significant than previously. At mean lung depositions of 3.5 and 22 nCi, lymphocyte values were within ranges observed in control dogs. A reduction in total leukocytes was evident in the higher-dose groups, which were also lymphopenic. No effects have been observed on red-cell parameters following $^{239}PuO_2$ inhalation.

Serum chemistry assays have been performed to detect organ-specific damage from plutonium that translocated from lung to extrapulmonary sites. No consistent, dose-related alterations have occurred in serum constituents (glutamic pyruvic transaminase [GPT], glutamic oxaloacetic transaminase, alkaline phosphatase [ALP], urea nitrogen, and serum protein fractions) of dogs exposed to $^{239}PuO_2$.

Table 5 summarizes, by dose-level group, mortality and lesions associated with death through 11½ years after exposure to $^{238}PuO_2$. During this period, all of the dogs in the highest-level dose group and in Dose-Level Group 5, nine dogs in Group 4, eight dogs in Group 3, six dogs in Group 2, and six dogs in Dose-Level Group 1 were euthanized when death was imminent. Seven control dogs were euthanized during the 11½-year postexposure period. Mean survival time was decreased in the two highest dose-level groups compared to the other groups. Twenty-one dogs were sacrificed for comparison of plutonium tissue distribution. Table 6 shows the primary causes of death and the distribution of ^{238}Pu in the tissues of these animals as percent of final body burden. Figure 3 shows the plutonium tissue distribution as percent initial lung burden.

At 10½ to 11½ years after exposure, the fraction of the final body burden in the lungs of the ^{238}Pu-exposed dogs was about 2%, compared to 12% in the ^{239}Pu-exposed dogs (Table 6). At that time, ~9% of the ^{238}Pu was in the thoracic lymph nodes, compared to ~60% of the ^{239}Pu. Livers of the ^{238}Pu-exposed dogs contained ~45% of the plutonium burden, compared to 10% in the livers of the ^{239}Pu-exposed dogs. About 45% of the final body burden was in the skeletons of the ^{238}Pu-exposed dogs, at that time, compared to ~2% in the ^{239}Pu-exposed dogs. Tissue distribution of ^{238}Pu in low-dose-level dogs did not differ from that in high-dose-level dogs. Plutonium analyses are still in progress on one dog. Figure 3 shows the ^{238}Pu tissue distribution as percent of initial lung burden for all dogs for which tissue radiochemical analyses are complete. The initial lung burdens and uptake and retention curves were estimated as described previously for ^{239}Pu. The uptake and retention curves were based on dogs in which initial lung burdens were estimated from the final plutonium body burden, plus the plutonium excreted, minus that excreted in the feces during the first 3 days after exposure.

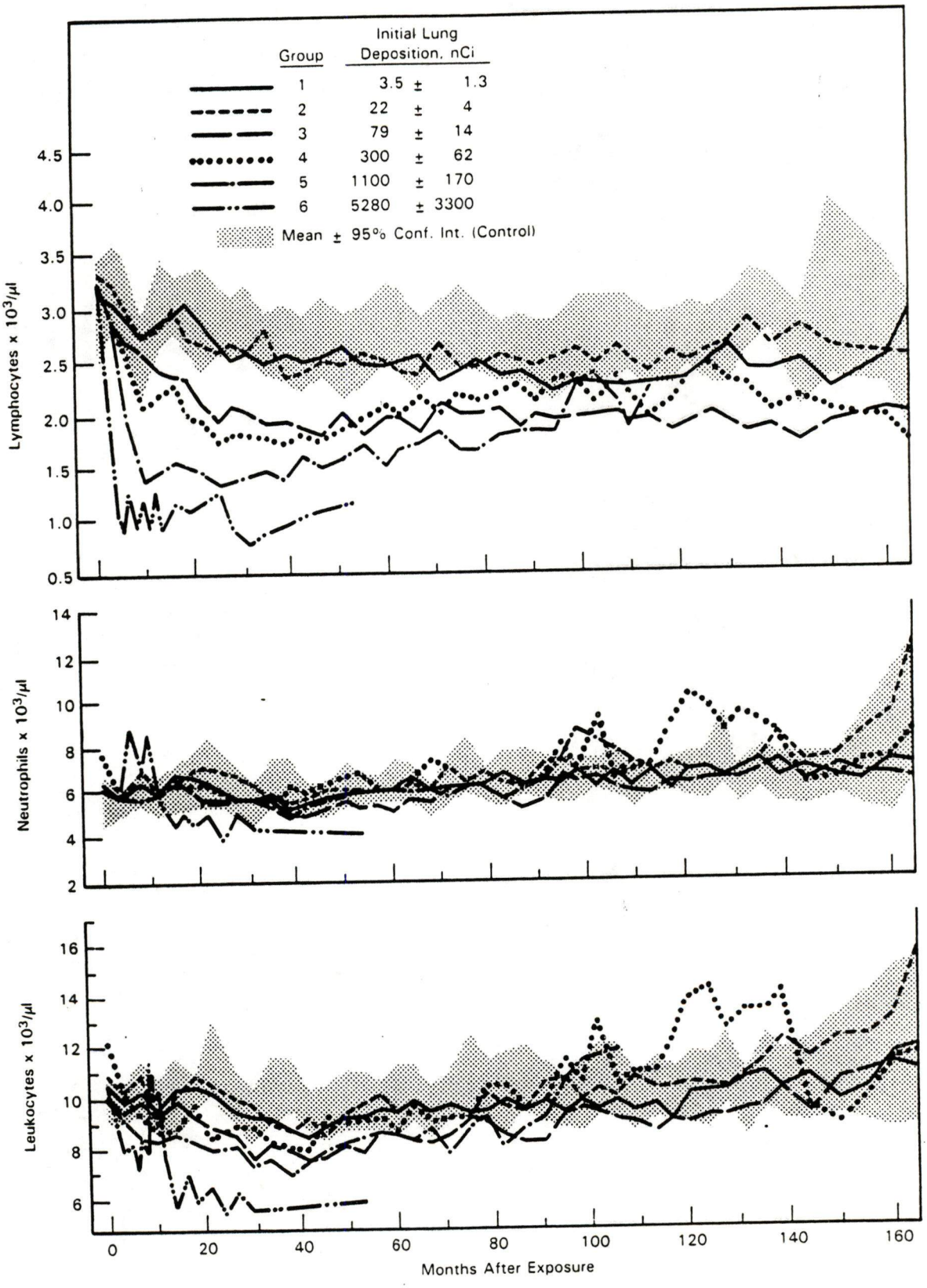

Figure 2. Mean Leukocyte, Neutrophil and Lymphocyte Values in Dogs After Inhalation of $^{239}PuO_2$.

Table 5. Summary of Lesions in Dogs Euthanized During the 11½-yr Period After Inhalation of $^{238}PuO_2$.

	Dose Group						
	6	5	4	3	2	1	Control
Number of Dogs/Group	13	20	20	22	21	20	20
Number of Dead Dogs/Group	13	20	9	8	6	6	7
Mean Survival Postexposure, yr	5	7	11	11	11	11	11
Condition[a]							
Bone Tumor	2	11	2			1	
Lung Tumor	3			1			
Bone and Lung Tumor	6	4	2				
Bone Tumor and Addison's Disease	1						
Bone and Lung Tumor and Addison's Disease		1					
Addison's Disease	1	2					
Malignant Lymphoma			1	3		1	3
Hemangiosarcoma; Heart and Spleen			1		1		
Pituitary Tumor, Cushing's				1			1
Urinary Bladder Tumor			1				2
Brain and Heart Tumor						1	
Brain Tumor					1		
Parathyroid Adenoma				1			
Adrenal Carcinoma						1	
Round Cell Sarcoma; Kidney					1		
Adrenal and Pituitary Tumor			1				
Lung Tumor, Metastatic					1		
Pneumonia		1	1	1	1		
Radiation Pnemonitis				1			
Spinal Cord Degeneration					1		
Pyometra							1
Herniated Vertebral Disk		1					
Anesthesia						1	
Liver Abscess						1	

[a]Number of dogs with lesion associated with death

Of the 62 exposed dogs euthanized, 30 were killed because of bone tumors, 4 because of lung tumors, and 1 because of radiation pneumonitis. Thirteen of the dogs that had bone tumors also had lung tumors. Twenty-eight of the 30 dogs with bone tumors had osteosarcomas, one Dose-Level Group 1 dog (989F) had a fibrosarcoma in the ilium, and one Dose-Level Group 4 dog (1103F) had a fibrosarcoma in a vertebra. All of the exposed dogs with osteosarcomas and/or lung tumors were in Dose-Level Groups 3, 4, 5, and 6. Twelve of the 28 osteosarcomas were in vertebrae; two in femora; four in ribs; two in the scapulae; four in the pelvis; one in the tibia; one in the sternum; one in the sacrum; and one in the humerus. Dog 994F (Dose Level 6); dogs 1047M, 1079M, 1096M, and 1191F (Dose Level 5); 983M, 991F, 1030F, 1081M, and 1166M (Dose Level 4); 960M, 1031F, 1040M, 1043F, 1059F, and 1066M (Dose Level 3); 971F, 1070M, 1078F, 1082M, 1188M, and 1229M (Dose Level 2); and 951M, 959M, 1063M, 1069F, and 1106F (Dose Level 1) died during the 11½-year postexposure period of causes presently thought to be unrelated to plutonium exposure.

The lung tumors were classified as bronchiolar-alveolar carcinomas in 12 dogs, bronchiolar-alveolar adenoma in one dog, adenocarcinoma in one dog, and adenosquamous carcinoma in two dogs. In one dog,

Table 6. Tissue Distribution of Plutonium in Beagles After Inhalation of $^{238}PuO_2$.

Dog Number	Time After Exposure, mo	Final Body Burden, μCi	Percent of Final Body Burden					Cause of Death
			Lungs	Thoracic Lymph Nodes[a]	Abdominal Lymph Nodes[b]	Liver	Skeleton	
1032M	0.25	0.150	97	0.34	0.20	1.7	0.16	Sacrifice
921F	1	0.0044	93	0.65	0.04	0.38	2.1	Sacrifice
930F	1	0.052	99	0.63	0.01	0.07	0.35	Sacrifice
931F	1	0.347	96	1.9	0.01	0.05	0.36	Sacrifice
929F	2	0.017	91	7.5	0.002	0.26	0.58	Sacrifice
932F	2	0.382	96	2.5	0.01	0.18	0.39	Sacrifice
923F	2	0.0023	88	9.4	0.03	0.09	0.44	Sacrifice
925M	3	0.0064	91	4.1	0.04	0.04	1.2	Sacrifice
926M	3	0.078	87	11	0.23	0.65	1.1	Sacrifice
934M	3	0.902	92	4.8	1.7	0.45	0.95	Sacrifice
1318M	12	0.030	45	27	0.08	10	15	Sacrifice
1319M	12	0.077	41	26	0.03	11	20	Sacrifice
1214M	13	0.014	52	9.2	0.32	6.2	16	Sacrifice
1310M	25	0.026	19	36	0.08	15	28	Sacrifice
1317M	25	0.041	20	33	0.16	17	26	Sacrifice
1315M	25	0.047	22	31	0.04	17	28	Sacrifice
1191F	35	0.658	26	32	0.13	18	22	Pneumonia
1215M	36	0.011	21	43	0.17	13	21	Sacrifice
1311M	37	0.036	13	31	0.22	21	32	Sacrifice
994F	42	5.024	17	45	0.50	18	18	Addison's Disease
970F	48	0.0022	20	34	0.36	16	24	Sacrifice
1312M	49	0.035	6.8	29	0.26	25	35	Sacrifice
1143M	49	6.331	11	43	2.0	15	22	Bone Tumor, Lung Tumor
1025M	50	10.033	16	27	7.1	24	23	Lung Tumor
1064M	51	8.427	13	48	1.9	15	20	Bone Tumor, Lung Tumor
1175F	52	3.641	14	31	0.08	25	26	Lung Tumor
1079M	56	2.182	9.8	40	4.3	13	25	Addison's Disease
1096F	59	1.204	4.3	22	2.7	36	24	Addison's Disease
1189M	60	0.044	8.9	25	0.16	37	25	Sacrifice
1115F	61	1.534	5.0	32	2.3	26	33	Bone Tumor
1162F	61	3.663	12	32	5.9	21	25	Bone Tumor, Addison's Disease
1009M	62	4.360	15	25	2.4	31	23	Lung Tumor
974F	64	1.465	5.1	24	5.9	33	29	Bone Tumor
1092M	65	1.515	2.1	26	9.1	29	30	Bone Tumor
975F	66	3.749	11	30	2.1	28	25	Bone Tumor, Lung Tumor
1042F	69	1.494	4.7	25	2.9	32	33	Bone Tumor, Lung Tumor
1037M	69	2.417	7.1	27	7.8	28	27	Bone Tumor
1027M	70	2.546	3.8	15	7.0	40	31	Bone Tumor, Lung Tumor
1006F	72	2.826	7.5	30	3.4	29	26	Bone Tumor, Lung Tumor
1057M	72	1.748	3.0	35	2.2	33	24	Bone Tumor
1082M	78	0.0083	2.4	20	0.31	40	34	Paralysis
1081M	80	0.361	4.6	15	0.48	47	29	Hemangiosarcoma, Heart

[a]Includes tracheobronchial, mediastinal and sternal lymph nodes
[b]Includes hepatic, splenic and mesenteric lymph nodes

Table 6. Continued.

Dog Number	Time After Exposure, mo	Final Body Burden, μCi	Percent of Final Body Burden					Cause of Death
			Lungs	Thoracic Lymph Nodes[a]	Abdominal Lymph Nodes[b]	Liver	Skeleton	
1058F	80	1.000	2.0	18	4.4	31	41	Bone Tumor, Adrenal Tumor
1002M	84	1.786	2.9	31	2.0	31	28	Bone Tumor, Lung Tumor
1109F	86	0.885	0.93	23	4.0	34	35	Bone Tumor, Addison's Disease, Lung Tumor
1218F	86	0.678	2.7	23	4.1	42	25	Bone Tumor
1071M	91	1.088	5.4	28	3.4	27	33	Bone Tumor, Lung Tumor
1063M	94	0.00060	3.4	15	1.3	22	43	Brain Tumor, Heart Tumor
1160F	95	0.956	1.6	21	0.91	43	30	Bone Tumor, Lung Tumor
960M	95	0.036	4.0	21	0.49	33	39	Malignant Lymphoma
1040M	96	0.059	3.0	17	0.96	40	35	Parathyroid Adenoma
1140M	97	0.504	3.8	18	7.7	37	30	Bone Tumor
989F	99	0.0017	5.1	11	1.2	22	29	Bone Tumor (Fibrosarcoma)
1211M	99	0.895	1.3	29	4.7	39	23	Bone Tumor
1173M	99	0.462	2.0	33	7.5	21	33	Bone Tumor
1043F	103	0.037	3.5	16	0.57	33	42	Empyema, Pituitary Tumor, Cushing's
1192F	109	0.345	2.4	7.3	4.6	36	46	Bone Tumor
1178M	110	0.594	0.86	17	2.0	33	42	Bone Tumor, Lung Tumor
1047M	115	0.241	1.4	7.8	11	28	48	Herniated Vertebral Disc
1106F	117	0.0029	1.3	16	1.8	9.9	57	Adrenal Carcinoma
1103F	118	0.232	0.76	18	3.1	45	32	Bone Tumor, Lung Tumor
1188M	119	0.0089	0.71	2.5	0.94	68	24	Metastatic Lung Tumor
1066M	121	0.035	1.1	4.4	0.52	57	32	Malignant Lymphoma
1069F	121	0.0022	10	2.1	1.6	51	33	Malignant Lymphoma
1030F	122	0.160	1.5	15	1.1	22	56	Pneumonia
951M	122	0.0023	3.3	8.9	0.77	47	35	Anesthesia
1229M	123	0.0060	0.94	11	0.73	35	49	Pneumonia
1072M	124	0.079	0.65	4.1	1.6	57	34	Radiation Pneumonitis
1157M	124	0.294	0.55	3.5	3.7	41	44	Bone Tumor
971F	125	0.0095	1.7	5.5	0.44	49	41	Hemangiosarcoma, Spleen
1078F	125	0.025	0.98	9.6	0.60	46	41	Meningioma
952F	125	0.106	1.0	4.4	2.1	39	48	Bone Tumor
1059F	126	0.050	4.2	7.4	0.99	45	39	Malignant Lymphoma
991F	126	0.058	1.8	14	0.81	36	41	Urinary Bladder Tumor
1070M	126	0.011	1.9	9.5	0.70	51	34	Round Cell Sarcoma, Kidney
1166M	128	0.354	1.8	11	1.6	47	35	Malignant Lymphoma
983M	132	0.274	1.5	5.9	2.9	47	37	Adrenal Tumor, Pituitary Tumor
1035F	132	0.172	2.8	10	1.9	19	53	Bone Tumor, Cushing's
1031F	134	0.025	1.9	13	0.97	17	65	Pneumonia
1190F	134	0.033	0.84	4.4	1.2	49	41	Lung Tumor
1062M	135	0.270	0.63	2.6	3.9	46	44	Bone Tumor, Lung Tumor
1177M	136				-----Processing-----			Bone Tumor
959M	138	0.0025	3.4	14	0.62	33	48	Liver Abscess

[a] Includes tracheobronchial, mediastinal and sternal lymph nodes
[b] Includes hepatic, splenic and mesenteric lymph nodes

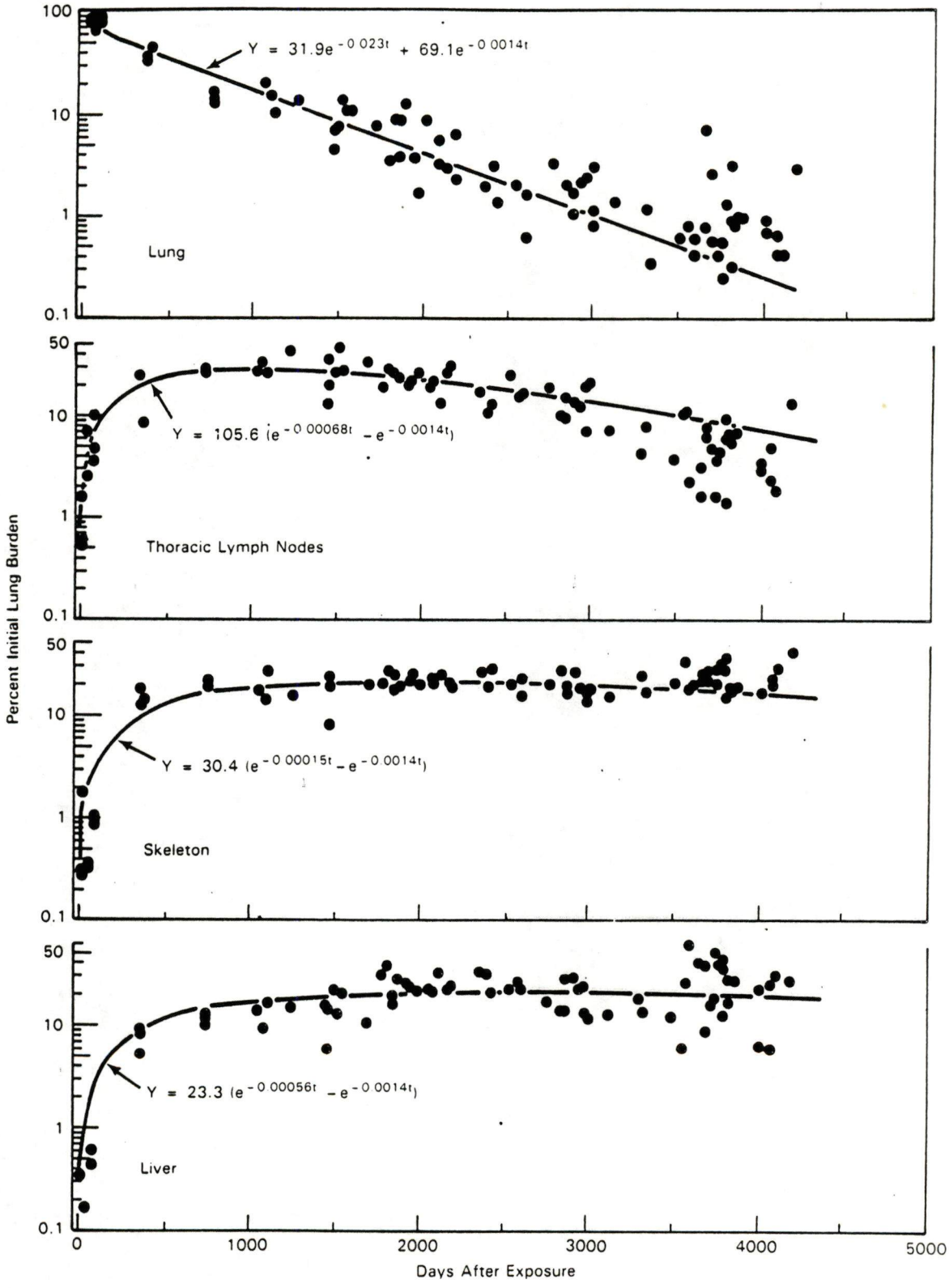

Figure 3. Plutonium in Tissues of Dogs After Inhalation of $^{238}PuO_2$. Points represent data from individual dogs. The uptake and retention curves and functions were based on dogs in which initial lung burdens were estimated from the final plutonium body burden, plus the plutonium excreted, minus that excreted in the feces during the first 3 days after exposure.

three lung-tumor types were observed: bronchiolar-alveolar, adenocarcinoma and fibrosarcoma. Metastases were observed in the lungs, thoracic lymph nodes, trachea, mediastinum, and heart of the dog with pulmonary adenocarcinoma. Bone-tumor metastases were found in the lungs of six dogs; in three dogs, the bone tumor metastasized to lungs, thoracic lymph nodes, liver, spleen and heart; in one dog, the bone tumor metastasized to the iliac lymph nodes; and in one dog, the bone tumor metastasized to the lungs, pleura, diaphragm and heart. The five dogs with Addison's disease had adrenal cortical atrophy.

In addition to the lesions associated with the cause of death, lesions in the lungs of the Dose-Level Groups 4, 5 and 6 dogs included focal alveolar histocytosis, alveolitis, alveolar epithelial cell hyperplasia, alveolar emphysema, pleural fibrosis, and interstitial fibrosis. Numerous alpha stars were observed, mainly in foci of fibrosis, and single alpha tracks were scattered throughout sections in foci of alveolar histocytosis and in alveolar septa. Sclerosing lymphadenopathy in the tracheobronchial and mediastinal lymph nodes was associated with high concentrations of plutonium observed as alpha stars in Dose-Level Groups 3, 4, 5 and 6. Similar but less severe lesions were seen in the hepatic lymph nodes. In Dose-Level Groups 5 and 6 there were extensive alterations in bone, including multiple areas of focal atrophy of bone; endosteal, trabecular and peritrabecular bone fibrosis; and osteolysis of cortical, endosteal, and trabecular bone. One dog had lesions of secondary hypertrophic osteoarthropathy. Radioactivity in the bone was present as single tracks, generally scattered throughout the bone, cartilage, and bone marrow. The liver contained foci of hepatocellular fatty change, where small clusters of single tracks were seen. There was also mild, focal, nodular hyperplasia of hepatocytes in Dose-Level Groups 3, 4, 5, and 6. Elevated serum GPT levels, suggestive of liver damage, were observed in the Dose-Level Groups 3, 4, 5 and 6 dogs.

