DOE/EIS-0064

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Final Environmental Impact Statement
(Final Statement to ERDA 1545-D)

Rocky Flats Plant Site

Golden, Jefferson County, Colorado

U.S. DEPARTMENT OF ENERGY

APRIL 1980
Volume 3 of 3
RESPONSES TO PUBLIC COMMENTS

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Final Environmental Impact Statement
(Final Statement to ERDA 1545-D)

Rocky Flats Plant Site

Golden, Jefferson County, Colorado

U.S. DEPARTMENT OF ENERGY
Washington, D.C. 20585

Responsible Official

Lynda L. Brothers/for

Ruth C. Clusen
Assistant Secretary for Environment

APRIL 1980
Volume 3 of 3
RESPONSES TO PUBLIC COMMENTS

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INTRODUCTION

A number of questions and concerns were expressed in formal letters commenting on the Rocky Flats Plant Draft Environmental Impact Statement (ERDA-1545-D) and at public hearings on the draft statement. Comment letters have been reviewed and appropriate additions and corrections have been made.

A list of some of the major revisions appear in the Foreword and in the pertinent chapters in Volume I. DOE responses have been sent to each commentor. These responses indicate the relevant changes made in the FEIS. Comments concerning questions or issues not pertinent to main text are discussed in the response. Because many of the issues and concerns are of general interest to the public, the comment letters and the respective DOE responses have been reprinted in this volume. Some of the attachments and exhibits submitted to DOE with the comment letters have been deleted for the reasons indicated in each section. For example, twenty-seven pages of names on a petition from Earth advocacy, a copy of the Colorado Emergency Response Plan, and one copy of letters submitted in duplicate have been omitted. All these items remain on file at DOE, and copies are readily available.

Public hearings were held on the draft EIS on May 24-25, 1977. The Federal Register Notice, Transcript of Proceedings, exhibits submitted at the hearings, the Presiding Board Statement, DOE responses to participants, and a DOE Staff Statement and Supplement have all been sent to the hearing participants. All of the above items are on file at DOE and have been sent to government public document repositories. The issues raised at the hearings did not differ significantly from those cited in the letters of comment received. The FEIS has also been revised, within its defined scope, to be responsive to the questions and requests made in this forum.

Because many DOE Orders, manuals and directives are still being promulgated, and were not considered final as of the time this FEIS was being written, numerous references have been made herein to ERDA Manual Chapters (ERDAM) which continue to serve as the applicable policies and guidelines until superseded by the final DOE Orders and Manuals.

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
11177 West 8th Avenue
P.O. Box 25127
Lakewood, Colorado 80225

8430

October 17, 1977

W. H. Pennington, Director
Office of NEPA Coordination
Mail Station E-201
Energy Research and Development
Administration
Washington, DC 20545

Dear Mr. Pennington:

We have received the draft environmental impact statement of the Rocky Flats Plant Site. We see no potential adverse impact on National Forest Land, nor do we have any special expertise concerning radioactive and nonradioactive releases connected with the plant operation.

We, therefore, have no comments to make regarding the draft statement.

Sincerely,

S H Hanks

S. H. HANKS
Deputy Regional Forester, Resources

DOE STAFF RESPONSE TO THE LETTER FROM S. H. HANKS, FOREST SERVICE, DEPARTMENT OF AGRICULTURE

This letter requires no staff response.

We wish to thank Mr. Hanks and the Department of Agriculture for their interest in the DOE activities at the Rocky Flats Plant.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20201

NOV 3 1977

W. H. Pennington
Director, Office of NEPA Coordination
United States Energy Research
and Development Administration
Washington, D.C. 20545

Dear Sir:

Thank you for the opportunity to review the draft Environmental Impact Statement on Rocky Flats Plant Site, Golden, Colorado.

The ongoing improvements and operational safeguards at the plant appear to have minimized the possibility of accidental release of radioactive materials in toxic quantities to the environment. Operations at the Rocky Flats Plant have resulted in some plutonium being released to the environment, but evidence does not indicate that the amounts involved represent a threat to human health.

In general, the DEIS is complete, however, it is recommended that the following changes be incorporated in the Appendix:

Appendix F, of the DEIS, contains a detailed discussion of human dose estimates from airborne radioactivity. Detailed calculations are given in this appendix for concentrations of isotopes in plants to be used for foodstuffs. There is some variation among the constants used in the equations in the Appendix. Koranda, J. "Agricultural Factors Affecting the Daily Intake of Fresh Fallout by Dairy Cows, UCRL-12479, March 1965" suggests $250 g/m^2$ instead of $400 g/m^2$ used in the DEIS for the density of vegetation defining the cows intake. Koranda gives a more plausible daily cow intake of 11.8 kg rather than the 200 kg used by the DEIS.

Incorporation of these constants will improve the accuracy of the dose estimates.

Sincerely,

Charles Custard

Charles Custard
Director
Office of Environmental Affairs

DOE STAFF RESPONSE TO THE LETTER FROM CHARLES CUSTARD, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

In the revised version of Appendix F, the dose from foodstuffs is determined from the publication of D. A. Bater, G. H. Hoenes, and J. K. Soldat: "FOOD - An Interactive Code to Calculate Internal Radiation Doses from Contaminated Food Products," Environmental Modeling and Simulation, Proceedings of a Conference held in Cincinnati, Ohio, April 20-22, 1976, USEPA, Washington, D.C. This source reflects a lower cattle intake value than that used in the DEIS; the value for milk cows is 55 kgs/d fresh forage and for beef cattle 68 kgs/d of dry feed.

Advisory Council on
Historic Preservation
1522 K Street N.W.
Washington, D.C. 20005

November 8, 1977

Mr. W. H. Pennington, Director
Office of NEPA Coordination
Energy Research and Development Administration
Washington, D.C. 20545

Dear Mr. Pennington:

This is in response to your request of September 23, 1977, for comments on the draft environmental statement (DES) for the Rocky Flats Plant Site (ERDA-1545-D), Golden, Colorado.

The Council notes from its review that while cultural resource studies to date indicate no properties included in or known to be eligible for inclusion in the National Register of Historic Places will be affected, additional studies are necessary before final determinations can be made. Accordingly, the Energy Research and Development Administration is reminded that should those additional studies identify cultural resources eligible for inclusion in the National Register which will be affected by the undertaking, it must afford the Council an opportunity to comment pursuant to the "Procedures for the Protection of Historic and Cultural Properties" (36 C.F.R. Part 800), prior to taking any further action with respect to the undertaking which will affect the cultural resource.

Should you have any questions or require additional assistance in this matter, please contact Brit Allan Storey of the Council staff at P. O. Box 25085, Denver, Colorado 80225, or at (303) 234-4946, an FTS number.

Sincerely yours,

Louis S. Wall
Assistant Director, Office of
Review and Compliance, Denver

The Council is an independent unit of the Executive Branch of the Federal Government charged by the Act of October 15, 1966 to advise the President and Congress in the field of Historic Preservation.

DOE STAFF RESPONSE TO THE LETTER FROM LOUIS S. WALL, ADVISORY COUNCIL ON HISTORIC PRESERVATION

In response to your recommendation, we have solicited proposals for additional studies to investigate possible cultural resources on the Plant site. Should future studies identify cultural resources that qualify for inclusion in the National Register, the Council will be given an opportunity to comment on any action that might affect the resource in question.

The continued operation of the Plant does not require new construction or other actions which would jeopardize any possible cultural resources.

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SCHOOL OF MEDICINE
DEPARTMENT OF PREVENTIVE MEDICINE
AND COMPREHENSIVE HEALTH CARE

14 November 1977

Mr. W.H. Pennington
Office of NEPA Coordination
U.S. Department of Energy
Washington, D.C. 20545

Dear Mr. Pennington:

In response to your letter of September 26th, I have examined the Draft EIS on Rocky Flats (ERDA-1546-D). I find that it has not adequately addressed the questions I raised in my three letters to you dated August 22, August 26, and September 4, 1975, relating to environmental issues not adequately dealt with in the Omnibus Environmental Assessment for the Rocky Flats Plant, published May 1975.

Now, if the DOE intends to continue operation of the Rocky Flats Plant, it is necessary that these issues be dealt with adequately in the final EIS. Toward this end, it is incumbent on the DOE to hold hearings on these issues and deal with them adequately, or else shut down the plant.

On page 10-1, under "Discussion of Pre-Draft Comments, the present draft states, "Issues that have not been addressed are related generally to ERDA or U.S. Government policy, national defense, and to details of security and safeguards." May I ask what justification there is under the NEPA law for a government agency, in writing an EIS, to fail to address issues relating to policy of that agency, or to safeguards of the operation under review?

If this were permitted under the law, it would make a farce of the whole thing. An agency like ERDA or DOE could simply say, "It is our policy to do thus and so (which may be harmful to the environment), and therefore we don't need to address these issues in our EIS." Similarly, they could say, "We need not deal with issues relating to certain threats to the environment inherent in the existence of this plant, because these are related to details of safeguards."

We who live near Rocky Flats are definitely concerned to know how adequate the safeguards are and we have reason to believe, judging from available GAO information, that they have been and perhaps still are inadequate.

The purpose of the NEPA law, as I understand it, is to help goverment agencies to formulate policies which will minimize the environmental impact of their operations; not to give any government agency a carte blanche to form its own policy regardless of environmental impact, and then declare this policy to be outside of the realm of the law and the EIS.

Our system of government is founded on checks and balances. We cannot tolerate autonomous government agencies which declare themselves immune from our checks and balances. This would lead to tyranny.

Specific questions which, so far as I have been able to find, have not been answered adequately in this draft EIS are as follows:

In my letter of August 22, 1975, questions numbers 1,2,3,4,5 under part A relating to cost-benefit analysis and questions numbers 1,3,4,5,6,7,8,9,10,11,12 under part B, relating to environmental monitoring and health and safety; in my letter of August 22, 1975, both questions; in my letter of September 4, questions numbers 1,3,4,5,6,7. Since there is no index to the draft EIS, it is possible that I could have missed the pertinent parts where my questions were answered. If so, I would appreciate receiving a detailed statement with page references, etc.

If I do not receive such a detailed statement, this will be tantamount to an admission on the part of DOE that, in fact, these questions have not been dealt with adequately. Under the law, then, the Rocky Flats Plant would have to be shut down, since as you state in your letter of September 26, 1977, "The statement was prepared in compliance with the National Environmental Policy Act of 1969, to support ERDA's continued operation of the Rocky Flats Plant...."

I must point out further that the delay of 2½ years between the publication of the Omnibus Environmental Assessment (May 1975) and the present draft EIS (September 1977) is inexcusable, especially since these questions, raised two years ago, have not been adequately dealt with in the present draft. It appears that ERDA has been dragging its feet. I trust that DOE, under the new administration, will do better.

Yours sincerely,

John C. Cobb

John C. Cobb, M.D., M.P.H.
Professor

JCC/rt

cc: President Carter
Governor Lamm
Congressman Wirth
Senator Haskell
Senator Hart
Congresswoman Schroeder
R.F. Monitoring Committee
Jack Eliott, Chairman
State Dept. Natl Resources
Bob Siek
Reed Kelley
Chris Crosby
Common Cause
Craig Barnes
Denver Health & Hospitals
Dr. Abe Kauvar
Jefferson County Health
Dr. Carl Johnson
Friends of the Earth
Kevin Markey
Environmental Defense Fund
David Mastbaum
Environmental Action
Morey Wolfson
American Friends Service Committee
Pam Solo
National Resources Defense Council
Colorado State Health Department
Dr. Anthony Robbins
Dr. William Evans

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SCHOOL OF MEDICINE
DEPARTMENT OF PREVENTIVE MEDICINE
AND COMPREHENSIVE HEALTH CARE

DIVISION OF HEALTH ADMINISTRATION
JOHN EDWARD KRALEWSKI, Ph.D.
DIRECTOR

August 22, 1975

Mr. W. H. Pennington
Office of the Assistant Administrator
for Energy and Safety
U.S. Energy Research & Development Administration
Washington, DC 20545

Dear Mr. Pennington:

Having reviewed the "Omnibus Environmental Assessment for the Rocky Flats Plant of ERDA" dated May 1975, as a member of Governor Lamm's and U.S. Congressman Wirth's Task Force on Rocky Flats, I hereby formally request that your Environment Impact Statement address the following questions, (A) relating to cost-benefit analysis of the Rocky Flats Plant (RFP):

1. What would be the short-term and long-term environmental and health effects and financial costs to citizens and governments of detonating nuclear weapons:

   (a) In the atmosphere near heavily populated land
   (b) In the stratosphere
   (c) On the ground in a heavily populated region
   (d) A few meters underground in a heavily populated region
   (e) On the surface of a body of water near a heavily populated region
   (f) A few meters underwater near a heavily populated region

The answer to this question must address not only the use of one of the largest nuclear weapons any of whose components are manufactured at Rocky Flats, but also the use of a number of smaller weapons in a so-called "limited nuclear war," and finally the use of all of the entire USA stockpile of these nuclear weapons within a few weeks, in one big all out nuclear war, and at the same time, all of the known or estimated stockpile of other nations.

The answer to this question also must address the following effects as well as any other which might be important to human welfare:

   (a) The blast effect on populations within range
   (b) The heat effect on populations within range
   (c) The radiation effect on populations within range
   (d) The radioactive fallout effect on populations nearby downwind, and also all around the world not only immediately, but over their whole lifetime.

(e) The total genetic effect on populations nearby, downwind, and all around the world
(f) The effect on the ozone layer in the atmosphere and its consequence for the biosphere

he answer to this question must also address:

(a) The cost of citizens and governments of the property damaged, or rendered unusable because of such nuclear detonations.
(b) The cost of cleaning up the debris, providing temporary housing, reconstruction of cities, etc.
(c) The cost of medical care, both for acute and long-term effects and of all future genetic effects resulting from nuclear detonations, not only in USA, but all over the world.

What has been the cost (expressed in terms of tax dollars over the past 35 years per American Family) of the entire nuclear weapons industry and related military operations of the USA all over the world, of which the Rocky Flats Plant is said to be a key component? The answer to this question must include, but not be limited to, the following costs:

(a) Cost of research and development since 1940
(b) Cost of mining uranium, enrichment of uranium production of plutonium and other radio-active components
(c) Cost of production of nonradioactive components
(d) Cost of assembly of weapons
(e) Cost of transportation of all components and of final weapons
(f) Cost of storage and maintenance of weapons
(g) Cost of training military and non-military personnel in the production, handling, testing, and use of nuclear weapons and components
(h) Cost of human life and health of nuclear explosions at Nagasaki and Hiroshima and all other accidental and "normal" exposures to radio-activity resulting from the mining of uranium and the production and handling of nuclear weapons and their components
(i) Cost of cleaning up accidental dispersals of radio-active substances resulting from nuclear weapons handling, including Palomares, Spain and Thule, Greenland as well as Rocky Flats after the "cutting oil spill," plutonium fires, etc.
(j) Cost to local, state and federal health and/or welfare agencies and other agencies such as the AEC, ERDA, and NRC, involved in the protection of citizens from the dangers resulting from nuclear weapons manufacture, handling and storage and possible use in war including, but not limited to, protection of health of citizens, employees, military personnel and miners, cleaning up uranium mill tailings, monitoring environment, enforcing regulations, inspection

of nuclear facilities, construction of fallout shelters, organization of civil defense and similar activities in case of nuclear attack or accident in a nuclear weapons production plant, and activities of citizens committees, such as, the Rocky Flats Task Force and other groups concerned about nuclear weapons, all over the USA

(k) Cost of property acquired by the Government in connection with research and development, uranium mining, plutonium production, storage, transportation, testing, deployment, and use of nuclear weapons all over the world.

(l) Cost of property rendered unsafe for human use in connection with the whole nuclear industry

(m) Cost of waste disposal resulting from nuclear weapons research, development, and production, etc.

3

(a) What are the actual and expected benefits (expressed in any terms) to the average American family resulting from the nuclear weapons industry and military preparedness, nuclear deterrence, etc.?

(b) How have the decisions been made, and how has the public been involved in the decision-making process, regarding cost-benefit analysis of nuclear weapons production, preparedness, deterrence, etc.?

(c) To the extent that the public has not, so far, been involved in these decisions, how, under the National Environmental Protection Act, should this be done in the future?

4. Assuming that sooner or later (hopefully sooner, before all-out nuclear war) the world may realize that nuclear weapons stockpiling does not solve international problems, but instead creates an intolerable risk to all people, and that then the nuclear weapons and nuclear power industry would be suddenly shut down, what would be the economic impact on ~~the economic impact on~~ the Denver area and employees of the Rocky Flats Plant (RFP) under the following conditions:

(a) RFP involved only with nuclear weapons and production

(b) RFP involved significantly with other energy research and development programs, such as, development of solar and wind energy sources which are not dependent on nuclear energy or non-renewable resources, and would therefore, expand as the other resources become unavailable.

Assuming that a gradual phasing out of nuclear weapons component production at Rocky Flats, is undertaken, for whatever reason, what would be the economic impact on the Denver area and the employees of Rocky Flats under the following conditions:

(a) RFP undertakes no new activity

(b) RFP gradually undertakes new activities mentioned in para. 4b above.

B. In regard to environmental monitoring and health and safety in relation to the Rocky Flats Plant, please address the following questions:

1. How adequate is the present air filtration system at RFP to catch very small particles of plutonium, americium, beryllium, and other radio-active or toxic elements or compounds involved in plant operations? I understand the filters are tested for particles of about 0.3 micrometers diameter, but that the smaller size particles (0.1 down to 0.01 micrometer size) may be able to get through the filters and would be very dangerous to inhale.

2. How adequate are the present and future-planned structures of the various buildings at RFP where plutonium, americium, beryllium and other radioactive or toxic substances are used or stored? Could they withstand the impact of a large jet plane crashing onto the roof or into the walls? Could they withstand the impact of a sheet of heavy metal blown in a tornado against the roof or wall at 300 miles per hour? How severe an earthquake could they withstand? What would be the maximum possible amount of plutonium, americium, and beryllium, etc. that might be released to the atmosphere in such an accident?

3. If a very large amount of radio-active or toxic material were released into the atmosphere at Rocky Flats from some sort of accident when the wind was blowing in the direction of Denver at 10 miles per hour (frequently prevailing conditions), what percentage of the population downwind could be evacuated in time to prevent inhalation of the radioactive or toxic material? How many people would be exposed? What plans for evacuation now exist? Have there been any "practice-alert" evacuations? How adequate are these evacuation plans? How much property would receive fallout from such a release? What would be the cost of buying all this property at present prices, as compared to the cost of relocating the Rocky Flats Plant? Assuming the material released were plutonium oxide particles of respirable size, and that the exposed population on the average each inhaled about one millionth of an ounce of these particles, what would be the expected health effects (short and long-term) on this exposed population? How adequate is the present air-monitoring system around Rocky Flats? Do the air-samplers actually get a representative sample of the air and its contaminants with respect to size distribution of suspended particles, and with respect to concentration in the air of substances like plutonium oxide dust consisting of particles of respirable size? In particular, how effective are these samplers in catching particles of plutonium oxide or americium of a size less than 0.1 micrometers diameter? Are there enough monitoring stations around the plant to be sure

to detect any even small releases of radioactive materials. How soon after such a release would the data from the monitoring stations normally be made available to the local authorities who might be involved, i.e. health departments, police, civil defense etc.? Could this be accomplished in time to evacuate people downwind in case it were deemed desireable for protection of their health? Referring to the Omnibus Environmental Assessment p. 3-67, if 0.37 gm of plutonium oxide were released in the 1957 fire, why didn't the monitoring systems detect it?

4. To what extent is it possible that plutonium and/or americium might get into the food or water of people, considering the fact that certain algae and aquatic animals have been shown to concentrate plutonium up to a level of 100,000 times the level of that in the water? To what extent might contamination of water or soil with these elements or their compounds result in production of contaminated food? What would be the effect of chelating agents in the soil (as sometimes used in fertilizers) on the uptake of plutonium and americium by food plants? What would be the effect of bacteria of various kinds in the soil, water, or food products on the degree of uptake by food plants and on the degree of absorption of the plutonium or americium through the gastro-intestinal tract of animals and humans?

5. What is the extent of risks to health from americium contamination of the environment, resulting from existing spills (the cutting-oil incident among others), and possible future releases? How does americium compare with plutonium in toxicity due to radio-activity for animals and humans, and how does it compare in degree of uptake or absorption from food, water, or inhaled air? Considering the fact that pound quantities of americium are involved in various operations at Rocky Flats and it is shipped out of the plant to other places, what are the control systems to prevent untoward releases or thefts of americium? How is the americium inventory kept? What percentage of the inventory could be lost without detection? What would be the result of a fire or other accident which breached the containment systems in the americium processing line at RFP? What would be the maximum possible amount of americium thus released?

6. How good are the systems now used for measuring the amount of plutonium, uranium, and americium in contaminated wastes which are being stored or shipped out of RFP? Could an informed and intelligent group of subversive employees and others, work out a

system whereby they would hide substantial amounts of plutonium or americium or enriched uranium, suitably shielded, in the packed containers of waste in such a way that it would not be detected? If might then be stored or shipped out to Idaho and could be retrieved later for subversive purposes, or become a danger to the environment where it was stored as the container deteriorates.

7. How reliable is the surveillance of operations at Rocky Flats by the ERDA authorities? In view of past serious operation and management errors by Dow Chemical Company and the subsequent protective and defensive attitude of ERDA officials toward Dow Chemical Company, can citizens expect any better supervision from ERDA officials of the Rockwell International operations and management? The fact that Dr. Yoder was formerly a high official in ERDA and is now in charge of the whole safety program at Rocky Flats suggests a lack of independent checks and balances.

8. What would be the comparative likelihood of a serious accident resulting in danger to health of a large city population if the Rocky Flats Plant were located at other ERDA facilities (e.g. Arco, Idaho) as compared with the present location? In answering this question, please consider the plans for development for large jet airplanes of the Jefferson County Airport, 3 miles from the Rocky Flats, and the likelihood of airplane crashes near airports as compared to remote untraveled places, and also natural disasters like tornadoes, earthquakes, floods, etc. Please also consider the closeness of the large city population to the plant and the possibility of evacuating the population in case of an accident. Please also compare the cost of buying up all the property within 25 mile radius of Rocky Flats in relation to the cost of moving the plant to various places like Arco, Idaho, and establishing a similar size buffer zone or reservation there.

9. How adequate is the surveillance of air filtering systems at RFP? Are the filters checked and changed frequently enough to prevent backing-up and loss of negative pressure gradient in the glove-box lines, etc.? If the negative pressure gradient is always adequately maintained, how did it happen that during August 1975 several workers were exposed to plutonium inhalation as a result of a break in some gloves?

10. How important is the injury to cell membranes caused by the low-level weak beta and gamma radiations from internal plutonium and americium?

Most attention has been directed to the alpha radiations which have a very short range in tissue. Consider the effect on living tissue of the longer range beta and gamma radiations interfering with the cell function by injury to the cell membranes, possibly acting synergistically with plutonium's alpha radiation to produce cancers and other diseases. Consider also the relatively greater effect on membranes of a given number of milirads of beta or gamma rays when the exposure is at a very low level over a long period of time, as demonstrated by Petkau (Health Physics, 22 p. 239-244, 1972). How would these considerations effect standards for plutonium and americium?

11. What are the possible genetic effects from plutonium or americium which gets into the body? Please consider the data from LASL (Dr. McInroy) and HASL and the study of cattle grazed on Rocky Flats land, all of which showed that plutonium concentrations were in general higher in the gonads than in other organs including the liver and lungs. Please consider the possible effect of plutonium and americium alpha, beta, and gamma radiations on the sperm, ova, and precursor cells in the gonads. What would be the increase in the percentage of defective genes in future generations and what would be the effect on the rate of genetic defects in children of future generations if the amount of plutonium and americium in the gonads were increased up to 0.1, 1.0, or 10.0 picocuries per gram of gonadal tissue on the average for a large population? (these are levels which might be expected from residentially or occupationally exposed people at or near Rocky Flats.)

I look forward to studying the responses to these questions in your forthcoming Environmental Impact Statement and assure you that I and others will be looking further into these questions ourselves with a view to giving pertinent testimony at the forthcoming hearings.

Yours sincerely,

John C. Cobb, M.D., MPH
Professor of Preventive Medicine and
Member, Lamm-Wirth Task Force

JCC:lmp

cc: Governor Richard Lamm
Rep. Tim Wirth
Members of Lamm-Wirth Task Force
Senator Haskell
Senator Hart
Rep. Pat Schroeder

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SCHOOL OF MEDICINE
DEPARTMENT OF PREVENTIVE MEDICINE
AND COMPREHENSIVE HEALTH CARE

DIVISION OF HEALTH ADMINISTRATION
JOHN EDWARD KRALEWSKI, Ph.D.
DIRECTOR

August 26, 1975

Mr. W. H. Pennington
Office of the Assistant Administrator
for Energy and Safety
U.S. Energy Research & Development Administration
Washington, DC 20545

Dear Mr. Pennington:

This is a supplement to my letter of 22 August 1975 regarding the Omnibus Environmental Assessment for Rocky Flats Plant of ERDA dated May 1975.

I have just received and reviewed two papers by John W. Gofman, "The Cancer Hazard from Inhaled Plutonium" (May 1975) and "Estimated Production of Human Lung Cancers by Plutonium from Worldwide Fallout" (July 10, 1975). These are both available from the Committee for Nuclear Responsibility P.O. Box 2329, Dublin, CA, 94566.

In the Environmental Impact Statement on Rocky Flats, please address the issues raised by Gofman in these papers and comment on the methods he uses to derive his conclusions. In particular, please make calculations of the amount of plutonium which would be deposited in the lungs of people living for 30 years downwind of Rocky Flats, where the concentration of plutonium in the air (as measured by monitoring devices is significantly higher than that in other parts of the state).

Please make these calculations assuming at least the following levels of plutonium-239 and plutonium-240 in the air:

1. 0.33 pci/m^3 (The maximum permissible concentration for a one year average for insoluble plutonium compounds.)

2. 0.02 pci/m^3 (ditto for soluble compounds)

3. 0.0064 pci/m^3 (the overall average 1970-1973) air concentration as measured by the Colorado Dept. of Health sampler D-3)

4. 0.00005 pci/m^3 (ditto for sampler D-5, corrected by subtracting 0.00008 pci/m^3 from world-wide fall-out)

In making these calculations, please assume various reasonable particle size distributions based on the known effluents from the HEPA filters and other sources at Rocky Flats. (Remember that the very small particles which get through a HEPA filter are the ones most likely to be caught in the human lung when inhaled.)

Then compare the amount of plutonium which would be deposited in the lungs from world-wide fall-out (0.00008 pci/m^3) with that deposited in each of the above levels of contamination of air.

Finally, from these data, please calculate the expected number of cases of cancer of the lung which would eventually develop in a population of one million people breathing such air for a 30 year period, over and above the number occurring from other causes.

In making these calculations, please consider, as Dr. Gofman has, the effect of cigarette smoking which evidently greatly increases the risk of cancer of the lung by interfering with the normal mechanisms of self-cleaning in the bronchi, etc.

Please also address the problem of the synergism of cigarette smoking and radio-active particles inhaled, in relation to cancer of the lung among workers at Rocky Flats Plant. Should workers there be advised not to smoke? Consider also the possibility that city smog, like cigarette smoke, mav act synergistically with plutonium particles to increase the prevalance of cancer. Should workers at Rocky Flats be advised not to live in the city Should Rocky Flats plant be moved away from any city to prevent this danger to workers and to the general population of the city, considering the known levels of air contamination mentioned above.

An additional concern has come to my mind on re-reading p. 3-72 of the "Omnibus Environmental Assessment." There it is stated that a criticality incident involving incorrectly stacked ingots of plutonium would produce energy release enough to "vaporize part of the metal." The subsequent discussion refers only to the "fission products" of this incident, not to the effect of the vaporized plutonium. I have several questions about this.

(a) How much plutonium might be vaporized in the maximum possible accident?

(b) Would the HEPA filters stop the vaporized plutonium or the very small particles of plutonium or plutonium oxide which would result from the condensation in the air of vaporized plutonium?

(c) Assuming, as is done on p. 3-72, that all the products escaped, including the vaporized plutonium, what would be the effect on the population downwind, both short-term and long-term? How much plutonium would people inhale if they were 5 miles directly downwind? How much at 10 miles, 25 miles and 50 miles?

Please add these questions to those of my letter of 22 August 1975. I would like to take this opportunity to re-emphasize the importance of the hearings on your Environmental Impact Statement. These should be held in Denver, among other places; and should be conducted in such a way that there can be worth-while scientific discussion between the people giving testimony on all sides of these questions.

Yours sincerely,

John C. Cobb

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cc: Governor Richard Lamm
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SCHOOL OF MEDICINE
DEPARTMENT OF PREVENTIVE MEDICINE
AND COMPREHENSIVE HEALTH CARE

DIVISION OF HEALTH ADMINISTRATION
JOHN EDWARD KRALEWSKI, Ph.D.
DIRECTOR

September 4, 1975

Mr. W. H. Pennington
Office of the Assistant Administrator
for Energy and Safety
U.S. Energy Research & Development Administration
Washington, DC 20545

Dear Mr. Pennington:

This is a second supplement to my letter of August 22nd regarding the Omnibus Environmental Assessment for Rocky Flats Plant of ERDA. I realize such comments were supposed to be made before September 1st, but hope you will be able to consider the following, even though late.

1. The Environmental Impact Statement should include a summary of the possible health effects of plutonium, americium, beryllium, and other toxic or radio-active materials used or handled at Rocky Flats. This should include a review of the work of Gofman, Martell, and others who have been critical of the contention by AEC and ERDA that the risk is not serious. (see "Actinides in the Environment and their Uptake by Man" by Edward A. Martell, National Center for Atmospheric Research Technical Note NCAR - TN/STR - 110, and "The Cancer Hazard from Inhaled Plutonium" by John W. Gofman, Committee for Nuclear Responsibility Report 1975-1R, P.O. Box 2329, Dublin, CA, 94566)

2. I understand from p. 2-46 that the Sanitary Sewer System was designed for 450,000 gals/day. What happens when in an unexpected event, more water than this is released into this system? I note on p. 3-37 that the total raw water use in 1973 was 161 million gallons, which is slightly more than an average of 450,000 gals/day; and that peak flow rates of 600,000 gals/day can be experienced in wet weather because of high infiltration into the system (p. 2-46). Could this wet weather infiltration contain run-off from areas of the plant which might be contaminated with plutonium, americium, beryllium, or other toxic or radioactive materials? How would this be handled to prevent contamination of the effluent?

3. Referring to figure 2-12 on p. 2-47, what is the salty waste from laundry and process? What is the non-treated waste? How much contamination with plutonium, americium, beryllium, etc. has been measured in these?

Why can't these wastes be treated instead of evaporated? What precautions are used to keep the evaporation pond water and contaminants from seeping into the soil and reaching the ground water? Have measurements been made to determine the extent of this seepage and contamination? How is it monitored?

4. What monitoring is done on effluent from potable water uses in plutonium or americium areas? Couldn't such effluents possibly become contaminated in the case of an accidental release of plutonium or americium? How would this be detected and how would it be handled to prevent release of such contamination into the sanitary waste treatment plant and eventually into the Great Western Reservoir (Broomfield's water supply)?

5. When an alarm goes off in one of the stacks or some other monitoring station on a weekend or at night, how does the attendant or guard find out whether it is a real problem or only a false alarm? How long would it take for competent personnel to be summoned to make such a determination? Would the civilian authorities and Health Department be notified in time, under such circumstances, to take necessary steps such as evacuation of the population downwind?

6. Since (as noted on p. 3-15) the airborne particulate samples collected are composited monthly before being analyzed for plutonium (p. 3-15), wouldn't it be possible for a substantial amount of plutonium to be released, and not detected for as long as one month, assuming it had somehow missed detection by the on-site monitors? Please comment.

7. From examining the locations of sampling stations on the figures on pages 3-14 and 3-16, it appears that a strong wind coming from slightly East of North, or from the Northwest, could pick up plutonium from the highly contaminated lip area and carry it in a plume which would miss all the sampling stations and carry plutonium right into heavily populated areas of Golden, Arvada, Wheatridge, Lakewood and Denver, without being detected at all. Please comment on the adequacy of the distribution of these sampling stations and refer specifically to the wind Tunnel Site Analysis done by Meroney et.al. (CER71-72 RNM-FC-45 and CER72-73RNM-JAP-TGH-16) in which they recommended that sampling stations should be much closer together (every 500 ft.) along Indiana Avenue in order to detect such plumes of contamination. At present, they are about a mile apart. Please comment.

I hope that the above questions are not too late to be included in the Environmental Impact Statement. In any case, they will be subjects for questions at the time of review of the EIS, and at the hearings, so it would be prudent to cover them in the EIS.

Yours sincerely,

John C. Cobb

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Rep. Tim Wirth
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Senator Haskell
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DOE STAFF RESPONSES TO LETTERS FROM JOHN C. COBB TO W. H. PENNINGTON, COMMENTING ON THE ROCKY FLATS PLANT DRAFT ENVIRONMENTAL IMPACT STATEMENT (ERDA-1545-D).

Response to Letter of November 14, 1977

paragraph 2

The issues raised that are relevant to the intent of the impact statement have been considered, and revisions included where appropriate. Hearings were held on the draft EIS in May 1978. Additional issues raised at the hearings have also been considered in the FEIS.

paragraph 3

The Foreword of the EIS has been revised to more clearly state the position of the DOE with respect to the production of nuclear weapons. The EIS is site specific and cannot address all issues related to the entire nuclear weapons program. It is intended to address those aspects that relate directly to Rocky Flats and its environment.

paragraph 4

The NEPA requirements and this EIS, which responds to them, provide the public with a comprehensive base of information concerning the Plant and its operations. The questions raised by the public are answered in the EIS, both in scientific terms and in terms that relate the technical concepts to the knowledgeable layman.

paragraph 5

The GAO study of various nuclear facilities, including Rocky Flats, was completed in June 1976. An independent second study, initiated by ERDA, was completed in November 1976 and contained recommendations to ERDA-ALO for upgrading the Safeguards and Security Program at Rocky Flats. Many of the recommendations duplicated those of GAO and have been implemented, since the publication of the DEIS, to increase the effectiveness of protective measures for nuclear material. Results of the study have formed a basis for the current Safeguards and Security Upgrading Program at the Rocky Flats Plant. (See Section 2.12.) This should not be misconstrued to imply that measures were or are inadequate. As in all fields of endeavor, Rocky Flats continuously strives to provide the best protective measures within the limits of technical knowledge.

paragraph 6

The purpose of this EIS, under NEPA, is to aid in decision making with regard to operation of the Rocky Flats Plant. The nuclear weapons program is a part of the national defense program, and these are not DOE policies but are policies determined by elected officials. Rocky Flats' part in that implementation and the policies that pertain to conducting the work at Rocky Flats is discussed in the Foreword to the EIS, and in Sections 1.1 and 3.4.1.

paragraph 7

The DOE concurs with the sentiments regarding our system of government. Its concurrence is demonstrated not only by adherence to laws and regulations as presented in this EIS (see, for example, Section 2.6.2.3), but also by its responsiveness to public interests and concerns (e.g., public tours and monthly information exchange meetings, Section 2.10).

paragraph 8

Responses to your questions are detailed in this letter. Additionally, please note that the EIS has been indexed.

paragraph 9

The questions which were raised in your letter of August 22 and September 4, 1975, have been considered in detail and responses are given in the pages that follow. Those responses that add to the clarity or intent of the EIS have been incorporated into the final document.

paragraph 10 and 11

As pointed out, approximately 2 1/2 years elapsed between the release of the Omnibus Environmental Assessment and the DEIS. This delay was due to the time-consuming and careful work necessary to draft such a statement. The issues raised in the letter of comment to the Omnibus were welcomed, and discussions of them were included in the DEIS where this was felt to be appropriate. The more detailed responses that we have provided in our present letter deal with the specifics as well as the general concept of the issues.

Response to Letter of August 22, 1975

paragraph A1 through A3

The EIS for the Rocky Flats Plant is specific to the operations of that site. The environmental and health effects and the financial costs to citizens and government of detonating nuclear weapons has not been addressed because these are not activities in which the Plant is engaged. These issues have been addressed in several references such as the following:

1. National Research Council, Committee to Study the Long-term Worldwide Effects of Multiple Nuclear Weapons Detonations, Assembly of Mathematical and Physical Sciences, LONG-TERM WORLDWIDE EFFECTS OF MULTIPLE NUCLEAR WEAPONS DETONATIONS, National Academy of Sciences, Washington, D.C. (1975).
2. Samual Glasstone and Philip J. Dolan, THE EFFECTS OF NUCLEAR WEAPONS, Third Edition, USDOD AND USDOE 1977.

Those aspects of the question which pertain directly to Rocky Flats have been included in the EIS. Information that is not directly related to Rocky Flats, but rather to the nuclear weapons program as a whole, is not covered in the EIS. As explained in the Foreword, the EIS is a site-specific document and is not intended to cover the entire nuclear weapons program for this country or for other nations.

paragraph A4 and A5

Chapters 5 and 9 of the EIS deal with the economic impact of terminating Plant operations. The shutdown applies to the operation of the Plant in its present mission and as it is expected to be in the foreseeable future. Hypothetical changes in Plant mission would require a decision based on EIS information. Any decisions subsequent to hypothetical changes in Plant mission are not treated in this EIS. Both decisions would require a policy judgment at the time the question arises.

The economic impact of new activities that might be undertaken by the Rocky Flats Plant are not discussed in the EIS. These considerations would have to be developed when the ultimate activities are defined.

paragraph B1

The High Efficiency Particulate Air (HEPA) filters, as noted in the DEIS on page 2-135, are tested with 0.3 μm (aerodynamic diameter) dioctylphthlate (DOP) aerosol, because particles in this size range are shown to be most penetrating in filter efficiency studies. A typical study showing this dependence was done by Spurney, and others (1969). This work also shows the high efficiency of this type of filter for particles as small as 0.002 μm. The high filter efficiency for small particles is caused by particle diffusion. As noted by Cadle (1975), "This mechanism (i.e., diffusion) is especially effective for very small particles, and the use of fiber filters is one of the most effective means for collecting submicron size particles from aerosols." Fuchs (1964) also reviews the mechanisms of particle deposition in filters and notes "It is clear that filter efficiency must tend to unity for very large and very small particle radii." Gonzales (1972) has related work wherein very small particles have been produced from dilute solutions. He reports that gold, holmium, and yttrium have produced satisfactory particles for filter efficiency testing. Gold particles in the range of 0.02 to 0.03 microns have been used. Yttrium particles as small as 0.01 microns have also been used. He states that the efficiency of HEPA filters to these particles has been demonstrated to be 99.99 percent. He further stated that the most penetrating particle has an aerodynamic diameter of 0.4 microns which related to the 0.12 micron actual diameter found by other investigators.

paragraph B2

The accidents and natural disasters described were included in the analyses discussed in Chapter 3 of the FEIS. Maximum releases are also listed in that chapter.

paragraph B3

It is extremely unlikely that an accident requiring any evacuation would occur. In the event of the maximum credible aircraft crash or solution criticality, it is possible (depending on wind conditions) that people within four miles of the center of the Plant would be asked to evacuate. (See Sections 2.11.4 and 3.2.4.2.)

For many years, the Rocky Flats Plant operating contractors and the responsible Federal agency (now the Department of Energy) have had emergency plans for responding to emergency situations that may occur on the Plant site. These plans interface with the State of Colorado Radiological Emergency Response Plan for Rocky Flats (finalized February 1, 1979, see Section 2.11.4), which would be put into effect in the event of a situation that involves off-site communities. The state plan defines responsibilities and the response activities of state emergency agencies, for the protection of the general population. (See Section 2.11.4.) If practice alert evacuations are conducted, they will be scheduled by State officials in exercising the plan. Emergency plans are discussed in greater detail in Section 2.11 of the FEIS. The health effects expected from the various accidents are discussed in Section 3.2.4 and its subsections. Demographic data is given in Section 2.3.3.

The calculations requested can be made using the population demography of Figure 2.3.3-1 (1977) from Volume I of the FEIS for the SE sector; and the short term related concentration value (χ/Q) for Pasquill Category F (worst case assumption) and wind speed at 10 miles per hour, with the methodology presented in Appendix B-2 of the FEIS. The magnitude of the release required for the exposed population in the direction of Denver to receive one millionth of an ounce of respirable particles can be shown to be several orders of magnitude in excess of the maximum credible accident. Because the questioned scenario is outside the realm of credible accidents, it was not developed in the FEIS.

With regard to the adequacy of Rocky Flats air samplers, please refer to a report prepared by Dr. James B. Wedding, Associate Professor of the Civil Engineering Department at Colorado State University, Fort Collins, Colorado. The report, entitled "Determination of Sampling Effectiveness of Rocky Flats Hi-Volume Sampler and Filtration Efficiency of Microsorban-98 Fiber Filter," is included as Appendix I in Volume II of the FEIS. The report indicates efficiencies for Rocky Flats ambient air sampler filter media of 99.8% or greater for all particle size ranges. Additionally, Dr. Wedding's evaluation of the inlet collection efficiency of the Rocky Flats air sampler shows that the Rocky Flats sampler is as efficient as the EPA approved sampler design utilized by the Colorado Department of Health.