Dose-related lymphopenia was observed in groups with mean lung $^{238}PuO_2$ deposition of 77 nCi or more (Figure 4). The lymphocyte depression was more pronounced in magnitude and appeared earlier than in dogs exposed to similar doses of $^{239}PuO_2$. Through 126 months after exposure, mean lymphocyte values were significantly lower ($P < 0.05$) for Dose-Level Groups 4 and 5 than for the control group. However, lymphocyte values in the $^{238}PuO_2$-exposed dogs tended to increase sooner after reaching a minimum than in $^{239}PuO^2$-exposed dogs, and mean lymphocyte concentrations in Group 3 dogs were not significantly different from values of control dogs 86 to 94 months following exposure. As with ^{239}Pu, lymphocyte values in the two lowest exposure groups (2.3 and 18 nCi) were not different from control values. A dose-related reduction in total leukocytes was evident, primarily because of lymphopenia, except in Groups 5 and 6, in which neutropenia was also observed. Through 118 months after exposure, mean leukocyte and neutrophil values were significantly lower ($P < 0.05$) for Dose-Level Group 5 than for the control group. No difference in monocyte values was seen in relation to dose levels. A significant and progressive reduction in eosinophils was evident only in Group 6 dogs following $^{238}PuO_2$ inhalation. No chronic effects have been observed in red-cell parameters.

Lymphopenia, the earliest observed effect after inhalation of either $^{239}PuO_2$ or $^{238}PuO_2$, occurred after deposition of ~80 nCi plutonium in the lungs. On a concentration basis, the 80-nCi dose level is about 40 times the 16-nCi maximum permissible human lung deposition, based on 0.3 rem/wk to the lung.

In serum chemistry assays of $^{238}PuO_2$ dogs, performed more than 118 months following exposure, ALP and GPT values were higher than those of the control group only in Dose-Level Groups 3, 4 and 5 dogs. Elevations in GPT are consistent with liver histopathologic findings and radiochemical analyses indicating ^{238}Pu translocation to the liver. Alkaline phosphatase elevations occurred in some of the dogs with primary bone tumors and in others in which the increase was attributable to the liver (by heat inactivation of ALP) as the source of the largest portion of the ALP.

Using the uptake and retention curves shown in Figures 1 and 3, cumulative radiation doses to death were estimated for the lungs of the ^{239}Pu dogs and the lungs (Table 7). For the dose calculations, mean plutonium concentration in the entire lung and skeleton was used.

Lung-tumor risk estimates based on data to 11 years after exposure suggested that $^{239}PuO_2$ was more effective than $^{238}PuO_2$ in causing lung tumors, especially at high cumulative lung doses (Figure 5). The influence of deaths due to bone tumors in the $^{238}PuO_2$-exposed dogs and/or other competing causes of death and survival time after exposure were not evaluated in these current risk estimates. Future risk estimates will consider these factors.

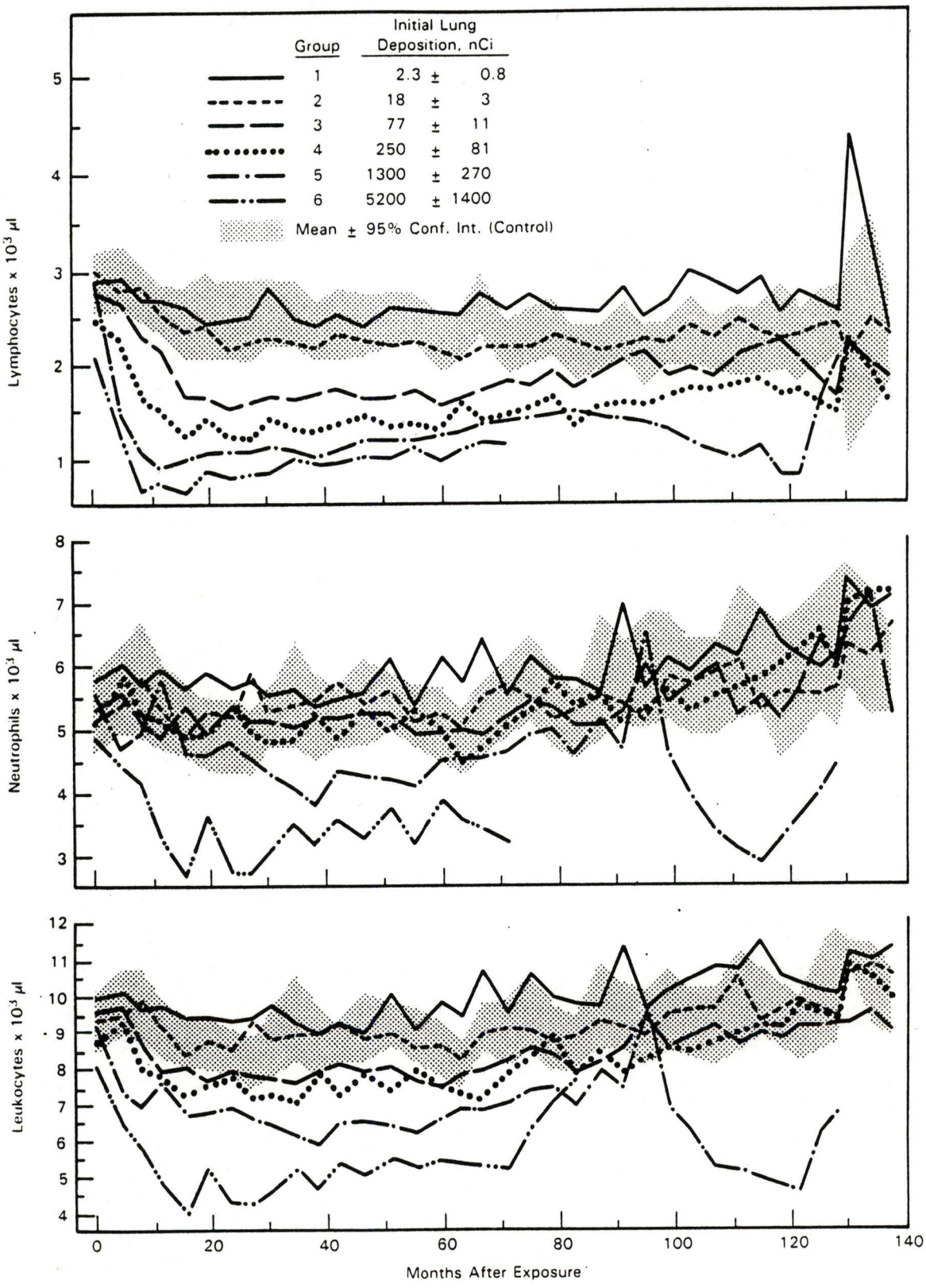

Figure 4. Mean Leukocyte, Neutrophil and Lymphocyte Values in Dogs After Inhalation of $^{238}PuO_2$.

Table 7. Estimates of Cumulative Radiation Doses to Lungs (^{239}Pu-Exposed) or Lungs and Skeletons (^{238}Pu-Exposed) of Dogs with Lung and/or Bone Tumors After Inhalation Exposure.

	Dose Level Group	Number of Dogs with Tumors	Survival Time Postexposure, mo	Cumulative Dose to Organ, rad
$^{239}PuO_2$- Lung Tumors	6	1	69	7400[a]
	5	20	37 - 115	1700 - 4000
	4	14	93 - 156	550 - 1500
	3	7	98 - 161	150 - 550
	2	1	166	30
	1	0	---	---
$^{238}PuO_2$- Lung Tumors	6	9	49 - 84	2300 - 9800[a]
	5	5	70 - 110	1350 - 2900
	4	2	118 - 135	400 - 450
	3	1	134	100
	2	0	---	---
	1	0	---	---
$^{238}PuO_2$- Bone Tumors	6	9	49 - 84	180 - 480[b]
	5	16	61 - 132	80 - 230
	4	4	118 - 136	50 - 60
	3	0	0	---
	2	0	0	---
	1	1	99	<1

[a] Dose to lungs
[b] Dose to skeleton

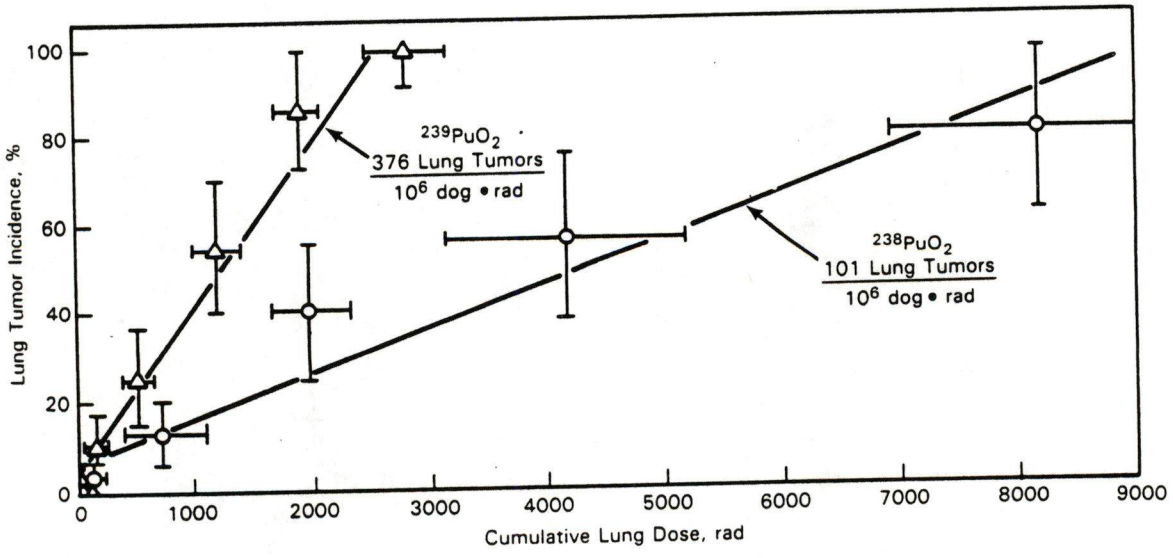

Figure 5. Comparison of Lung Tumor Risk Estimates in Dogs at 11 Years After Inhalation of $^{239}PuO_2$ or $^{238}PuO_2$ (Mean ± SD).

SPECIAL ISOTOPE SEPARATION PROJECT - INEL

Good evening. I am Peter T. Johnson, currently a private citizen and a resident of McCall, Idaho. My most recent career was in public service where I served, from May of 1981 to July of 1986, as the Administrator of the Bonneville Power Administration, the largest Power Marketing Agency in the Department of Energy. My previous career was as a businessman in the State of Idaho where, over 25 years, I was active in construction, logging, ranching and manufacturing.

I am familiar with the technology of the Atomic Vapor Laser Isotope Separation (AVLIS) Process through an assignment given me by then Energy Secretary Donald P. Hodel in 1984. He appointed me Chairman of a seven member Process Evaluation Board (PEB) that was to evaluate the Advanced Gas Centrifuge (AGC) and AVLIS technologies regarding their potential for future deployment on a production scale in the U. S. uranium enrichment enterprise. This PEB study extended over 10 months and required more than 100 manyears of effort on the part of the various government and contractor organizations involved. Several classified meetings were held and one public meeting took place in Germantown, Maryland.

When we submitted our report of findings to Energy Secretary John Herrington on May 15, 1985 recommending that the AVLIS technology be selected for further development and demonstration, we stated "The AVLIS technology has been under development for the past 13 years and has grown out of laboratory concepts that involve innovative technologies such as lasers and use of vaporized uranium metal. No fundamental science and technology flaws have been identified in the process, and it is expected that the AVLIS program will be successful in demonstrating the capability of large scale enrichment of uranium."

The PEB's safety assessment which was included in our report to the Secretary stated "The AVLIS safety concerns have not been addressed in a formal Safety Analysis Report but have been assessed to pose no unacceptable risks. The more significant hazard potentials associated with the AVLIS process include laser beam exposure, ionizing radiation, magnetic fields, hazardous and toxic materials, overpressurization, fire, and other standard industrial hazards. AVLIS RD&D has not identified a reasonable potential for major hazards. Neither has the AVLIS process identified a reasonable potential for major off-site consequences. For

on-site consequences, preventive or mitigating features appear to exist that would reduce any hazards to acceptable levels." The Secretary accepted our recommendations and development work has proceeded.

I am informed that, while the product of its application is different, the technology being used in the Special Isotope Separation (SIS) Project at the Idaho National Engineering Laboratory (INEL) is substantially the same as the AVLIS technology used in uranium enrichment.

This evening I would like to provide comments on DOE's proposed scope of the Environmental Impact Statement (EIS) for the Special Isotope Separation Project. First, however, I want to express my personal satisfaction with the Environmental Laws of our Nation. As the Administrator of BPA I supervised many environmental inquiries under the National Environmental Policy Act (NEPA) that resulted in either EIS's or Findings Of No Significant Impacts (FONSI's) and contributed importantly to the quality of the decisions I had to make.

1. The scope of the EIS as presented in the Federal Register Notice of Monday, February 9, 1987, appears to be sufficient and covers, among other issues, subjects of concern to Idaho citizens.

2. The choice of INEL as the preferred site is to be applauded. The demonstrated professionalism and productivity of employees at the site will result in a safe, quality facility. The INEL has a history of safe and responsible management of nuclear activities. It is only logical, therefore, that Idaho's INEL play an expanded role in the national defense complex that assures peace through a strong deterrent posture.

3. The DOE is encouraged to make the SIS Project the safest facility possible to assure protection of people and the environment using established safety standards, know-how, and today's best technologies.

4. The choice of the INEL as the preferred site for the SIS Project was well reasoned as it adds diversity in location, due to INEL's remoteness, to the Nation's weapons production complex.

5. Because of DOE's need for this Project and the favorable impacts it will have on Eastern Idaho's employment and economy, time is of the essence. Therefore, the DOE is encouraged, without jeopardizing the NEPA process,

to move expeditiously to complete the development of this EIS

6. The DOE is to be complimented on its openness in providing information about the SIS Project to the community. The development of this EIS testifies to this forthrightness and the DOE is encouraged to continue this policy.

7. Where the INEL/DOE is a significant contributor to Idaho's economy, has been a good neighbor and citizen for 35 years, and is a valuable national asset; it is fitting and proper that the Laboratory be given serious consideration in meeting the national needs as determined by Congress and the President.

8. As Idaho's Governor, Legislature, and citizens are desirous of stablizing existing employment and attracting new and desirable businesses to the State, the possible introduction of the laser isotope separation technology to our economy is welcomed not only for itself, but for the satelite businesses it will encourage. The INEL/State of Idaho will benefit by the introduction of this major project with its advanced technological areas new to the INEL, with the potential for spin-off applications in other commercial/research contexts at or near the Site.

9. As the SIS Project provides additional productive capacity and a contingency against unanticipated interruptions in existing plutonium production capabilities, the Project promises to help fulfill DOE's responsibility for developing and maintaining the ability to produce nuclear material required for defense programs authorized by the President and Congress.

10. The technology will convert existing DOE owned fuel-grade plutonium through laser energy technology (which separates or purifies plutonium isotopes) to weapons-grade plutonium. The facility will not use commercial nuclear fuel for defense purposes.

11. The technology will result in improved processes for (1) minimizing radiation exposure to workers (2) minimizing nuclear waste materials (3) reducing costs of weapons materials. The Project presents an opportunity to apply state-of-the-art (1980's-1990's) technology to plutonium

This concludes my testimony. Thank you.

Testimony Concerning

THE PROPOSED ATOMIC VAPOR LASER ISOTOPE SEPARATION FACILITY

(AVLIS)

Boise, Idaho, February 26-27, 1987

JAMES C. WARF
Professor of Chemistry, Emeritus
University of Southern California
Los Angeles, CA 90089-1062

Sponsor:
Natural Resources Defense Council

1. Qualifications

I have been a Professor of Chemistry at the University of Southern California for nearly 40 years. Starting in June 1942, I was a group leader on the Manhattan Project, which developed nuclear reactors and weapons, for more than five years. While based at the installation at Iowa State University in Ames, I worked out of the University of Chicago and also spent time at Oak Ridge, Tennessee and at universities on the east coast. At various times I had 50 to 120 chemists under my supervision in inorganic and analytical chemistry of uranium, neptunium, plutonium, the fission products, and other areas. One of my accomplishments was the first use of butyl phosphate as an extractant for uranium and other heavy metals, which later evolved into the Purex process; the patents are in my name. In the years following I have been a consultant at Jet Propulsion Laboratory (working with carbon-14, a radioactive nuclide used in life-detection probes on Mars) and have taught radiochemistry.

2. General Statement

The current nuclear arms race is the most perilous activity of the human species in our entire history. The two super powers engage in an action-reaction exercise of escalation which represents an extension of the mode of thinking about military matters born of millennia of war. It should have ended in 1945, with the annihilation of Hiroshima and Nagasaki.

At the moment, there is approximate parity between the two superpowers. The United States has roughly 28,000 nuclear warheads, the USSR roughly 22,000. While the total megatonnage yield of the Soviets exceeds that of the U.S., the lethality of U.S. weapons exceeds the Soviet level; this is because of higher accuracy of targeting systems.

Each side has all the deterrence necessary. The time is overdue when we should exert more of our efforts toward defusing hostilities. I oppose AVLIS because it merely jacks up the arms race another notch, endangering the precarious balance. If implemented, the net effect will be to reduce our security, not enhance it.

The arms race-mentality is exemplified in such documents as the Department of Energy memorandum of October 24, 1986, which stated that the AVLIS capability would provide "a timely response to potentially increased defense program demands for plutonium resulting from Soviet production expansion, technological surprise, or breakout." This is precisely the type of mindset, I believe, which we should avoid. It assures a continued arms race and ultimate disaster. It would be better to spend the hundreds of millions of dollars proposed for AVLIS on research with the objective of making a more peaceful, more secure, world.

3. The Objectives of AVLIS

Two main objectives can be identified:

A. To lower the gamma and neutron radiation background arising from existing warheads, largely due to their Pu-240, Pu-241, and Pu-242 content.

B. To upgrade military plutonium of fuel grade which contains approximately 16% Pu-240 and 2% Pu-241.

While the proposed facilities will synthesize no additional plutonium, more Pu-239 of weapons grade will be made available, resulting in production of more warheads.

4. Alternatives

If the AVLIS program were abandoned, what alternatives would be available? The scientific, engineering, and military communities of industrialized states have now had 40 years experience in handling weapons grade plutonium containing approximately 6% Pu-240 and smaller proportions of still heavier isotopes. Military personnel manage nuclear warheads in several situations:

A. Servicing warheads in land-based missiles. In these cases the warheads are at a considerable distance from the crew. Protection similar to that of medical radiologists would give adequate shielding. Only relatively brief periods of close contact for loading and adjusting should be necessary.

B. Warheads for aircraft. During storage, there is no need for prolonged exposure of personnel to the immediate area of warheads. Exposure during other times is relatively brief.

C. Retirement of old warheads. Shielded equipment for manipulating such warheads is available or can be developed.

D. Submarines. This is the principal instance where prolonged proximity to background radiation from warheads might be likely. If the problem is important, excessive exposure can be avoided by a number of steps. One is to use only uranium-235 in the fabrication of warheads for submarines. This would require some changes in warhead design, but should be possible if it is genuinely vital to lower radiation background by a large factor. Another possibility is to use the current U-235/Pu-239 combination, but choosing super grade plutonium, that is 3% Pu-240. A third possibility is to employ shielding made from depleted uranium (metal whose U-235 has been removed), an excellent absorber of gamma rays. Further shielding by aqueous borax containing cadmium salts absorbs neutrons.

5. Plutonium from Civilian Reactors.

Once an AVLIS facility is in operation, the psychology of the arms race would be to present a constant temptation to manipulate the laws so as to permit upgrading plutonium created in civilian reactors. About 75 tons of such plutonium is now available. Such a step would be catastrophic for the Non-proliferation Treaty.

6. Accidents

Examination of the unclassified literature on AVLIS has led me to surmise that of many types of accidents possible, two are most likely, namely criticality accidents and fires, especially fires in glove-boxes.

Despite years of accumulated experience in processing spent reactor fuel, there are always unsuspected dangers when new technology is scaled up to industrial size. The personnel is not yet fully trained. It is unlikely that all units would function without failure at all times. While the processes of reduction of plutonium compounds to the metal and casting it are well controlled, the AVLIS procedures involve vaporization of plutonium in vacuum chambers, where it could accumulate undetected in invisible areas. Over time, a supercritical amount might accumulate. In this case, an explosion with a flash of radiation would open up a portion of the apparatus to the air. The environment would be contaminated by plutonium dioxide dust. There would be several kilograms of plutonium involved. Inhalation of 100 microcuries (less than 2 milligrams of Pu) suffices to produce one cancer. The accident with a military reactor in 1961 near Idaho Falls should not be forgotten; accidents do happen.

7. Our Security

Again I would like to emphasize that the overriding issue is our security, which cannot be attained through an arms race. The construction of AVLIS would be a destabilizing influence. An Environmental Impact Statement should address these points.

Statement of

DANIEL HIRSCH
Director
Program on Nuclear Policy
University of California, Santa Cruz

Before the
United States Department of Energy
Scoping Hearing on Potential Impacts
of the Proposed Plutonium Laser Enrichment Facility

Boise, Idaho
February 26, 1987

Introduction

My name is Daniel Hirsch. I am director of the Program on Nuclear Policy at the University of California, Santa Cruz, an interdisciplinary research and teaching program dealing with policy questions associated with nuclear weapons and nuclear power. I have specialized in nuclear proliferation, nuclear safety, nuclear safeguards, nuclear terrorism and nuclear regulatory issues, among other matters.

A few examples of recent work: My study, "The Truck Bomb and Insider Threats to Nuclear Facilities," prepared for the International Task Force on Prevention of Nuclear Terrorism, is to be published next month by Lexington Books in a volume entitled Preventing Nuclear Terrorism. My research over the last several years regarding the policy aspects of reducing enrichments for research and test reactors is said to have been influential in the recent decision by the U.S. Nuclear Regulatory Commission to require, in cooperation with the Department of Energy, the conversion of such reactors to low-enriched fuels because of proliferation and nuclear terrorism concerns. I am currently working on a study for the Three Mile Island

Public Health Fund regarding emergency planning issues associated with the undamaged TMI reactor. Last year I served on a Nuclear Regulatory Commission panel established to help develop containment performance design objectives for U.S. nuclear reactors, the meetings of which coincided, ironically, with the Chernobyl nuclear accident. Shortly after the accident began, I was asked by the General Oversight Subcommittee of the House Interior Committee to assemble a group of independent nuclear experts to review the safety of the Department of Energy's Hanford "N" plutonium production reactor in light of its similarities to the ill-fated Chernobyl reactor. Among those who participated in that review was my colleague Professor James Warf, an affiliate of the Nuclear Policy Program, who has kindly agreed to participate in this review of DOE's proposed plutonium laser enrichment project and joins me here today.

In addition to Professor Warf, I have consulted with several colleagues from the Nuclear Policy Program in preparation of this testimony: Dr. Joel Primack, a physicist; Dr. James Lewis, a chemist; and Dr. W. Jackson Davis, a biologist and environmental scientist. As they cannot be with me today, it should be understood that my testimony is mine alone, although I will do my best to accurately represent their concerns. It should further be made clear that the views presented here are not necessarily those of the University of California. Finally, I should add that my appearance here today is at the request of the Natural Resources Defense Council and the Snake River Alliance.

Summary of Issues

The Department of Energy (DOE) proposes to build a plutonium enrichment facility utilizing Atomic Vapor Laser Isotope Separation (AVLIS) technology.

The primary purpose appears of the project appears to be to increase the amount of weapons-grade plutonium for the U.S. nuclear weapons arsenal by using lasers to enrich non-weapons-grade plutonium separated from spent reactor fuel. Before deciding whether to proceed with the proposed project, DOE is required by the National Environmental Protection Act (NEPA) to prepare an Environmental Impact Statement (EIS). The EIS must address potential impacts of the proposed action and consider alternatives, including the alternative of not proceeding whatsoever with the proposed project. At the heart of a genuine environmental impact assessment process is the requirement to balance potential negative impacts to the human environment against potential benefits. If the impacts outweigh the benefits, or if the negative impacts are otherwise unacceptable, the alternative of no action is the clearly preferred option. Furthermore, environmental law places the burden of proof that the potential negative impacts are acceptable on the party proposing the activity that may result in changes in the human environment.