In the event of a release of radioactive material, data would be made available to local authorities as soon it is received by DOE officials from the contractor. Sufficient information would be available in time for possible evacuation of people.

At the time of the 1957 Plant fire, approximately 10 low-volume air samplers comprised the Rocky Flats ambient air monitoring network. The samples collected received total long-lived alpha analysis. In 1978, the ambient air monitoring network consisted of 49 high-volume air samplers, all of which are analyzed weekly for total long-lived alpha, and 37 of which receive bi-weekly or monthly specific plutonium analysis. These sampling and analytical capabilities were not available in 1957.

<u>paragraph B4</u>

The extent to which plutonium and americium are carried to human drinking water is the subject of extensive monitoring (EIS Section 2.10.2.3). This information is presented at a Monthly Information Exchange Meeting with the Colorado Department of Health and is reported annually. Studies have been conducted to define the transport of radionuclides in the environment and the possible pathways to humans. Some of these are discussed in EIS Sections 2.10.4.1 through 2.10.4.3.

Extensive studies of plant uptake of plutonium and americium have been done (Au et al., 1977). These studies included consideration of the effects of chelation and use of fertilizers. Following in response to paragraph B.5 of the letter is a discussion of the degree of absorption through the gastrointestinal system.

paragraph B5

Radiological impacts of americium releases are included in the EIS analysis. (See Chapter 3, especially Section 3.1.2 and its subsections.) Concern for the toxicity of americium-241 dates back to the early 1950's. The chemistry of americium was reviewed in depth by Taylor (1973). The distribution and retention of americium in the body after ingestion, inhalation, intravenous injection, and intramuscular injection has been studied in a number of animal species (Mewhinney et al., 1976; Scott et al., 1948; Zalikin et al., 1969; Lloyd et al., 1970).

Accidental exposures of people to americium-241 (Brodsky et al., 1966) have also made it possible to relate data obtained from studies with laboratory animals to distribution and retention of americium-241 in man. These studies have been summarized by Durbin (1973). She indicated that americium-241 is distributed and retained in mammalian species in a pattern similar to plutonium-239. Both isotopes accumulate in the liver and on bone surfaces after absorption into the systemic circulation. For most chemical forms of these isotopes, however, more americium-241 translocates from the lung to the liver and bone than is observed for plutonium-239 (Thomas et al., 1972). Americium-241 is also absorbed more readily than plutonium-239 in the gastrointestinal tract (ICRP, 1972) and in the environment americium-241 is thought to be more readily taken up by plants (Watters and Hansen, 1970). These characteristics lead to minor differences in the estimated hazards from plutonium-239 and americium-241 released to the environment. However, the toxicity of americium-241 is known and can be related to the hazards from plutonium-239. Per unit of dose to the organ, the effectiveness of americium-241 is similar to plutonium-239 in producing toxic effects after deposition in the body (Durbin, 1973).

Genetic and cytogenetic studies indicate that similar amounts of radioactivity reach the reproductive organs (Green et al., 1975) and this produces similar genetically significant doses for plutonium-239 and americium-241. The cytogenetic damage produced by both isotopes when incorporated into liver cells is also similar (Brooks, 1975). Thus, no unique or unexpected health risks will occur from exposures to americium-241 different from those seen in laboratory animals after exposures to plutonium-239. A discussion of the genetic effects of plutonium is included in Appendix G-1 of this EIS.

The present levels of contamination of the Rocky Flats area with americium-241 are about 10% of the plutonium-238, -239, -240 contamination levels. Levels of all of these isotopes in soil vary with location around the facility. They are higher in the areas east of the facility than in those areas to the west. Contamination levels are also higher near the facility than in areas at greater distances. The estimates of health hazard, given in Chapter 3, are based on levels of americium-241 activity equal to 20% of the plutonium alpha activity, for releases from on-site soil and from accidents, and on levels of 50% from routine releases from buildings. Additional discussion is given in Appendix F, which incorporates up-to-date knowledge of uptake, absorption, and translocation of these isotopes in the computation of doses and risk assessments.

Dose calculations for this Impact Statement include a higher absorption fraction in the GI tract for americium-241 than for plutonium-239 and plutonium-240. These fractions are 1×10^{-3} for americium-241 and 1×10^{-4} for plutonium-239 and plutonium-240, following the approaches of the EPA (EPA, 1977). For plutonium-238 and plutonium-241, the absorption fractions are considered to be the same as that for americium-241 because of the higher specific activity of these isotopes of plutonium.

In the lung, inhaled americium is probably absorbed more rapidly than inhaled plutonium. Dosimetry and risk models predict more bone tumors for more soluble, inhaled transuranic radionuclides, but fewer lung tumors and fewer total tumors (Cuddihy et al., 1977). Dose calculations for this Impact Statement maximize the organ doses and consequent tumor risk for inhalation. This is done by assuming that both americium and plutonium are in a soluble form when considering doses to organs other than the lung and are in an insoluble form when considering doses to the lungs.

With regard to control systems to prevent theft of americium, the americium inventory, the effects of fire, and the amounts of americium released, see Sections 2.11, 2.12, 3.2.2.4, and 3.2.4 of the EIS. Inasmuch as plutonium and americium are very similar in their chemical and nuclear properties, the controls for plutonium apply equally to americium. Radiation detection instrumentation responds to the 60 kev gamma radiation from americium, thus making it observable by both alpha and gamma sensitive instrumentation. Details of sabotage control and response, and quantities of materials if divulged would weaken the effectiveness of the control system.

References

Au, F. H. F., V. D. Leavitt, W. F. Beckert, and J. C. McFarland, "Incorporation of Transuranics Into Vegetable and Field Crops Grown at the Nevada Test Site," Transuranics in Desert Ecosystems, NVO 181, USDOE, Nevada Operations Office, Las Vegas, Nevada, November 1977.

Brodsky, A., J. A. Sayeg, N. Wald, R. Wechslor, and R. Caldwell. "The Measurement and Management of Insoluble Plutonium-Americium Inhalation in Man," Radiation Protection Proceedings, International Radiation Protection Association, Rome, Italy, Ed. W. S. Synder, pp. 1181-1190, Oxford: Pergamon Press, 1966.

Brooks, A. L., "Chromosome Damage in Liver Cells from Low Dose Rate Alpha, Beta and Gamma Irradiation: Derivation of RBE", Science, Vol. 190, pp. 1090-1092, 1975.

Cadle, R. D., The Measurement of Airborne Particles, John Wiley and Sons, 1975.

Cuddihy, R. G., R. O. McClellan, M. D. Hoover, V. L. Dugan, L. D. Chapman, and J. R. Wayland, "Radiation Risks from Plutonium Recycle", Env. Sci. and Tech., Vol. 11, pp. 1160-1165, 1977.

Durbin, P. W., "Metabolism and Biological Effects of the Transplutonium Elements," Handbook of Experimental Pharmacology, Uranium Plutonium Transplutonic Elements, Eds. H. C. Hodge, J. N. Stannard, J. B. Hursh, pp. 739-896, New York: Springer-Verlag, 1973.

Energy Research and Development Administration, Final Environmental Impact Statement: Liquid Metal Fast Breeder Reactor Program, ERDA-1535, 1975.

Fuchs, N. A., Mechanics of Aerosols, p. 217, The MacMillan Company, 1964.

Gonzales, M., J. C. Elder, H. J. Ettinger, "Performance of Multiple HEPA Filters Against Plutonium Aerosols," LA-5170-PR (Progress Report), July 1-December 31, 1972.

Greene, D., G. R. Howells, E. R. Humphreys, and J. Vennart, "Localization of Plutonium in Mouse Testes," Nature (London), Vol. 255, p. 77, 1975.

ICRP, International Commission on Radiological Protection, Publication 19, The Metabolism of Compounds of Plutonium and Other Actinides, Pergamon Press, New York, 1972.

Lloyd, R. D., C. W. Mays, G. N. Taylor and D. R. Atherton, "Americium-241 Studies in Beagles," Health Phys., Vol. 18, pp. 149-156, 1970.

Mewhinney, J. A., C. H. Hobbs, T. Mo and B. A. Muggenburg, Radiation Dose Pattern Following Inhalation of Monodisperse and Polydisperse Aerosols of $^{241}AmO_2$ in Beagle Dogs, Inhalation Toxicology Research Institute Report, LF-56, 1976.

Taylor, D. M. "Chemical and Physical Properties of Transplutonium Elements," Handbook of Experimental Pharmacology, Uranium Plutonium Transplutonic Elements, Eds. H. C. Hodge, J. N. Stannard, J. B. Hursh, pp. 717-738. New York: Springer-Verlag 1973.

Thomas, R. G., R. O. McClellan, P. L. Thomas, T. L. Chiffelle, C. H. Hobbs, R. K. Jones, J. L. Mauderly and J. A. Pickrell, "Metabolism, Dosimetry and Biological Effects of Inhaled ^{241}Am in Beagle Dogs," Health Phys., Vol. 22, pp. 863-871, 1972.

Scott, K. G., D. H. Copp, D. J. Axelrod, and J. G. Hamilton. "The Metabolism of Americium in the Rat," J. Biol. Chem., Vol. 175, pp. 691-703, 1948.

Spurney, K. R., J. P. Lodge, E. R. Frank, and D. C. Sheesley, "Aerosol Filtration by Means of Nuclepore Filters-Structural and Filtration Properties," Env. Sci. Tech., Vol. 3, p. 453, (1969).

Watters, R.L. and W. R. Hansen, "The Hazards Implication of the Transfer of Unsupported ^{210}Po From Alkaline Soil to Plants," Health Phys., Vol. 18, pp. 409-413, (1970).

Wilson, D. O. and J. R. Cline, "Removal of ^{239}Pu, ^{185}W and ^{210}Pb from Soil by Plants and Ion Extracting Solutions," Hanford Biology Research Annual Report for 1963, Eds. H. A. Kornberg and E. G. Sweeza, (HW-80500), pp. 187-190, (1963).

Zalikin, G. A., Y. I. Moskalev and I. K. Petrovich. "Distribution and Biological Effects of Americium-241," Radiobiologya , Vol 9, pp. 599-603, AEC-tr-7109, (1969).

paragraph B6

The systems utilized at Rocky Flats for measuring quantities of radioactive materials contained in wastes shipped from the Rocky Flats Plant are among the best that exist. These systems, in some cases, have been designed and installed by Rocky Flats engineers who are most knowledgeable in Plant operations, the government requirements for radioactive waste disposal, and the disposal methods utilized in Idaho. As part of the Rocky Flats Research and Development effort, measurement systems are continuously under redesign and evaluation to improve their capability. (See Sections 2.7.4.1 and 2.12.1.4.)

All employees who have access to nuclear material at the Plant possess security clearances, which substantially reduces the risk of a "group of subversive" employees being a reality. The term "substantial amount" can only be related to the purpose of the intended removal. Assuming that some "substantial" material in some form was shielded in some manner so as to escape detection by measuring, monitoring, and detection systems, waste container packaging and sealing methods would preclude undetected recovery within the Plant. Storage drums are sealed and welded shut and crate containers are sealed in fiberglass coating. Upon receipt at Idaho, the containers are stacked within a security-controlled area to await transport to a permanent federal repository. To locate a given container within the stacking by an individual, open that container and retrieve illicit material without releasing detectable contamination, is virtually impossible.

Regarding environmental release due to container deterioration, the packaging methods and materials utilized today are far superior to those of the 1950's. Also, continuous monitoring of storage site environmental conditions provide immediate detection and corrective actions to prevent an environmental hazard.

paragraph B7

Surveillance of the operations at the Rocky Flats Plant is a joint effort between the contractor and the Department of Energy. The errors cited and the suggestion of lack of checks and balances are given consideration in the establishment of an internal review process for all operations. This system, which began approximately in 1976 is discussed in greater detail in Section 2.6.2. In addition to these internal checks, the Rocky Flats Plant is in compliance with all laws and regulations in effect and regulated by other agencies. Throughout the EIS there are references to the various regulations and the agencies that enforce them. The Department of Energy audits contractor operations regularly and observes them on a continuing basis. This continued audit process provides a basis for updating and perfecting procedures.

paragraph B8

The first part of the question regarding relative impacts on surrounding areas in the case of Plant relocation is discussed in Section 5.3. With respect to the specific suggestion of a relocation of the Plant to the Department of Energy Reservation in Idaho, we concur that the man-rem dose to local populations would be less there than at its present site. In its present site, the cumulative man-rem dose commitments and associated cancer and genetic risk from both normal Plant operation and postulated accident releases (see Tables 3.1.2-11 and 3.2.4-5 of the EIS) are acceptable by the standards used to judge other risks (Table 3.2.4-8). With regard to the Idaho site, it is to be noted that the reservation boundary is about 30 miles upwind of a city of about 56,000 persons (Idaho Falls) and no more than 45 miles upwind of a metropolitan area of approximately 150,000 people.

In regard to the question on factors such as floods, tornadoes, and airplanes on the evaluation of potential plant accidents, it is to be noted that all these factors are taken into account in the accident analysis. Contacts with Jefferson County Airport planning officials revealed no plans in the foreseeable future to enlarge the Jeffco Airport to accommodate large jet-type aircraft but even if this were done, it would involve only minor modifications to the present aircraft crash risk assessments which already include Denver and Jeffco originated flights, other flyovers, and rotorcraft engaged to fly over the Plant site.

A basis for comparison of the cost of buying all properties within a 25 mile radius of Rocky Flats in relation to the cost of moving the Plant to an alternative site can be derived from the information given in Chapters 5 and 9 of the EIS. This comparison can be made if property values were computed within the prescribed radius. Information is provided in the EIS so detailed investigation and analysis of specific alternatives can be developed when these are more clearly defined.

paragraph B9

You are referred to Section 2.7.1. A 15 man crew is assigned to filter surveillance and maintenance on a full time basis. Filters are checked daily using magnahelic gauges to monitor pressure differential. Where necessary, there are visual checks for physical deterioration of filters, and there are automatic alarm systems that activate when pressure differences exceed a prescribed level. Filters are changed on an "as required basis" which is determined by the degree of loading, the nature of the filtered material and the type of work activity. Some are changed every 2 to 3 weeks, while others may stay in service for several years.

Negative pressure differential is not sufficient protection against spread of contamination between the glovebox atmosphere and the work area, especially when there are local disturbances in the pressure differential. Such disturbances occur, for example, if a worker withdraws his hand from a glove that has a hole in it. That is why the Plant makes numerous checks on glove integrity as well as on the pressure differential. The glove quality program has been greatly improved since 1975.

paragraph B10

The studies of Petkau (1972) show the effect of Sodium-22 on the integrity of inert, artificial membranes. In contrast, membranes of living cells in living tissues are very dynamic and undergo constant synthesis and repair by the cells. This is a normally occurring function which continues in all cells in or out of radiation fields.

The integrity of cell membranes and membranes within cells is necessary for cell viability and normal function. Damage to cell membranes is a well known action of ionizing radiations of all types: alpha, beta, photons, and recoil nuclei. Cell membranes are only about 100 angstroms thick and are easily penetrated by all of these radiations. Electron and photon emissions from plutonium-239 and americium-241, however, account for only 10^{-3} to 10^{-5} of the total energy released per disintegration. More than 99.9% of the total energy deposited in surrounding tissue is due to the alpha particles.

All observations of plutonium toxicity in laboratory animals and alpha radiations in man have included the weak beta and gamma radiations referred to. These occur from natural background and medical x-rays. The average medical exposure for people living in this country is about 70 mrem/year (NAS, 1972). Obviously, when the exposed human populations and animal studies are used to establish radiation exposure limits, the data collected in these observations include much more radiation with low specific ionization than would result from these alpha-emitting radionuclides. These radiations may contribute a small amount to the cell injury, but no large synergistic effects are ever observed.

Dose rates used by Petkau that disrupted the artificial cell membranes were about 0.001 rad/min for 600 min (600 mrad) or 1 rad/min for 25 min (25 rad). Exposures to x-rays for medical purposes are generally in these ranges of dose rates. Patients receive 10 mrad to 5 rad of exposure within minutes during these procedures (NCRP, 1977). Medicine related exposures occur to people who also have organ burdens of alpha-emitting radionuclides such as industrial workers, cigarette smokers and everyone exposed to radon and radon daughter radionuclides in the environment. If membrane damage is produced, it is of little biological importance as there are no reported cases of a generalized breakdown of their cell membranes. Thus, the studies of Petkau are interesting scientific observations but they do not have a good parallel in injury to living cells or a major influence in the setting of radiation protection standards.

The maximum permissible lung burden for occupational workers with plutonium-239 in lung tissue is 16 nCi in the total lung. This amount of activity would result in about 15 rem of dose to the lung each year. The electron and photon components of the dose are less than 15 mrem per year. Natural background radiations result in about 250 mrem of radiation to lung tissue. Therefore, the electron and photon radiations of lung tissue from plutonium-239 and americium-241 add little to the constant radiations fields which normally exist in the lung even if the lung contained 16 nCi of plutonium-239.

References

NAS, National Academy of Science, Report of the National Research Council on the Biological Effects of Ionizing Radiation, Washington, D.C., 1972.

NCRP, National Council on Radiation Protection, Medical Radiation Exposure of Pregnant and Potentially Pregnant Women, Report No. 55, Washington, D.C., 1977.

Petkau, A., "Effect of $^{22}Na^{+}$ on a Phospholipid Membrane," Health Phys., Vol. 22, pp. 239-244, (1972).

paragraph B11

The possible differences in genetic effects from high or low Linear Energy Transfer (LET) radiations have been recognized since the advent of the nuclear era and have been studied extensively (USNC, 1972). From these studies, it was concluded that high LET radiation such as neutrons or alpha particles were 10 times as effective as low LET x-rays or gamma rays in producing genetic damage. This factor is generally used to establish the radiation protection standards for plutonium-239 in the reproductive organs.

Since only a small fraction of the total body burden of plutonium-239 reaches the reproductive organs, little research or concern was directed toward genetic effects of plutonium prior to 1970. Evidence that a small fraction of the body burden (2×10^{-4}) can reach the reproductive organs (Campbell et al., 1974; Richmond and Thomas, 1975), testes, ovarian follicles, and ovarian interstitial (Green et al., 1975; Richmond and Thomas, 1975; and Taylor, 1977) has resulted in an increase in research on potential genetic effect of plutonium. Evidence for genetic damage has been evaluated by studying mutation frequencies in vitro, (Barnhart and Cox, 1977), chromosome aberrations in cells both in vivo and in vitro, (Brooks, 1975; DuFrain et al., 1978), dominant lethal events in plutonium-239 exposed animals (Lunning et al., 1976), chromosome translocations in testes cells of animals injected with plutonium-239 (Beechey et al., 1975), and specific locus mutations transmitted to offspring. This research represents a unified battery of tests to determine if a unique or unexpected genetic response could result from plutonium deposition.

Results of these studies indicate that for mutations in mammalian cells in tissue culture, plutonium is five times as effective per rad as acute gamma irradiation (Barnhart and Cox, 1977). Measurements of chromosome damage in liver and blood indicate that plutonium is from 15 to 40 times as effective as protracted cobalt-60 gamma ray exposure in producing aberrations (Brooks, 1975; DuFrain et al., 1978). In studies measuring dominant lethal events, plutonium-239 was about 10 times as effective as protracted gamma exposure (Lunning et al., 1976). Translocations and mitotic aberrations, which were measured in the testes after plutonium exposure, increased slightly over the background level, and remained constant with little increase as a function of time or dose (Beechey et al., 1975). For specific locus mutations, a measure of genetic damage resulting in specific mutations seen in the offspring, the relative effectiveness for plutonium may be as high as 3.5 in early weeks after plutonium injection and decreases to 1 at later times. Thus, for gene mutations and small chromosome deletions, the biological hazards from plutonium are similar to that expected from exposure to acute x-rays. All of these changes were measured following large doses of intravenously injected plutonium that would also produce marked life shortening and increased cancer incidence. The total battery of tests indicate that no unexpected increase in genetic risk from plutonium exists and that the effectiveness factor used for other high LET radiation is appropriate for plutonium.

Other tissue measurements and dose calculations indicate that the value used to define effectiveness for alpha emitters, including plutonium, is, in fact, conservative for genetic change. Since americium-241 has an alpha emission with an energy very similar to that of plutonium-239, it is possible to estimate genetic effects of americium-241 by knowing the body burden and distribution of the isotope.

Discussion of the Rocky Flats cattle study is in Section 2.10.4 of the EIS.

General

A response to question 12 under part B of the letter dated August 22, 1975 was also requested. There is no question 12 in that letter.

References

Barnhart, B. J. and S. H. Cox, "Mutagenesis of High LET Alpha Radiation," Somatic Cell Genetics Conference, Los Alamos Scientific Laboratory, October 3-5, 1977.

Beechey, C. V., D. Green, E. R. Humphreys, and A. G. Searle, "Cytogenetic Effects of Plutonium-239 in Male Mice," Nature (London), Vol. 256, pp. 577-578, (1975).

Brooks, A. L., "Chromosome Damage in Liver Cells From Low Dose Rate Alpha, Beta, and Gamma Irradiation: Derivation of RBE," Science, Vol. 190, pp. 1090-1092, (1975).

Campbell, E. E., J. F. McInroy, W. D. Moss, B. C. Eutsler, and H. F. Schulte, Annual Report of the Biomedical and Environmental Research Program of the LASL Health Division 1973, Los Alamos Scientific Laboratory Report LA-5633-PR, pp. 27-33, (1974).

DuFrain, B. J., L. C. Littlefield, and E. E. Joiner, "Cytogenetic Dosimetry for Am-241 Alpha Particle Irradiation of G. Stage Human Lymphocytes," Rad Res., Vol. 74, p. 523, (1978).

Green, D., G. R. Howells, E. R. Humphreys, and J. Jennant, "Localization of Plutonium in Mouse Testes," Nature (London), Vol. 255, p. 77, (1975).

Lunning, K. G., H. Frolen, and A. Nilsson, "Dominant Lethal Tests of Male Mice Given Pu-239 Salt Injections," Biological and Environmental Effects Low-Level Radiation, IAEA, Vienna, STI/PUP/409, pp. 48-53, (1976).

Richmond, C. R. and R. L. Thomas, "Plutonium and Other Actinide Elements in Gonadal Tissue of Man and Animals," Health Phys., Vol. 29, pp. 241-250, (1975).

Taylor, D. M. "The Uptake, Retention, and Distribution of Plutonium-239 in Rat Gonads," Health Phys., Vol. 32, pp. 29-31, (1977).

USNC, United Nations Scientific Committee on the Effects of Ionic Radiation, Ionizing Radiation: Levels and Effects Annex E: Genetic Effects of Ionizing Radiation, Vol. II, pp. 199-302, (1972).

Letter of August 26, 1975

paragraphs 3 through 8

The amount of insoluble plutonium which accumulates in the lungs of people exposed constantly to a specific air concentration can be estimated using the relationships given below. For example, assume an exposure level of 1 pCi/m^3 of air which is constant for more than 10 years. Near the end of this time period, the lung will reach an equilibrium level of 2.5 nCi. This is derived by multiplying the following factors:

0.001	nCi/m^3	Pu concentration, 24 hr/day, 7 days/week,
20	m^3/day	amount of air breathed per day for an adult,
0.3		fraction of 1 μm AMAD (activity median aerodynamic diameter) particles deposited in pulmonary lung
0.6		fraction of deposited particles retained for 700 days
700	days	average retention time for insoluble particles in the pulmonary lung

For more soluble forms of plutonium, the equilibrium lung burden would be less. For example, for Class W material, according to the ICRP Task Group on Lung Dynamics (1966), the pulmonary clearance half-time would be 50 days. For these Class W materials, the equilibrium lung burden would be reached in about 2 years, but the burden would be only 0.25 nCi.

Lung burdens equivalent to the air concentrations listed in the above request for information are provided in the following table.

Assumed Air Concentration (pCi/m^3)	Solubility Class[a]	Equilibrium Lung Burden (pCi)
0.33	Y	830
0.02	W	5
0.0064	Y	16
0.00005	Y	0.13

[a]Solubility class is assumed from the ICRP Task Group on Lung Dynamics; Class Y (insoluble), pulmonary clearance half-time of 500 days; Class W (moderately soluble), pulmonary clearance half-time of 50 days.

For Class Y compounds these equilibrium levels will be reached in about 10 years and no further accumulation should occur. For Class W compounds the equilibrium level should be reached in 2 years with no further accumulation. We assumed a 1-μm activity median aerodynamic diameter (approximately 0.3-μm diameter real size) for these calculations because it results in a high level of pulmonary deposition.

To verify the relationships between air concentrations of plutonium and measured lung burdens in people, consider the following data. Air concentrations of Pu-239 from nuclear weapons fallout were approximately 0.00009 pCi/m^3 in New York City between 1960 and 1970 (EML, 1978). The level in Denver was similar. Lung burdens of Pu for people in Colorado were about 0.4 pCi over these time periods (Campbell et al., 1973). From the relationship given above, lung burdens of 0.25 pCi would have been predicted. However, the lung burdens measured by Campbell et al. (1973) were obtained from people who had also been exposed to the higher fallout levels which occurred prior to 1960. Thus, it is not unusual that the observed burdens were somewhat smaller than predicted from 1960 to 1970 air concentration data.

Radiation doses related to levels of plutonium in human lungs can be estimated from the approximate relationship:

1 pCi Pu in Lung ——> 1 mrem per year

Air concentrations of fallout Pu are relatively easy to determine, and one can make a reasonable estimate of the associated health risks. Denver residents have lung burdens of 0.4 pCi of fallout plutonium. This leads to individual doses of 0.4 mrem per year and 0.6×10^6 man rem/yr for the entire Denver population of 1.4 million. The BIER Report (NAS, 1972) recommends lung dose-risk estimators of 16×10^{-6} to 110×10^{-6} cancers per man rem. Thus, we could expect no more than 0.006 to 0.06 lung cancers from fallout in Denver each year. Lung cancer estimates for the Denver population, as related to plutonium released from Rocky Flats, are much smaller since little of the plutonium in the Denver air is from Rocky Flats.

Dr. John Gofman has speculated that the health risks associated with fallout plutonium in the lungs of people is greatly in excess of the risks estimated using the relationships contained in the National Academy of Science BEIR Report (NAS, 1972). He postulated that this inhaled plutonium would collect in damaged areas of smokers lungs, which represent only 1/1000 of the total lung mass. Therefore, the dose to this lung tissue would be proportionately higher than if the plutonium were distributed throughout the entire lung. Gofman then assumed a lung tumor doubling dose which was markedly less than the BEIR Report recommends. He divided his unrealistically high estimate of lung dose from fallout plutonium to the very low value for the lung tumor doubling dose. This was done to obtain an estimate of the number of times the normal incidence of lung cancer would double in the future. Dr. Gofman then doubled the lung cancer incidence observed in humans for the number of times indicated by the above ratio to estimate the effect of fallout.

The errors incorporated in this analysis include the following:

1. Lung clearance in smokers is impaired by smoking only for short periods of time, a few hours. Lung clearance could never be impaired to the degree Dr. Gofman suggested; otherwise the small airways would fill with debris and breathing would cease.

2. The lung dose risk estimator used by Dr. Gofman was four times too high.

3. Using a human cancer incidence rate, which includes smokers, as the popula-

tion's natural incidence is incorrect for the purpose of estimating increased radiation risks from fallout. Smokers inhale about 0.1 pCi polonium-210 per cigarette or at one pack per day about 700 pCi per year. They also inhale about 0.4 pCi of fallout plutonium per year. Thus, the fallout plutonium has little impact upon the total alpha doses to the lung tissues of smokers and no measurable impact upon their incidence of lung cancer. The same considerations apply to nonsmokers because of their comparatively high exposures to radon-222 and daughter products in the environment.

The speculations of Dr. Gofman on plutonium toxicity were reviewed by Snipes et al. (1975), Healy et al (1975), Bair (1975) and Richmond (1975). Detailed discussions of the inaccuracies in Gofman's analysis (listed above and others) are included in these reports. Another review of the generally related hypothesis on nonuniform irradiation of lung tissue is described in the Final Environmental Impact Statement Appendix G-1.

With respect to your suggestion that Rocky Flats workers should not smoke, this is a generally accepted recommendation advocated by the vast majority of toxicologists for all people. Whether or not Rocky Flats workers live in the city of Denver is also a personal choice. The most significant risk from doing so relates to driving automobiles locally. This risk far outweighs the risks from radiation exposures. Finally, whether or not the Rocky Flats facility should be moved out of the Denver area is a complex cost-benefit judgment which is a major subject of the entire Environmental Impact Statement.

References

Bair, W. J., "Review of Reports by J. W. Gofman on Inhaled Plutonium," a communication from Battelle Pacific Northwest Laboratories, Richland, Washington, 1975.

Campbell, E. E., M. F. Milligan, W. D. Moss, H. F. Schulte, and J. F. McInroy, "Plutonium in Autopsy Tissue," Los Alamos Scientific Laboratory Report, LA-4875, (1973).

EML, Environmental Measurements Laboratory, Environmental Quarterly Appendix, EML-342 Appendix UC-11, (1978).

Healy, J. W., E. C. Anderson, J. F. McInroy, R. G. Thomas, and R. L. Thomas, "A Brief Review of the Plutonium Lung Cancer Estimates by John W. Gofman," LA-UR-75-1799, Los Alamos Scientific Laboratory, Los Alamos, New Mexico, 1975.

ICRP, Task Group on Lung Dynamics, Committee II of the International Commission on Radiological Protection, Health Phys., Vol. 12, p. 1973, (1966).

NAS, National Academy of Sciences, Report of the National Research Council on the Biological Effects of Ionizing Radiation, Washington, D.C., 1972.

Richmond, C. R., "Review of John W. Gofman's Reports on Health Hazards From Inhaled Plutonium," ORNL/TM-5257, Oak Ridge National Laboratory, Oak Ridge, Tennessee, 1976.

Snipes, M. B., A. L. Brooks, R. G. Cuddihy, and R. O. McClellan, Review of John Gofman's Papers on Lung Cancer Hazard From Inhaled Plutonium, LF-51, Inhalation Toxicology Research Institute, Lovelace Foundation for Medical Education and Research, Albuquerque, New Mexico, 1975.

paragraph 9a

The hypothetical ingot-stacking accident has been reevaluated, and the 500 g of vaporized plutonium has been taken into account. See Section 3.2.2.6 of the FEIS.

paragraph 9b

The effectiveness of HEPA filters for very small particles is discussed extensively in the hearing record, Hearing Record of the Public Hearing on the Draft Environmental Impact Statement, Rocky Flats Plant, Denver, Colorado, May 1978, Department of Energy (ERDA 1545-D). The applicable portion of the record has been transmitted to the commenter. In summary, the HEPA filters would stop small particles of plutonium, vaporized plutonium, and plutonium oxide.

paragraph 9c

The effects of a criticality accident are discussed in Chapter 3.

Response to Letter of September 4, 1975

paragraph 1

The Rocky Flats Environmental Impact Statement includes a summary of the possible health effects of plutonium, americium, and beryllium exposures. These are included in Volume I, Chapters 2 and 3 and Volume II, Appendix G, of the FEIS. Greater attention has been given to the potential health effects from exposures to radioactive elements than has been given to beryllium. This emphasis is due to radioactive plutonium and americium releases from the Rocky Flats facility having been documented and the fact that these elements have been measured in air and soil beyond the Rocky Flats property line.

The scientific literature has abundant information on the health effects of internally deposited radionuclides. It would be impossible to summarize this body of literature in the EIS; it would also be redundant since this is the responsibility of the National Council on Radiation Protection and the Environmental Protection Agency.

For nonradioactive materials, the Environmental Protection Agency and the Occupational Health and Safety Administration are responsible for establishing human exposure limits and the scientific basis for these limits.

As a convenience to readers of the Rocky Flats EIS, short descriptions of the health effects of exposures to radioactive and nonradioactive toxic substances used at Rocky Flats have been included, with references to the major review articles on each of the toxic substances. These documents are basic references for the EIS but the total information is too voluminous to be reproduced within the EIS.

The toxicity of plutonium and other transuranium elements and of beryllium are frequent subjects of debate. The permissible levels of exposure to beryllium may change in the near future (Wagoner et al., 1978). If so, Rocky Flats personnel will comply with the new exposure limits. However, the permissible exposure limits for any of these substances will not change because of arguments presented in the DEIS or the final EIS. This responsibility lies with other government agencies. To change population exposure limits to toxic substances, other methods of publication and review must be applied. Therefore, the reader of the Rocky Flats EIS is strongly encouraged to follow the references cited indicating the progress being made in the general fields of toxicology and in the regulation of industrial exposures.

Reference

Wagoner, J. K., P. F. Infante, and T. Mancuso, "Beryllium: Carcinogenicity Studies," Science, Vol. 201, pp. 198-302, (1978).

paragraph 2

As stated on page 2-46 of the Omnibus, there are two 70,000 gallon pre-aeration holding tanks located upstream from the sewage plant which serve as surge basins to reduce peak flows. It also states on this page that the design capacity of the sewage plant is 450,000 gallon per day, but can handle higher peak loads. Further, if the sanitary influent is excessive, plant-wide announcements are made requesting curtailment of discharges to the sanitary treatment plant. This has been done successfully on past occasions. Finally, there are several reservoirs on Plant site that can be used to contain water in an emergency situation.

With regard to the total raw water use, approximately 50% of the annual raw water is used for cooling tower and steam plant makeup for evaporation losses and Plant chemical processes that discharge to the process waste system rather than the sanitary system. Therefore, it is invalid to compare Plant raw water use with sewage plant operating capacity.

The contents of the holding ponds are not discharged when contaminants are present. A system of monitoring and control assures that there are no inadvertent releases.

Excessive Plant surface water runoff reaching the Woman and Walnut Creek drainages can be contained in the A, B, and C holding ponds and analyzed prior to discharge. Additional backup capability will be provided upon completion of the surface water control dams which are under construction (see Sections 2.10 and 9.5 of Volume I in the FEIS).

paragraphs 3 and 4

"Salty waste" refers to aqueous solutions containing high concentrations of soluble salts such as chlorides, nitrates, and sulfates.

"Non-treated waste" refers to waste solutions with lower salt concentrations than "salty waste." These solutions are not sent to the sewage treatment plant because of radioactive materials being present; instead they are sent to Evaporation Ponds B-2 and A-2. These wastes are not treated because the levels of radioactivity are too low to be removed efficiently by waste treatment processes.

Impervious barriers lining the ponds keep the evaporation pond water and contaminants from seeping into the soil and reaching the groundwater. These include layers of asphalt concrete on the pond bottom and sides plus "petromat" (polypropylene film) on the sides (berms).

The extent of seepage has been determined by drilling test holes around the ponds. Test wells downslope from the ponds are monitored twice a year. Water from these wells has been found to contain nitrate and tritium indicating that there has been some seepage into the groundwater. No confirmed concentrations of plutonium, americium, or uranium have been determined.

Potable water used in plutonium and americium areas is discharged to the sanitary sewage system. The monitoring which is performed on the water which passed through the system is outlined in Section 2.10 of the EIS. No monitoring is done on the water as it leaves the individual buildings. The water passes through the sewage treatment plant to the holding ponds as described. Grab samples taken from Pond B-3 are analyzed, and the results are reviewed before approval is given to release the water from the pond. This procedure is designed to prevent release of contamination. The Colorado Department of Health collects samples from Pond B-4, which is just downstream from B-3.

paragraph 5

The stack alarms are connected to an alarm in the Radiation Monitoring office in the plutonium buildings. If an alarm sounds the Radiation Monitor on duty could immediately assess the problem and initiate the proper actions.

A Plant Dispatcher, Shift Superintendent, Utilities Shift Foreman, and Radiation Monitor are on duty 24 hours a day every day of the year. The Radiation Monitor would immediately notify the Plant Dispatcher by either telephone or radio and advise him of the exact location of the alarm that is sounding.

The Plant Dispatcher would immediately call the Plant Shift Superintendent and others and advise them of the nature and location of the alarm. The Shift Superintendent, in continual radio contact with the dispatcher, would verify the location of the alarm.

At the same time the radiation monitor would be in the process of evaluating the situation. The Shift Superintendent would make the final decision as to the necessary action. He has a Utilities Shift Foreman to assist in tracing the air flow and determining the cause of the problem.

If a real problem existed, the shift superintendent would immediately inform the Director of Health, Safety & Environment of the situation and what actions have been taken. The shift superintendent would next notify the Manager or Assistant Plant Manager, the Manager of Environmental Science, the DOE Staff Duty Officer, and then standby for instructions. All of these people are on a call list 24 hours each day. If they are not available, then an alternate name is submitted for the on-call list.

If a serious problem were to exist, the appropriate civilian authorities would be notified as quickly as possible after the initial alarm.

paragraph 6

The Rocky Flats building-stack alarm system which operates continuously would provide the first warning of any release from a building. Routine total long-lived alpha measurements are conducted three times weekly for stack particulates.

The EIS states that ambient air samples are collected weekly and analyzed for total long-lived-alpha activity.

If, "a substantial amount of plutonium were released," the stack alarm and the weekly total long-lived alpha measurement would indicate this and appropriate action would be taken.

Further, the Rocky Flats Plant has 24 on-site ambient air monitors in the network. It is the opinion of Loren Crow, a certified consulting meterologist, that releases would not go undetected by this network.

Based on these considerations, it is highly unlikely that any release of plutonium would go undetected.

paragraph 7

At the time of the Wind Tunnel Site Analysis in 1973, the Rocky Flats ambient air sampling network consisted of 34 samplers. After the study, 15 more high-volume ambient air samplers were added.

In June 1976, L. W. Crow, did extensive meteorological studies of Rocky Flats and all surrounding areas and was asked to comment on the density of the ambient air samplers.

His reply indicated that for long-term cumulative measurements, a pattern of sampling stations having a density of approximately one for each 30 degrees of arc would be sufficient to determine general levels of any pollutant material which is moved by meteorological response mechanisms. He also indicated that an increased density of one sampler for each 15 degrees of arc would not show any marked change from a pattern determined from samplers located at 30 degrees of arc.

For these reasons, it is believed that the Rocky Flats ambient air monitoring station network is more than adequate.

508 Hardwicke Drive
Knoxville, Tennessee 37919
November 26, 1977

W. H. Pennington, Director
Office of NEPA Coordination
U.S. Department of Energy
E-201
Washington, D.C. 20545

Re: ERDA - 1545-D

Dear Mr. Pennington:

The purpose of this letter is in response to requests for comments concerning the issuance of the Draft Environmental Impact Statement for the Rocky Flats Plan Site, Golden, Colorado in September 1977.

My specific interest for reviewing this document was for purposes to gain insight into some of the current methods and assessments surrounding the safeguarding of facilities and material accountability. This is a result of a limited amount of time I am devoting to assessing and developing safeguard systems through my employment at Union Carbide Corporation in Oak Ridge, Tennessee. My interest has focused upon section 12 of Chapter 2 entitled Safeguards.

Specifically, the general content of the section and general assessment of the Safeguard-Security program at Rocky Flats is well within the guidelines as prescribed by the NRC's Division of Safeguards in the Office of Nuclear Material Safety and Safeguards. Since the document under review is an environmental impact statement, only the data necessary to a evaluate the possible effects of a successful safeguards impenetration is reflected. This is a good stance for assessing the possible outcome of releases in the event of a maximum credible accident.

However, I do feel that one point was overlooked in the presentation of the assessment of the system. This is in regard to the alarm based security system. ERDA (now DOE), in its attempt to prevent successful malevolent acts, approaches the problem by considering as one of their responsibilities, to minimize the possibilities of success. This is reflected in section 2.12.1. In the discussion that follows, no mention is made regarding the evaluation of alarm and detection systems that exist, as to the frequency of maintenance and/or to the evaluation of the operability of the various systems at locations throughout the plant. Although a minor point, in considering minimizing the possibility of a successful overt or covert malevolent act, ERDA (DOE) does prescribe guidelines for periodic or routine evaluations of safeguard alarm systems. The inclusion of a brief statement to mention this fact, should reinforce the idea that the facility is better protected, and that the likelihood of a radiation leak or the diversion of material to the environment is very remote.

One other question exists in my mind and it relates to the term "Book" Physical Inventory Difference". Is this "material unaccounted for" or MUF?

Finally, I have noted two editing changes that should be corrected for issuance of the final copy. They are on pages 2-247 and 2-249 respectfully. The first is a misspelling of system. This is found in the first line on page 2-247. The second involves a grammatical exclusion of a verb in the fourth paragraph's first sentence. This I believe should read: ". . . the person or vehicle is detained by the guard until cause of the alarm condition can be determined."

Thank-you for having the opportunity to comment. I hope the statements are benefical.

Sincerely,

David W. Swindle, Jr.

David W. Swindle, Jr.
Union Carbide Corporation
Bldg. 7601
Oak Ridge, Tennessee 37830

DOE STAFF RESPONSE TO THE LETTER FROM DAVID W. SWINDLE, JR., UNION CARBIDE CORPORATION

Section 2.12 has been revised considerably from the Safeguards section in the DEIS. Your suggestion about alarm systems has been included in Section 2.12.1.4. Also, clarification of the term, "Book Physical Inventory Difference", is given in the discussion of "Material Balance Accounts" in Section 2.12.9.3 of the FEIS.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
P. O. Box 17107, Denver, Colorado 80217

December 2, 1977

Mr. W. H. Pennington
Director, Office of NEPA Coordination
Energy Research & Development Division
Washington, D. C. 20545

Dear Mr. Pennington:

Thank you for sending us a copy of the draft EIS for the Rocky Flats Plant Site. We have the following comments to offer.