Given these standards, the magnitude of the potential impacts, and the paucity of potential benefits from the proposed plutonium laser enrichment facility, it appears difficult for the alternative of proceeding with the project to be successfully justified. The potential negative impacts of such a project, although difficult to quantify, may be very large, whereas the asserted benefits appear, upon closer scrutiny, to substantially add to, rather than reduce, social and environmental risks.

Among the potential impacts of DOE's proposed plutonium laser enrichment facility upon the human environment that need to be fully assessed are proliferation, accident, and terrorism risks. The plutonium facility--called by DOE the Special Isotope Separation plant, or SIS--is to use a new technique involving lasers to enrich fissionable material. Large

quantities of plutonium, a highly toxic and strategically dangerous material, are proposed to be shipped in and out. The consequences of accident or sabotage involving even a small proportion of these inventories, whether in transit or on site, could be extremely severe and long-lasting. The impacts upon the international nonproliferation regime can be expected to be quite disruptive, both by leading to the spread of a potentially cheaper, less energy-intensive and more concealable method of producing weapons-grade nuclear material and by bringing down the current barriers between civilian reactors and military use of the plutonium contained in their spent fuel. And the theft or diversion of plutonium--even very small fractions of the estimated throughput of the proposed plant--could have devastating consequences were acquisition of clandestine nuclear explosives by subnational groups or states currently not in possession of such weapons to result.

Proliferation Risks

The primary barrier to the construction of atomic weapons is the acquisition of the nuclear material needed--plutonium or highly enriched uranium. As has been noted by John S. Foster, a noted nuclear weapons expert and former Director of the Lawrence Livermore National Laboratory and former Director of Defense Research and Engineering in the Department of Defense:

> It must be appreciated that the only difficult part of making a fission bomb of some sort is the preparation of a supply of fissionable material of adequate purity; the design of the bomb itself is relatively easy...

Unlike the hydrogen bomb, the design principles of atomic (e.g., fission rather than fusion) weapons are relatively straightforward and known to any good physicist and large numbers of others. It has long been recognized--

indeed, since the dawn of the atomic era--that the primary barrier to the spread of atomic weapons would be the difficulty in acquiring plutonium or highly enriched uranium, both of which have, since, the forties, required massive, extremely large and expensive facilities. It has only been the magnitude of the effort necessary to produce weapons-grade materials that has kept the proliferation of nuclear weapons from being far more extensive than it already is.

That may all soon change if this proposed DOE project is permitted to go forward. For some years now DOE has been working--to the horror, I must add, of the international nonproliferation community--on a technique for producing weapons-grade materials that could be much cheaper, less energy-intensive, and easier to conceal than the methods currently available. This technique, laser isotope separation (LIS), uses lasers to selectively excite and thus separate different isotopes of uranium or plutonium. (Because the different isotopes are chemically identical, normal chemical separation cannot be used.) DOE now proposes to move the technique out of the laboratory and into mass use--a major and perhaps irreversible step down the slippery slope of nuclear proliferation.

Reducing the barriers to acquisition of weapons-grade materials is going in precisely the wrong direction, working at cross purposes to stated U.S. and international nonproliferation goals. I note that there is some irony in the fact that while one division of DOE--the RERTR program--is involved in carrying out U.S. and international policy of reducing enrichment of nuclear materials so as to slow weapons spread, another division of DOE is proposing introduction of a technique and large-scale use of it to increase enrichment, which can only speed the proliferation of such weapons. This is, of course, not the only example of Administration

policies working at cross-purposes, but it is one that should be carefully examined in assessing the potential impacts of this proposed project.

A second major potential proliferation impact is the risk that this plant, if built, will result in tearing down the wall, carefully constructed internationally over the decades, between civilian uses of nuclear power for peaceful purposes and military uses. Ever since the Atoms for Peace program in the 1950s, civil nuclear power has been kept largely separate from the military. Plutonium in spent commercial fuel has been off-limits to the military. In the early part of the Reagan Administration, DOE officials proposed construction of laser isotope separation plants as part of a plan to use civilian reactor fuel for weapons purposes. (Plutonium from fuel from commercial reactors can be used directly in nuclear weapons, but with a loss in reliability of explosive yield. Weapons states prefer to use weapons-grade, rather than reactor- or fuel-grade plutonium, in their bombs; laser enrichment is intended to "enrich" the plutonium from reactor fuel to weapons-grade levels.) The proposal was met with large-scale opposition, not the least of which came from the nuclear power industry, which knows that public acceptance of nuclear power, already tenuous at best, would plummit were people to feel that they were paying their utility bills not to a public utility but to what amounts to a bomb factory. More importantly, Congress felt that such activity would undermine the international nonproliferation regime and result in wholesale "mining" of commercial reactor fuel for weapons purposes by nations abroad. Congress passed legislation, still in effect, forbidding the proposed use of civilian fuel for weapons purposes.

It is difficult to escape the conclusion, however, that the DOE proposal to go ahead with building the laser isotope separation plant is intended to do an end-run around that legislation. The construction of such

a facility for enrichment of the relatively small quantity of fuel-grade, non-civilian fuel available to DOE makes little sense unless there is intention to enrich fuel from the civilian stockpile as well. This would have devastating consequences on international efforts to keep civilian stockpiles abroad from being used for weapons purposes, in addition to the purely technological impact discussed above of providing a relatively concealable method of obtaining weapons-grade materials from existing civilian stocks of non-weapons-grade materials. Countries with stockpiles of civilian spent fuel would rapidly have a means of getting weapons from currently non-weapons-grade, civilian sources, a kind of plows-into-swordshares process, and very dangerous. These impacts should be fully assessed as well.

Accident Impacts

Plutonium, in addition to being extremely dangerous internationally if used for nuclear weapons purposes, is a very toxic substance, difficult to handle safely. It burns in the presence of air, releasing plutonium oxide particulates that, if inhaled, can result in cancer or fibrosis of the lungs. If too much plutonium is accidentally brought together, a low-grade nuclear explosion known as a "criticality accident" can result. While the explosive yield is relatively small--the equivalent of a few sticks of dynamite--the radiation released can be of concern. Furthermore, since plutonium needs to be handled in inert atmospheres or vacuums to avoid it catching fire, a criticality accident can result in breaching a pressure boundary, causing air to rush in and a fire to start. Other events involving transportation accidents are of potential concern.

The potential accidents at such a facility need to be carefully

assessed. I should note that some of the early safety analyses for the SIS plant that I have reviewed seemed to rather narrowly define the maximum credible accident for the facility to a fire releasing to the environment on the order of a few hundredths of a gram, this despite the availability at the plant of vastly larger quantities for combustion and release to the environment should there be a fire. (The plan, after all, calls for the processing of tons, i.e., millions of grams, of plutonium). This kind of understating of potential impacts does a disservice to the safety analysis and should be corrected in the environmental impact process. Chernobyl and Three Mile Island--both of which went far beyond the "design basis accident" estimates established in safety analyses by their respective governments before the events--should teach us that very serious accidents are possible and that failure to analyze the potential for such accidents can be very dangerous.

I should add that the presence of plutonium in metallic (and thus flammable) form at many points in the SIS process is of especial concern, as is the need to put the plutonium at high temperatures for the process. The impacts of a severe plutonium fire could be devastating.

Nuclear Terrorism Risks

Given the nature of the world in which we now live, analysis of potential impacts of terrorism is essential for a facility such as this proposed plutonium plant. Terrorism has been escalating at a dramatic rate, whereas protective measures, particularly for nuclear facilities, has not well kept pace. [For a more detailed discussion of the matter, please refer to my March 1986 article in the Bulletin of the Atomic Scientists, "Protecting Reactors from Terrorists."] The risks of truck bomb attacks and the threat of insider sabotage are substantial, difficult to deal with, and

the impacts, particularly in a facility handling large quantities of plutonium, could be catastrophic. Risks during transportation to and from the facility of the large quantities of plutonium anticipated need also to be carefully assessed.

An even more worrisome terrorist risk is the theft or diversion of plutonium for construction of a clandestine nuclear explosive. DOE facilities in the past have had a poor record in material accountability. The amount of "MUF" (Material Unaccounted For, now referred to as "ID" or Inventory Difference) is many scores or hundreds of bombs-worth. Since the facility proposes to process thousands of kilograms of plutonium, and since the NRC "formula quantity" for plutonium is only two kilograms (and computer calculations by our Program on Nuclear Policy suggest one can make a nuclear explosive with even less than the formula quantity), it is clear that theft or diversion of several bombs-worth of plutonium from the proposed facility, or during transport to or from the facility, must be considered. The environmental impacts of detonation of a device made from such stolen material must be considered in the environmental impact review process; it is hard to see how such an impact could be considered acceptable.

Conclusion

The potential negative impacts of the proposed plutonium laser enrichment facility are extraordinarily large. The project can substantially spur nuclear proliferation, both by helping spread a technology that can more easily provide weapons-grade materials to nations that don't have them and by helping tear down the wall that has protected the world from civilian nuclear fuel being "mined" to make nuclear weapons.

The results of such proliferation--more nations having nuclear weapons and increased likelihood of their being detonated, with all the attendant destruction of the human environment that would entail--would appear to vastly outweigh any potential benefit the proposed plant might have (e.g., reduced radiation exposure to sailors). [Furthermore, there are far more sensible methods for providing the same purported benefit (e.g., better shielding, blending with "super blend" plutonium) and it seems unlikely that there would be any net radiation savings if the exposures to workers at the SIS plant itself are taken into account, as well as potential exposures to the public in case of accident. This needs to be carefully addressed, which to my knowledge has not been done to date by the Department.]

Because of the extreme toxicity of plutonium and its long life (half life of 24,400 years), accident risks are substantial. Because of the presence of large quantities of plutonium in the metallic (and thus flammable) form, the risk of fire could be considerable and the consequences long-lasting and severe. [Analyses of potential impacts, by the way, should extend over the time of those impacts, not just a few years, as the plutonium released to the environment would be toxic for thousands of generations.] Furthermore, the potential for criticality accidents also seems substantial.

The risks of terrorism--be it sabotage or theft for bomb purposes of plutonium--are worrisome as well. The consequences of detonation of even one atomic bomb by a terrorist group--let alone the increased risk of larger scale nuclear war due to escalated proliferation due to the SIS project--would appear to vastly outweigh any potential benefit from the proposed facility.

Lastly, it must be said that the primary asserted benefit from this proposed project--the production of thousands of more bombs-worth of

weapons-grade plutonium--seems not a benefit at all but in all likelihood the largest negative impact of the entire SIS scheme. We have more than enough nuclear weapons already, and more can only increase the risk of nuclear war and the global environmental consequences of such a war. Once again the Administration appears to be working at cross purposes: working in Geneva supposedly on reducing nuclear arsenals while at the same time trying to build in the U.S. plants to substantially enlarge the arsenals. If reducing arsenals reduces the probability and consequences of nuclear war, plans like SIS can only increase those probabilities and consequences.

The U.S. has on the order of 25,000 nuclear warheads already. If their sole purpose is, as the public has been led to believe, to deter nuclear war, it was long ago determined that a few hundred bombs could do that job. These weapons are so extraordinarily destructive, and the number of major and intermediary-sized cities in the U.S.S.R and U.S. (with the bulk of the countries' population and industry) so few, that unacceptable damage of incomprehensible scale would result from detonation of very small fractions of either side's arsenals. The rest is just overkill, plain and simple. The proposed SIS plant would just add to that overkill, something I am hard pressed to perceive as a societal benefit.

In summary, the proliferation, accident, and terrorism risks associated with the proposed plutonium laser enrichment facility are substantial, and the asserted benefit, an increase in nuclear weapons, seems to be not a benefit at all but among the greatest of dangers.

COMMENTS OF
RICHARD L. HAHN
MANAGER-INDUSTRIAL DEVELOPMENT
IDAHO POWER COMPANY

SIS SCOPING HEARING
BOISE, IDAHO
FEBRUARY 26, 1987

On behalf of Idaho Power Company, I have several comments concerning the Special Isotope Separation (SIS) project which is proposed for siting at INEL, the Department of Energy's (DOE) preferred location.

First, I would like to thank the DOE for their efforts in providing information to the public on the SIS project. Not only is this information important to understanding what the SIS project is, and is not, but it also demonstrates the commitment and emphasis DOE places on ensuring that their activities or project proposals utilize all practical means to preserving the environment. For these efforts, you are commended.

I have reviewed the Identification of Environmental Issues as outlined in the Federal Register that will be considered in the preparation of the Environmental Impact Statement (EIS) on the SIS project. I believe these issues are broad as well as comprehensive, and they address the areas of concern to the citizens of Idaho.

One recommendation that I would make regarding the impact from the SIS operation is:

> For the past 38 years, the operation at INEL has recorded a history of safety as well as responsible management of their nuclear activities. The DOE should follow the leadership demonstrated at INEL in these areas to develop the safest facility possible, using the latest technology available.

The remainder of my comments address the economic impacts of the SIS project.

During the past several years, the industries that traditionally have been the mainstay of Idaho's economy have been in the doldrums. Agriculture, timber, mining, and to some degree our electronics' industry have been affected by a recession, resulting in decreased employment and a reduced value of production. But even during this economic downturn, Idaho still had several bright spots--one of these being the operation at INEL.

INEL is very important to Idaho's economy, and particularly to the communities in southeastern Idaho. The SIS project, if located at INEL, would be a tremendous positive economic benefit to the state.

This 500 million dollar project will employ 400 construction personnel. I believe it is appropriate to assume a significant number of these personnel will be from Idaho, which would be a great benefit to the state's construction industry. Additionally, it is likely a large percentage of the construction materials will be supplied by or provided through Idaho businesses.

Once completed, the SIS will employ an operating staff of 750, with annual operating costs of 54 million dollars.

Not only will this project benefit the state's economy during construction, but it will also add 750 permanent employees to Idaho's work force, which based upon Idaho's total employment, is a significant increase.

But the SIS project has additional positive economic benefits. The addition of the SIS at the proposed site adjacent to the Idaho Chemical Processing Plant will result in maximum utilization of the existing infrastructure that provides supporting services. This maximum utilization will enhance the ability of INEL to avoid or minimize any negative impacts to the region's economy should certain DOE programs be reduced or eliminated.

Another benefit is the SIS technology itself. Located in Idaho, our state will be on the leading edge in the application of advanced laser technology. What can this mean to Idaho? This technology has the potential to be applied to high-tech, spin-off industries. The result may be many satellite industries locating in this region and other areas of the state. The SIS could literally take Idaho's economy into the 21st century and beyond.

I am confident the SIS project will be environmentally acceptable, and a tremendous benefit to Idaho's economy. Idaho Power is proud of the relationship we have had with DOE as the primary electricity supplier since 1951. We intend to assist in any way that is appropriate to see that the SIS project is located at INEL.

COMMENTARY ON THE SCOPE OF THE EIS ON SPECIAL ISOTOPE SEPARATION PROJECT: IMPLICATIONS FOR IDAHO

February 26th, 1987

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INTRODUCTION

I would like to submit the following comments on the scope of the Environmental Impact Statement for the proposed atomic vapor laser isotope separation (AVLIS) facility. There are a number of questions which should be addressed about the political, military, economic, environmental, and health effects of this project. I could, for example, dwell on the police state atmosphere created by these kinds of top security programs or question the morality of people participating in the preparation of a nuclear holocaust. But I will resist the temptation to discuss these matters except to say that I believe the crux of the matter has to do more with the organized interests of the nuclear weapons industry than with the rationality of our defense policy (Bertsch and Shaw, 1984). My comments are directed at the potential effects of SIS on Idaho's environment and wildlife, INEL workers, and the public in the vicinity of the INEL site. I will place these comments in the context of past research on the radiological effects of nuclear weapons programs.

WILDLIFE

Background

By 1974 more nuclear reactors (50, of which 16 were operating or operable) had been built at the National Reactor Testing Station (NRTS) than at any other location in the world. In that same year the NRTS was renamed the Idaho National Engineering Laboratory (INEL) and was designated a National Environmental Research Park where scientists could do radioecological research. In the years since the INEL's radioecology research program has produced a steady stream of published research. The focus of some of this research has been on assessing the possible radiological effects in humans of the consumption of contaminated game species. This part of my commentary concentrates on the radioecological effect of INEL radiation releases on wild animals as a "bioindicator" of the extent to which southeastern Idaho's biosphere has been contaminated radionuclides by site activities.

An overview of the studies reveals the following picture. Several studies have concentrated on the contamination of water fowl that use the radioactive waste leaching ponds, (e.g., mallard ducks, nestling raptors, marsh hawks, american kestrals, long-eared owls) and sage grouse around the Test Reactor Area (TRA) and Idaho Chemical Processing Plant (ICPP). These studies report detectable levels of a variety of radionuclides in the tissue samples collected from the animals. One study by Halford and Markham (1983) reported significantly higher levels

of I-127 and I-129 in waterfowl muscle samples collected between 1975 and 1981 near the TRA pond than a control group. The same pattern was found in sage grouse for eleven different radionuclides in samples collected between 1977 and 1979 (Connelly and Markham, 1982; Connelly and Ball, 1983).

Another set of studies have concentrated on rabbits, small burrowing mammals, the coyote, soil and vegetation in the Subsurface Disposal Area and SL-1 Accident Waste Disposal Area. Significantly higher levels of americium-241 was found in rabbit carcasses, soil, plants, and coyote feces samples than in controls (Arthur and Markham, 1983b). Detectable and significantly higher levels than controls of Cs-137 were found in samples of rabbit, deer mice, pocket mice, soil, plants, and coyote feces samples collected between 1977 and 1981 (Arthur, Grant and Markham, 1983a; Arthur and Markham, 1983b). Finally, detectable and significantly higher levels than controls of Pu-238, Pu-239, and Pu-240 were found in samples of rabbit carcasses, deer mice carcasses, soil, plants, and coyote feces in the waste disposal areas (Arthur and Markham, 1983b). The latter study also reported high levels of Sr-90 in the same samples.

A final set of studies have focused on the radioecological effects of the Idaho Chemical Processing Plant on rabbits and pronghorn antelope. Pronghorn antelope are found in the sagebrush areas of the upper Snake River Plain and adjacent mountain valleys of southeastern Idaho. According to Markham et al.(1982:30), "In winter, as many as 4,500-6,000 of the estimated 13,000-15,000 pronghorn in Idaho are on the Idaho National Engineering Laboratory Site." They move down out of the mountain valleys onto the site during the late fall and winter. Since 1953, the ICPP has dissolved spent R&D and Naval fuels to recover materials for the production of weapons grade plutonium and tritium. During the processing and solidification of the resultant liquid waste, radioactive plutonium, iodine, strontium, and cesium have been released into the atmosphere.

The two primary sources of man-made I-129 are nuclear weapons detonations and nuclear fuel reprocessing plants. Iodine-129 is a danger because of its long half-life (15 millon years) and because it readily enters humans through the food chain. One study by Fraley et al. (1982) examined I-129 in rabbit thyroids near the Idaho Chemical Processing Plant. The researchers thought a study of rabbit thyroids might be a better indicator of the radiological effects of the ICPP than comparable studies of antelope because pronghorn are migratory. Rabbits have smaller home ranges. The experimental and control rabbit samples were collected from all areas of the INEL site. The control rabbits were collected from Copper Basin located almost 30 miles northwest of the site out of the predominant northeast and southwest wind flow. The results of the study indicated that all but 4 of the 66 rabbit thyroids collected on and adjacent to the site had detectable amounts of I-129. The levels of I-129 in rabbits along the predominant wind direction were regressed against distance from the ICPP. The results of the analysis indicate that levels of I-129 in rabbit thyroids decrease with distance from the ICPP. Moreover,"...the regression analysis of the data collected to the northeast of the ICPP predicted that above background con-

centrations also existed beyond the northeast boundary of the site" (Fraley et al., 1982:255). The authors also conclude that their data establishes the ICPP as a primary source of I-129 "within the southeastern portion of Idaho" (Fraley et al., 1982:256). The authors could not determine the potential dose to humans from their data. They claim that likely sources of human exposure would come from meat raised on- and off-site and vegetables or milk produced off-site. Their most important claim is that "Atmospheric releases of I-129 from the Idaho Chemical Processing Plant have increased the concentrations of I-129 and I-129/I-127 ratios in the environment in the vicinity of the INEL site" (Fraley et al., 1982:256).

The major sources of radioactive I-131 in the environment are nuclear reactors, reprocessing facilities like the ICPP, and above ground testing of nuclear weapons. A study by Markham et al. (1980b) examined I-131 concentrations in air, milk and antelope thyroids in southeastern Idaho. The study was prompted by the concern that this radionuclide is readily transferred to man through the air-cow-milk pathway. It was also conducted to see which media---air, milk or antelope thyroids---was the most sensitive indicator of the presence of I-131 in the environment due to fallout from nuclear weapons tests and releases from the INEL. The levels of I-131 in air, milk, and antelope thyroids were determined in samples collected from 1972-77. Thyroids were collected from antelope on-site and from mountain valleys north and northwest of the site. During the study five nuclear weapons tests were conducted by the People's Republic of China. Elevated levels of I-131 were detected in thyroids after all five of these tests and following one air release from facilities at the INEL site. "In September 1972, 3.5 Ci of methyl iodide were released into the atmosphere from a facility on the INEL site as part of a research experiment" (Markham et al., 1980b:325). The authors conclude that antelope thyroids are more sensitive indicators of radiation in the environment than air or milk. They note that maximum concentrations of I-131 in the antelope thyroids were comparable to maximum concentrations found in Colorado elk and mule deer during 1964 and 1965 that resulted from two Chinese tests and a nuclear excavation test at the Nevada Test Site. Iodine-131 found in pronghorn thyroids in 1972, and in three separate single thyroids in 1974, 1975, and 1976, could be directly associated with the INEL site.

A study by Markham et al. (1980a) found Sr-90 concentrations in antelope bones collected 1972-1976 averaging 9.6 pCi/g (ash) within 10 km of ICPP, 4.0 pCi/g on the remainder of the site, and 5.5 pCi/g in off-site control animals. The majority of the off-site controls were collected from Copper Basin and the Big Lost River Valley about 50km NW of the INEL site. But some of the control samples were collected in the Crooked Creek and Medicine Lodge Creek valley NE of the INEL boundary. Significantly, there was no statistical difference between the levels of Sr-90 found in bones collected near ICPP and off-site controls. The variation among the three groups is attributed to the migratory nature of the animals and other factors. However, some of the controls were collected "downwind" from the ICPP in the mountain valleys to the northeast. This could account for the elevated levels of Sr-90 in some of the control samples. The researchers do not consider this possibility.

They do cite the results of a 1956-1960 study of antelope collected in southeastern Idaho. The yearly average concentrations of Sr-90 reported in the earlier study ranged from a low of 7.9 pCi/g-Ca in 1957 to a high of 31.1 pCi/g-Ca in 1959 (Markham et al., 1980a:815).

Another atmospheric effluent of nuclear fuel reprocessing at ICPP is plutonium. A study by Markham et al. (1979), based on antelope lungs collected on- and off-site between 1972 and 1976, found that 50% of the lung samples collected within 10km of the chemical plant had detectable Pu-238, 19% of the lungs collected on the remainder of the INEL site, and 7% of the lungs collected off-site had detectable concentrations. As a result of past atmospheric releases, the authors state that above background concentrations of Pu-238 are present in the surface soil surrounding the ICPP. Soil studies indicate that elevated Pu-238/Pu-239-240 ratios exist in surface soil for 2.5km from the plant in the predominant, northeast wind direction. Pronghorn could have inhaled the Pu-238 from the soil. Moreover, elevated Pu-238/Pu-239-240 ratios were found in a pronghorn lung 35km from the ICPP in the same direction.