Page D-38 - Appendices - Erosion, Sedimentation and Landslides

This section deals with erosion only from the standpoint of water erosion. We believe it would also be desirable to discuss any significant wind erosion problems that exist. This would be especially important on areas that are contaminated with plutonium.

Otherwise, we believe the Draft EIS is very thorough and adequately discusses the areas in which the Soil Conservation Service has expertise.

We appreciate your using the material we provided on soils and vegetation in the Draft EIS. If we can be of further assistance, please call on us.

Sincerely,

Duane Bartel

Robert G. Halstead
State Conservationist acting

cc: R. M. Davis, Administrator, SCS, Washington, D.C.
Office of the Coordinator of Environmental Quality Activities
Office of the Secretary, USDA, Washington, D.C.
Council on Environmental Quality (5 copies)(Attn: General Counsel)
Director, Environmental Services Division, SCS, Washington, D.C.
Kenneth L Williams, Director, WTSC, SCS, Portland

DOE STAFF RESPONSE TO THE LETTER FROM ROBERT G. HALSTEAD, SOIL CONSERVATION SERVICE, DEPARTMENT OF AGRICULTURE

In response to your comment concerning erosion, Section 2.3.7 entitled "Material Movement and Wind Erosion" has been added. This new section discusses wind transport.

November 18, 1977

Mr. W. H. Pennington
Director
Office of NEPA Coordination
ERDA
Washington D. C. 20545

COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT
ERDA-1545-D

Sir:

Enclosed are my comments on the draft. This document covers all areas of concern to me and my comments mainly deal with clarifying some of the statements.

Sincerely,

C. R. Forrey

C. R. Forrey
905 Laurel
Broomfield, Co. 80020

CRF:slo

cc

Page 1-3, The statement "production process waste water is treated-----within drinking water standards.

1. A table is needed to list these limits.
2. How long is the waste water stored.
3. If the waste water is "within drinking water standards", why is it not released for use down stream?
4. List dates, time, quantity and ions involved in the 12 discharges which exceeded the NPDES permit specified limit.
5. List the NPDES specified limits.

Page 1-4, 2nd Paragraph

Has there ever been any radioactive material released to the environment outside to confines of the sending and receiving installation while being shipped? If so, when, where, quantity and material involved. This is covered in Section 3.2-3.3 but should be summarized here.

Page 1-6, 3rd Paragraph

This is a good factual statement, however should the fires of 1957 and 1969 be included to prevent questions concerning the validity for concluding there has been "no significant dose increase" due to the facility?

Page 1-17, Section 1.8, 2nd Paragraph

The direct employment maximum of 3710 people in 1972 and the employees badged (Table H-3) do not agree. If the difference is construction employees, this should be more clearly stated.

Page 2-77, Figure 2.4-23

Add to this graph, the volume of liquid pumped into the deep wells at the Arsenal each month to better show the coorelation.

Page 2-81, Surface Water, 1st Paragraph

Where do Coal Creek, Leyden Gulch and Rock Creek flow?

Page 2-90, Background Radiation, 2nd Paragraph

It is not clear how the Colorado Department of Health established a background level for plutonium of 0.08 d/m/g if the levels at Rocky Flats, the same as the rest of the United States, are 0.33 d/m/g. If this difference is due to the depth of sampling, the two numbers should be directly compared to show any similarity or difference.

Page 2-91, Last Paragraph and
Page 2-93, Figure 2.4-24

Are these contours corrected for 0.015 $\mu Ci/m^2$ background?

Page 2-92, Permissible Levels of Radioactive Material In Uncontrolled Areas

Is this limit corrected for 0.015 $\mu Ci/m^2$ background?

Page 2-139

Why was there a large decrease in natural gas usage in 1976?

Page 2-141

Why was there a large decrease in fuel oil usage in 1975?

Page 2-164

Why is there a difference between the quantity limits in Table 2.6-10 and the values given for plutonium and uranium on this page?

Page 2-172, Last Paragraph, Last Sentence

The word "contain" may be misinterpreted to mean "hold" as for future use. Perhaps "trap" would be more easily understood. The sentence should end "to prevent them from being discharged into the environment.

Page 2-172, 3rd Paragraph

Some HEPA filters use a metal frame.

Page 2-175, 3rd Paragraph

Steel body filters are going to be used in the new building, why not use them in existing buildings?

Page 2-177, Table 2.7-1

Adjust the spacing to get the same number of items in each half. It would also make to table easier to read if it were double spaced.

Page 2-182, 3rd Paragraph

To emphasize the self imposed limit of 100 Ci tritium release per year, include the maximum total release allowed under the ERDA standard in curies per year based on 200,000 p Ci/m^3 times the yearly average cubic meters of stack exhaust.

Page 2-184, 5th Paragraph

The first sentence should be included in the previous paragraph. The second sentence starts a new subject.

Page 2-186, 1st Paragraph

"The dried salts are packaged as salt in a box." What happens to the box?

Page 2-189

The double drum drier product goes into a 745 drum. Is this the same as the box referred to on Page 2-186?

Page 2-190, Section 2.7.3.3

Where does the liquid in the unlined ponds go, if they are not allowed to flow off-site?

Page 2-194, Table 2.8-1

Convert gallons to pounds or better yet, convert both gallons and pounds to kilograms.

Page 2-196, Section II, Tree Spray Operations

Last statement should be "D" not "C".

Page 2-247, 1st Sentence

"sysem" should be "system".

Page 3-12, 3rd Paragraph

Remove the comma between "25" and "years".

Page 3-27, 2nd Paragraph

What is the units on the number "6.3×10^{-4}"?

Sections 3 through 3.4.1 were only read superficially however, a defination of "maximum probable" and "maximum credible", Page 3-43, would be helpful as would a simple table at the end of Section 3.3.2.5 summarizing the probability of significant releases from all incidents covered.

DOE STAFF RESPONSES TO COMMENTS FROM C. R. FORREY ON THE ROCKY FLATS PLANT SITE DRAFT ENVIRONMENTAL IMPACT STATEMENT (ERDA-1545-D)

Page 1-3

1. Production process wastewater is treated within DOE Radioactivity Concentration Guides (RCG's) given in ERDA Manual Chapter 0524. The specific limits are discussed in FEIS Sections 2.7.3.1 and 2.10.2.2 and are listed in Table 2.10.2-3.

2. The discussion of wastewater storage is given in Section 2.7.3.1.

3. Process wastewater, regardless of its quality, is not released for use downstream because of the ALAP (As Low As Practicable) policy observed at the Rocky Flats Plant.

4. Violations of the NPDES Permit are listed in Table 2.9.1-2.

5. The NPDES limits are given in Appendix D, Volume 2 of the FEIS.

Page 1-4, 2nd paragraph

Section 1.2.6 includes the statement "...there has never been a transportation accident (from shipments from Rocky Flats) which released radioactive materials."

Page 1-6, 3rd paragraph

Contributions of alpha activity from past fires are included in the source term from resuspension of plutonium in onsite soil. Extensive field measurements were performed to determine the fraction of the plutonium in soil which will be reentrained each year (see Section 3.1.2.1). Measurements of plutonium in onsite soil include plutonium from all sources, including the amount deposited from past fires.

Page 1-17, Section 1.8, 2nd paragraph

The difference in the two figures is because: (1) the maximum number of employees is a "rounded" figure to account for hirings and terminations; (2) the number of employees badged, as indicated in Appendix H, includes all employees badged for that year, regardless of numbers of new hires and terminations.

Page 2-77, Figure 2.4-23

The information on the deep well pumping operation of the Rocky Mountain Arsenal is available in the open literature: D. M. Evans, "Denver Area Earthquakes and the Rocky Mountain Arsenal Disposal Well," Mountain Geologist, Vol. 3, number 1, pp. 23-25, 1966. The cause-effect relationship is generally accepted, thus additional detail was not included in this EIS.

Page 2-81, Surface Water, 1st paragraph

The flow of Rock Creek and Coal Creek are shown in Figure 2.3.9-2 and discussed in Section 2.3.5.1. Leyden Gulch, which flows east, does not significantly impact Rocky Flats surface water systems.

Page 2-90 Background Radiation

See Section 2.3.8 for a discussion of background levels of plutonium in soil. The difference in sampling procedures for a large portion of the differences in background values reported for a given locality. A discussion of sampling procedures used by various agencies is presented in Volume I, Section 2.3.9.3 of this EIS.

Page 2-91, last paragraph, and 2-93, Figure 2.4-24

The corresponding contours shown in Figure 2.3.9-1 of this EIS are not corrected for background.

Page 2-92

The State plutonium in soil limitation of 2 dpm per gram of dry soil does not allow for subtraction of a background value.

Pages 2-139 and 2-141

The decreases in natural gas and fuel oil usage are due to energy conservation measures which are discussed in greater detail in Section 4.4.2.1.

Page 2-164

The quantities are related to limits given in the Table 2.6-10 (DEIS, pg. 164). Section 2.6.10 of the FEIS has been revised to provide the needed clarification.

Page 2-172, last paragraph, last sentence

The comment must have referred to the first paragraph. The sentence in the fifth paragraph of Section 2.7.1 of the DEIS in this EIS has been reworded to preclude the possible misinterpretation pointed out.

Page 2-172, 3rd paragraph

Some HEPA filters are used that have metal frames. See Section 2.7.1.

Page 2-175, 3rd paragraph

The HEPA filters that will be used in the new plutonium recovery and waste treatment facility will be constructed of the same materials as HEPA filters used elsewhere on the Plant site (see Section 2.7.1): a fiberglass and asbestos filter media and a fire-retardant frame. The frames in which the filters are mounted will be constructed from corrosion-resistant stainless steel in those plenums where moisture and corrosive salt, such as fluorides or nitrates, might be present.

Most of the existing buildings on the Plant site do not have exhaust gases that are considered to be corrosive. Therefore, while the extra expense of stainless steel mounting frames is justified in selected plenums, it would not be justified in other building plenums.

Page 2-177, Table 2.7-1

The suggestion for formatting the Table was incorporated in the corresponding Table (2.7.2-1) of this EIS.

Page 2-182, 3rd paragraph

The pertinent discussion can be found near the end of Section 2.7.2.

Page 2-184, 5th paragraph

See the modifications made in Section 2.7.3.1.

Page 2-186, 1st paragraph

The box is sealed and banded, then shipped to a DOE-approved storage site. This information was added to Section 2.7.3.2 of this EIS.

Page 2-189

The drums shown in Figure 2.7.3-4 collect salts from the double drum dryer. The dried salts are removed from the drums, packaged in boxes, and disposed of as described in Section 2.7.4 and its subsections.

Page 2-190, Section 2.7.3.3

The liquid in the unlined ponds is subject to natural evaporation. Volume reduction is accelerated by spray evaporation (see Section 2.7.3.1).

Page 2-194, Table 2.8-1

The units in Table 2.8-1 are English units for the reason given on page xxxviii, Volume I. The units used through out the document are the units that are most appropriate for the technology being discussed. A conversion chart in the EIS is presented to aid those readers who wish to use different units.

Page 2-196

The fourth entry should have been lettered "D" instead of "C." This has been corrected in Table 2.8-3 of the FEIS.

Page 2-247

The word "system" was spelled incorrectly. This has been corrected in Section 2.12 of the FEIS.

Page 3-12, 3rd paragraph

Section 3.1.1.2 of the DEIS has been rewritten for this EIS.

Page 3-27, 2nd paragraph

The number, 6.3×10^{-4} is the fraction of plutonium in soil that will be re-entrained and has no dimensions.

Section 3 through 3.4.1

Clarification of these terms is given in the beginning of Section 3.2 and the terms are defined in the Glossary.

Table 3.2.3-1 summarizes the probabilities of Plant accidents. Section 3.3 discusses transportation accidents.

Department of Radiology and Radiation Biology

Colorado State University
Fort Collins, Colorado
80523

December 2, 1977

W. H. Pennington
Office of NEPA Coordination
U. S. Department of Energy
Washington, D. C. 20545

Dear Mr. Pennington:

Per your letter of September 26, 1977, I wish to comment on the Draft Environmental Impact Statement, Rocky Flats Plant Site, Golden, Colorado (ERDA-1545-D, 2 volumes):

Volume I

p. 2-18 Our data indicate a mule deer population in the Rocky Flats buffer zone of 100-125 animals. Most of these appear to be permanent residents.

3-32 Our data indicate over 99% of the plutonium is in the soil. Cite: Little, C. A. 1976. Plutonium in a grassland ecosystem. Ph.D. Dissertation. Colorado State University, Ft. Collins. 170 p.

3-33 Our most recent and up-to-date value for the plant/soil concentration factor is 3.4×10^{-2} (Little, 1976).

4-2 The statement that existing radiation levels have not caused measureable ecological perturbations can be strengthened on the basis of: Whicker, F. W. 1977. Three-year summary report to the U. S. Energy Research and Development Administration on Contract EY-76-S-02-1156 (COO-1156-90). 11 p.

Volume II

You may wish to include as a short appendix the above report (COO-1156-90) which seems very pertinent to the Environmental Impact Statement. A copy is enclosed.

Sincerely yours,

F. Ward Whicker

F. Ward Whicker
Professor

FWW/sf

Enclosure

DOE STAFF RESPONSE TO THE LETTER FROM PROFESSOR F. WARD WHICKER, DEPARTMENT OF RADIOLOGY AND RADIATION BIOLOGY, COLORADO STATE UNIVERSITY

The information you provided has been included in the FEIS in Sections 2.3.10.2, 2.10.4.2, and 4.2. The three-year summary report you provided on radioecology of natural systems has been included as Appendix A-2 in the FEIS.

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

ROCKY MOUNTAIN REGION
10455 EAST 25TH AVENUE
AURORA, COLORADO 80010

NOV 11 1977

W. H. Pennington, Director
Office of NEPA Coordination
Energy Research and Development
Administration
Washington, D.C. 20545

Dear Mr. Pennington,

We have reviewed your draft Environmental Impact Statement (DEIS) on the Rocky Flats Plant Site at Golden, Colorado.

The DEIS adequately addresses the potential impacts on aviation by the operation of the Rocky Flats Plant.

Thank you for the opportunity to comment on your DEIS.

Sincerely,

S. K. Oleson

STANLEY K. OLESON
Chief, Planning Staff

DOE STAFF RESPONSE TO THE LETTER FROM STANLEY K. OLESON, FEDERAL AVIATION ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

This letter requires no staff response.

We wish to thank Mr. Oleson and the Federal Aviation Administration for their interest in the DOE activities at the Rocky Flats Plant.

AGRICULTURAL RESEARCH SERVICE
OFFICE OF ADMINISTRATOR

OF UNITED STATES DEPARTMENT OF AGRICULTURE

WASHINGTON, D.C. 20250

December 5, 1977

Mr. W. H. Pennington, Director
Office of NEPA Coordination
U.S. Energy Research and
Development Administration
Washington, D.C. 20545

Dear Mr. Pennington:

The Agricultural Research Service has reviewed the Draft Environmental Impact Statement related to the Rocky Flats Plant Site, Golden, Colorado, and has no comments.

We appreciate having the opportunity to review this statement.

Sincerely,

H. L. Barrows
Deputy Assistant Administrator

DOE STAFF RESPONSE TO THE LETTER FROM H. L. BARROWS, AGRICULTURAL RESEARCH SERVICE, DEPARTMENT OF AGRICULTURE

This letter requires no staff response.

We wish to thank Mr. Barrows and the Agricultural Research Service for their interest in the DOE activities at the Rocky Flats Plant.

17 November 1977

Dear People,

Enclosed you will find a petition form which was distributed to approximately 12 Business Establishments in the City of Boulder, Colorado. This petition effort was organized as a response to the E.R.D.A. report on the Rocky Flats Nuclear Facility. It has 511 signatures of people who have questions and fears regarding the safety and direction of nuclear developments in the State of Colorado. The planet upon which we live is limited in its natural resources. Air, water, vegetation and land are all being affected adversely, through the developmental processes of the human animal.

We as human beings who are part of these natural cycles believe that our environment is threatened by such developments. We care and are concerned. These signatures may be cast aside lightly or possibly considered for what they are: 511 people objecting to the directions a few have chosen for us. No one elite group of people should decide on such catastrophic issues as these, No matter what investments have been made,for the returns on these investments may not be what some expected nor wanted.

Douglas C. Rhoden

Earth Advocacy
1742 Walnut #2
Boulder, Colorado 80302

17 November 1977

Dear People,

Enclosed you will find a petition form which was distributed to approximately 12 Business Establishments in the City of Boulder, Colorado. This petition effort was organized as a response to the E.R.D.A. report on the Rocky Flats Nuclear Facility. It has 511 signatures of people who have questions and fears regarding the safety and direction of nuclear developments in the State of Colorado. The planet upon which we live is limited in its natural resources. Air, water, vegetation and land are all being affected adversely, through the developmental processes of the human animal.

We as human beings who are part of these natural cycles believe that our environment is threatened by such developments. We care and are concerned. These signatures may be cast aside lightly or possibly considered for what they are: 511 people objecting to the directions a few have chosen for us. No one elite group of people should decide on such catastrophic issues as these, No matter what investments have been made, for the returns on these investments may not be what some expected nor wanted.

Douglas Lifhoden

Earth Advocacy
1742 Walnut #2

petition

We, the undersigned, citizens of the state of Colorado, The United States of America and the planet Earth believe that:

1. We have not been fairly represented in the decision making process concerning Nuclear development in this state.

2. The safeguards practiced in the transportation of radioactive materials do not adequately protect the citizens of this state. This became evident recently when 42,000 lbs. of radioactive 'yellow cake' were released into the environment. Unknown numbers of people were exposed to radioactivity when shipping containers ruptured after a transport truck collided with horses crossing the highway.

3. The utility companies should not be subsidized by the government for reactor accidents, as this practice encourages nuclear development. They should be held responsible for their actions and take the risks with the people of Colorado.

4. There presently appears to be no safe means of storing radioactive waste materials. Sabotage is a constant threat to the operation of nuclear facilities. This threat became evident when control cables were severed and helium filters clogged at the St. Vrain Reactor in Colorado.

5. Past nuclear reactor incidents have proven the fallibility of nuclear power installation: The Browns Ferry Reactor was shut down when control cables caught fire, almost causing complete loss of control of the reactor. The Fermi Breeder Reactor was shut down averting the need to evacuate the city of Detroit.

6. Continued rapid development of nuclear power and nuclear weaponry (Rocky Flats Neutron Bomb Development) in the Front Range poses a substantial threat to all of us.

We the undersigned, propose establishment of a citizen's review process to monitor present and future nuclear development in the State of Colorado.

11

NAME	ADDRESS
Jan Lozuan	655 Hawthorn, Boulder [illegible]
Matty McNair	" " " "
[illegible]	[illegible] Bu[illegible] [illegible]
Kay Degood	666 Manhattan #[illegible] Boulder
Patric Mosier	810 Manhattan Dr. C-11
[illegible] Schantz	3090 Stanford Ave Boulder CO
[illegible]	THE FALLS APT 205 Denver Colo.
[illegible]	3010 Stanford Ave. Boulder, CO.
Michael [illegible]	3090 Stanford Boulder Co.
[illegible]	259 B Linden Bldr Co
Elizabeth Weems	

REMOVED ENCLOSURE

PETITION

27 PAGES

The portion of the enclosure (Petition) consisted solely of signatures, which are on file with DOE.

DOE STAFF RESPONSES TO THE PETITION DATED NOVEMBER 17, 1977 SUBMITTED BY EARTH ADVOCACY TO W. H. PENNINGTON, COMMENTING ON THE ROCKY FLATS PLANT SITE DRAFT ENVIRONMENTAL IMPACT STATEMENT (ERDA-1545-D)

Item 1

With regard to public involvement in the decision-making process concerning nuclear development, the foreword of the Environmental Impact Statement has been revised to reflect the position of the DOE in this matter. Hearings were held in May 1978. Many of the issues raised by the public have been addressed by means of additions or revisions in the final version of the EIS to provide more information or greater emphasis on the issues of interest. Some issues are not addressed in this EIS since they are not pertinent to the Rocky Flats Plant Site (see Foreward, Volume I).

Item 2

A paragraph has been added to the EIS (Section 3.3.2.2) describing the yellowcake spill that occurred in eastern Colorado and explaining the difference between such shipments and Rocky Flats shipments which are subject to much more stringent regulations. The yellowcake transportation incident was in no way related to the Rocky Flats Plant. The environmental impact of transportation of radioactive materials is addressed in another Environmental Impact Statement. The reference is as follows: USNRC. Final Environmental Statement on Transportation of Radioactive Material by Air and Other Modes. NUREG-0170. U.S. Nuclear Regulatory Commission. December 1977.

Item 3

Utilities having nuclear reactors pay for insurance against nuclear accidents just as one pays for car or house insurance. The difference is that the government, under the recently extended Price-Anderson Act, is presently responsible for liability claims associated with a reactor accident above $140,000,000 and less than $560,000,000. U.S. utilities pay approximately $14,000,000 a year for such insurance coverage and since 1957 insurance companies have paid out an average of about $30,000 per year in claims, mostly associated with minor contamination incidents. It should also be noted that such government liability protection is not unique to nuclear plants, but is also provided to coal miners and their families, to bank account holders, to persons in flood plains, and to everyone under disabled aid provisions.

Since the Rocky Flats Plant is not a power reactor facility, the preceding information is not covered in the Environmental Impact Statement.

Item 4

The subject of radioactive solid waste is covered in the EIS, Section 2.7.4. Rocky Flats Plant does not store radioactive waste; therefore, the concerns associated with storage are not discussed in detail in the EIS. The subject is covered in other

Environmental Impact Statements, such as INEL (Idaho National Engineering Laboratory) DEIS (USERDA, 1978).

We are not familiar with an incident involving clogged helium filters and severed control cables. Officials at the Ft. St. Vrain facility were contacted and they also have no knowledge of such an event.

The prevention of sabotage is one of the objectives of our Security Department and emergency planning. These subjects are covered in the EIS, Sections 2.11 and 2.12.

Item 5

The issue raised does not apply to the Rocky Flats Plant because this Plant is not a power reactor. The safety of the Plant is discussed in the EIS, Chapter 3.

Item 6

We are not aware of any plans for rapid expansion of either nuclear power or nuclear weaponry in Colorado. The Rocky Flats installation does not develop weaponry but only manufactures components of weapons. The EIS, Chapter 3 contains a detailed analysis of the extent of environmental health impacts for the operation of the Rocky Flats Plant. The comments submitted regarding nuclear power reactors are not relevant to the operation of the Plant. The development of new weapon concepts is supported by the Plant in terms of hardware fabrication and development of manufacturing techniques, but is not initiated by the Plant. It is therefore discussed in the EIS only as a part of the general operations (Chapter 2) and mission of the Plant (see the Foreward and Chapter 1).

USERDA. Draft Environmental Impact Statement, Waste Management Operations, Idaho National Engineering Laboratory. U.S. Energy Research and Development Administration. March, 1977.

CENTRAL INTELLIGENCE AGENCY
WASHINGTON, D.C. 20505

13 December 1977

Mr. W.H. Pennington, Director
Office of NEPA Coordination
Energy Research and Development
Administration
Washington, D.C. 20545

Dear Mr. Pennington:

We appreciate the opportunity to review the draft environmental impact statement concerning the Rocky Flats Plant Site, Golden, Colorado; however, we have no comment on the draft submitted.

We have no jurisdiction by law or special expertise.

Sincerely,

James H. McDonald

James H. McDonald
Director of Logistics

DOE STAFF RESPONSE TO THE LETTER FROM JAMES H. MCDONALD, CENTRAL INTELLIGENCE AGENCY

This letter requires no staff response.

We wish to thank Mr. McDonald and the Central Intelligence Agency for their interest in the DOE activities at the Rocky Flats Plant.

Dec. 12, 1977

W.H. Pennington, Director
Office of NEPA Coordination
Mail Station E-201
ERDA
Washington, D.C. 20545

I have read the Draft EIS for the Rocky Flats Plant Site, Golden, Colorado. I do not have time to do a careful analysis of the entire EIS, but I must write to strenuously object to section 5.5.3 in Volume 1.

The second paragraph of the noted section ignores the data presented in Volume 2, Appendix A. Since the buffer zone contains 327 species of vascular plants, 25 species of lichens, 16 species of bryophytes, green algae, + numerous mammals, birds, reptiles, amphibians, + an abundance of aquatic organisms, it can hardly be labeled "barren". My observations at Rocky Flats lead me to believe it is a quite undisturbed expanse of mixed grass prairie supporting a diversity of organisms adapted to survive (indeed, thrive) in the soil + climatic conditions native to the site.

I hope the final draft of 5.5.3 will ~~retain~~ not contain the 2nd, 3rd + 4th sentences of the second paragraph. Instead, I suggest the native species be left to their <u>own devices</u>. The land now is a natural area that is also used for grazing. These uses should continue. In addition environmental research should continue on the site.

Sincerely,

Karen S. Hollweg
4440 Greenbriar Blvd.
Boulder, Colo 80303

DOE STAFF RESPONSE TO THE LETTER FROM KAREN S. HOLLWEG, BOULDER, COLORADO

Section 5.5.3 was reevaluated and modified as a result of the comments.

WILLIAM EVANS, M.D.
2650 13TH STREET
BOULDER, COLORADO 80302
(303) 447-0234

December 7, 1977

Mr. W.H. Pennington
Office of NEPA Coordination
U.S. Department of Energy
Washington, D.C. 20545

Re: Rocky Flats Environmental Impact Statement

Dear Mr. Pennington:

As a physician, I call to your attention that the major causes of death in America are, from birth to age thirty seven, trauma, and thereafter, heart disease, cancer and stroke, in that order.

Medical literature documents the factors and synergistic effects producing these deaths. Specifically, in regard to the Rocky Flats Environmental Impact Statement (RFEIS), a majority of human cancers are related to environmental conditions. Therefore, ignoring known carcinogenic factors is done so at grave risk.

John Little and researchers at Harvard Medical School have induced lung cancer in hamsters by instillation of the carcinogens benzo(a)pyrene and polonium 210. Studies were carried out with the agents individually and together. In the latter case there were "... induced twice the prevalence of lung tumors expected from the additive effect of either carcinogen alone."

Ernest Wynder, M.D., in <u>Seminars in Oncology</u>, March, 1976, indicates carcinogenic particulates in tobacco smoke are primarily benzo(a)pyrene and other polynuclear aromatic hydrocarbons, but include ionizing radiation of polonium 210.

Edward Martell has further delineated ionizing alpha radiation's roles in bronchial cancer and a heretofore unappreciated concentration of radioactivity on tobacco trichomes as reported in <u>Nature</u>, volume 249, May 19, 1974.

Colorado uranium miners who were also smokers have shown a significantly higher than average incidence of lung cancer. Since Wilhelm Conrad Roentgen and Madame Curie, radiation has taken its toll as a carcinogen.

The RFEIS incompletely addresses these health facts, and in lacking an index, the document seems purposefully inadequate. For example. plutonium is pyrophoric; yet, in the two volumes no index can be used to locate fires, one of the great hazards of plutonium.

The 1977 spring issue of Cancer Update, published by the Colorado Regional Cancer Center, called to the attention of physicians the increased risk of cancer in those individuals who have received therapeutic doses of radiation to the head, neck and upper thorax for nonmalignant conditions during infancy or childhood. The time lag between these exposures indicates a long interval exists before the appearance of cancer. Time is against Rocky Flats' safety, and its present location imposes an unnecessary increase in the population's radiation burden. Its continued operation constitutes experimentation with the population's cancer and genetic risks.

The RFEIS ignores many specific questions which John C. Cobb, M.D. has asked over the past two years. Beyond negating the radiation burden which is imposed for many thousands of years on the people of Denver, synergistic effects may occur with other environmental pollution and are ignored. The mandate for national security does not license poisoning the people of Denver.

As a physician, I urge you to reopen your hearings on the environmental impact of Rocky Flats and reconsider the wisdom of locating a carcinogenic plutonium mill upwind and upstream from my home, Denver.

Be well,

William Evans MD

William Evans, M.D.

WTE/mt

cc: President Carter
U.S. Department of Energy
Secretary James Schlesinger
Governor Lamm
Congressman Wirth
Senator Haskell
Senator Hart
Congresswoman Schroeder
Rocky Flats Monitoring Committee
Jack Eliott, Chairman
State Department of National Resources
Bob Siek
Reed Kelley
Chris Crosby
Common Cause
Craig Barnes
Denver Health and Hospitals
Dr. Abe Kauvar
Jefferson County Health
Dr. Carl Johnson
Friends of the Earth
Kevin Markey
Environmental Defense Fund
David Mastbaum
Environmental Action
Morey Wolfson
American Friends Service Committee
Pam Solo
National Resources Defense Council
Colorado State Health Department
Dr. Anthony Robbins
The Wilderness Society
Sally Ranney
David Griffith, Attorney at Law
Tom Lamm, Attorney at Law
Bill Mann, Attorney at Law
John C. Cobb, M.D.

DOE STAFF RESPONSE TO THE LETTER FROM WILLIAM EVANS, M.D., BOULDER, COLORADO

Paragraphs 1-6

The causes of death in this country and their relative magnitude are acknowledged. It is also acknowledged that some environmental pollutants interact to produce an increase in cancer over that observed with each agent acting alone. Such interactions have been demonstrated between radiation and other environmental factors. Each of the examples cited in your letter involve an interaction of radiation with cigarette smoking or the chemicals in cigarette smoke. To understand the potential synergistic role of radiation from plutonium in the Denver area, it is necessary to compare this radiation dose with that from other sources. In Table 3.1.2-6 of the attached FEIS, it is shown that in the Denver area the average lung dose from natural sources is 230 mrem/year, including 5 mrem/year from fallout plutonium. Cigarette smokers receive an added 10 mrem/year lung dose from the alpha emitter ^{210}Po. The dose to a Denver resident from Rocky Flats originated ^{239}Pu is 0.01 mrem/year. Addition of this small radiation dose (1/1000th of that from cigarettes) will not make a measurable contribution to the potential synergistic action of radiation and smoking. Thus, the overriding synergistic question is the interaction between the radiation dose (from both cigarettes and the natural environment) and the chemical carcinogens present in cigarettes. Other synergistic effects on smokers and the pollutants in their work place (e.g., workers in asbestos, chemical, hard rock mining, or uranium mining industries) have been demonstrated. Hence, control of cigarette smoke in the work environment can decrease the radiation dose to the lungs, can reduce the level of chemical carcinogens in the lung, can reduce lung cell damage by irritant gases and lead to a general improvement in worker health.

Paragraph 7

The FEIS, as you will note, contains a detailed index so that you may more readily find information on issues, such as the pyrophoroic nature of plutonium, which are of interest to you.

Paragraph 8

The time log of fifteen to thirty years between radiation exposure and incidence of cancer is acknowledged. This is one reason for the dose monitoring of the health records of all Plant employees and especially those who have received external or internal radiation doses approaching or exceeding permitted occupational limits (c.f. Appendix H of Volume II). While insufficient data presently exists to draw valid conclusions concerning Rocky Flats workers, a study on Hanford reservation workers (exposed from as early as 1944) has been made. While the initial interpretation of the data by Stewart and Kneal indicated a positive carcinogenic effect of the low level radiation experience by these workers, a more detailed analysis (watching worker age and length of employment at Hanford) by Gilbert showed a lower risk of death than for all United States males.

Paragraph 9

The questions by Dr. Cobb to which you refer are answered in Section 4 of Volume III of the FEIS.

Paragraph 10

Hearings were held in Denver in May, 1978. The wisdom of retaining the Plant in its present location is demonstrated in the FEIS. You are particularly referred to Chapter III of Volume I entitled "Environmental Impacts."

DRCOG

Denver Regional
Council of
Governments

1776 South Jackson Street
Denver, Colorado 80210

303/758-5166

December 9, 1977

W. H. Pennington, Director
Energy Research & Development Administration
Office of NEPA Coordination
Washington, DC 20545

Re: EIS/022-77 Draft, Rocky Flats Plant Site, Golden, Colorado

Dear Mr. Pennington:

In accordance with Office of Management and Budget Circular A-95 procedures, the Denver Regional Council of Governments' staff has reviewed the above captioned project and offers the following comments:

The EIS indicates that "the Golden Fault is considered inactive from a seismological viewpoint." (page 2-74) A recent study on the Golden fault by Mr. Robert Kirkham, Colorado Geological Survey, indicates evidence of Quaternary displacement along the Golden fault and classifies the faultas "active". In addition a study by Mr. Glenn Scott, U. S. Geological Survey in 1970 classified the Golden fault as an active fault. These studies should be consulted as references relating to the classification of the Golden fault.

In addition, the Denver Regional Council of Governments notified local concerned and affected agencies of the project and solicited their comments. All comments that were received are attached.

The Council of Governments appreciates this opportunity to be of service to you.

Sincerely,

Robert D. Farley
Executive Director

RDF/bjs

Enclosure: EIS and comments

cc: Steve Ellis, Colorado State Division of Planning

Jefferson
County
Colorado

BOARD OF COUNTY COMMISSIONERS

HAL ANDERSON
District No. 1 Arvada

BOB CLEMENT
District No. 2 Lakewood

JOANNE PATERSON
District No. 3 Golden

November 22, 1977

Mr. Dwight Heffner
Denver Regional Council
of Governments
1776 South Jackson Street
Denver, Colorado 80210

Dear Mr. Heffner:

In response to the referral on EIS/022-77 regarding the Rocky Flats Plant Site, please find attached comments from the Board of County Commissioners. In addition, I would like to list some general concerns in regard to the economic, social and environmental impacts to the site that this Department feels have not been adequately addressed. Our concerns are outlined below.

1. The meterology of the site is described as mild. There are, however, strong prevailing westerly winds occurring on site during much of the year. The impact of these winds carrying radioactive material to down wind residential areas needs to be addressed so that prudent decisions can be made with regard to compensating the affected property owners.

2. The above has mentioned the affects on residential land uses, but it is difficult to assess the possible constraints the Rocky Flats Plant might have on other types of adjacent uses, particularily industrial uses.

3. The study also fails to acknowledge that 6,500 acres of land does not resolve any major tax revenue losses because the land is of low revenue value. I think the report fails to recognize the implications to potential residential and industrial expansion in the surrounding area and consider the adverse economic impacts. Until such time as the plant pays property taxes, there is no direct way for Jefferson County to collect revenues except indirectly through citizens who

reside in Jefferson County and are associated with the plant as employees.

I hope the above concerns, particularily those as specifically pointed out by the Board of County Commissioners and which the Planning Staff feel are the most pertinent can be more fully addressed. I request that we be advised as to the status of this proposal as it proceeds through the review process.

Sincerely,

Michael W. Davidson

Michael W. Davidson, Planning Director
Jefferson County Planning Department

MWD:mt

Attachment

M E M O R A N D U M

To: Mike Davidson, Planning Director

From: Robert Clement, Chairman
Board of County Commissioners

Date: November 21, 1977

Reference: Rocky Flats Environmental Impact Statement Summary

The Board of County Commissioners has been informed that your staff is in the process of reviewing the Environmental Impact Statement Summary on the Rocky Flats Facility. Our concerns related to this operation are outlined below.

1. The Rocky Flats Facility should be responsible for acquiring adequate buffer lands surrounding it facility. All lands that become unusable due to plutonium danger should be purchased at fair market value from the property owners.

2. The Plant should strive for improved testing and monitoring procedures with regard to radiation dangers.

3. All plutonium shipments by both air and rail should be in approved crash protected containers.

4. The implications of moving plutonium related activities to a more remote location should be fully examined.

The Jefferson County Planning Department will respond to the specific planning implications of the Environmental impact Statement Summary. We appreciate the extra time for response that has been extended on this matter.

Sincerely,

Robert Clement, Chairman
Board of County Commissioners

RC:mt

REMOVED LETTER FROM DR. JOHNSON AND ENCLOSURES

23 PAGES

Material prepared by Dr. Carl Johnson and submitted by Robert D. Farley was omitted in this section since the same material was submitted under his own signature. This letter and the DOE staff responses appear with Dr. Johnson's letter which is included later in this volume.

DOE STAFF RESPONSE TO COMMENTS DATED DECEMBER 9, 1977 SUBMITTED BY R. D. FARLEY FOR THE DENVER REGIONAL COUNCIL OF GOVERNMENTS TO W. H. PENNINGTON.

Letter of Robert Farley

The Golden fault and the question of its activity is discussed in Section 2.3.4.7 of the FEIS. The studies suggested are referenced and it is noted that the results of further studies to determine the capability of this fault are to be reported in the Final Safety Analysis Report of the Rocky Flats Plant.

Letter of Michael W. Davidson

1. Wind Transport of Radioactive Materials

The items of concern here are covered in the following FEIS sections:

Volume I, Section 2.3.6.2 discusses the local climatology, including winds typical of the area. In Volume II, Section B, specific meteorological data are given for January 1, 1972 through August 1974. It is of interest to note that winds in excess of 20 mph occurred between 500 and 600 hours per year, which is less than 7% of the time. The recently proposed EPA Standard Dose Limits for the Transuranium Elements presents guide concentrations of radioactive materials in air and soil. Concentrations in the vicinity of Rocky Flats are small fractions of the allowable levels. Further discussion may be found in Sections 2.3.8 and 2.3.9 and their subsections.

2. Land Uses

Section 7.2 discusses Plant influence on land use. As noted in Section 2.3.2 and Section 7.1, the adjacent lands are zoned industrial and the operation of the Plant does not limit the usefulness of the land for this purpose. It is not known whether development would occur in the immediate vicinity in the near future, whether or not the Plant is in operation.

3. Tax Revenues

This subject is discussed briefly in Section 4.3 of the FEIS. To go beyond that brief discussion, however, would also require a balancing of the loss of such tax revenues against the extra cost of community services which would be required in support of the postulated "other" development for the area. Any such discussion would involve such a degree of speculation as to the types and values of businesses and/or residential developments which might locate in the area in the absence of the Rocky Flats Plant, as well as with respect to whether such developments would not otherwise still locate in the same governmental areas, that any conclusions resulting therefrom would be of questionable merit, and, therefore, are considered inappropriate for inclusion in the FEIS.

Letter of Robert Clement

1. Buffer Zone

It is the opinion of the Department of Energy that an adequate buffer zone does exist surrounding the Rocky Flats Plant. The 384 acres of the Plant facilities constitute less than 6% of the 6,550 acres of restricted area at the Rocky Flats site and the closest public access to the facilities are more than one mile distant.

The alternative of purchasing additional land is discussed in Chapter 5.

2. Monitoring

Rocky Flats continually strives to maintain "state of the art" testing and monitoring procedures for Plant worker protection and for protection of the surrounding environment from radiation dangers. The monitoring program is discussed in Chapter 2 of the EIS.

Several sections of the FEIS are devoted to a description of programs in those areas. A list follows:

Section Number	Contents
1.2.10	Summarization of the Environmental Monitoring Program
2.3.9.3	Details of soil monitoring techniques and programs
2.5.1 to 2.5.6	Includes sections describing the radiation safety, environmental control, and industrial hygiene programs associated with Plant production and research operations
2.6.2	A complete description of the Plant Health, Safety, & Environment program
2.7	Controls and practices associated with radioactive waste systems
2.9	Practices associated with sanitary and other liquid waste handling
2.10	A description of the entire Plant environmental monitoring Program
4.4.3	Administrative and physical controls and effluent monitoring practices to mitigate any environmental radiological impacts

These health, safety, and environmental protection programs are continuously updated.

3. Plutonium Shipments

Air shipments of plutonium to and from Rocky Flats were terminated in April, 1977. In the future air shipments of plutonium to or from the Rocky Flats Plant would be expected to resume only if made in containers certified as meeting aircraft crash, accident safety criteria, or as otherwise permitted for National Security purposes in accordance with 10 CFR Part 871 "Air Transportation of Plutonium."

4. Relocation

The implications of relocating the Plant's radioactive materials functions have been treated in Sections 5.3 and 9.3.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

DEC 19 1977

Mr. W. H. Pennington, Director
Office of NEPA Coordination
U. S. Department of Energy
Washington, D. C. 20545

DRAFT ENVIRONMENTAL IMPACT STATEMENT ADDRESSING THE ROCKY FLATS PLANT SITE, GOLDEN, COLORADO

Dear Mr. Pennington:

This office has reviewed the draft environmental impact statement for the Rocky Flats Plant Site, Golden, Colorado (ERDA-1545-D) as requested in your letter of September 23, 1977. In consideration of the subject programmatic environmental impact statement, our comments on ERDA-1545-D are enclosed for your use.

Sincerely,

Voss A. Moore, Assistant Director
for Environmental Projects
Division of Site Safety and
Environmental Analysis

Enclosure:
As stated

cc: EPA (5)

NRC Comments on the Rocky Flats Plant
Draft Environmental Impact Statement (ERDA-1545-D)

1.3.1 Environmental Effects of Normal Plant Operation

(p. 1-7) The pathways used to determine the maximum individual dose commitment should be described.

2.4.3 Demography

(p. 2-12) The location of any existing residences, milk animals, meat animals, or vegetable gardens within 5 miles of the plant should be identified. The annual production of meat, milk, and crops within a 50 mile radius of the plant should be shown by sector, in a manner similar to the population distribution.