Cesium-137, a gamma-emitting radionuclide, is also an atmospheric effluent of reprocessing at ICPP. In a published report by Markham et al. (1982), the results of a radiological analysis of antelope rumen, lung, and liver tissues to detect the presence of Cs-137 were reported along with a general summary of previous studies (see Table 1). Fourteen radionuclides appeared in pronghorn rumen samples, but only Cs-137 was consistently detected in muscle and liver samples. Cesium-137 concentrations in muscle from near the ICPP averaged 384 pCi/kg, the muscle samples from the rest of the site averaged 53 pCi/kg, and off-site control muscle samples averaged 38 pCi/kg. In the discussion this and previous studies of the pronghorn antelope, the authors argue that food ingestion appeared to be the mode of entry of Cs-137 into pronghorn from ICPP atmospheric effluents, and the predominant wind direction is toward the northeast from the plant "and the predominant fallout path for ICPP releases follows the wind pattern" (Markham et al. 1982:38).

Table 1
Average Radiation Does to Pronghorn Near the Idaho Chemical Processing Plant, The Remainder of the INEL Site, and Off-site Control Areas, 1972-76.*

Source	Critical Organ	Average dose rate (mrad/year) Near ICCP	Remainder INEL	Off-Site
Cs-137 in muscle	Whole Body	2	0.3	0.2
Sr-90 in bone	Endosteal cells	40	15	20
	Active marrow	20	7	10
Pu-138, Pu-238 240 Lung	Lung	(0.1 maximum dose)		
I-131 in thyroid	Thyroid	36	34	34
I-129 in thyroid	Thyroid	30	6	
Nuclides in Rumen	Rumen	20	4	2
K-40 in muscle (Natural)	Whole body	15	15	15
Natural external radiation*	Whole body	117	117	117

*From Markham et al. (1982).

Assessment Implications

This review documents the history of radiation contamination of the environment and wildlife in the vicinity of the INEL. There can be no doubt about the exposure of the antelope, jack rabbits, small burrowing mammals, coyotes, mallard ducks, nestling raptors, marsh hawks, american kestrals, long-eared owls, and sage grouse. The studies reviewed indicate two things:

1. The environment in the vicinity of INEL has been permanently contaminated with radioactive plutonium and iodine.

2. The wildlife in the vicinity of INEL have been exposed to radioactive plutonium, iodine, strontium, and cesium released to the biosphere by past INEL operations, particularly the ICPP.

The EIS on the SIS Project should assess the following potential impacts on the environment and wildlife:

1. The EIS should address the problem of the accumulation of radioactive iodine, plutonium, cesium, strontium on- and off-site described above.

2. The EIS should assess the implications of the additional accumulation of these toxic substances on- and off-site due to the operation of the SIS.

3. The EIS should assess the additional contamination on- and off-site due to the enhanced operation of the ICPP due to SIS operations.

4. The EIS should assess the radiological impacts of SIS and enhanced ICPP operations on the air-water-waste-plant-wildlife-human pathways.

WORKERS

Background

Mancuso, Stewart and Kneale (1977) have published data on gamma-ray exposed workers at the Hanford Nuclear site in Washington state. They report that sensitivity to the cancer-induction effects of radiation is at a low ebb between 25 and 45 years of age, but that at younger and older ages there is a cancer hazard associated with low level radiation which affects bone marrow cancers more than other neoplasms and cancers of the pancreas and lung more than other solid tumors.

Assessment Implications

The EIS on the SIS Project should assess the following potential impacts on the health of INEL workers:

1. The EIS should report the existing data on job related health effects from past INEL operations.

2. The results of Mancuso et al. (1977) should be employed as an empirical baseline to assess the implications of SIS for the disease impacts in SIS workers.

3. The EIS should also assess the health impacts on workers due to the enhanced ICPP operations.

4. The assessment of health effects in workers should employ the range of hypothesized relationships between radiation dose and health effects (e.g., in cancer, the linear and supralinear relationships).

PUBLIC

Background

It was AEC policy during the early years of the nuclear arms race to place a higher priority on production of nuclear weapons materials than on considerations of public health around government nuclear weapons facilities like Hanford. The Manhattan Project mounted during World War II spawned a system of power composed of the following institutional elements: agencies of the executive branch of the federal government, particularly the Atomic Energy Commission and the Department of Defense, multinational corporations deeply involved in defense contracting, and the R&D laboratories affiliated with certain major universities. The interests of the elites that governed these institutions, cloaked in the rhetoric of "national security," "secrecy," and later, "the Peaceful Atom," determined the operating policy at nuclear sites like INEL. That the effect of radiation on the public's health was not an important interest dictating the decisions made by these elites is clearly manifested in the high levels of atmospheric release of radioactive pollutants from these facilities.

U.S. Government radiation guidelines during the 1960s permitted the average U.S. citizen near civilian nuclear power facilities to receive a dose of 0.17 rads (or 170 millirads) per year. Tamplin and Gofman (1970:4) estimated that this dose would result in the following long term effects:

> -32,000 extra cancer plus leukemia deaths annually for the (then) current population of 200 million people.
>
> -150,000 to 1,500,000 extra deaths from genetically determined diseases annually for a future population of 300 million people (This does not even include the genetically-determined stillbirths and infant deaths).

The guidelines for legally permitted radiation doses to radiation workers and the public have been reduced by quantum drops in since the early 1950s, from 15rem/y to 5 rem/y for radiation workers, and from 1.5 rem/y to 0.0005 rem/y for members of the public. The application of these guidelines to populations near near Atomic Energy Commission facilities

involved in defense activities were not as stringent. It has been estimated that long-term worldwide effects of nuclear weapons testing may cause 29,000 to 72,000 deaths from cancer and 168,000 genetic effects (Johnson, 1984:230).

Recently the whole question of the long term effects of low-dose radiation on the public's health has become the subject of intense controversy among the experts (see BEIR-III Report, Final, 1980; Gofman, 1981:368-415). A review by Beebe (1981) of the evidence from the Japanese atomic bomb survivors stresses the new uncertainties about low-dose radiation effects on health. Leukemia deaths peaked in the first five years after the bombing. Subsequently, there has been a persistent increase in other cancers. This excess has been caused by cancer of the esophagus, stomach, colon, lung, breast, and urinary tract, lymphoma, and multiple myeloma, and the thyroid gland As a result of this new evidence, low-dose risk estimates may in some cases be doubled under the linear or linear-quadratic models of dose-response proposed in BEIR-III. In a discussion of current knowledge of tissue variation in sensitivity to the carcinogenic action of radiation, Beebe concluded, "If we use relative risk, where radiogenic risk is proportional to natural incidence of disease, then bone marrow is the most sensitive; but if we use absolute risk, where radiogenic risk is independent of natural risk, breast and thyroid tissue in the female are more sensitive" (Beebe, 1981:38-39).

In spite of these developments Johnson (1984:135) was forced to conclude that few investigations had been made of the effects in local populations of the potent carcinogens emitted from nuclear weapons facilities. An epidemiological study by Johnson (1981) found a sixteen percent excess of cancer in local populations near to Colorado's Rocky Flats nuclear bomb-trigger plant. Stebbings and Voelz (1981) report evidence of effects in local populations near the Los Alamos Laboratory, New Mexico. An excess of childhood leukemias (Lyon et al., 1979) had been reported in populations in areas of radioactive fallout downwind from the Nevada Test Site. Subsequently, Johnson (1984) found an excess of cancers of the more radiosensitive organs in a Utah-Mormon population downwind of the Nevada Test Site. A study of childhood cancers in rural villages located near the Windscale plant in England found plutonium contamination 40 miles away and fourteen cases of cancer where only three would be expected (Craft and Birch, 1983; Gardner and Winter, 1983; Urquhart, Palmer, and Cutler, 1983). Johnson (1984) found an excess of cancers of the more radiosensitive organs in a Utah-Mormon population downwind of the Nevada Test Site.

The Idaho National Engineering Laboratory (INEL) has released millions of curies of radionuclides in exhaust plumes and in liquid waste discharges in the past 35 years (since 1952) from 51 reactors and a chemical processing plant. Environmental contamination with radionuclides has been confirmed by onsite studies of soil, water, plant and animals, but not of local populations. Federal data on cancer mortality and state data on cancer incidence in the six counties near INEL were analyzed by Blain, Johnson, Kreider, and Nicholas (1985). When the Idaho state population was employed as a control group, there was an excess number of deaths (1950-69) from cancer of the more radiosensitive

organs (17 observed, 9.4 expected, P<.05) and an excess of cancer cases (1971-80; 11 observed, 8.0 expected) in Clark county, Idaho downwind of INEL. The excess is due to a lower than expected number of male cancers (2 observed, 2.8 expected) and a higher than expected number of female cancers (9 observed, 5.2 expected), particularly female breast tumors (6 observed, 2.8 expected). Mormons have a 23% lower rate of cancer than other populations and the six counties have large Mormon populations (range = 40%-80%). When the cancer incidence in the counties is compared to a Mormon control population, there is an excess cancer incidence (1971-80) in Bannock (659 observed, 485.7 expected, p=.001), Bonneville (547 observed, 447.9 expected, p=.001), Butte (47 observed, 34.5 expected, p=.05), and Clark (11 observed, 6 expected) counties. There is a need for a comprehensive cohort study (1952-present) that considers membership in the Mormon Church.

Assessment Implications

Bailar and Smith (1986) argue that "we are losing the war against cancer." The age adjusted mortality rates, adjusted for changes in age distributions and population size, increased by 8.7 per cent from 1962 to 1982 (from 170.2 to 185.0 per 100,000). Bailar and Smith suggest a shift in orientation from an emphasis on cancer treatment, the search for a technical fix, to an emphasis on prevention.

The Blain et al. (1985) study of cancer effects in populations near the INEL site indicate that past operations at the site have had health impacts on local populations, particularly in West Jefferson and Clark counties. The EIS on the SIS Project should assess the following potential impacts on the environment and wildlife:

1. The EIS should address the potential for additional health impacts in the populations in the vicinity of the INEL site.

2. The potential health effects should be assessed employing appropriate epidemiological studies of the population which take account of its peculiar demographic characteristics (i.e., rural, religious).

3. The EIS should also assess the health impacts due to the enhanced ICPP operations.

4. The assessment of health effects in the public should employ the range of hypothesized relationships between radiation dose and health effects (e.g., in cancer, the linear and supralinear relationships).

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ENERGY
RESEARCH
FOUNDATION

SCOPING COMMENTS
DRAFT ENVIRONMENTAL IMPACT STATEMENT
SPECIAL ISOTOPE SEPARATION PROJECT

Boise, Idaho
February 26, 1987

Energy Research Foundation
2600 Devine Street
Columbia, South Carolina 29205

Energy Research Foundation submits the following comments on the scope of the draft Environmental Impact Statement for the proposed Special Isotope Separation Plant. Energy Research is a private operating foundation based in Columbia, South Carolina, whose purpose is to encourage the wise use of South Carolina's natural resources through research and public education. In this endeavor we have been involved in numerous environmental issues at the Department of Energy's Savannah River Plant in South Carolina. The Savannah River Plant is one of two Energy Department facilities which produce plutonium for the nuclear weapons program, the other being at Hanford Washington. SRP is the sole source of tritium for the nation's nuclear arsenal, and is an alternative site for the Special Isotope Separation Plant.

We commend you for initiating this process voluntarily. We were forced to bring a lawsuit in 1982 to compel preparation of an Environmental Impact Statement prior to the startup of a renovated reactor, the L-Reactor, at Savannah River Plant. Our comments on a proper scope for the present EIS are informed by this experience and others at SRP, including a dormant lawsuit concerning an EIS for a new production reactor which may be proposed at a DOE facility in the future.

THE NEED FOR PLUTONIUM

The most important issue to be addressed in this EIS and in any discussion of a new production reactor should be the overall need for more plutonium. Therefore the EIS for the Special Isotope Separation Project should include a full explanation of the need for the project, as well as a justification for the alternative chosen to meet that need.

During the scoping process for the L-Reactor EIS, we and others repeatedly asked that questions about the need for the project be discussed. Dr. Thomas Cochran of the Natural Resources Defense Council and defense analyst Dr. George Rathjens of the Massachusetts Institute of Technology prepared detailed analyses of DOE and Department of Defense projections of the need for plutonium on which the L-Reactor startup timetable was based. They showed that since the L-Reactor startup was first scheduled, plans for some weapons systems had been cut back or eliminated, and pro-

duction was ahead of schedule. DOE never responded to any of this analysis, based on publicly available documents, and continued to insist in the face of overwhelming evidence to the contrary, that national security demanded startup of L-Reactor by a certain date which made implementation of critical environmental protection measures impossible.

South Carolinians were asked to accept substandard environmental practices which would never have been allowed commercial facilities. We were told that national security depended on speed, but were not allowed to know why. And it turned out to be a false claim. Fortunately for the South Carolina environment, some of the protective measures involved turned out to be mandated by the Clean Water Act. The supposedly crucial startup date was postponed for more than a year, and our nation survived. It seems that DOE's national security assumptions in the case of the L-Reactor were ill-informed, a fact exposed only because our state's environmental regulatory agency, the Department of Health and Environmental Control, insisted that DOE comply with the Clean Water Act.

The Energy Department should not be allowed to hide their justifications behind a veil of secrecy. Our national security depends more on governmental accountability than an increased stockpile of plutonium.

Additionally, we support the Hart-Simpson-Mitchell amendment to the Atomic Energy Act which prohibits the use of commercial spent fuel in the nuclear weapons program. The Special Isotope Separation Project EIS should include a statement by DOE on its future plans in this regard, and the Department should be held to that statement, which presumably will reflect a respect for this important law.

STATE REGULATION OF FEDERAL DEFENSE FACILITIES

Another experience which informs these comments concerns the relationship between state regulators and DOE facilities. Not being intimately familiar with present INEL operations, it is difficult for us to know to what extent the proposed SIS Project will add to and change the state's regulatory burden, but that burden will certainly increase. We strongly urge that the implications of the SIS Project for this relationship and the added burden to Idaho's environmental regulators be addressed fully in the EIS.

Enforcing environmental laws at Savannah RIver Plant is a monumental task that even in the best of circumstances would challenge state regulatory resources. And it is a sad fact that in South Carolina DOE has not facilitated this process. It has been our experience that DOE has consistently resisted the attempts of our state officials to carry out their responsibilities. So environmental regulators have been further, and unnecessarily, taxed by the constant struggle to assert their authority even in those areas where state jurisdiction is undisputed.

We are currently involved in a lawsuit at Savannah River Plant provoked by the failure of DOE to implement requirements of the Resource Conservation and Recovery Act, the nation's hazardous waste law, at numerous waste disposal sites at SRP. Our state regulatory agency joined us in that lawsuit. They are responsible for enforcing the RCRA program in South Carolina, but simply don't have the resources to enforce it adequately. It is a sad commentary when citizens groups have to take the lead in ensuring that the federal government obeys its own laws.

A further problem arises because many DOE activities are removed from state jurisdiction by the Atomic Energy Act. The exemption of radioactive releases and waste from state authority removes a major health and environmental hazard from our control. DOE's reliance on claims of national security restrictions to obscure operating practices and the rationales for decisions which have impacts on our health and safety - as in the case of the L-Reactor - is another burden the nature of which we are not even allowed to know.

We strongly advocate an assessment in the EIS of the additional costs to be borne by the state to monitor and regulate the SIS and related activities, and a description of what areas of these activities will be removed from state authority and the implications of such exemptions.

ECONOMIC IMPLICATIONS

The economic implications of the proposed SIS Project should be thoroughly examined in the EIS. While there seems to be a generally unquestioned assumption that the construction of a major facility will bring economic benefits, there are drawbacks

as well, as we have learned in South Carolina.

Some negatives are not easily quantifiable. It is not an inviting prospect to live near a weapons facility which produces plutonium, one of the most toxic substances known to man. It is a widely accepted belief in South Carolina that there are industries which considered locating in the area around SRP but chose not to do so because of the proximity to that facility. Now - with more than 150 waste disposal sites, more than 30 million gallons of high-level liquid radioactive waste, and contaminated soil and groundwater - the Savannah River Plant site will be unusable for many generations, and its vicinity suspect.

Another economic drawback is dependence on an industry whose future will be decided independently of local conditions. We all hope for an end to the arms race; it is the expressed goal of the current Administration. Plutonium lasts virtually forever, anyway, and so sooner or later our stockpile will be deemed sufficient even if arms control fails completely. In South Carolina, the future of employment at Savannah River Plant, which represents a substantial proportion of the area's total workforce, is a major and continuing concern for our state. This negative impact should be analyzed in the EIS for the Special Isotope Separation Project, and DOE should outline what steps will be taken to lessen the impact of layoffs if and when hoped for cutbacks occur.

ENVIRONMENTAL IMPACTS

The environmental impacts of SIS operations must of course be comprehensively addressed in the EIS. Again, our lack of detailed knowledge of current INEL practices precludes comments by Energy Research on the nature of the increased burden. If South Carolina were the focus of the EIS, we would have extensive comments on the damage that has already been done to our state, and would strongly resist adding to that environmental burden. We urge DOE to take the situation at Savannah River Plant and other defense facilities into account in assessing environmental impacts and choices, so as to avoid if possible the grave, perhaps insurmountable, environmental problems we now face.

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Statement of

James E. Beard
Seattle Nuclear Campaigner

Prepared for the
Special Isotope Separation Project
Environmental Impact Statement
Scoping Hearing

Red Lion Inn--Riverside
Boise, Idaho
7:00 pm
26 February, 1987

My name is James E. Beard. I am the Seattle Nuclear Campaigner for Greenpeace. As you may know, Greenpeace is an international organization, with offices in 17 countries. Greenpeace was formed in 1971 in Vancouver, British Columbia, to oppose United States nuclear weapons testing in the Aleutians. Since then, Greenpeace has campaigned on several environmental and disarmament issues, including working for an end to the production of plutonium for nuclear weapons. I would like to express my thanks for the opportunity to speak this evening.

In a letter to the Director of the Office of Management and Budget dated January 13, 1986, Secretary of Energy John Herrington and Secretary of Defense Caspar W. Weinberger attempted to justify the need for the Special Isotope Separation Plant. They said that,

> "We cannot allow [the Soviets] greater special nuclear materials production and surge capacity to create an even greater asymmetry in nuclear capabilities."
>
> (emphasis added)

and

> "This facility will. . . provide a capability to counter a possible Soviet breakout."
>
> (emphasis added)

These statements are an attempt to instill fear in the American public, and are not a justification for increased, or even continued, production of plutonium for nuclear weapons. Any real, strategic need for plutonium is based on the number and design of weapons systems funded by the Congress, and on that alone. There is no strategic necessity for the United

States to match the Soviet Union's plutonium production pound for pound, kilogram for kilogram.

The Environmental Impact Statement for the Special Isotope Separation Project must address the issue of the strategic need for plutonium. Current information available publicly indicates that the United States has approximately 100 metric tonnes of weapons-grade plutonium on hand, including that material in active and retired weapons, and stockpiled in various raw material forms. Given the current practice of recycling plutonium from retired warheads, this stockpile is sufficient to support an aggressive nuclear weapons buildup, quite beyond what is funded by Congress through the 1990's. If there is a need for plutonium production capability above that currently available, the SIS Environmental Impact Statement must quantify that need (40 CFR 1502.13).

A second major issue is our concern that the construction of the Special Isotope Separation Plant, along with the Process Facilities Modification (PFM) at the Hanford Reservation, is part of the Department of Energy's plan to extract weapons-grade plutonium from commercial spent fuel. The Special Isotope Separations Plant and the Process Facilities Modification go hand in hand, they are the two pieces of a whole. Together, they would give the DOE this capability.

PFM is a stand-alone, head-end modification to the PUREX (Plutonium URanium EXtraction) Plant at Hanford. Ostensibly, PFM is being completed to increase the efficiency of reprocessing operations at Hanford, and to allow the reprocessing of FFTF (Fast Flux Test Facility) fuel, providing fuel grade

plutonium as feedstock for the SIS Plant. However, the PFM will also, DOE has admitted, make it possible to reprocess commercial Light Water Reactor (LWR) fuel at Hanford, a capability not currently available. The fuel grade plutonium recovered from the spent commercial fuel would then be enriched to weapons-grade in the SIS Plant.

An examination of the economics behind PFM and SIS, together with the design of the facilities, further reinforces the conclusion that the reprocessing of commercial spent fuel is planned by DOE. PFM and SIS are being built at a combined cost of nearly $2 billion. The DOE claims that these plants are being built to reprocess and enrich plutonium recovered from Defense Project spent fuel stocks totaling approximately 6 metric tonnes. This amount of feedstock can be enriched in 2-4 years. Such an investment does not seem to be justified. The only large source of feedstock that could make SIS and PFM economically viable is commercial spent fuel. The DOE's assurances that there are "no current plans" to reprocess commercial fuel are not comforting.

The reprocessing of commercial spent fuel for weapons production by the United States would totally undermine the current system of nuclear materials safeguards established by the International Atomic Energy Agency (IAEA). Such a move would be an incredible act of folly, endangering the world and threatening our security.

The IAEA safeguards system is specifically intended to prevent countries from using commercial nuclear facilities to develop a nuclear weapons capability. The only reason this system functions at all is the example set by

countries such as the United States, which maintain a clear separation between commercial nuclear power and nuclear weapons production. If the United States abandons this system of safeguards, other countries will most assuredly do so as well. The resulting proliferation of nuclear weapons will clearly be a threat to our security and safety.

Also, we must remember that the Special Isotope Separations Plant is a wepons facility. The sole purpose of SIS is to make plutonium available for nuclear weapons. In this sense, SIS is a bomb factory. As such, the plant is a serious threat to world peace, aside from the threat posed by the reprocessing of commercial spent fuel.

The Special Isotope Separations Plant will take INEL employees and the people of Idaho across the line between peaceful nuclear power and nuclear weapons production. This is a line that has not been crossed here before. Whatever one's feelings about nuclear power, one must acknowledge that INEL employees have not been directly involved in the production of nuclear weapons. Your hands, previously clean, will be soiled. Plutonium production is by no means a harmless activity; it threatens the planet.

In conclusion, it is clear that there is no established need for the Special Isotope Separations Facility. The Department of Energy is using false arguments of economics and national security in a transparent attempt to develop the capability to recover weapons-grade plutonium from commercial spent fuel. The only reasonable conclusion that this Environmental Impact Statement can reach is one of "no action." The Special Isotope Separations Plant should not be built.

V.F.W.

VETERANS OF FOREIGN WARS OF THE U.S.
GLENN A. PHILLIPS
P.O. Box 181
Arco, Idaho 83213

STATEMENT OF

GLENN A. PHILLIPS, representing the

VETERAND OF FOREIGN WARS OF THE STATE OF IDAHO

before

DEPARTMENT OF ENERGY IDAHO OPERATIONS

SPECIAL ISOTOPE SEPARATION PROJECT

AT THE IDAHO NATIONAL ENGINEERING LABORATORY

BOISE, IDAHO FEBRUARY 26, 1987

Ladies & Gentlemen:

I am Glenn A. Phillips, P.O. Box 181, Arco, Idaho, representing the Veterans of Foreign Wars, of the State of Idaho and also as a private business man residing in Arco, Idaho.

We are here tonight to extend our Full Support and offer our assistance to the building of the SIS at the INEL. We are strongly committed Socially, Economically in the Interest of our National Defense, to this type of new Technology.

As a third generation of Idahoan's who have grown up with our great State in the Southeastern protion, I have been proud, eager and Happy with the operation of the INEL by the Department of Energy and it's Operating Contractors. Their Safety, Expertise, and Concern for the Public in the operation of the INEL has received the highest support of the residents of Butte County, the County that over 70 percent of the INEL is located in. We fully support the past history of their operation as well as have full confidence in their capability and desire, to continue to operate and develop new projects in the future.

I have over six close relatives that work at the INEL and there is no doubt in their mind or my mind that the INEL has a long continuous Safety Record that is hard to match in any part of the world. We would not have this confidence of there was any doubt what-so-ever, that there was danger to the people who work there.

After an in depth study of the proposal to construct the SIS at the INEL, it is the conclusion of the Veterans of Foreign Wars, over 2 million Strong, that this project is a vital link to our concern and we fully support it.

In conclusion, may I say We appreciate the openness, fairness and support of the many people who are involved in this project who have given everyone the material, time and opportunity to express their individual concern for or against a project of this size. I think we have all been treated very fair and we appreciate it very much, and extend our thanks to all concerned; Let us continue the Free American Spirit, the support of our great country and build the Sis at the INEL.

Thank you.

Glenn A. Phillips

HEAL

Hanford Education Action League

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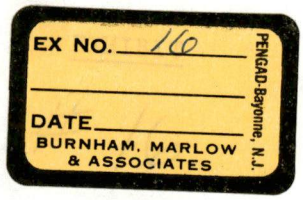


February 26, 1987

Mr. Carl P. Gertz
Manager SIS Project Office
U.S. Department of Energy
Idaho Operations Office
785 DOE Place
Idaho Falls, Idaho 83402

SIS Scoping Comments

Dear Mr. Gertz:

Thankyou for the information you and your staff have provided about the proposed SIS facility. I very much appreciate your efforts in that regard.

The following are scoping comments I am presenting on behalf of the Hanford Education Action League, a group of 500 Northwest citizens, concerning the proposed Special Isotope Separation (SIS) project.

HEAL is very much concerned, as it has been with Department of Energy operations in the past, that activities like the proposed SIS project fail to satisfy the government's obligation to conduct its activities in a way that empowers free people to render informed consent to these undertakings. Inasmuch as the Department (see your Dec. 9, 1986 letter to Liz Paul of the Groundwater Alliance) continues to shield information vital to public understanding of the risks and benefits of special nuclear material production behind the Atomic Energy Act of 1954, our hopes are not high that the Department will reverse itself and take part in the full breadth of the discussion that is necessary.

Still, we persevere in these requests, if only to emphasize to the agency and our elected representatives that the dislocation of the public from the debate leading to such actions are inevitably responsible for a lack of public support for, and confidence in, the decision-makers and the decision-making process. Obviously, this is a state of affairs that is in nobody's best interests.

We request the Environmental Impact Statement on the proposed Special Isotope Separation facility address the following questions:

Need:

1) The Department should address, specifically, what the plutonium refined in the planned facility will be used for and clearly identify alternatives to constructing the SIS plant.

2) It is not at all clear why plutonium with greater than 6 percent concentrations of plutonium-240 cannot be blended with higher grade plutonium, currently being produced at the Savannah River Plant, to achieve a weapons grade blend of plutonium. This question should be addressed.

3) It is not clear that there will ever be a demand for SIS activities. One cannot help but note that in the literature you've kindly distributed to those of us interested in the SIS project there is no clearly identified need for additional plutonium in the timeframe (mid-1990s) in which the plant may actually come on line. Instead, we've been provided a January 13, 1986 statement from Secretaries Weinberger and Herrington which suggests that the arms race is now a matter of what the Soviets *may* do in terms of boosting production of nuclear material. This is lame. A discussion of the assumptions involved in such thinking, inasmuch as they lead to decisions to pursue the SIS, should be a part of the EIS.

4) The Department should identify the specific programs, approved by Congress, that the SIS facility will be used for. To the extent authorized demand for SIS activities is as yet undefined and ambiguous, the Department should remark candidly, and fully.

Environmental Impacts and Nuclear Safety:

The EIS must fully address the environmental and public health impacts of constructing the SIS facility. At virtually every Department of Energy installation involved with plutonium production, affected states and citizens have had to resort to legal action to compel compliance with federal and state environmental protection rules.

The environmental damage after forty-three years of plutonium production at the Hanford, Washington plant is an example. Here more than 300 acres of soil have been heavily contaminated with plutonium and other long-lived radioactive chemicals. Indeed, there is enough plutonium in Hanford soils (well over 400 pounds) for several nuclear warheads. Airborne emissions from plutonium processing facilities have, in the past, been of such

magnitude as to bring a call from the recently convened Hanford Health Effects Panel (organized by the State of Washington and Center for Disease Control) for epidemiological studies of people living downwind from the Hanford facilities. And now there is evidence that long-lived radioactive wastes have migrated more than six miles from Hanford waste sites to springs along the Hanford Reach of the Columbia River.

Similar lists can be offered for the Savannah River Plant, Rocky Flats, Fernald, Mound, Oak Ridge, the Nevada Test Site, and other of the Department of Energy's nuclear weapons installations. All told, the experience represents a serious breach of trust with contemporary American society and those in generations to come who will likely bear the cost of trying to clean these places up.

The Department should harbor no doubt that the burden of proof, now, is clearly upon it to assure the public that nuclear weapons facilities, like the proposed SIS facility, can be operated safely and with a minimum of harm to the environment.

Accordingly, the Department should address the following issues in the SIS facility environmental impact statement.

5) How will expected release levels from SIS compare to accepted federal standards (40 CFR Part 61) for emissions of radionuclides to the environment?

6) What are the expected release/disposal levels of non-radioactive and/or mixed hazardous wastes?

7) The Department should specify which, if any, waste streams it asserts are exempt from regulation by the Environmental Protectection Agency under terms of the Resource Conservation and Recovery Act (RCRA)?

8) The Department should describe how operations at SIS pertain to relevant portions of Idaho and Washington state laws, and whether the Department is prepared to tolerate the enforcement of such laws.

9) The Department should consider a genuine worst-case accident scenario that would, at the very least, discuss the consequences of a major fire at the facility consuming the maximum chemical and radionuclide inventory at the plant. This analysis should be quite apart from any discussion such as that found on page 17 of DOE/EA-0298, "Environmental Assessment Special Isotope Separation Process Selection" which addresses the most easily imagined accidents.

10) The Department should identify the lowest-ranking agency official with authority to order an immediate shutdown of SIS operations for safety reasons.

Transportation

11) The Department should adequately discuss the additional nuclear cargoes--including nature, size, and frequency--that will travel to and from INEL as a result of the construction at INEL of the SIS facility.

12) The Department should discuss a worst-case transportation accident involving the combustion and dispersal of a shipment of plutonium such as that which would arrive or depart the SIS facility.

13) The Department should discuss emergency preparedness planning with municipal and state jurisdictions along routes that will be used to transport plutonium to and from SIS.

We would, of course, appreciate notification from you when a scoping decision is made along with a statement outlining how the Department plans to proceed.

Sincerely,

410 Parkway T
Boise, ID 837[illegible]
Feb. 26, 1987

SCOPING HEARING FOR PROPOSED
SPECIAL ISOTOPE SEPERATION(SIS) PROJECT IN IDAHO

I am Patricia Hall. I am here as a concerned citizen, a member of Ada County Citizens for Peace and Justice, and, through that organization, a part of the Coalition for Safe Transportation of Hazardous and Radioactive Materials.

I have two sets of questions, the first pretaining to the proposed building of an SIS plant, and the last set concerning transportation of plutonium to such a plant.

First, I request the Department of Energy to publicly respond to The Natural Resources Defense Council letter dated December 1st, 1986, written to Carl P. Gertz. Their letter clearly states intelligent reasons against building an SIS plant. I request the Department of Energy to address the issues as they were stated in the letter so the public can easily compare the DOE's response to the NRDC's arguments.

Next, if an SIS plant were to be built in Idaho, would the state be involved in an independent monitoring system of the environmental impact of such a project? Congressional budgetting being what it is, what quarantees do we have the monitoring will be funded?

Will permanent provision be made for independent scientists to study all health effects, including contamination of the surrounding (within and outside the INEL boundries) land, air and water resources as well as possible genetic or other health damage to the workers and the population of Idaho? How would such research be paid for?

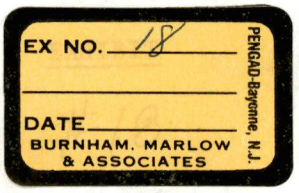
Now, concerning the transportation of plutonium to the proposed plant:

I want information about the past transportation of, the shipment rate, the kind of vehicles used, the number of containers per shipment, and the types of containers for both PuO_2 and plutonium metal. I would like the history of the containers and the history of the packaging inside the containers (that is, how and how long they have been used, any accidents and any tests).

I want to know the age of the material before it is shipped to the proposed plant and how long it stays at the plant before it is shipped out, as I understand gas tends to build up in the containers. Is there any inspection of the containers by agencies outside the DOE, especially by the NRC?

Patricia Hall

William K. Chisholm
Buhl, Idaho



US. corp. doing business with Soviet Union - check linkings with us govt. - personael, contracts, amounts, dealings with Soviets,

AEC, Acme Mfg. Co., Alcoa, Allen Bradley, Alliance Tool & Die Corp., Allis-Chalmers, Allsteel Press Co., Alpha Press Co, American Can Co. American Chain & Cable, American Express, American Magnesium Co., Applied Magnetic Corp. Ara Oztemal (Subsidirary of Satra Corp.) Armco Steel, Atlas Fabricators Inc. Automatic Production Sys. (Div. of Ingersoll Rand), Babcock & Wilcox, Bechtel, Belarus Equip of Candda Ltd, Bendix Corp. Besley Grinder Co[illegible], Bliss, E.W. Div. of Gulf & Western Industries, Boeing, Borg Warner, Brown & Root Inc., Brown & Sharpe Mfg. Co., Brunswick Corp., Bryant Chucking Grinder Corp. Burr-Brown Research Corp., C.E. Carl Equipment, Carborandum Co., Carlton Machine Tool Co. Carpenter Technology Corp., Catepillar Tractor Co., Centrispray, Century Data, Chase Manhattan Bank, Chemetron Corp, Cincinnati Milacron Inc. Clark Equipment, Cleveland Crane & Eng., Colonial Broach, Combustion Engineering Comma Corp., Control Data, Cooper Industries Inc. Cromally-Kessler Asso. Inc., Cross Co., DAB Industries Inc Denison Div. of Abex Corp, DoAll Co., Douglass Aircraft Dow Chemicals, Dresser Industries, Dr. Dvorkovitz & Asso., E.I. du Pont de Nemour & Co. E.W. Bliss Div. of Gulf, Easco Sparcaltron,

Electronic Memories & Magnetics Corp.,
El Paso Natural Gas Co., Englehard Minerals
& Chem Corp. Ex-Cell-O corp., FMC,
Fenn Rolling Mills Co., Fondulac,
Ford Motor Co., GMC, Gearhart Owens,
General Dynamics, General Electric,
General Tool Corp, Giddings & Lewis,
Gleason Works, Goddard Space Flight Center,
Gould Inc, Gulf General Atomic, Gulf Oil Corp.
Halcoff & Co., Honeywell, Honeywell Information
Systems, Hudson Vibratory Co., IBM, Ingersoll,
Ingersoll Milling Machine, Ingersoll Rand Co.
International Computers, Intel Corp., International
Nickel, International Harvester, Irving Trust Co.,
ITel, Jones & Lamson (Textron) Joy Mfg.
Kaiser Aluminum, Kaiser Aluminum & Chem Corp.
Kearney & Trecker Corp., Kochring Co.
LaSalle Machine Tool Co, Leasco, Leesona Corp.
Libby Owens Ford Co., Litton Industry -
International Machine Tool System Group,
Lockheed, Lummus Corp., McDonnell Douglas,
Micromatic Hone, Minnie Punch & Die Co.,
Modicon Corp, Monarch, Monsanto,
Moore Special Tool Co., NBS, National Engineering
NED's Reactor & Fuel Mfg. Fac., Norton Co.,
Occidental Petroleum, Pneumatic Tool Co.,
Pratt & Whitney, Pullman Corp., RCA,
~~Raytheon Corp~~, Raycon Corp., Raytheon, Reynolds
Metal Co., Rockwell International, Sikorsky
Aircraft, Singer Co., Snow Mfg. Co.
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Speed Pam Corp., Sperry Rand, Standard Oil, Swindell Dressler Co., Systron-Donner Corp. Technic Inc. Tektronix Inc., Teledyne Lewis, Teledyne Pines Co., Tenneco, Texas Eastern Transmission, Textron Inc, Udylite Corp. Univac, V+O Press, VSI Automational Assembly Inc. Varian, Verson Allsteel Press Co, Waveteck, Wells-Index Corp, Welt International Corp. Western Industrial Production Corp., Xerox Young + Berke Co.

SPECIAL ISOTOPE SEPARATION PROJECT
TESTIMONY OF: CLAIRE L. TURNER
REPRESENTING ECUMENICAL ASSOCIATION OF CHURCHES IN IDAHO/PEACE COMMIT
FEBRUARY 26, 1987

My name is Claire Turner and I represent the Peace Committee of the Ecumenical Association of Churches in Idaho--an organization whose membership includes eight mainline denominations throughout Idaho.

We Americans recently allowed ourselves to have high hopes for the summit meeting held betwen Reagan and Gorbechev in Rejkavich, Iceland. We continue to hope for progress towards the slowdown and eventual halt of the arms race. Outdated but prevailing governmental priorities of arms race planning and spending are consuming the very essence of the earth's potential. Efforts to continue talks between the two superpowers are supported by American citizens, who applaud any and all efforts towards peace without more nuclear weapons production. This should come as no surprise since polls consistently show that Americans are overwhelmingly in favor of a freeze in weapons production. Congress is fully aware of these strong sentiments and has shown ~~every~~ strong indication it will not be funding any more new weapons systems.

So why are we now considering the DOE's Special Isotope Separation Project? It, by fact, serves only one purpose: to make available plutonium-239 for the production of more weapons systems.

*we already have a stockpile of weapons of every size and description beyond our capability of ever using up

*on-line plutonium processing plants have already produced enough plutonium to maintain our current stockpiles

*current plutonium stockpiles have a "bang-ability" that will continue for thousands of years to come; our society has yet to find safe, permanent storage for the plutonium, the by-products, and the waste; without a solution to this, how could the DOE possibly consider yet another stream of plutonium and plutonium wastes?

As important as the technical questions that you will need to answer, you must answer this: Why is the DOE asking the people of Idaho to accept nuclear weapons production as their only economic hope for the future? The long-term consequences, both locally and globally, of operating this facility far outweigh any economic boost it may provide. Many times more jobs could be opened up for the same cost of producing a few hundred jobs promised by this SIS Project. The money for such a wasteful, dangerous, and immoral venture starts in our pockets, as taxpayers, and we could find better life-enhancing uses for spending it.

In these tense, and bad economic times, all of us must have the courage to work for economic solutions that offer security and hope--for ourselves, our neighbors, and our children. Producing plutonium for unneeded weapons is a tremendous waste of human and financial resources leaving another legacy of fear and danger for generations to come. The American people have said it repeatedly: More weapons systems, however grandiose, have never and will never be able to buy for us the kind of security found through peaceful methods. Our current stockpiles are so large as to keep us from any imagined military vulnerability. We know that all too well. Please listen and have the courage to look for alternatives to building the SIS, and work with us to find answers that move us towards a lasting peace.

Just Say NO to the Nuclear Addicts

As Idahoans, let's do our part to help America and the world kick the worst addiction there is — the addiction to nuclear weapons.

Let's "Just say 'NO' " to the scheme to locate a plutonium bomb fuel factory at the INEL in eastern Idaho.

The planned facility is known as the Special Isotope Separation Project (SIS). Its only purpose is to produce plutonium 239 for nuclear warheads. Federal nuclear weapons planners are truly like drug addicts: they want more, more, more of their controlled substance.

As you think of sharing your Idaho home with a plutonium factory, consider the following:

- Do we want to leave our children and their children a legacy of more radioactive and chemical pollutants in Idaho? Even the federal SIS advocates state: "Plutonium is carcinogenic when deposited in or on living tissue." And, "PU-239, because of its half-life, must be regarded as a permanent contaminant."
- Why pick Idaho for this factory? "We're trying to build the plant far away from where it would hurt people," says Bill Jensen, a federal Department of Energy official.
- Is it prudent to locate a plutonium factory over the Snake River Plain Aquifer in an area characterized by earthquakes and volcanic activity?
- Will agriculture suffer? SIS will increase INEL's threat to the reputation of Idaho's potatoes, trout and other products. And consider the market repercussions of a major accident.
- Will tourism suffer? Would a bomb-fuel plant make Idaho's famous outdoors, hunting and fishing seem less attractive? INEL is just over the mountain from Sun Valley, the heart of Idaho vacation land.
- Do we want frequent armed government convoys hauling deadly material on our highways? How long will it be before a truly tragic accident?

The final result of addiction to narcotic drugs is death.
The result of addiction to nuclear weapons is the same.
Let's just say "No" to the nuclear addicts.
Just say "No" to SIS.
Let's defeat the addiction through positive effort.
Let's say "Yes" to:

- Protecting our country with our existing arsenal while we actively participate in negotiations to end the arms race.
- Using our scientific talents to enhance life rather than threaten it.

P.S. Important Note of Clarification

SIS in NOT the same as SSC, the proposed Super-conducting Super Collider. SSC is a physics research facility our Governor and Legislature want to attract to Idaho.

In fact, locating SIS at INEL would probably *kill* our chances for attracting SSC, a much larger project.

Don't keep your opinions to yourself. Write or call Governor Cecil Andrus, The Statehouse, Boise, ID 83720, 334-2100; Representative Richard Stallings, 8th & Bannock, Boise, ID 83702, 334-1953; or your other elected officials.

This ad paid for by 100 Idahoans, and sponsored by The Snake River Alliance.

To: The Snake River Alliance, P.O. Box 1731, Boise, ID 83701, 208/344-9161

☐ Enclosed is a contribution for your educational work.

☐ Please send information on SIS.

☐ Other comments or questions:_____

_____

Name_____

Address

TOWARDS A TECHNOLOGY OF PEACE

Testimony before the SIS scoping hearings

By Harry P. Massoth

Feb. 26, 1987, Boise, Idaho

Note: Mr. Massoth is a plant scientist, teaches classes on world religions at the College of Southern Idaho and is Chairman of the Magic Valley Peace Committee.

Address: Rt. 1, Box 50, Buhl, ID 83316

TOWARDS A TECHNOLOGY OF PEACE

By Harry P. Massoth
Feb. 26, 1987

My name is Harry Massoth, I live in Buhl, Idaho, and work as a research scientist for a major seed company. I'm married and have three children. I'm here representing the Magic Valley Peace Committee.

Our concerns regarding the Special Isotope Separation project are similar to those voiced by other people here this evening--concerns such as the proliferation of nuclear weapons and increased escalation of the arms race, the increased risk of a nuclear attack on Idaho communities, and the various environmental impacts the project could have, especially the possibility of radio-active wastes contaminating the Snake River Plain aquifer since it is that precious water that provides life and livelihood to everyone living in Southern Idaho.

Beyond these concerns, however, I wish to address two specific aspects of this project which have far reaching implications well beyond the borders of Idaho: the actual need for this project and the cost opportunities associated with it. Let's first examine the need for the SIS facility.

According to a letter dated Jan. 13, 1986, from the Secretary of Defense and the Secretary of the Energy-the justification for the project is this:

> "We cannot allow (the Soviets') greater special nuclear materials production and surge capacity to create an even greater asymmetry in nuclear capabilities. Therefore, it is essential to preserve the option to initiate construction of a Special Isotope Separation facility as soon as possible....The National Security Council supports this position."

Furthermore, they write:

> "For reasons of national security, DOD and DOE have now concluded that an SIS production facility should be deployed. This facility will provide a contingency against unanticipated interruptions to the existing plutonium production capability and provide a capability to counter a possible Soviet breakout."

Now friends, I want you to look at this chart. The single dot in the center of the chart represents all the firepower contained in all the allied aerial bombing during World War II from 1939 tO 1945, including the atomic bombs dropped on Hiroshima and Nagasaki: 3 megatons or 3 million tons of TNT.

The six dots in this corner represent the firepower contained in the nuclear missiles of one new Trident submarine: 18 megatons or 6 W.W.II's. This is enough firepower to destroy every major city in the nothern hemisphere.

The 6,000 dots represent the explosive power in the nuclear arsenals of the superpowers today: 18,000 megatons or 6,000 W.W.II's. The United States and the Soviet Union share this firepower with approximately equal destructive capability.

Consider these facts closely and you will be struck by two very significant points:

First, the U.S. now has enough firepower to destroy every major city and industrial site in the entire communist block at least 10 times over. This tells us that we don't need to build any more nuclear weapons.

Second, detonation of little more than one square would cause a 'nuclear winter' which would make this planet uninhabitable. Thus even a limited nuclear exchange would result in a nuclear winter. This tells us that we absolutely do not dare to use these weapons even if we have them.

These two points bring us to the following conclusion: THE SIS PROJECT IS DESIGNED TO PRODUCE A PRODUCT, PLUTONIUM FOR NUCLEAR WEAPONS, WHICH WE DO NOT NEED AND ABSOLUTELY CANNOT USE. In simple economic common sense, this is absurd. Our government is about to purchase a product it doesn't need and dares not use. How many of you would spend a billion dollars on such an item?

The next point I want to explore is the opportunity costs associated with this project.

By OPPORTUNITY COSTS I mean this: If you have X amount of dollars to spend and there are two items you wish to purchase each of which costs X amount, you can only purchase one of them. Thus the 'opportunity' of purchasing the other is lost. Most sensible people carefully weigh their priorities before investing large sums of money.

Now let's consider some of the opportunities we are passing up by spending our 1 billion on the SIS plant.

* This 1 billion could finance the whole malaria eradication program for the World Health Organization.
* 1/100th of it or $1 million could improve storage facilities for

100,000 tons of rice and thus save 4,000 tons or more annually. One person can live on about one pound of rice a day. This same expenditure could buy 1,000 classrooms for 30,000 children.

* 1/5 or $20 million would pay for about 40,000 village pharmacies.
* This $1 billion would pay for the farm equipment needed to increase food production and provide near self-sufficiency in all food-deficit, low-income countries by 1990.

Let's bring it closer to home.

We are all aware that our 'nation is at risk' due to our deteriorating education system. This is true nationally and even more so in our own state. A number of studies have suggested that to make the needed changes we need to create a new institution dedicated to this task. One such proposal calls for an International Center for Human Development.

With $1 billion Idaho could become the location for the first International Center for Human Development founded for the duel purpose of revitalizing educational systems throughout the entire world and promoting a world beyond war. Since money spent on educational enterprises buys about 2½ times that spent on high technology, the Human Development Center could create about 1,400 jobs and be funded for at least 30 years (as compared to the SIS plant's 750 jobs).

If the International Center for Human Development does the job it is created for, it would save our nation and others hundreds of billions of dollars annually--money that could be spent to conquer the problems of war and global terrorism, of world hunger, poverty and disease, of environmental degradation, urban decadence and rural economic collapse. Not only could such an investment help to usher in a renaissance in civilization but it could help release the resources needed to send space explorations to all the nearest planets.

Perhaps my case is slightly over-stated but the point should be clear. Man has made tremendous strides in the area of technology in this century. We now have everything from space-flight to insulin, from computers to lasers, and from communications satellites to inoculations for dozens of diseases that were once major killers. Nevertheless, societies have chosen to devote much of their technology to the area of war. What is needed is a major shift in priorities which would further the search for a technology of peace.

Why not shift our priorities right now, right here in Idaho, and tell our public leaders that we do not want the SIS facility but rather an enterprise that will help build a world beyond war. THANK YOU

SPECIFIC QUESTIONS ADDRESSED TO THE SIS PROJECT DIRECTOR:

1. How can the DOD and the DOE justify spending $1 billion on a facility which will produce a product which we already have enough of and which, when used in nuclear weapons, we cannot use?