2.10 Environmental Monitoring Programs

The contractor reports and other agencies monitoring results do not appear to be referenced completely.

2.10.1.2 Ambient Air Monitoring

The specific radionuclide analyses performed on air samples and the detection limits should be included in Table 2.10-2.

2.10.2 Water Monitoring

The water sample detection limits in Table 2.10-5 do not include the limits for specific radioisotopes, and for gamma, gross beta, or gross alpha activity as listed in Table 2.10-4 (Elements or Conditions Monitored by Locations).

2.10.3 Soil Sampling

The available reports on soil sampling results should be referenced in sections 2.10.3.1 and 2.10.3.2.

2.10.4.3 Vegetation Sampling

The sampling of any vegetation used an animal feed or human food could provide a backup means of comparing calculated doses based on plant releases with doses calculated using vegetation sample results and existing pathways.

3.1.2 Radiological Impact

It is not clear whether the General Population average dispersion factor (X/Q) in Table 3.1.2-2 was weighed or determined according to the 50 mile distribution of population in the 16 cardinal compass sectors.

The use of X/Q in calculating individual dose commitments for pathways such as vegetation, meat, and milk, could result in underestimates without considering atmospheric deposition.

Table 3.1.2-6 should show the pathways and individual dose commitments used to determine the listed totals. The location of the maximum individual should be identified. The individual age group and the population age distribution pertaining to Table 3.1.2-6 should be given. The table footnote should clarify that the man-rem dose commitment includes the total population within a 50 mile radius of the plant.

It is not clear if the potential risk for cancer mortality and genetic effects (page 3-40) are both based on the Table 3.1.2-6 total body man-rem and Table 3.1.2-7 values.

Appendix F

Table 3 should include non-occupational permissible doses. It is not clear whether the dose conversion factors in Table 4 include only the listed nuclides or whether the daughters are included when appropriate. Including carbon-14 in Table 6 and omitting it from Table 4 is not clear. The radionuclides listed in Table 4, 5, and 6 are more than adequate considering the source term used. Table 6 should identify and include the dose factors for the total body and skin.

General

The annual occupational radiation exposure for past plant operations and estimated exposure due to future operations should be included in the impact statement.

Page 2-184, Section 2.7.3.1, Paragraph 4

Define the limits, and the bases for the limits, used for liquid waste discharges.

Page 2-184, Section 2.7.3.1, Paragraph 5

We would recommend including a discussion of the methods used to remove and dispose of sludge from solar-evaporation ponds.

DOE STAFF RESPONSES TO THE UNITED STATES NUCLEAR REGULATORY COMMISSION COMMENTS ON THE ROCKY FLATS PLANT SITE DRAFT ENVIRONMENTAL IMPACT STATEMENT (ERDA-1545-D)

Section 1.3.1 Environmental Effects of Normal Plant Operation

The pathways assumed in dose modeling and the general dose calculation methodology are described in Sections 3.1.2.3 and 3.1.2.4 of Volume I and in detail in Appendix F of Volume II of the FEIS. Note especially Table 3.2.4-10 where fraction of dose by pathway is given.

Section 2.4.3 Demography

Use of demographic data on food production in the dose calculations is given in Appendix F, Section F.1.2.1 (Volume II) of the FEIS. Eight food categories were assumed and the available area data on total food production in each category were utilized to estimate the fraction of locally grown food in each person's diet. These calculations use a "backyard garden" assumption. Where these data were unavailable, data from the NRC report referenced in this section were assumed to apply.

Section 2.10 Environmental Monitoring Program

Per this request, additional references to environmental monitoring by Plant personnel and by other agencies have been added wherever it seemed appropriate to do so.

Section 2.10.1.2 Ambient Air Monitoring

Table 2.10-2 (Table 2.10.1-2 in Volume I of the FEIS) has been modified to respond to your question. Additional changes have been made to clarify and update discriptions of ambient air monitoring programs in the Plant vicinity.

Section 2.10.2 Water Monitoring

Table 2.10-5 (Table 2.10.2-3, Volume I of the FEIS) has been modified to supply the information requested on detection limits and identification of the specific radionuclides involved. Gamma detection limits are not specified as they depend on a variety of variable factors that need to be defined for each isotope detected.

Section 2.10.3 Soil Sampling

In Sections 2.10.3.1 and 2.10.3.2 of the FEIS (Volume I), references to soil sampling by Rockwell personnel and by outside agencies have been added. A description of soil sampling methods used by various agencies has also been added to the FEIS as Section 2.3.9.3.

Section 2.10.4.3 Vegetation Sampling

A sampling program designed to assess dose via the human food chain is being considered. However a satisfactory experimental design capable of separating the Plant contribution from the overwhelming fallout effect is very difficult to achieve reliably.

Section 3.1.2 Radiological Impact

The χ/Q value was computed by multiplying the χ/Q value for each sector referred to in the Demography Section (DEIS, Volume I, Section 2.4.3) by its associated population value, summing those products, and dividing by the total area population. In the FEIS (cf Sections 2.3.3, 3.1.2, and 3.2.4 of Volume I and Appendix F of Volume II), a revised demography and dose assessment procedure is used, such that the population-weighted χ/Q value is not used and organ doses are obtained for the 1977 and year 2000 population distributions in each sector or for selected sectors.

The use of surface deposition and the resultant transfer of this deposited material up the food chain is fully accounted for in this revision of the FEIS by the computer codes used in dose evaluation. These codes are identified and the associated documentation appear in Volume II, Appendix F of the FEIS.

Section 3.1.2 Table 3.1.2-6

All of the details of the dose calculations, including procedures required for obtaining doses by pathways from the given data and a sample pathway calculation are given in Appendix F (Volume II) of the FEIS. Also in Volume I, Table 3.1.2-5, a tabulation of organ dose by pathway for the maximum reference man appears. The pathway ratios for area populations is similar except that most area residents will not drink water from Great Western Reservoir or Standley Lake. In the case of organ doses, the inhalation pathway is always about an order of magnitude greater than other pathways.

Identification of the maximum reference man as the off-site individual receiving the maximum dose to all organs is made in text just previous to Table 3.1.2-5. The maximum exposed individual in FEIS Table 3.1.2-6 is identified in Section 3.1.2.4 as an adult male (20 years of age or older) and likewise the population doses (Table 3.1.2-8) are for a population of adult males. The effect of age and sex on organ dose calculations to an individual is given in Tables 3.1.2-4 and 3.2.4-3. The area (within 50 miles of the Plant) covered by the population and reference man dose calculations appears in the "distance" column of Table 3.1.2-3 and in text just before Table 3.1.2-8 (the Table most nearly corresponding to the DEIS Table 3.1.2-6 in question).

Section 3.1.2 Page 3-40 Cancer Mortality and Genetic Effect Risk

In the FEIS (Section 3.1.2-4, Volume I), it is made clear how the number of genetic effects and cancer mortalities are deduced from the man-rem risk estimates (cf Tables 3.1.2-10 and 3.1.2-11).

Appendix F

Dose conversion factors are not calculated in this manner in the FEIS. The computer code DACRIN is used for both acute and chronic inhalation dose factors (Sections F.1.1.1 and F.2.1.1). This code does include daughter products where appropriate.

In the FEIS, the release of carbon 14 is not considered to occur, thus it is not included in the table of dose conversion factors for ingestion (Tables F-5 and F-20 of Volume II and 3.2.3-2 in Volume I). The Appendix F dose conversion factors in the FEIS are applicable only for those nuclides considered in the rest of the analysis.

The skin was not considered to be a critical organ in the FEIS. For a criticality accident, however, some fission products would be released and skin radiation associated with plume shine is a factor. Dose conversion factors for a skin penetration depth of one centimeter, appear in Section 2.1.5 of Appendix F.

General (Concerning occupational radiation exposures)

Occupational exposures for past Plant operations are discussed in Volume II, Appendix H, of the Impact Statement. Compliance with applicable criteria and continued application of the ALAP (as low as practicable) philosophy will assist in minimizing future exposures.

Page 2-184, Section 2.7.3.1, paragraph 4

This section discusses process liquid wastes for which no off-site discharges are permitted. The FEIS (Section 2.7.3.1, Volume I) is modified to clarify the on-site disposition of these liquid wastes and the several limits associated with these dispositions.

Page 2-184, Section 2.7.3.1, paragraph 5

Past practices have been to handle the sludge as contaminated waste. Decontamination workers package the sludge in safe containers, and the containers are shipped off-site to a DOE-approved site (see Section 2.7.3.2).

Future plans involve transferring the sludge as a heavy slurry in a pipeline to an on-site waste processing facility. After separating the liquid, the sludge will be dried, pelletized, packaged, and sent to a DOE-approved waste storage site.

COLORADO DEPARTMENT OF HEALTH

4210 EAST 11TH AVENUE · DENVER, COLORADO 80220 · PHONE 388-6111
Anthony Robbins, M.D., M.P.A. Executive Director

December 19, 1977

Mr. W. H. Pennington
Director, Office of NEPA Coordination
Department of Energy
Mail Station E-201
Washington, D.C. 20545

Re: Draft Environmental Impact Statement - Rocky Flats Plant

Dear Mr. Pennington:

For 25 years the people of Colorado have lived with the Rocky Flats nuclear weapons plant. The facility has placed a heavy burden of responsibility on State government. We have attempted to protect against accidents, injury to workers, and radiation exposure to nearby residents. We have had sole responsibility for emergency planning beyond the borders of the facility. The people of Colorado have accepted the risk of Rocky Flats, but as facts emerge about the potential hazard there is a growing reluctance to live in ignorance about the facility. Our concerns continue to reflect those recommendations expressed in October, 1975 by the Lamm-Wirth Task Force Report:

> "Congress and the President of the United States should reassess the Rocky Flats Plant as a nuclear weapons component parts manufacturing facility. In reassessing the Plant as a weapons manufacturing facility, consideration should be given to a program of gradually phasing out its present operation, possibly transferring those operations to a more suitable site, and decontaminating and converting the Plant's facilities to a less hazardous energy-related industry, such as solar energy research and development. In evaluating these alternatives, strong consideration should be given to maintaining the economic integrity of the Plant, its employees, and the surrounding communities."

Now, in 1977, the United States Department of Energy offers a Draft Environmental Impact Statement for our review and comment. It purports to give a complete presentation of program goals and the facts that have been considered by the Department of Energy. Our review suggests that the Draft Environmental Impact Statement has been put together in a fragmented fashion. In the State's opinion, the information gathered is considered incomplete in many instances and there is little indication that these materials have actually been used to consider the

Plant's current mission or future. It will not be sufficient to correct this document. The Draft Environmental Impact Statement should be completely rewritten to be the basis for serious decisions.

An overview of the major issues which the State feels have been inadequately addressed in the Draft Environmental Impact Statement is outlined below. Failure to address these general concerns and also the more technical and specific comments, which are appended for your consideration, raises our apprehensions. The State continues to believe, based upon health and safety considerations, that the Rocky Flats Plant should be redirected in its mission to less environmentally harmful uses. The major issues are as follows:

1. What are the benefits of the nuclear weapons plant? We recognize that this analysis is beyond the State's capability, but we would like assurance that an independent agency of the Federal government has reviewed the military mission of Rocky Flats. This process was envisioned by Congress when they required review of the arms control and disarmament impact of military programs by the Arms Control and Disarmament Agency. We believe this is necessary so that we are not dealing with a cost-benefit equation with the benefit side blank or marked "top secret." Also, we feel that the document can be substantially strengthened by a stricter adherence to the Council on Environmental Quality's guidelines: "Agencies engaging in major technology research and development programs should develop procedures for periodic evaluation to determine...the magnitude of Federal investment in the program, the likelihood of widespread application of the technology, the degree of environmental impact which would occur if the technology were widely applied, and the extent to which continued investment in the new technology is likely to restrict future alternatives." (CFR, Title 40, Chapter V, Part 1500.6).

2. Is the site location safe enough? The Plant is located 16 miles northwest from the center of Denver. No nuclear facility would be located so near a metropolitan area today, yet the Rocky Flats Plant complex continues to expand. To complicate the problem, the State has recently presented the U.S. Department of Energy with data concerning a geologic fault and potential earthquake risk. It is our understanding that current U.S. Nuclear Regulatory Commission standards would not permit power plant siting at Rocky Flats given our geological, meteorological, and hydrological information.

3. Is the low level radiation hazard from Rocky Flats to this and future

generations being fully evaluated? We are concerned that the U. S. Department of Energy has failed to use the most conservative methods for estimating the hazard. Whole body radiation dose comparisons used by the U.S. Department of Energy fail to comprehend the processes of biological concentration which result in far larger doses to certain organs, certain cells, and even certain subcellular parts. It is our opinion that perhaps it may be just those processes that make certain compounds carcinogenic in infinitesimally small quantities.

The problems caused by the continued releases of radioactive material to the environment must be considered along with improved disposal systems at the Plant. No mention is made of the longstanding commitment to remove radioactive materials to a permanent Federal transuranic repository.

4. What is the commitment of the U.S. Department of Energy to employ the best available technology to protect health in Colorado? There must be firm guarantee that the U.S. Department of Energy will employ the best available technology to keep levels as far below the health standards as possible.

5. Can there be an adequate emergency plan? Consider the truly "maximum credible accident" - caused by a criticality incident, sabotage, or a major transportation accident. Is the burden left totally on the State to cope or can the Department of Energy assure the people of Colorado that such a catastrophe is not only unlikely but will be responded to in an effective manner? What Federal resources are committed to such an event?

6. When will transportation problems be addressed directly? For example, air transportation of plutonium in unapproved shipping containers remains an unresolved major concern. All such shipments should cease until crash-proof containers have been officially approved.

Attached to this letter are the specific comments provided by the departments and agencies of the State of Colorado which express their concerns on the Draft Environmental Impact Statement. They have been submitted as a contribution toward making the final document a truly useful decision-making tool regarding this controversial plant situation. By your proper addressing of the matters and concerns expressed, hopefully a truly viable document might result.

Sincerely,

Anthony Robbins

Anthony Robbins, M.D.
Executive Director

AR/pl

COLORADO DEPARTMENT OF HEALTH

4210 EAST 11TH AVENUE · DENVER, COLORADO 80220 · PHONE 388-6111

Anthony Robbins, M.D., M.P.A. Executive Director

November 28, 1977

Ron Simsick
Colorado Department of Health
4210 East 11th Avenue
Denver, Colorado 80220

Transmitted herewith are the general and specific comments of the Radiation and Hazardous Wastes Control Division on the Rocky Flats Draft Environmental Impact Statement. The Division has major concerns with the DEIS in 16 general areas as follows:

I. The basic health concern is the location of the Rocky Flats Plant in relation to the rapidly growing Denver Metropolitan Area. Although ERDA (now DOE) has made many improvements in Plant operation, and calculable routine releases to the environment may be small, human judgmental failures and intentional acts cannot be accurately forecast. These factors, along with the uncertainty of the risks due to latency effects, leave the hazard to the general population essentially undefined. It is uncontested that if such a plant were sited today, it would not, because of the concern for health risks, be located near a large metropolitan area. It is therefore recommended that the Department of Energy remission the Rocky Flats Plant and relocate hazardous activities to a more suitable site.

II. Dose calculation and risk evaluation procedures in the DEIS are completely inadequate. Whole body radiation exposure comparisons are improperly used throughout the report. For dose comparisons to be valid, they must relate to the hazard, which for plutonium, is the health risk, not to the whole body but to the specific organs (bone, liver and lungs), where it is deposited.

III. There is inadequate use of organ dose and risk estimate data derived by other agencies. Several significant efforts have been made by the Colorado Department of Health, i.e. "A Risk Evaluation of the Colorado Plutonium in Soil Standard (1976)" and "Factors, Equations, and Considerations Used in Selecting the Protective Action Guide for the State of Colorado Rocky Flats Emergency Response Plan (1977)".

Comparisons of dose and risk estimates contained in the U.S. Environmental Protection Agency Guidance for Transuranics in the General Environment should be included.

Various local health personnel have also provided opinions on this matter. It would be appropriate for the DEIS to discuss these opinions.

IV. The demographic projections based on low population densities in the vicinity of the Plant are misleading. While projection of demographic data from the present to the year 2000 is commendable, it is not conservative to base projections on rural instead of urban population densities for a fast growing metropolitan area. The dose aquisition period and the population growth period should be identical.

V. There is a need to summarize all of the "conservatisms" that are used in the health risk calculations so that they may be readily evaluated.

VI. The appropriate standard, regulation or guide should be identified for each major division of Volume I, Part 3 of the DEIS. These would include ERDA Manual Chapters, Department of Transportation regulations, U.S. Environmental Protection Agency Guidance, and State of Colorado Regulations, as appropriate under the Executive Order of the President of the United States. Throughout the document references are made to various emissions being a percentage of a standard. The DEIS should make clear that the ERDA Manual Chapters require that the sum of these fractions for radioactive materials shall not exceed unity.

VII. There are a number of cross references between various sections of the DEIS which are inaccurate. Those inaccuracies which are pointed out in our specific comments, make it very difficult to understand some sections of the document.

VIII. The DEIS does not address the liability for off-site contamination that is now being contested in the U.S. Federal District Court in Denver. The DEIS also does not point out that the government's decision to defend against this suit was apparently made without regard to the environmental consequences of that decision.

IX. Inadequate attention is given to the problem of waste disposal at the Plant. Continued operation of the Plant generates transuranic waste for which there is no approved permanent disposal site. While the containers that are being used for transport to and storage in Idaho have an estimated 20 year lifetime, a good portion of that time frame has already passed without any indication of a permanent repository becoming available in the near future.

Present disposal sites at the Plant do not meet current U.S. Nuclear Regulatory Commission Criteria. It has been the Department's experience that waste site monitoring wells can give a false sense of security if they are improperly placed. Once contamination is detected it is extremely difficult and costly to decontaminate an aquifer. The tritium levels found in Walnut Creek over the past several years indicate that the Plant does contaminate the aquifers.

No mention is made of the Atomic Energy Commission commitment to Colorado Governor Love for the removal of the contamination under the asphalt pad area when a permanent transuranic repository becomes available.

X. Air transport of plutonium in unapproved shipping containers remains a major concern. All such shipments should cease until crash proof containers have been officially approved. ERDA has been given too much flexibility in interpreting the constraints of "National Security" in this matter. The Federal Register response to the Colorado Department of Health letter on this matter was considered inadequate because it did not address the real issues.

XI. Seismic design criteria are inadequately addressed. Information is given only for the new plutonium facilities. Design criteria and the recent evaluations should be given for all of the production facilities.

XII. The threat of nuclear blackmail is inadequately discussed. One such threat has already occurred in Denver due to the presence of the Rocky Flats Plant. Should the Greater Denver Area populace be subject to such threats because of the proximity of this tax supported facility?

XIII. The socio-economic benefit of the plant has not been properly compared to the cost generated by ill health due to radiation exposure. An evaluation of this cost based on Note 18, (page 69) of the Appendices to Chapter V of the "Biological Effects of Ionizing Radiation" (National Academy of Sciences, National Research Council, 1972) might in effect considerably reduce the $114.8 million (1975 dollars) per year economic benefit.

XIV. Dose calculations and projections fail to take into account past releases from the Plant. All past releases from the beginning of Plant operation should be factored into the calculations.

XV. It would be well to use a uniform cut-off point (1976 or 1977) for all data, information, and decisions, rather than the arbitrary non-uniform procedure which apparently has been used in the generation of this document.

XVI. The Colorado Department of Health would like to receive, for review, the comments on this DEIS that have been made by Rockwell International and by the Rocky Flats Area Office of the U.S. Department of Energy.