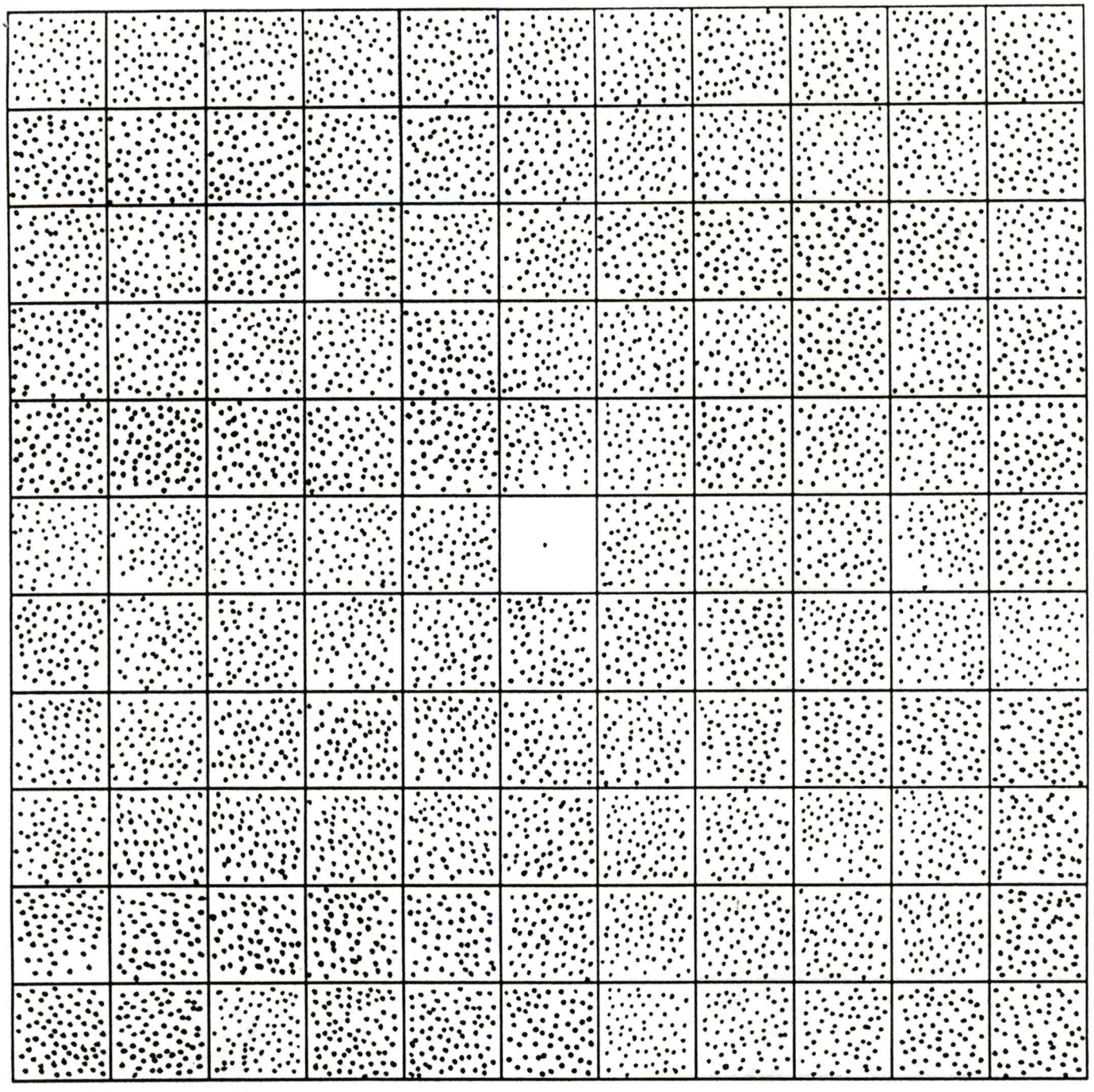
2. How can the DOD and the DOE morally justify contibuting to an already inflated military budget which is syphoning off funds necessary to maintain critical social programs as well as the infra-structure needs of our country--needs such as highways, clean water, bridges, sewage systems, environmental preservation, etc.?

3. What are the possibilities of radio-active wastes from the SIS facility contaminating the Snake River Plain aquifer and what would be the economic, environmental and social consequences in the event of such a mishap?

4. What are the routes by which nuclear waste products will be transported from Idaho to the the dump site and what are the increased risks associated with the transportation of these waste products?

5. Will the SIS facility add to the possibility of the northwest becoming a dump site for even more nuclear wastes? If so, what are the environmental and social implications of such a dump site?

6. What are the increased risks of nuclear attack on Idaho communities which may be associated with the SIS facility?



FIREPOWER CHART

1 DOT - represents the firepower contained in all the allied aerial bombing during World War II (1939 - 1945), including the bombs dropped on Hiroshima and Nagasaki: 3 megatons (3 million tons TNT).

6 DOTS - represents the firepower contained in the nuclear missiles of 1 new Trident submarine: 18 megatons. This is enough firepower to destroy every major city in the northern hemisphere.

6,000 DOTS - represents the explosive power in the nuclear arsenals of the superpowers today: 18,000 megatons. The United States and the Soviet Union share this firepower with approximately equal destructive capability.

Detonation of a little more than one square could cause a "nuclear winter".

SOURCE: Center for Defense Information
303 Capitol Gallery West, 600 Maryland Ave. S.W., Washington D.C. 20024

KNOWLEDGE

War Is Obsolete

"With thousands of nuclear explosives in the world everyone must come to understand that a military solution of any kind is not a solution at all."

Victor F. Weisskopf, Physicist
Professor Emeritus, MIT
Physics Today, March, 1983

"Unconditional war can no longer lead to unconditional victory. It can no longer serve to settle disputes. It can no longer be of concern to great powers alone. For a nuclear disaster, spread by winds and waters and fear, could well engulf the great and the small, the rich and the poor, the committed and the uncommitted alike. Mankind must put an end to war or war will put an end to mankind."

John F. Kennedy
Sept. 25, 1961
Address to the United Nations

"War in our time has become an anachronism. Whatever the case in the past, war in the future can serve no useful purpose. A war which becomes general, as any limited action might, could only result in the virtual destruction of mankind."

President Dwight D. Eisenhower
Speech, July, 1957

"The very triumph of scientific annihilation (the atom bomb) has destroyed the possibility of war's being a medium for the practical settlement of international differences... Global war has become a Frankenstein to destroy both sides. No longer is it a weapon of adventure — the shortcut to international power. If you lose, you are annihilated. If you win, you stand only to lose... (War) contains only the germs of double suicide. (Abolishing war) is the one issue upon which both sides can agree, for it is the one issue upon which both sides will profit equally. It is the one issue — and the only decisive one — in which the interests are completely parallel. It is the one issue which, if settled, might settle all others."

General Douglas MacArthur
Speech, 1961

"The threat of the atom bomb cannot be met by removing the bomb alone. It can only be met by removing war, by establishing world peace... If a new world war comes, atom bombs are sure to fall. If an atomic holocaust is to be averted, no world war must break out. Every little war threatens to set off a world war. So there must be no more war."

Karl Jaspers, German Philosopher
The Future of Mankind
Awarded German Peace Prize, 1958

Testimony of Dorian Duffin
1525 Malad
Boise, ID 83705

SIS Scoping Hearing
26 February 1987

I'm here tonight primarily to question geologic and hydrologic impacts of the SIS.

The INEL is situated in the eastern end of the Snake River plian. The Snake River plain is a continued build-up of volcanic and sedimentary layers filling in a depression in the Basin and Range mountain system. The region is geologically unstable. It is seismically active in the boundary mountains as evidenced by the Borah earthquake, and volcanically active in the plain as evidenced by the Craters of the Moon. A series of volcanic rift zones cross-cut the Snake River plain at the INEL which seem to be extentions of faulting features in associated mountains. The ICPP/SIS area is located between the Arco rift zone and the Howe/East Butte rift zone, making it very volcanically vulnerable.

Studies by the USGS show that the Snake River plain as a whole has volcanic eruptions every 2000 years. The Arco-Big Southern Butte area (where INEL is located) has active volcanic activity at approximately 3000 year periodicity. The latest incident was approximately 2000 years ago at the Craters of the Moon. Statistically, a volcanic event may be due anytime.

Flowing in the plain is the Snake River plain aquifer which is the lifeblood of southern Idaho. The aquifer traditionally has been a nuclear waste dumping ground. Solid waste has been dumped in pits with radionuclides leaching to the aquifer. The ICPP also discharges radioactive wastewater to the aquifer. Protection of the aquifer is of supreme importance to Idaho and the Idaho economy.

I would like to see the SIS environmental impact statement fully address the following questions.

A. Volcanism

1. What is the impact of volcanism on the site and region?
2. What is the impact of a volcanic event on the SIS?
3. What is the impact of a volcanic event on other surrounding nuclear facilities which could contaminate the area and affect SIS operation?
4. What are the relationships of faults and volcanic rifts on the plain?
5. Why was the seismic zone changed from zone 3 to 2 and what are the possibilities and effects of a change back to zone 3?

B. Aquifer

1. How much water will SIS consume?
2. Will SIS discharge to the aquifer and, if so, what is the quality and quantity of the discharge?
3. Will there be a localized aquifer flow change due to the facility?
4. Will aquifer flow models be assessed relative to USGS studies and to other studies?
5. What impact will the increased water consumption have on irrigation supply and associated well depths?

C. Facility

1. What is the interrelationship between the ICPP and SIS including material transfer between facilities?
2. What is the interrelationship between the SIS and the waste calcine facility?
3. What is the worst case impact on other INEL facilities including the possible SSC?

4. What are the socio-economic impacts of facility failure?

5. What are the potential impacts if a worst case transportation accident occurs (e.g., if spent fuel truck goes into the Snake River off Balls Bridge between Bliss and Glenns Ferry)?

In closing, I would like to request that you pay particular attention to two documents: 1) USGS open file report 78-691 by Mel Kuntz on area volcanics, and 2) Associated Resource Consultants Inc. draft report entitled Review of Radioactive Waste Management Complex--Core Drilling Program. These reports address many of the problems that I feel impact the facility and the area. Thank you for this opportunity to comment.

February 26, 1987

Mr. Carl P. Gertz, SIS Project Manager
Idaho Operations Office
U. S. Department of Energy
785 DOE Place
Idaho Falls, Idaho 83402

Dear Mr. Gertz:

Thank you for the opportunity to submit testimony at a Boise field hearing on the Special Isotope Separator.

My name is Kerry Cooke, and I live at 2424 Bella Street, Boise, ID 83702. Idaho was the home for my pioneering great-grandfather in the 1860's, and is the home of choice for me and my family. INEL was originally developed in Idaho at a time when no-one, from scientist, to elected representative, to citizen, knew they should be concerned about seismicity, ground water, wind patterns, permanent contamination, and other such things.

But today is very different. We have the knowledge to ask the questions, and run the tests to make educated guesses about impacts. Best of all, we have the expertise to evaluate the results and recognize that sometimes the tests tell us: DO NOT PROCEED. The Department of Energy must look at ALL aspects of potential impact from the SIS and finally ask its data, "What about not building?" and then be receptive to the answer.

Here are my specific questions:

1. Idaho's leaders are pinning great hopes on attracting the Super-conducting Super Collider to our state. Idahoans from the Panhandle to Swan Falls have caught the SSC fever, and our newspapers are full of the benefits to come to Idaho with the SSC. Not least among them would be the emergence of INEL as a major draw for scientists from around the world to learn from the state of the art SSC.

Can DOE ascertain that getting the SIS would not diminish or remove Idaho's chances of getting the SSC? How can operating a high-security, police-state control around a plutonium-for-weapons facility be compatible with an international attraction to the scientific and lay community?

INEL has always prided itself as the home of the peaceful atom, and the leader of reactor safety research. Will getting the SIS mean INEL is shifting to nuclear weapons production as its main mission? What other nuclear weapons projects might be on the horizon for INEL that are compatible with the SIS?

Another area of great concern to me:

2. According to the SIS Program Management Plan, one of the major reasons to build the SIS is to enrich plutonium that is already in deployed warheads. What are the plans for removing that plutonium from the warheads and transporting it to the SIS? Will the warhead be taken to the PANTEX plant in Texas and dismantled, the plutonium removed, enriched plutonium put in, and the warhead shipped back to its deployment site? Or will this process happen somewhere else? What will be the volume of plutonium involved in bringing the plutonium to the SIS and then back to the bomb? What transportation plans are in place or will be needed, and what routing will be used, to bring the plutonium to the SIS and then back to the weapon?

Idaho has been home to my family for 5 generations. In your response to all our questions about the impact of the SIS on Idaho, please consider the next five generations of Idahoans, and a few after that.

Thank you.

Respectfully submitted,

Kerry Cooke

Kerry Cooke
2424 Bella Street
Boise, Idaho 83702

-IONS-

IDAHO ORGANIZATIONS for NUCLEAR SAFETY

EX NO. 24
DATE
PENGAD-Bayonne, N.J.
BURNHAM, MARLOW & ASSOCIATES

Citizens Against Nuclear Weapons and Extermination 208-667-9389
BOX 2152 COEUR d'ALENE, IDAHO 83814

GROUNDWATER ALLIANCE
Box 4090 • Ketchum, Idaho • 83340
208-726-7728

PALOUSE-CLEARWATER HANFORD WATCH
P.O. Box 8582, Moscow, ID 83843
882-4210 835-6152

Box 1731 · Boise ID 83701 · 208/344-9161

moscow chapter
Idaho Conservation League

26 February 1987

Public Comment regarding the scope of the Environmental Impact Statememt for the proposed Special Isotope Seperation Facility to be installed at the Idaho Nuclear Engineering Laboratory near Idaho Falls, Idaho.

My name is Lisa Shultz of 1302 N. 21st Street, Boise.

I am offering testimony tonight on behalf of the Idaho Oranizations for Nuclear Safety, which includes the Citizens Against Nuclear Weapons and Extermination in Coeur D'Alene, Idaho the Groundwater Alliance, in Ketchum, Idaho, The Moscow Chapter of the Idaho Conservation League, The Palouse/Clearwater Hanford Watch, also in Moscow, and the Snake River Alliance, located in Boise, Idaho.

The Member Groups of the Idaho Organizations for Nuclear Safety would like the Environmental Impact Statement to specifiacily address the following questions related to transportation:

1) It is important for emergency response personell to be prepared.
   - What is the route that will be followed?
   - Has an EIS on these shipments, with respect to the determined route, been done?
   - What type, if any, of fire supression will be available in the transport vehicle?

2) Accidents are sometimes unavoidable.
   - What kinds of measures will be taken to prevent water being used on plutonium fires by local emergency crews? Who are, in many cases, minimally trained, volunteer firefighters.
   - Is the DOE prepared to provide funding to assist in training and equiping local firefighters and emergency response personell in order to prepare them to handle high-level radioactive incidents?

3) We realize that the DOE has done some amount of research and testing on transport containers.
   - Will the SST provide air-tight containment?
   - What information have the tests, conducted thus far, on the SST provided?
   - What is the "track record" of the containers? Actual, not theoretical.

4) There have been some concerns raised with regard to terrorism.
   - What is the history of sabbatage threats on DOE shipments? (in 1971 shots were fired at a transport vehicle carrying spent fuel through Idaho.)
   - How will the security of shipments be garunteed?
   - How will the DOE determine a balance between the protection of shipments against sabbatage, while at the same time allowing for notification procedures (that the citizens of Idaho demand) to take place so that emergency response personell can be prepared?

These questions address only one of the many aspects related to the impact a project like SIS would have on the state of Idaho. The Idaho Organizations for Nuclear Safety are also conerned with the overall implications of increasesd plutonium production, the possibility of continued damage to the health of our citizens and the integrity of our environment and the affect a project such as this would have on agriculture and tourism in Idaho.

Finally, I would like to conclude with a brief personal comment. It seems apparent to me that the DOE is more concerned with protecting our country with an "overkill" defense build-up, in preparation of some future attack, that may never occur, than it is with the protection of the citizens and environment that exists today, right now. Which, by the way, is the only thing anyone can ever really be certain of anyway! Do we really NEED the additional Plutonium that SIS would produce? Is this project REALLY necessary, or is it just another dream fulfillment for nuclear engineers and scientists? Well, I have dreams too, and they don't include nuclear weapons!

Thank you for this opportunity.

My name is John [illegible]
I am a native of Idaho
born and reared on the Great
Snake River Aquifer before
Our potatoes glowed in the
dark.

Jim O'Dell questioned on
November 13, 1986, "Why
did INEL become
the preferred site for the
SIS after Hanford was
chosen (sic) previously?"

On December 9, 1986
Carl B Gerity, Project
Manager, SIS in a
model of bureaucratic
obfuscation answered,
"The Department of Energy, at the
direction of the Congress, performed
a technology readiness review

of the Atomic Vapor Laser Isotope Separation (AVLIS) and the Molecular Laser Isotope Separation (MLIS) processes in 1986 to select the most suitable process for a production facility. The AVLIS was selected as the preferred process. As a follow up to that review, a decision process was initiated to identify a preferred site for the SILEX Project. Prior to that decision Hanford was the reference site for SIS plant design considerations. A site evaluation team was appointed within DOE to provide an independent technical evaluation of production and/or reactor fuel processing sites. On June 5, 1986, and August 8, 1986, the findings of the site evaluation team were reviewed internally as part

III.

of the Energy System acquisition Advisory Board process. As a result of this process, the Idaho National Engineering Laboratory (INEL) was designated the preferred site for the definitive design of an SIS plant.

Mr Gerty seems to have told Fry more than she wanted to know without answering her question. I repeat Ms Paul's general question with a desire to specific reference made to the political clout of our neighboring states who do not want this Atomic Vapor Laser Isotope Separation process in their state or across the river from their state.

In response to Ms Paul's eighth question Mr. Gerty informs, "N-Reactor produced material will be utilized for defense application."

In his answer to Ms Paul's first question Mr. Derby alludes to an independent evaluation of production and/or reactor fuel processing sites. I would like DOE to specifically address, Does the intended Atomic Vapor Laser Isotope Separation installation have the size which will require correction of the Fiscal Year 1982-1983 authorization bill to allow more weapons grade plutoniums to be concentrated in this facility?

We have been advised that source materials will come from Hanford and other sources. Please address the efficacy of transporting reactive materials from Hanford rather than processing them at Hanford.

Hanford is presently designated

the repository for atomic waste,
what is the efficacy of transporting
fissionable material from Hanford
and transporting of radioactive
wastes back to Hanford.

If some of the "other sources" are
aged fissionable bombs where
plutonium content could benefit
from this advanced refining
process (I refer to the Atomic
Vapor Laser Isotopic Separation
process) where would any dismantling
take place.

Thank you

STATE OF IDAHO
OFFICE OF THE ATTORNEY GENERAL
BOISE 83720

JIM JONES
ATTORNEY GENERAL

TELEPHONE
(208) 334-2400

February 25, 1987

Mr. Carl P. Gertz
SIS Project Manager
Idaho Operations Office
U.S. Department of Energy
785 DOE Place
Idaho Falls, ID 83402

Dear Mr. Gertz:

I have reviewed the background materials pertaining to the Special Isotope Separation Project and it appears to be a sound and environmentally acceptable project for location at the Idaho National Engineering Laboratory.

Although I have been supportive of the activities of the Department of Energy at the INEL and elsewhere, I have also been quite concerned that adequate consideration be given to the safe transportation, storage and handling of radioactive materials. In reviewing the plans for the SIS Project it appears that adequate safeguards are planned by the Department of Energy. With safety considerations contemplated for the construction and operation of the facility, there should be no harmful effect for the area, including the aquifer. The Project appears to be environmentally sound and worthy of support in a number of other regards.

With the operation of this Project, Idaho can play its part in insuring an adequate supply of weapons-grade plutonium for the United States. Certainly, Idahoans are willing to do their part to fulfill the needs of our national defense policy.

In addition, the Project will place the INEL in the forefront in laser technology, which will be of benefit to the entire state.

From my review of the materials, it appears that the SIS will be a worthwhile project and that there should be no detrimental effects in locating it at the INEL. I strongly support the construction and operation of the project at the proposed location

and would urge that the Department of Energy move forward with its proposal.

Please include this letter in the record for the Public Scoping hearing.

Sincerely,

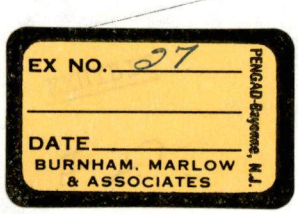
JIM JONES
ATTORNEY GENERAL

JTJ/tg

cc Ignacio Resendez
Troy E. Wade, II.
Post Register
Associated Press
United Press International

League of Conservation Voters

320 4th Street, N.E. Washington, D.C. 20002 (202) 547-7200



February 25, 1987

Mr. Carl P. Gertz
SIS Project Manager
Idaho Operations Office
U.S. Department of Energy
785 DOE Place
Idaho Falls, Idaho 83402

Dear Mr. Gertz:

I wish to enter comments, questions, and concerns on behalf of the League of Conservation Voters into the record for the Scoping Process in preparation of the Environmental Impact Statement evaluating the environmental impacts from the siting, constructing, and operating of a special isotope separation (SIS) plant based on the atomic vapor laser isotope separation (AVLIS) process technology.

As the potential siting of such a facility in Idaho would introduce a technology new to the INEL site, I offer the following scoping concerns. The EIS should not only discuss the impacts from such an operation in any location, but should also include detailed site specific information about impacts to the region around the Idaho location.

The specific concerns addressed herein include those dealing with day to day operations, potential accidents, and the plans for decommissioning the facility. The questions are particularly focussed on environmental impacts to habitats and agricultural operations.

Regarding the possible releases of plutonium in various chemical and physical forms from the SIS process, the EIS should address the complete range of potential risks, how these releases would be controlled and monitored by both state and federal agencies, the complete range of potential impacts to human health, and the impacts on plants and animals in the region. Particular attention should be placed on the agricultural enterprises and the hunting and fishing values of the region.

The movement and storage (either temporary or permanent) of products, by-products, materials, and wastes pose environmental hazards. The EIS should address the range of methods, safeguards, and regulations proposed. The entire potential range of impact both geographic and physical should be detailed and addressed.

Also important to include is a complete assessment of the types of potential accidents, their geographic range of impact, and the worst case evaluation of those impacts. Any planned mitigation measures should be discussed and evaluated fully.

Regarding decontamination and decommissioning of the SIS facilities, the EIS should discuss and evaluate fully plans, measures, means, and methods to insure human and environmental health and safety.

Following the release of the EIS, the League of Conservation Voters requests that field hearings again be held to allow public comment on the report.

The opportunity to attend field hearings on the Scoping Process is appreciated.

Sincerely,

Carol C. Kriz

Carol C. Kriz
Western Political Director

I & S Separation Project
Dorothy Strait
Citizens for Energy
& the Environment

I Compliment the
panel on their presentation
and conduct in this
hostile environment.
I would say that
I represent the silent
majority that agree
that I N & L is and has
been an asset to the
State of Idaho, who are
busy with their jobs
and families, rather
than running around
the country impeding
progress.
The Workmens Compensation
Chart proves the safety
of I N & L. In comparison
wood stoves cause far
more problems through
accidents, deaths and
also polluted air.
I prefer that our nation
be able to defend us
th[illegible]ed
[illegible] positions
I[illegible] testimony
of Lt. Gov Butch Otter, Peter
Johnson, Ann Rydalch,
& Rich Hahn.
To those wanting
peace without nuclear
weapons rather than
opposing advancing
technology, a better
way is to work
against aid and
trade with Communist
nations.

Mrs. Dorothy Strait
304 Driftwood
Boise, Id 83704
375-1168

SPECIAL ISOTOPE SEPARATION PROJECT
PUBLIC SCOPING MEETING REGISTRATION
FEBRUARY 24, 1987 IDAHO FALLS, ID
FEBRUARY 26, 1987 BOISE, ID

NAME Jane Lynn

REPRESENTING self

ADDRESS 310 Renegade

CITY Boise STATE ID ZIP 83702 PHONE 345-6343

YES	NO	
☐	☐	I HAVE PRE-REGISTERED TO MAKE A COMMENT ABOUT THE SIS
☒	☐	I WOULD LIKE TO MAKE AN ORAL PRESENTATION ON THE SCOPE OF THE SIS ENVIRONMENTAL IMPACT STATEMENT
☒ submitted written comment	☐	I WOULD LIKE TO RECEIVE THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR REVIEW AND COMMENT

310 Resseguie Street
Boise, Idaho 83702
24 February 1987

Carl P. Gertz, Project Manager
SIS Project
Department of Energy
785 DOE Place
Idaho Falls, Idaho 83340

Re: Proposed Special Isotope Seperation Plant Scoping

Dear Mr. Gertz,

The SIS Project poses grave health and environmental risks to the workers, the public in Idaho, and the physical environment in the region. To meet the requirements of NEPA it will be essential that the EIS **fully disclose** all health, environmental, and economic impacts on the workers and the public, and on the water, air and soil, and in economic terms, on both the region and the nation. It is critical that the Environmental Impact Statement analyze not only impacts from the SIS itself but it must also analyze the cumulative impacts of SIS with the impacts of the adjacent chemical reprocessing operation specifically, as well as other operations at INEL. Furthermore, the draft EIS should examine a range of reasonable safer and less expensive alternatives including but not limited to other locations and no action.

HEALTH

The DOE has conducted a number of studies on the long range impact on workers as a whole in nuclear industry but not on the workers at INEL. This is a site specific need that must be met prior to conducting any reliable analysis of radiation particle impacts on humans. A reliable study must be conducted independently and externally from the DOE and/or their contractors. The question of whether or not we will be killed, slowly, by the operation of the SIS and whether our future children will be born in health is a fundamental question that must be thoroughly and reliably answered by the EIS. Without a study of the current and long term real health status of INEL workers as a whole, a monitoring base cannot even be established let alone statistical analysis of possible solo or cumulative impacts. I believe that this is a simple and compelling issue that cannot be dealt with in sophomoric rhetoric but must be examined by such institutions as the Center for Disease Control and the National Institute of Occupational Safety and Health.

In addition to analyzing radioactive impacts on people directly, it is essential that the EIS examine the research on soil, water and airborne particles and those impacts on people. The DOE has not been forthcoming with historical data on the impact INEL has had to date on the health of people and the environment. This refusal to disclose fundamental historic information coupled with the lack of a health study is ominous and must be corrected.

People are, of course, our most precious resource and the fundamental reason we even need to process this plutonium. But, also of great value to Idaho is our water, our soil, our forests and deserts, our wildlife, and our opportunities for recreation and solitude. How will the radioactive and other toxic emissions from the SIS, and cumulatively from all INEL operations, impact these resources? The magnitude and longevity of this project cannot be overemphasized nor can this research be called excessive.

An EIS is intended to be a "environmental full disclosure document." Full disclosure may be frustrated when scientific uncertainty and gaps in relevant information lead to incomplete or inconclusive evaluations. NEPA requires though that an agency, in this case the DOE, must take one of two options in confronting rather than ignoring data deficiencies: a) research missing relevant information, or, b) prepare a worst case analysis. I voice these options here only to emphasis that the missing human and environmental health data cannot be omitted in the DEIS. Further, it is important to point out that the probability of worst case scenarios actually occurring is not to be a factor in making the threshold determination whether to prepare a worst case analysis. The question of whether or not a <u>significant</u> effect on the (human) environment would occur hardly seems necessary to ask. Indeed, catastrophic effects are all too possible.

WATER

Just as water is an essential prerequisite for the SIS project it is also essential to the human and natural environment. The human and natural environments require non-contaminated water. The aquifer above which this project would be located, and from which the water will be drawn, and later into which used water will be injected serves a huge geographic and economic base. The water from the Snake River supports much of Idaho's agricultural economy, fisheries and wildlife habitat, and domestic water supplies. Chemical and temperature contamination of the river from the various INEL projects would be greatly increase with the addition of SIS. The DEIS should offer a full range of alternatives that analyze water involved

impacts of the project, and the project cumulatively with other contaminating sources at INEL, on fisheries and wildlife, agriculture, domestic water supplies and recreation on the Snake and Columbia Rivers. Water is certainly the life blood of the west, and the DOE is compelled by the law and the public trust to evaluate the environmental impacts of processing plutonium at this site prior to the commitment of these irreplaceable resources.

ECONOMICS

The DEIS should fully disclose the uncertainty of ongoing funding for DOE's Atomic Vapor Laser Isotope Separation (AVLIS) technology in the longterm and how that will impact the SIS project at INEL. The Congress, in its FY'88 budget, proposed elimination of all further funding for the AVLIS program until the agency is able to resolve a series of financial and operating difficulties. Chairman Robert Roe of the House Science, Space and Technology Committee this month acknowledged that the government is faced not only with budget issues relative to AVLIS and plutonium processing but also policy issues. The policy issues revolves around privatization of AVLIS. He believes the AVLIS should emerge as a serious competitor in providing commercial utility customers worldwide with low-cost service in the 1990's and beyond. This objective has been clearly stated and should be fully disclosed in the DEIS. The impact of thus making all nuclear power plants the providers of weapons grade plutonium creates montrous risks. I believe that the risks and possible catastrophic impacts of the SIS project would be viewed in a very different light should the processing ever be outside the public domain as advocated by Chairman Roe. Is this project needed only to create some economic feasiblity for private nuclear power plants? The DEIS should examine the impacts of no action on national security and and no action on private utility customers . It is my view that processing of utility customer spent fuel would not be acceptable to the public in light of the health and environmental risks posed.

Will this SIS project be economically justified? It appears that AVLIS is not only having trouble getting financed now, but that plutonium produced by it may cost many, many times more than plutonium produced at another facility. Surely the DEIS should examine the economic feasibility and prove economic benefits exist before going forward with the project.

TRANSPORTATION

Deadly and catastrophic risks are significantly increased for the local population and environment because of greatly increased occurrences transporting radioactive

materials to and from INEL. Inadequate regulations and laws exist to control this danger to the public and the public estate. The DEIS should fully disclose the probably risks and worst case scenarios for accidents in a variety of situations, such as what might occur if an accident occurred near people, near a water source or river, during different seasons, etc. What facilities and personnel would be needed to treat the damaged people and or resources? Is this the burden of DOE? The location of this project so far from Hanford, Los Allomos, or Rocky Flats seems imprudent at best in terms of creating unnecessary risks due to the transportation requirements.

SECURITY

The DOE may determine that some questions might only be answerable by secure information. Be this as it may, full disclosure of those issues must be made in order for the public to be assured that our interest is being served. It is my view that the DEIS should include an appendix that would fully address any and all "need" questions such as an evaluation of national security and private sector spent fuel processing needs. This appendix would be available only to those members of Congress with applicable security clearances. Only in this way can public review of the proposal be met. Without it the public cannot be assured that an analysis of many very serious and pivotal issues will be kept from any form of public review.

Thank you for this opportunity to participate the planning process for such an important project.

Sincerely,

Jane Leeson

SPECIAL ISOTOPE SEPARATION PROJECT
PUBLIC SCOPING MEETING REGISTRATION
FEBRUARY 24, 1987 IDAHO FALLS, ID
FEBRUARY 26, 1987 BOISE, ID

NAME Ingrid Brudenell

REPRESENTING

ADDRESS 10892 Bridgetower Drive

CITY Boise STATE ID ZIP 83709 PHONE

YES	NO	
☐	☒	I HAVE PRE-REGISTERED TO MAKE A COMMENT ABOUT THE SIS
☐	☒	I WOULD LIKE TO MAKE AN ORAL PRESENTATION ON THE SCOPE OF THE SIS ENVIRONMENTAL IMPACT STATEMENT
☐	☐	I WOULD LIKE TO RECEIVE THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR REVIEW AND COMMENT

Submitted written comment for public record.

Ingrid Brudenell,R.N.M.S.
10892 Bridgetower Drive
Boise,Idaho 83709

Please add to the testimonies from the public hearing in Boise,Id. on the Plutonium Separation Project.

Dear Sir:

Thank you for the opportunity to address the issues surrounding the plutonium separation project. My comments will center on the key points involved with health.First,transportation of high level radioactive material presents many problems both while the material is in transit and at either end of the destination.Idaho is just beginning to identify and respond in ways to limit health exposures during transit.Are these problems adequately addressed in the project plans and are they communicated to all necessary agencies for example local health department disaster planning? Second, the Rocky Flats Plant in Denver is heavily contaminated with a variety of toxic materials. What monitoring and safeguards will be in place to protect workers and the larger community? Third, Has a need been established and documented for the additional nuclear weapons? Through continued production of nuclear weapons are we not in violation of arms limitation agreements? The U.S. Public Health Association has identified nuclear warfare as the ultimate environmental disaster. Continued weapon production contributes to this threat.
Three key concerns have been identified in this testimony about the plutonium separation project.

Thank you for your time.Please include my testimony with the public hearing on the plutonium separation project.

Sincerely,

2-26-87

Ingrid A. Brudenell

responsiveness, and price reasonableness. A prospective contractor must affirmatively demonstrate its responsibility. Hence, the Government must be apprised of this information prior to award.

The contracting officer must know the place of performance and the owner of the plant or facility to (a) determine bidder responsibility; (b) determine price reasonableness; (c) conduct plant or source inspections; and (d) determine whether the prospective contractor is a manufacturer or a regular dealer.

b. Annual Reporting Burden

The annual reporting burden is estimated as follows: Respondents, *79,397;* responses per respondent, *14;* total annual responses, *1,111,558;* hours per response, *.07;* and total burden hours, *77,781.*

Obtaining Copies of Proposals

Requesters may obtain copies from the FAR Secretariat (VRS), Room 4041, GSA Building, Washington, DC 20405, telephone (202) 523–4755. Please cite OMB Control No. 9000–0047, Place of Performance.

Dated: January 27, 1987.

Margaret A. Willis,

FAR Secretariat.

[FR Doc. 87–2616 Filed 2–6–87; 8:45 am]

BILLING CODE 6820–61–M

DEPARTMENT OF ENERGY

Special Isotope Separation Project; Scoping Meeting

AGENCY: U.S. Department of Energy.

ACTION: Notice of public scoping meetings for the Environmental Impact Statement (EIS) for the proposed Special Isotope Separation (SIS) facility.

SUMMARY: Notice is hereby given that the Department of Energy (DOE) has scheduled public scoping meetings to provide an opportunity for public participation and comment regarding the EIS for the SIS Project. On October 31, 1986, (51 FR 39785) the DOE announced its intent to prepare an EIS for siting, constructing and operating the proposed SIS facility based on the Atomic Vapor Laser Isotope Separation (AVLIS) process technology. The purpose of the SIS facility is to segregate the isotopes of DOE's Defense Programs' plutonium into specific isotopic concentrations required for various national defense materials and research activities. More background information on the SIS project is contained in the previously published Notice and should be referred to for more detail.

Several written comments pursuant to the previously published Notice of Intent requested that public scoping meetings be held. In response to these comments, DOE has decided to conduct public scoping meetings and extend the scoping period during which written comments will be received and considered. Once the Draft Environmental Impact Statement (DEIS) has been completed, that document will be made available for public review and additional meetings/hearings will be conducted to solicit public comments.

FOR FURTHER INFORMATION: Written comments or suggestions on the scope of the EIS, requests to speak at the scoping meetings, or questions concerning the SIS project should be directed to: Mr. Carl P. Gertz, SIS Project Manager, Idaho Operations Office, U.S. Department of Energy, 785 DOE Place, Idaho Falls, ID 83402, telephone (208) 526–0306. For general information on the DOE EIS process, please contact the Office of the Assistant Secretary for Environment, Safety and Health, U.S. Department of Energy, Attention: Ms. Carol M. Borgstrom (EH–25), Room 3G–092, Forrestal Building, 1000 Independence Avenue, SW., Washington, DC 20585 (202) 586–4600.

Scoping

I. Previous Notice Of Intent

The DOE published a Notice Of Intent on October 31, 1986, (51 FR 39785–3986) regarding the preparation of an EIS for the proposed SIS facility.

II. Background for the Proposed Project

Background information, a description of the proposed action, and an identification of environmental issues and alternatives to be considered are contained in the previously published Notice of Intent. In addition, an information packet will be available at the time of each meeting and may be requested in advance by contacting Mr. Carl P. Gertz, U.S. Department of Energy (address given above).

III. Comments and Scoping

Several of the written comments received in response to the previously published Notice of Intent have included requests for public scoping meetings for the EIS on the SIS Project. In response to these requests and in accordance with the National Environmental Policy Act (NEPA), as implemented by the Council on Enivornmental Quality Regulations (40 CFR Part 1500 *et seq.*), the DOE will conduct public scoping meetings to assist DOE in determining the appropriate scope of the EIS and the significant environmental issues to be addressed. The Department is also extending the written comment period to March 2, 1987. Written comments received during this period will be considered in preparing the EIS.

Two public scoping meetings will be held on the following dates, at the following locations and times: February 24, 1987, in Idaho Falls, Idaho, at University Place, 1776 Science Center Drive, commencing at 7:00 p.m.; on February 26, 1987, in Boise, Idaho, at the Red Lion Inn-Riverside, commencing at 7:00 p.m.

IV. Written Comment Procedures

Interested agencies, organizations, and members of the general public who desire to submit written comments or suggestions for consideration in connection with the preparation of this EIS are invited to do so in order to assist the DOE in identifying significant environmental issues and the appropriate scope of the EIS. Any written comments received will be given equal weight with oral comments presented at the scoping meetings. Written comments or suggestions on the scope of the EIS should be sent to Mr. Carl P. Gertz (address given above), and should be postmarked by March 2, 1987, to assure consideration.

V. Public Meeting Participation Procedure

Those parties interested in making oral comments or suggestions for consideration in connection with the preparation of this EIS are invited to do so by attending the public scoping meetings cited above. Intentions to present oral testimony should be received by Mr. Carl P. Gertz (address given above) by February 17, 1987.

The public scoping meetings will be held at the times and locations and on the dates specified above. The DOE will designate a presiding officer to chair these meetings. These meetings will be conducted as formal hearings. All interested individuals will be afforded an opportunity to speak. There will be no cross-examination of persons presenting statements. The presiding officer may ask questions of persons presenting statements, if needed for clarification, to assure that DOE understands the comments or suggestions made. The presiding officer will establish the order of speakers and provide any additional procedures necessary for the conduct of the meeting. As time permits, speakers will be allowed about five minutes for their oral statements and are requested to provide a brief written summary of their oral presentation. Speakers who desire

additional time to speak or who wish to provide further information for the record should be sure to submit such a request or information along with their notice of intent to speak. Individuals who do not make an advance arrangement to speak may register to speak at the time of each meeting. After all scheduled speakers have been given an opportunity to make their presentation, an opportunity will be provided to these registrants to speak.

A transcript of these scoping meetings will be prepared at the time of each meeting and the entire record of the meetings, including the transcript together with other information pertaining to the SIS Project will be retained by the DOE and made available for inspection at the DOE-Idaho public reading room located at the INEL Technical Library, University Place, 1776 Science Center Drive, Idaho Falls, ID 83415, between the hours of 8:00 a.m. and 5:00 p.m., Monday through Friday. Additional copies of the complete transcript will also be available for a fee. In addition, anyone may make arrangements with Brent Jacobsen at the INEL Technical Library (address given above), telephone (208) 526-1144, to purchase a copy of the transcripts.

Issued in Washington, DC, February 2, 1987.

Mary L. Walker,

Assistant Secretary, Environment, Safety and Health.

[FR Doc. 87-2635 Filed 2-6-87; 8:45 am]

BILLING CODE 6450-01-M

Office of Assistant Secretary for International Affairs and Energy Emergencies

International Atomic Energy Agreements; Civil Uses; Proposed Subsequent Arrangement; Civil Australia

Pursuant to section 131 of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2160) notice is hereby given of a proposed "subsequent arrangement" under the Additional Agreement for Cooperation between the Government of the United States of America and the European Atomic Energy Community (EURATOM) concerning Peaceful Uses of Atomic Energy, as amended, and the Agreement for Cooperation between the Government of the United States of America and the Government of Australia concerning Peaceful Uses of Nuclear Energy.

The subsequent arrangement to be carried out under the above-mentioned agreements involves approval of the following retransfer:

RTD/EU(AU)-5, for the transfer of 18.286 kilograms of uranium, containing 16.923 kilograms of uranium-235 (92.546 percent enrichment) from the Australian Atomic Energy Commission to the United Kingdom Atomic Energy Authority, for fabrication of fuel elements (60 percent enrichment) for the HIFAR research reactor.

In accordance with section 131 of the Atomic Energy Act of 1954, as amended, it has been determined that this subsequent arrangement will not be inimical to the common defense and security.

This subsequent arrangement will take effect no sooner than fifteen days after the date of publication of this notice.

Dated: February 2, 1987.

For the Department of Energy.

George J. Bradley, Jr.,

Principal Deputy Assistant Secretary for International Affairs and Energy Emergencies.

[FR Doc. 87-2590 Filed 2-6-87; 8:45 am]

BILLING CODE 6450-01-M

International Atomic Energy Agreements; Civil Uses; Proposed Subsequent Arrangement; Germany

Pursuant to section 131 of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2160) notice is hereby given of a proposed "subsequent arrangement" under the Additional Agreement for Cooperation between the Government of the United States of America and the European Atomic Energy Community (EURATOM) concerning Peaceful Uses of Atomic Energy, as amended.

The subsequent arrangement to be carried out under the above-mentioned agreement involves approval for the loan of 200 micrograms of plutonium-242 to the European Institute for Transuranium Elements, Karlsruhe, the Federal Republic of Germany, for collaborative experiments. The material is to be returned to the United States upon conclusion of the experiments. Contract No. WC-EU-244 has been assigned to this proposed subsequent arrangement.

In accordance with section 131 of the Atomic Energy Act of 1954, as amended, it has been determined that this subsequent arrangement will not be inimical to the common defense and security.

This subsequent arrangement will take effect no sooner than fifteen days after this date of publication of this notice.

Dated: February 2, 1987.

For the Department of Energy.

George J. Bradley, Jr.,

Principal Deputy Assistant Secretary for International Affairs and Energy Emergencies.

[FR Doc. 87-2591 Filed 2-6-87; 8:45 am]

BILLING CODE 6450-01-M

Atomic Energy Agreements; Proposed Subsequent Arrangement With European Atomic Energy Community; Correction

In a document published on page 45512 in the **Federal Register** of Friday, December 19, 1986, the following correction should be made:

In the fourth line of the second paragraph of the document the "4 kilograms" should read "approximately 20 kilograms".

George J. Bradley, Jr.,

Principal Deputy Assistant Secretary for International Affairs and Energy Emergencies.

February 2, 1987.

[FR Doc. 87-2592 Filed 2-6-87; 8:45 am]

BILLING CODE 6450-01-M

Economic Regulatory Administration

Proposed Consent Order With Agway, Inc., Agway Petroleum Corp., and Texas City Refining, Inc.

AGENCY: Department of Energy (DOE).

ACTION: Notice of proposed consent order and opportunity for public comment.

SUMMARY: The Economic Regulatory Administration (ERA) hereby gives the notice required by 10 CFR 205.199J that it has entered into a Consent Order with Agway, Inc., Agway Petroleum Corporation, and Texas City Refining, Inc., ("Agway"). The Consent Order proposes to resolve matters relating to Agway's compliance with the federal petroleum price and allocation regulations for the period January 1, 1973, through January 27, 1981. To remedy any violations that may have occurred during the period, Agway has agreed to make three payments totalling $1 million plus interest from the date of execution of the Consent Order. The settlement reflects the negotiated compromises present in every settlement, including assessments of litigation risks in the significant areas of dispute between ERA and Agway.

ERA will petition the Office of Hearings and Appeals (OHA) to implement a Special Refund Proceeding pursuant to 10 CFR Part 205, Subpart V

agency and public review in the fall of 1987. The final EIS is scheduled for publication in early 1988.

ADDRESS: If you have any questions or need additional information, please contact Mr. Eric Braun, telephone (503) 221–6096 (ETS 423–6096), US Army Corps of Engineers, Portland District, Natural Resources Branch, PO Box 2946, Portland, Oregon 97208–2946.

Dated: October 28, 1986.

Brenda K. Hagstram,

Department of the Army, Alternate Liaison Officer With the Federal Register.

[FR Doc. 86–24539 Filed 10–30–86; 8:45 am]

BILLING CODE 3710–92–M

DEPARTMENT OF ENERGY

Intent To Prepare an Environmental Impact Statement for the Proposed Special Isotope Separation Plant

AGENCY: U.S. Department of Energy.

ACTION: Notice of intent (NOI) to prepare an Environmental Impact Statement (EIS) for siting, constructing, and operating a proposed special isotope separation (SIS) plant based on the atomic vapor laser isotope separation (AVLIS) process technology.

SUMMARY: The Department of Energy (DOE) announces its intent to prepare an EIS in accordance with section 102(2)C of the National Environmental Policy Act (NEPA). The EIS is to provide environmental information for consideration in decisionmaking related to the proposed construction and operation of a plutonium AVLIS/SIS plant. The purpose of the AVLIS/SIS plant is to segregate the isotopes of DOE's Defense Programs' plutonium into specific isotopic concentrations required for various national defense materials and research activities. This capability is required to increase utilization of existing DOE's Defense Programs' plutonium resources. The AVLIS/SIS project was authorized by Congress based on recommendations from the Senate and House Armed Services Committees.

The purpose of this NOI is to present pertinent background information on the proposed scope and content of the EIS and to solicit comments and suggestions for consideration in its preparation. Agencies, organizations, and the general public desiring to submit comments or suggestions for consideration in the preparation of this EIS are invited to do so. No public scoping meetings are scheduled: should DOE determine, after it reviews public comments in response to the NOI, that a scoping meeting is appropriate, a public scoping meeting will be scheduled at any one or more of the communities close to the DOE sites under consideration. Upon completion of the draft EIS, the document will be made available to the public for review. Comments received will be used in preparing the final EIS. Written comments or suggestion on the scope of the EIS may be submitted to: Mr. Carl P. Gertz, SIS Project Manager, Idaho Operations Office, U.S. Department of Energy, 785 Doe Place, Idaho Falls, ID 83402, 208/526–0306.

Those seeking further information of DOE's EIS process may contact: Mr. Robert J. Stern, EH-23, Director, Office of Environmental Guidance, Office of Assistant Secretary for Environment, Safety and Health, U.S. Department of Energy, Washington, DC 20585, 202/252–4600.

DATE: Written comments should be postmarked within 30 days of publication of this NOI to assure consideration in the preparation of the EIS.

Background Information

DOE nuclear reactors produce plutonium for various national programs. The production process results in a product containing several isotopes of plutonium, with the relative amount of each isotops depending primarily on fuel irradiation history. Some of DOE's Defense Programs' existing plutonium does not meet isotopic requirements for particular defense and research and development activities. Construction and operation of the proposed AVLIS/SIS plant would provide for the separation of a number of undesirable isotopes from DOE's Defense Programs' plutonium to produce material meeting the requirements of nuclear weapons or research programs.

Conventional chemical processes (such as the Plutonium Uranium Extraction Process) are not capable of separating plutonium isotopes. However, technologies based on physical effects have been demonstrated to be capable of isotopic separation. DOE considered a number of separation technologies including AVLIS, Molecular Laser Isotope Separation (MLIS), gaseous centrifuge, plasma separation process, calutron, gaseous diffusion, and chemical exchange. Conceptually, all of these technologies could be developed for the proposed application. However, because of fundamental technical considerations, cost, or the need to carry out extensive research and development programs, most are not now viable. The two most promising for application to the SIS project were recently evalua technical readiness.

These two technologies were the AVLIS and MLIS processes. Based on a technology readiness review performed in response to a congressional request, the technology preferred by DOE for the SIS project is AVLIS. The AVLIS process uses laser energy to selectively photoionize and electrostatically separate plutonium isotopes from an atomic vapor stream.

As part of the DOE technology readiness review, an Environmental Assessment (EA), DOE/EA–0298, March 1986, was prepared to evaluate the differences in potential environmental impacts of constructing and operating an SIS plant based on either of the two technologies. The EA showed that there were no significant differences, and DOE issued a Finding of No Significant Impact dated April 17, 1986, concerning the SIS technology selection. This EIS will be prepared to analyze the potential environmental impacts of siting, constructing, and operating an SIS plant using the AVLIS concept.

Proposed Action

The proposed action is to select a site and decide whether to construct and operate an AVLIS/SIS plant by the early 1990's. The plutonium for this plant would come from DOE's defense programs. The weapon-grade product and byproduct materials resulting from the separation process would be stored in a vault for future disposition, while process wastes would be accommodated by DOE waste management facilities. The EIS will include discussions of transportation of feed, product, and byproduct materials; feed receipt and interim storage; isotope separation; product treatment; interim storage of product and byproduct material; and waste handling and off-gas treatment.

Identification of Environmental Issues

Items to be addressed for the proposed action and its alternatives during the preparation of the EIS include:

1. Potential impacts on the general population from radiological and nonradiological releases caused by normal operations.

2. Potential impacts on site operation, including changes in support operations (e.g., radiological and nonradiological waste management).

3. Potential environmental impacts, including air and water quality caused by construction and normal operations.

4. Potential transportation impacts onsite and offsite caused by material shipment.

5. Potential offsite impacts caused by postulated accidents.

6. Potential socieconomic impacts to surrounding communities.

7. Short-term versus long-term land use impacts.

8. Irretrievable and irreversible commitment of resources.

9. Applicable reguations and guidelines.

10. Decontamination and decommissioning.

This list is intended neither to be all inclusive nor a predetermination of the relative magnitude of the impacts.

Alternatives

The alternatives to be considered include:

1. Siting, constructing, and operating an AVLIS/SIS plant at the Idaho National Engineering Laboratory (INEL) located near Idaho Falls, Idaho. This is DOE's preferred alternative.

2. Siting, constructing, and operating an AVLIS/SIS Plant at the Hanford site located near Richland, Washington.

3. Siting, constructing, and operating an AVLIS/SIS Plant at the Savannah River Plant located near Aiken, South Carolina.

4. No action. This alternative involves no change from present practice regarding DOE's defense programs nonweapon-grade plutonium. No SIS plant would be constructed.

Comments and Scoping

All interested parties are invited to submit written comments or suggestions to be considered by DOE in preparing this EIS.

Written comments or suggestions on the scope of the EIS may be submitted to Mr. Carl P. Gertz (address given above). Written comments should be postmarked within 30 days of the publication of this NOI to assure consideration in the preparation of this EIS. Those who wish to receive a copy of the draft EIS for review and comment when it is issued should also notify Mr. Gertz. The draft EIS is scheduled to be completed by August 1987 at which time its availability will be announced in the **Federal Register** and in local news media, and public comments will again be solicited. Those seeking further information on the EIS process also may contact Mr. Robert Stern (address given above).

Dated at Washington, D.C., the 22nd of October 1986, for the U.S. Department of Energy.

Mary L. Walker,

Assistant Secretary Environment, Safety and Health.

[FR Doc. 86-24628 Filed 10-30-86; 8:45 am]

BILLING CODE 6450-01-M

National Petroleum Council Coordinating Subcommittee on U.S. Oil and Gas Outlook; Meeting

Notice is hereby given that the Coordinating Subcommittee on U.S. Oil and Gas Outlook will meet in November 1986. The National Petroleum Council was established to provide advice, information, and recommendations to the Secretary of Energy on matters relating to oil and natural gas or the oil and natural gas industries. The Coordinating Subcommittee on U.S. Oil and Gas Outlook will be addressing the current activities of all task groups and providing guidance for future studies. Its analysis and findings will be based on information and data to be gathered by the various task groups.

The Coordinating Subcommittee on U.S. Oil and Gas Outlook will hold its seventh meeting on Thursday and Friday, November 13 and 14, 1986, starting at 9:00 a.m., in the 29th Floor Conference Room of Tenneco Inc., the Tenneco Building, 1010 Milam Street, Houston, Texas.

The tenative agenda for the Coordinating Subcommittee on U.S. Oil and Gas Outlook meeting follows:

1. Opening remarks by the Chairman and Government cochairman.
2. Discuss study assignments.
3. Review task group assignments.
4. Discuss any other matters pertinent to the overall assignment from the Secretary of Energy.

The meeting is open to the public. The Chairman of the Coordinating Subcommittee on U.S. Oil and Gas Outlook is empowered to conduct the meeting in a fashion that will, in his judgment, facilitate the orderly conduct of business. Any member of the public who wishes to file a written statement with the Coordinating Subcommittee on U.S. Oil and Gas Outlook will be permitted to do so, either before or after the meeting. Members of the public who wish to make oral statements should inform Ms. Pat Dickinson, Advanced Fuels, Technology, Extraction and Environmental Controls, Fossil Energy, 301/353-2430, prior to the meeting and reasonable provision will be made for their appearance on the agenda.

Summary minutes of the meeting will be available for public review at the Freedom of Information Public Reading Room, Room 1E-190, DOE Forrestal Building, 1000 Independence Avenue SW., Washington, DC., between the hours of 9:00 a.m. and 4:00 p.m., Monday through Friday, except Federal holidays.

Issued at Washington, D.C., on October 22, 1986.

J. Allen Wampler,

Assistant Secretary Fossil Energy.

[FR Doc. 86-24629 Filed 10-30-86; 8:45 am]

BILLING CODE 6450-01-M

National Petroleum Council Historical Factors Task Group; Meeting

Notice is hereby given that the Historical Factors Task Group will meet in November 1986. The National Petroleum Council was established to provide advice, information, and recommendations to the Secretary of Energy on matters relating to oil and natural gas or the oil and natural gas industries. The Historical Factors Task Group is responsible for the identification and analysis of events, governmental policies, and actions (federal, state, and local) and the reactions of the oil and gas industries to such events, policies and actions (i.e., the "factors") that affect the supply of and demand for oil and gas in the U.S. since the end of World War II.

The Historical Factors Task Group will hold its ninth meeting on Thursday, November 6, 1986, starting at 10:00 a.m., in the Conference Room of the National Petroleum Council, 1625 K Street, NW., Washington, DC.

The tentative agenda for the Historical Factors Task Group meeting follows:

1. Opening remarks by the Chairman and Government Cochairman.
2. Discussion of the factors affecting petroleum supply and demand.
3. Discussion of any other matters pertinent to the overall assignment from the Secretary of Energy.

The meeting is open to the public. The Chairman of the Historical Factors Task Group is empowered to conduct the meeting in a fashion that will, in his judgment, facilitate the orderly conduct of business. Any member of the public who wishes to file a written statement with the Historical Factors Task Group will be permitted to do so, either before or after the meeting. Members of the public who wish to make oral statements should inform Ms. Pat Dickinson, Advanced Fuels, Technology, Extraction and Environmental Controls, Fossil Energy, 301/353-2430, prior to the meeting and reasonable provision will

(4) Duration of agency's involvement.
(5) Sequence of agency's involvement.
(d) Any Federal agency, or any State local agency or private person substantially affected by the absence of lead agency designation, may make a written request to the potential lead agencies that a lead agency be designated.
(e) If Federal agencies are unable to agree on which agency will be the lead agency or if the procedure described in paragraph (c) of this section has not resulted within 45 days in a lead agency designation, any of the agencies or persons concerned may file a request with the Council asking it to determine which Federal agency shall be the lead agency.

A copy of the request shall be transmitted to each potential lead agency. The request shall consist of:
(1) A precise description of the nature and extent of the proposed action.
(2) A detailed statement of why each potential lead agency should or should not be the lead agency under the criteria specified in paragraph (c) of this section.
(f) A response may be filed by any potential lead agency concerned within 20 days after a request is filed with the Council. The Council shall determine as soon as possible but not later than 20 days after receiving the request and all responses to it which Federal agency shall be the lead agency and which other Federal agencies shall be cooperating agencies.

[43 FR 55992, Nov. 29, 1978; 44 FR 873, Jan. 3, 1979]

1501.6 Cooperating agencies.

The purpose of this section is to emphasize agency cooperation early in the NEPA process. Upon request of the lead agency, any other Federal agency which has jurisdiction by law shall be a cooperating agency. In addition any other Federal agency which has special expertise with respect to any environmental issue, which should be addressed in the statement may be requested by the lead agency. An agency may request the lead agency to designate it a cooperating agency.

(a) The lead agency shall:
(1) Request the participation of each cooperating agency in the NEPA process at the earliest possible time.
(2) Use the environmental analysis and proposals of cooperating agencies with jurisdiction by law or special expertise, to the maximum extent possible consistent with its responsibility as lead agency.
(3) Meet with a cooperating agency at the latter's request.

(b) Each cooperating agency shall:
(1) Participate in the NEPA process at the earliest possible time.
(2) Participate in the scoping process (described below in § 1501.7).
(3) Assume on request of the lead agency responsibility for developing information and preparing environmental analyses including portions of the environmental impact statement concerning which the cooperating agency has special expertise.
(4) Make available staff support at the lead agency's request to enhance the latter's interdisciplinary capability.
(5) Normally use its own funds. The lead agency shall, to the extent available funds permit, fund those major activities or analyses it requests from cooperating agencies. Potential lead agencies shall include such funding requirements in their budget requests.

(c) A cooperating agency may in response to a lead agency's request for assistance in preparing the environmental impact statement (described in paragraph (b) (3), (4), or (5) of this section) reply that other program commitments preclude any involvement or the degree of involvement requested in the action that is the subject of the environmental impact statement. A copy of this reply shall be submitted to the Council.

§ 1501.7 Scoping.

There shall be an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. This process shall be termed scoping. As soon as practicable after its decision to prepare an environmental impact statement and before the scoping process the lead agency shall publish a notice of intent (§ 1508.22) in the FEDERAL REGISTER except as provided in § 1507.3(e).

(a) As part of the scoping process the lead agency shall:
(1) Invite the participation of affected Federal, State, and local agencies, any affected Indian tribe, the proponent of the action, and other interested persons (including those who might not be in accord with the action on environmental grounds), unless there is a limited exception under § 1507.3(c). An agency may give notice in accordance with § 1506.6.
(2) Determine the scope (§ 1508.25) and the significant issues to be analyzed in depth in the environmental impact statement.
(3) Identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (§ 1506.3), narrowing the discussion of these issues in the statement to a brief presentation of why they will not have a significant effect on the human environment or providing a reference to their coverage elsewhere.
(4) Allocate assignments for preparation of the environmental impact statement among the lead and cooperating agencies, with the lead agency retaining responsibility for the statement.
(5) Indicate any public environmental assessments and other environmental impact statements which are being or will be prepared that are related to but are not part of the scope of the impact statement under consideration.
(6) Identify other environmental review and consultation requirements so the lead and cooperating agencies may prepare other required analyses and studies concurrently with, and integrated with, the environmental impact statement as provided in § 1502.25.
(7) Indicate the relationship between the timing of the preparation of environmental analyses and the agency's tentative planning and decisionmaking schedule.

(b) As part of the scoping process the lead agency may:
(1) Set page limits on environmental documents (§ 1502.7).

(2) Set time limits (§ 1501.8).

(3) Adopt procedures under § 1507.3 to combine its environmental assessment process with its scoping process.

(4) Hold an early scoping meeting or meetings which may be integrated with any other early planning meeting the agency has. Such a scoping meeting will often be appropriate when the impacts of a particular action are confined to specific sites.

(c) An agency shall revise the determinations made under paragraphs (a) and (b) of this section if substantial changes are made later in the proposed action, or if significant new circumstances or information arise which bear on the proposal or its impacts.

§ 1501.8 Time limits.

Although the Council has decided that prescribed universal time limits for the entire NEPA process are too inflexible, Federal agencies are encouraged to set time limits appropriate to individual actions (consistent with the time intervals required by § 1506.10). When multiple agencies are involved the reference to agency below means lead agency.

(a) The agency shall set time limits if an applicant for the proposed action requests them: *Provided,* That the limits are consistent with the purposes of NEPA and other essential considerations of national policy.

(b) The agency may:

(1) Consider the following factors in determining time limits:

(i) Potential for environmental harm.

(ii) Size of the proposed action.

(iii) State of the art of analytic techniques.

(iv) Degree of public need for the proposed action, including the consequences of delay.

(v) Number of persons and agencies affected.

(vi) Degree to which relevant information is known and if not known the time required for obtaining it.

(vii) Degree to which the action is controversial.

(viii) Other time limits imposed on the agency by law, regulations, or executive order.

(2) Set overall time limits or limits for each constituent part of the NEPA process, which may include:

(i) Decision on whether to prepare an environmental impact statement (if not already decided).

(ii) Determination of the scope of the environmental impact statement.

(iii) Preparation of the draft environmental impact statement.

(iv) Review of any comments on the draft environmental impact statement from the public and agencies.

(v) Preparation of the final environmental impact statement.

(vi) Review of any comments on the final environmental impact statement.

(vii) Decision on the action based in part on the environmental impact statement.

(3) Designate a person (such as the project manager or a person in the agency's office with NEPA responsibilities) to expedite the NEPA process.

(c) State or local agencies or members of the public may request a Federal Agency to set time limits.

PART 1502—ENVIRONMENTAL IMPACT STATEMENT

Sec.

later in the process, and to head off potential conflicts.

To implement this requirement DOE will:

(a) Review preliminary internal program planning documents, regulatory agenda, draft legislation, budgetary materials and other developing DOE proposals, to ensure the proper integration of the NEPA process;

(b) Incorporate into its early planning processes a careful consideration of: (i) the potential environmental consequences of its proposed actions, and (ii) appropriate alternative courses of action;

(c) At the earliest possible time, in accordance with paragraph A.3 herein, determine whether an environmental assessment (EA) or an environmental impact statement (EIS) is required.

2. *Applicant Processes.* With respect to applicant processes, the CEQ regulations (40 CFR 1501.2(d)) require agencies to:

(d) Provide for cases where actions are planned by private applicants or other non-Federal entities before Federal involvement so that:

(1) Policies or designated staff are available to advise potential applicants of studies or other information foreseeably required for later Federal action.

(2) The Federal agency consults early with appropriate State and local agencies and Indian tribes and with interested private persons and organizations when its own involvement is reasonably foreseeable.

(3) The Federal agency commences its NEPA process at the earliest possible time.

To implement this requirement:

(a) Applicants for a DOE lease, permit, license, certificate, financial assistance, allocation, exemption or similar action are expected to:

(1) Consult with DOE as early as possible in their planning processes to obtain guidance with respect to the appropriate level and scope of any studies or environmental information which DOE may require to be submitted as part of or in support of their application;

(2) Conduct studies which are deemed necessary and appropriate by DOE to determine the impact of the proposed action on the quality of the human environment;

(3) Consult with appropriate Federal, regional, State and local agencies and other potentially interested parties during the preliminary planning stages of the proposed action to ensure that environmental factors including permitting requirements are identified;

(4) Submit applications for all required Federal, regional, State and local permits or approvals as early as possible;

(5) Notify DOE as early as possible of other Federal, regional, State, local and Indian tribe actions required for project completion in order that DOE may coordinate the Federal environmental review, and fulfill the requirements of 40 CFR 1506.2, regarding elimination of duplication with State and local procedures, as appropriate;

(6) Notify DOE of private persons and organizations interested in the proposed undertaking, in order that DOE can consult, as appropriate, with these parties in accordance with 40 CFR 1501.2(d)(2);

(7) Notify DOE if, prior to completion of the DOE environmental review and decisionmaking process, the applicant plans or is about to take an action in furtherance of an undertaking within DOE's jurisdiction which may meet either of the criteria set forth at 40 CFR 1506.1(a).

(b) Upon receipt of an application, or earlier if possible, DOE will:

(1) Initiate and coordinate any requisite environmental analyses in accordance with the requirements set forth at 40 CFR 1506.5;

(2) Determine, in accordance with paragraph A.3 herein, whether an EA or an EIS is required; and

(3) Establish time limits for the NEPA Process when requested to do so by an applicant.

(c) For major categories of DOE actions involving a large number of applicants, DOE may prepare generic guidelines describing the level and scope of environmental information expected from the applicant and will make such guidelines available to applicants upon request.

(d) For DOE programs that frequently involve another agency or agencies in related decisions subject to NEPA, DOE will cooperate with the other agencies in developing environmental information and in determining whether to prepare an EA or an EIS. Where appropriate and acceptable to the other agencies, DOE will develop or cooperate in the development of interagency agreements to facilitate coordination and to reduce delay and duplication.

3. *Whether to Prepare an Environmental Impact Statement.* The CEQ regulations (40 CFR 1501.4) require the Federal agency, in determining whether to prepare an EIS, to:

(a) Determine under its procedures supplementing these regulations (described in § 1507.3) whether the proposal is one which:

(1) Normally requires an environmental impact statement, or

(2) Normally does not require either an environmental impact statement or an environmental assessment (categorical exclusion).

(b) If the proposed action is not covered by paragraph (a) of this section, prepare an environmental assessment (§ 1508.9).

To implement this requirement and the requirements contained at 40 CFR 1507.3(b)(2):

(a) DOE has (in Section D), identified typical classes of DOE action:

"(i) Which normally do require environmental impact statements.

"(ii) Which normally do not require either an environmental impact statement or an environmental assessment [categorical exclusions (§ 1508.4)].

"(iii) Which normally require environmental assessments but not necessarily environmental impact statements."

(b) DOE will review individual proposed actions to determine the appropriate level of NEPA documentation required where:

(1) The proposed action is not encompassed within the categories of Section D,

(2) The proposed action is encompassed within the categories of Section D, but DOE believes that the categorization is not appropriate to the individual proposed action.

(3) Public comment received on or relating to a proposal included within the categories of Section D raises a substantial question regarding the categorization.

(c) DOE will, in conducting the reviews of paragraph (b) above, either:

(1) Determine that neither an EA nor an EIS is required where it is clear that the proposed action is not a major Federal action significantly affecting the quality of the human environment. (In such cases, a brief memorandum may be prepared explaining the basis for that determination);

(2) Prepare an EA where it is unclear whether an EIS is required; or

(3) Proceed directly to EIS preparation where it is clear that an EIS is required.

(d) DOE may add actions to or remove actions from the categories in Section D based on experience gained during implementation of the CEQ regulations and these guidelines.

4. *Scoping.* The CEQ regulations (40 CFR 1501.7) require:

An early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action.

To implement this requirement, DOE will:

(a) As soon as practicable after a decision to prepare an EIS, publish in the Federal Register a Notice of Intent (NOI) to prepare an EIS in accordance with 40 CFR 1501.7. Howe-

DOE finds that there is a lengthy period between DOE's decision to prepare an EIS and the time of actual preparation, DOE may instead publish the NOI at a time sufficiently in advance of preparation of the draft EIS to provide reasonable opportunity for interested persons to participate in the EIS preparation process;

(b) Provide additional dissemination of the NOI in accordance with 40 CFR 1506.6;

(c) Through the NOI, invite comments and suggestions on the proposed scope of the EIS including environmental issues and alternatives for consideration in the preparation of the draft EIS and invite public participation in the NEPA process except where there is an exception for classified proposals pursuant to 40 CFR 1507.3(c) and paragraph C.1, herein. The comment period for the NOI will normally be 20 days. To the extent practicable, DOE may consider comments received after the close of the designated comment period on the NOI in preparing the draft EIS.

(d) If a scoping meeting is to be held, provide notice of the meeting in the NOI at least 15 days before the meeting.

(e) Prepare and use an EIS implementation plan to record the results of the scoping process and to provide guidance to DOE for the preparation of an EIS.

(1) The EIS implementation plan will be a brief document and will contain:

(i) Information to address the provisions of 40 CFR 1501.7(a)(2), (3), (5), (6), and (7);

(ii) A detailed outline of the EIS;

(iii) A description of the means by which the EIS will be prepared, including the nature of any contractor assistance to be used.

(2) The EIS implementation plan may also contain:

(i) Target page limits for the EIS;

(ii) Target time limits for EIS preparation;

(iii) An allocation of assignments among DOE and cooperating agencies.

(3) DOE will complete an EIS implementation plan as soon as practicable after the close of the designated comment period on the NOI or after a scoping meeting, if one is held, whichever is later.

(4) DOE may revise the implentation plan, as necessary during EIS preparation.

Section B—NEPA and Agency Decisionmaking

1. *DOE Decisionmaking.* The CEQ NEPA regulations (40 CFR 1505.1) require that agencies adopt procedures to ensure that decisions are made in accordance with the policies and purposes of NEPA.

To implement this CEQ requirement, this section designates the major decisonmaking processes for DOE's principal programs and provides procedures to assure that the NEPA process corresponds with the decisionmaking processes. These processes are designated as policy level decisionmaking, program level decisionmaking, and project level decisionmaking. The procedures consist of general procedures applicable to all DOE decisionmaking processes followed by specific procedures applicable to the individual decisionmaking processes.

The decisionmaking structure designated herein in consistent with the CEQ tiering concept (40 CFR 1502.20), which provides for focusing on the actual issues ripe for decision and eliminating repetitive discussions of the issues already decided. Accordingly, environmental documents prepared for policy level decisions will normally focus on broad issues and will provide the foundation for subsequent program and project environmental documents. Environmental documents prepared for program level decisions will normally focus on narrower issues than at the policy level and may summarize and incorporate by reference discussions contained in any relevant policy level environmental document but should not repeat the discussion of issues already decided at the policy level of decisionmaking. Similary, environmental documents propared for project level decisions will normally focus on issues specific to the proposed project and may summarize and incorporate by reference discussions contained in any broader environmental documents but should not repeat the discussion of issues decided at higher levels of decisionmaking.

(2) *General Procedures.*

(a) The following general procedures apply to all DOE decisionmaking processes. DOE will:

(1) At the earliest possible time in the decisionmaking process: (i) identify and evaluate environmental factors and appropriate alternative courses of action, and (ii) determine in accordance with paragraph A.3 herein the appropriate level of enviromental review document required.

(2) Commence preparation of the relevant environmental document as close as possible to the time that DOE begins development of or is presented with a proposal (40 CFR 1508.23), and complete the document in advance of final decisonmaking.

(3) During the development and consideration of a proposal and the relevant environmental document, review other DOE planning and decisionmaking documents to ensure that alterntives (including the proposed action) to be considered by the decisionmaker are encompassed by the range of alternatives in the relevant environmental document.

(4) Circulate the relevant environmental document or summary thereof with the proposal and other decisionmaking documents through DOE's internal review processes to ensure that DOE officials use the environmental documents in making decisions and that the decisionmaker consider the alternatives described therein.

(5) Where an EIS is prepared, publish the record of decision (40 CFR 1505.2) in the Federal Register and make it available to the public as specified in 40 CFR 1506.6 except as provided in paragraph C.1. For the purposes of 40 CFR 1506.1, the record of decision will be deemed issued upon signature by the appropriate DOE official.

(6) Utilize the tiering concept in accordance with 40 CFR 1502.20 and 1508.28 to the fullest extent practicable.

3. *Specific Procedures.*

(a) *Policy level decisionmaking.* At this level of decisionmaking, DOE is deciding on broad strategies to achieve energy goals such as conservation, development of new resources and use of more abundant resources. Policy level decisions may, for example, be representated by proposals for legislation or by formal statements of national energy policy.

(1) For legislative proposals, DOE will: identify and evaluate relevant environmental issues and reasonable alternatives, and make a determination regarding the need to prepare an environmental document during the proposal formulation and early drafting stages; and, normally prepare, consider, and publish any required environmental document in connection with the submittal of a proposal to Congress, except as may be provided in 40 CFR 1506.8.

(2) For formal statements of national energy policy DOE will: initiate implementation of the applicable general procedures specified above during the analysis phase of policy development; and will prepare, consider, and publish any required environmental document in advance of policy adoption for those policies that will result in or substantially alter DOE programs.

(b) *Program level decisionmaking.* At this level of decisionmaking, DOE is deciding on a variety of approaches to implement specific policies or statutory authorities. Program level decisions are