Albert J Hazle

Albert J. Hazle, Director
Radiation and Hazardous Wastes Contro

AJH:wsr

ROCKY FLATS DEIS SPECIFIC COMMENTS
RADIATION AND HAZARDOUS WASTES CONTROL DIVISION - 11/28/77

p. iii	par. 3	WASH 1517 should be WASH 1507.
p. xxvii		Aquifer: Rock only? Common usage includes sand or gravel.
p. xxvii		Briquette: Metal only or could this include non-metalic wastes?
p. xxx		Fuel cycle material: Is this irradiated? If not it should be so stated.
p. xxxi		The definition of "100-year storm" is inappropriate. It should read as follows: "A storm of such severity that it is unlikely to occur with a probability of more than .01 per year. Numerical manipulation would indicate that over a 100-year period, the probability would be 1 of having a storm of such severity."
p. xxxiv		Regarding the definition of "plutonium" it is recommended that spontaneous fission half-life should also be indicated for plutonium 239.
p. xxxvi		The definition of "stack" is inappropriate for the Rocky Flats Plant. In general there are only three major high chimneys that exhaust airborne effluents at high vertical velocities. In the majority of the cases at Rocky Flats, the airborne effluent release points are at a low profile.
p. xxxvii		Uranium: Percentages should be identified as weight percentages. It should be made clear that the report sometimes uses the word uranium generically regardless of the isotopic ratios.
p. xxxvii		Worst case accident and maximum credible accident definitions could be more clearly distinguished.
P. 1-3		Reference to <u>specific</u> drinking water standards should reference the standards.
p. 1-3	par. 3	Reference is made to the Colorado Department of Health's Environmental Surveillance Programs and references the Rocky Flats Surveillance as part of the Statewide effort. The Rocky Flats Plant Surveillance effort of the State Health Department is a source oriented surveillance program similar to the ones conducted for the Fort St. Vrain Nuclear Power Generating Station and the Plowshare Projects which have been conducted in Colorado in the past.
p. 1-3	par. 4	Reference is made to the Jefferson County Health Department's sampler on the East Guard Shack. This sampler is operated by the Jefferson County Health Department and the samples are analyzed by the Colorado Department of Health as part of the State's air pollution surveillance and the surveillance regarding the Rocky Flat's Plant impact on its environment.

p. 1-4 par. 1 Reference to quantities. Administrative errors have allowed shipments greater than allowed quantities.

p. 1-5 par. 1 Standley Lake could be considered a recreation area.

p. 1-6 par. 2 Reference is made to natural background radiation level in the Denver area which only includes the external radiation dose. With regard to the Rocky Flats Plant impact, not only must the external dose be considered, but more importantly, the internal doses to the bone, the liver, and the lung must also be compared against the natural radiation background that affects those organs.

p. 1-7 Reference is made to the RCG value of 1667 picocuries per liter for plutonium 239 and 20,000 pCi for tritium in drinking water. This is an inaccurate reference as, when there are mixtures of radioactive materials in a sample, the appropriate RCG value is the ratio of the observed concentration over the RCG value plus the second radionuclide observed value over the RCG for that particular nuclide and so forth with the sum of those ratios not to be greater than one.

p. 1-7 par. 2 Reference is made to the release of a number of radionuclides as being less than 1 percent of applicable standards. A summation of those percentages should also be presented to give full proper context to the statement.

p. 1-7 par. 4 Reference is made to the whole body dose due to routine continued operation of the Rocky Flats Plant. This value is compared against natural background exposure or whole body dose received by the Denver area population. While this comparison may be of value, comparisons between the natural background and doses due to the operation of the Plant are more appropriately done regarding the individual organ doses because of the particular deposition patterns within the body that have been identified for the materials used at the Rocky Flats Plant. Additionally, whole body dose calculation for plutonium is wholly inappropriate when considering the health effects involved.

p. 1-8 Regarding environmental effects of postulated plant accidents - only radiation incidents are considered. However, the Plant does handle a considerable amount of toxic materials which would also be released in such postulated accidents. The biological effect of these materials should also be evaluated. While it may not be possible or desirable to detail scenarios or estimate releases resulting from acts of sabotage, the probability of such an incident is undoubtedly as large if not larger than many of the "accidents" included here. Consequently, it should not be ignored. Tornados, high winds and earthquakes are not accidents. If these are included why not floods? The list should be complete at this point.

p. 1-8 par. 4 Reference is made to a proposed EPA guidance for evacuation which references an external radiation dose. The use of that particular value is inappropriate as it does not provide appropriate conservatism for the effect of the postulated deposition of plutonium within specific areas. Reference should be made to the Colorado Department of Health Protective Action Guide for the Rocky Flats Emergency Response Plan and the supportive information used therein. (copy of PAG enclosed)

p. 1-9 par. 1 The dose calculations should be referenced. Continued reference of external radiation dose: Attention is called to the fact that Colorado has one of the highest backgrounds Because of that background level there is no need to additionally expose the population without good and sufficient reason to do so.

p. 1-9 par. 5 Refers to the unavoidable adverse impacts and references the land being removed from the tax roles. The impact would even be less if Rocky Flats, in the person of Rockwell, would pay the assessed taxes to Jefferson County.

p. 1-10 par. 2 Reference is made to the acquisition of a larger buffer zone. The purpose of the buffer zone was to provide a green belt between the Plant and industrial and residential expansion in the vicinity of the site, not just residential alone.

p. 1-10 par. 3 The last sentence of that paragraph. The plan is also designed to reduce the possibility of other toxic chemicals that might be in onsite soil and released during storm runoff.

p. 1-11 par. 2 Reference is made to the Denver area population through the year 2000. The dose calculations are based on a fifty year exposure period. The population growth considered is only that for twenty-five years. It is suggested that a maximum population be used by assuming the population density of a developed metropolitan urban community and that density be used in the area immediately adjacent to the Plant, out to a distance of fifty miles. While it is unlikely that the water resources available to Metropolitan Denver would allow such a population increase, growth beyond the year 2000 should definitely be considered.

p. 1-12 At the top of the page, reference is made to reasonable growth in the general plant waste through 1985. Various statements have been made by Plant personnel, both verbally and in writing, that the production capability of the Plant was not to increase, therefore, why is there reference to reasonable growth in the generation of plant waste.

p. 1-12 par. 2 Reference is made to whole body dose per year to the Denver area population. The whole body dose is the lowest dose that can be calculated for exposure due to the Rocky Flats Plant operation emissions. It is inappropriate to use such values when determining the impact of that Plant's operation on its environs.

p. 1-12 There is no mention of a commitment to Governor Love regarding removal of the asphalt pad where the oil drums were stored from the period 1959-1969. Such removal is to be accomplished when an approved transuranic repository has been established.

p. 1-13 par. 2 Reference is made only to the relocation of radioactive materials processing functions. It would be far superior to remove or relocate all hazardous processing functions to provide a better environment for Metropolitan Denver. Relocation away from a large metropolitan area would remove a major threat. It is not just the potential 22.9 man-rems annual dose, it is the threat from a major unpredictable accident.

p. 1-13 par. 3 Reference is made to complete relocation followed by total decontamination, however, the level of decontamination is not specified.

p. 1-13 par. 5 Cost factors should be referenced. Standby condition is not adequately described. Reference is made to the annual reduction of man-rem/year, which is again whole body dose, to the general population. One questions what year that is and what population you're talking about. There have been several references to the year 2000. One questions why the dose calculation was based on 50 years when the population was only expanding for 25 years. Is the Plant to be relocated or remissioned at that time?

p. 1-14 par. 4 There is reference to the State guideline of two disintegrations per minute/gram of dry soil. It should be pointed out that this guideline is based on the State's soil sampling technique whereby the soil is sampled to a depth of one-eight inch. Therefore, a question is raised regarding the use of the HASL data which was data generated to determine the total inventory that had been lost from the control of the Plant.

p. 1-15 par. 2 Reference is made to plutonium containment due to runoff - what other soil contaminants such as uranium and lithium?

p. 1-15 par. 4 Reference is made to 11,000 acres being populated with 10,000 people, and the dose commitment calculated for plutonium in soil. As this would be a population density of less than one person per acre, one questions the validity of such calculations based upon such unrealistic densities (15 per acre would be more realisti for an urban area). The cost of purchasing additional land might be a lot less than the liability from a major accident. The decision to defend against the District Court Lawsuit vs. buying out surrounding land has major environmental impact, involves a large amount of money and is controversial. An EIS would be justified for that action alone. At the very least, it should be addressed in this EIS.

p. 1-16	par. 1	Is a 100 year storm the best to use? The potential hazard from a probable maximum precipitation should be addressed. Were these proposals in fact adopted in the 1978 Budget? Reference is to the dose due to any plutonium that might leave the site because of resuspension and runoff water. Other soil contaminants should also be considered.
p. 1-17	par. 1	Is it appropriate to refer to growth in the area east of the Plant as "limited residential development?
p. 2-1	par. 2	Reference is made to the beginnings of the Rocky Flats Plant. Question arises where were the nuclear components manufactured before Rocky Flats was built and why couldn't they have been continued to be made there?
p. 2-3	par. 4	Reference is made to the production oriented work and should also include the decommissioning of weapons and the extraction of americium.
p. 2-8	figure 2.3-3	The area to the Southeast is not identified. Should the proper notation be 902?
p. 2-9	par. 5	Reference is made to the Rocky Flats effort in aiding other countries with knowledge and ability to handle and process materials such as uranium. One wonders if that is a definite plus knowing that other countries are developing nuclear weapons for their own purposes.
p. 2-11	par. 3	Reference is made to the nonexistence of schools and parks or recreation areas within five miles of the Plant. This is true at the present time; however, by the year 2000 it is most likely that schools, parks, etc. would be in the area.
p. 2-15 & 2-16		Again the question regarding the year 2000 and the fifty year dose calculation. The maximum density population for an urban area should be used also.
p. 2-21	figure 2.4-6	Regarding the holding ponds, reference should be made to the three-way valve at Building 774 which allows flow of liquids to the solar ponds or to Pond B-2. Additionally, the valve to the north of Pond B-3 should be eliminated to preclude accidental opening and the release of industrial waste into the Walnut Creek drainage. This also applies to the valve at Pond A-2.
p. 2-22	par. 2	Reference is made to Woman Creek being a permanent stream; however, the stream does not flow at its intersection with Indiana Street during a major portion of the year unless assisted by irrigation waters.
p. 2-23	par. 3	Will there be an ER or EIS for the Long Term management program of the buffer zone?

p. 2-66	par. 5	Reference is made to preliminary work and no firm conclusions can be drawn; however, is there anything to date which indicates contradiction to earlier references to the nonexistence of seismic problems with the Rocky Flats Plant site area?
p. 2-73	table 2.4-16	The information ends with March, 1971. Are there any more recent significant earthquakes within 200 miles of the Rocky Flats Plant?
p. 2-74	par. 3	Association of microseismicity in the Rocky Flats area with construction and mining activities: Is this due to the use of explosives or what?
p. 2-82	par. 1	Reference is made to the discharge of sanitary sewage into South Walnut Creek being stopped in late 1974. One questions the date and also whether you are referring to the end of industrial waste discharge into South Walnut Creek. Reference is made to process waste water being disposed of by evaporation and the recycling of sanitary waste water. One wonders about the disposal that happens to be occurring due to seepage, particularly in the case of A2.
p. 2-82	par. 2	Reference is made to the flow of Woman Creek. Additionally, Woman Creek receives the subsurface drainage from around the asphalt pad area.
p. 2-82	par. 4	Reference is made to Pond A3 being constructed during 1974-75. This particular pond did exist prior to that time, but it was enlarged during that time period.
p. 2-83	table 2.4-18	A water balance should also be presented for Pond A2.
p. 2-84	par. 1	This section should discuss the contribution of on-site ponds to the groundwater.
p. 2-88 2-89		Will the sediment accumulating in Great Western Reservoir eventually need to be removed to restore the capacity of the reservoir. If so, what health hazards will be generated?
p. 2-89	par. 1	Reference is made to a storm ditch that discharges into South Walnut Creek and two stepdrops, the second stepdrop is described; however, the first stepdrop also needs description.
p. 2-89	par. 3	The last sentence of that paragraph refers to the Walnut Creek drainage. Shouldn't this be the Woman Creek drainage?

p. 2-90	par. 1	The reference to recharge by leakage from surface water creeks, ponds, and reservoirs to the Arapahoe formation should also include the ponds that receive the Plant effluents on site.
p. 2-90	par. 2	Regarding background radiation: The levels identified are primarily whole body doses and are improper for comparing plutonium exposures, and the health effects resulting therefrom. Background radiation doses to the bone, to the liver, to the lung, and the gonads should be the items that are referenced and not the whole body dose.
p. 2-91	par. 1	Reference is made to a one millirem exposure level to individuals in the general population, it does not refer to the time period over which that dose was accrued.
p. 2-91	par. 4	CDH did not do inventory sampling. Neither did Poet and Martell.
p. 2-92	par. 1	Reference is made to the State of Colorado adopting the plutonium-in-soil standard. This was adopted in 1973 and not in 1971.
p. 2-92	par. 2	Reference is made to calculations based on HASL data. It must be pointed out that the HASL data referred to was the determination of the inventory values while the Colorado Department of Health standard is for surface deposits only and related directly to health risk. In addition, the area described as the Colorado "general area of concern" refers to the current description. Previously, a larger area was involved.
p. 2-92	par. 3	Refers to measurements for the Colorado Department of Health that were made in the Walnut Creek development area. It should be pointed out that these measurements were made for the Jefferson County Commissioners in the proper handling of such developments under the requirements of State law. At the request of the Jefferson County Board of Commissioners, the Colorado Department of Health evaluates such measurements. Reference is made to two areas of residential development. It should be pointed out that one area is the Walnut Creek development No. 2 and the other one is the area that was proposed for development by the Good Financial Corporation.
p. 2-92	par. 4	Regarding the concern by the Jefferson County Department of Health for the soil sampling methods used by CDH and Rocky Flats: This also involves other agencies besides those two mentioned.
p. 2-94	par. 1	Statement is made regarding Colorado regulation being based on a calculated dose assessment. At the time of adoption the acceptance of the two disintegrations/minute per gram of dry soil that was proposed to the Board of Health, by the Department, was based on three items; 1) a review of the literature available at that time. The suggested value was below any of the standards.

guidelines, or other suggested measurements that were available in the references; 2) air sampling results from samples collected and locations of plutonium contaminated soil. When appropriate adjustments were made for soil contamination limits of down to two disintegrations/minute/gram of dry soil the air concentrations would not be detectable above worldwide fallout values; 3) the standard or guidance provided in the State regulation as proposed would be significantly different from that experienced due to worldwide fallout. As both of these contamination situations have a population distribution, it was felt that a land area contaminated to the standard value, which would actually have a population of values, should not overla with the population of values for worldwide fallout levels. It was determined that by using a factor of ten above the maximum worldwide fallout value that the State would not inadvertently condemn any property that might have elevated levels solely due to worldwide fallout. In 1976, three years following the adoption of the standard, the Colorado Department of Health prepared a dose assessment evaluation on the Colorado Standard verifying that it had adopted an appropriately conservative standard.

p. 2-94 par. 3 Reference is made to the most recent measurements made for the Colorado Department of Health and for the Good Financial Corporation. It should be pointed out that more recent measurements made by the Colorado Department of Health and for the Good Financial Corporation and other developers were made using the one-eighth inch sample depth.

p. 2-96 Reference is made to several contaminations or major releases other than the oil leakage area. There should be mention of the Building 771 laundry discharge area into North Walnut Creek and the leakage that has occurred over many years from the solar evaporation ponds. Additionally, several burning pits were used by Rocky Flats in the 1950's and 60's to reduce the bulk volume of contaminated combustibles.

p. 2-97 par. 1 Third line - There is reference to "stream condensate" which we believe should be "steam condensate". Reference is made to the stopping of most discharges into Walnut Creek and working toward a zero total discharge system in 1978. It should, however, be pointed out that currently the sanitary waste discharge still goes into Walnut Creek.

p. 2-101 par. 1 Reference is made to CSU measurements. It is not clear if the CSU measurements were made during a study at the time of reconstruction of the B Series Ponds, or at a different time. Howeve the Colorado Department of Health data on Walnut Creek at Indiana indicates that the plutonium does not quickly redeposit into bottom sediments as identified here. Also, the EPA study on the reservoirs in the area clearly indicate that a large inventory of plutonium had been received into the Great Western Reservoir between EPA's two studies done on the Great Western Reservoir. This is primarily due to the retention pond reconstruction.

p. 2-101 par. 3 — Reference is made to the total alpha activity being due to plutonium and uranium and its daughters. It should also be pointed out that there are americium concentrations equalling the plutonium values. Additionally, the amount of alpha activity due to uranium is not solely due to the natural uranium content of the water taken into the Rocky Flats Plant, but also due to uranium processing within the Plant site.

p. 2-101 par. 4 — Refers to the average plutonium concentration in 20 samples from sediment of Great Western Reservoir. We wonder about the procedure used to calculate the average plutonium concentration due to the unevenness of the reservoir bottom and the sediment deposited thereon. Simple numerical average of the 20 sample values would be inappropriate.

Reference is made to the Great Western Reservoir sediments being less than one-tenth of a percent of that in Pond B-1 indicating a very low transfer of plutonium downstream. It appears that this is an inaccurate statement and that the concentration is lower in Great Western Reservoir due to dilution from sediments from irrigation waters.

Reference is made to the possibility of the plutonium that is found in Great Western Reservoir being due to the surface soil contamination and not due to water discharges. Data from the 1972-1973 period when properly reviewed, strongly indicate and identify that the reconstruction of the B series ponds contributed the major portions of the plutonium into Great Western Reservoir. I refer to the presentation by Dow Chemical of a plaque to Mr. Belmont Evans regarding his concern for the plutonium levels that were being experienced at that time at Walnut Creek at Indiana. It should also be pointed out that the EPA report on Great Western Reservoir also indicates this same experience.

p. 2-103 par. 1 — Statements suggesting that contamination of Great Western Reservoir is due to surface runoff from contaminated land surrounding that reservoir are completely erroneous and contrary to fact.

p. 2-103 table 2.4-20 — Total alpha: During the early history of the plant, a term called gross alpha was used. Are the references to total alpha and gross alpha synonymous?

p. 2-104 par.3 — The EPA proposed standard listed in that paragraph is for drinking water and, additionally, the two hundred millirem natural radiation background level is a per year exposure rate to each individual of the Denver population.

p. 2-104 — Reference is made to the accidental release of tritium to the Rocky Flats environment. The incident actually began in April of 1973 and continued for a considerable period of time until the incident was fully identified and steps taken to preclude additional release of materials. Major releases occurred during April, May, and June of that year.

p. 2-105 par. 1 Reference is made to the tritium concentration decreasing as uncontaminated water was mixed into the Great Western Reservoir. It should be noted that this has taken at least four years to get down to the level that currently is experienced, which is slightly above the background levels currently experienced for other water bodies in the area. Is the ERDA limit of 1 μCi/l for ^3H an effluent or drinking water limit?

p. 2-105 par. 2 Reference is made to shallow wells used for monitoring possible contamination of aquifers resulting from disposals, releases, or solar pond operation. It is the State's experience that negative results obtained from such wells can provide one with a false sense of security. Positive results, if obtained, can provide useful information; however, negative results may simply indicate the possible improper placement of the monitoring well.

p. 2-105 par. 3 Reference is made to elevated plutonium readings in the deep well into the Arapahoe formation directly east of Plant buildings. There is a definite indication of impact of the Plant operation on water aquifers, and it should be so stated.

p. 2-106 par. 2 Reference is made to the onsite burial of plutonium and other contaminated radioactive materials. No mention is made regarding removal of the asphalt pad contaminated area as promised Governor Love when the permanent transuranic disposal site becomes operational.

p. 2-106 par. 3 Reference is made to the total of all increases in "background" radiation from the Plant operation. It is not increased by more than a fraction of one percent of the natural background radiation level of 200 millirem per year, but it may be increasing due to past releases; and again the comment is made that this 200 millirem per year of natural background whole body radiation is an improper reference and should not be used when evaluating the Rocky Flats Plant impact on its environs.

p. 2-107 Are Buildings 776 and 777 still fabrication and assembly areas? They are not modulized as described.

p. 2-109 Reference is made to detectors located at strategic places to actuate systems and alarms. Additionally, it should be mentioned that criticality alarms and gamma and air concentration monitors also provide such actuation of automatic systems.

p. 2-109 par. 4 and 6 — Reference is made to an ERDA approved waste storage site in Idaho. Actually this is a temporary transuranic waste storage site as no permanent site has yet been approved by any Federal agency.

p. 2-111 par. 1 — Reference is made to the use of carbon tetrachloride, one of the more hazardous solvents used by industry. Its use has diminished over the years and it is recommended that some other solvent be used which does not have the high toxicity that this material does. One questions the amount of carbon tetrachloride being released in the gaseous effluent discharges from the Plant site.

p. 2-111 par. 5 — Makes certain statements regarding the mandatory showering at the end of each shift and also the mandatory monitoring after working in a potentially contaminated area prior to leaving the process area. Our past experience at the Plant site is that while mandatory showering is written into the building regulations, there is no overview to see that each and every person does shower. Additionally, some people do self monitoring before leaving the potentially contaminated work area. Recent changes in both the building regulation and enforcement may have accomplished what was not being done earlier under a different contractor.

p. 2-111 par. 7 — Should also refer to americium recovery.

p. 2-112 par. 2 — While this document is primarily aimed at the environmental impact, it would be appropriate to state the typical work area concentration of beryllium that has been identified over the Plant's experience.

p. 2-112 par. 2 — There is no reference as to the ventilation provided to preclude inhalation of beryllium by the workers. The use of glove boxes is not evidenced in facilities where this particular material is used.

p. 2-112 par. 6 — Last sentence of that paragraph - Refers to the residue disposal being done in accordance with contractor established procedures. Please describe and identify procedures, locations and methods.

p. 2-113 par. 4 — States that protective measures against dust containing beryllium particles include a number of items. However, protective measures do not include room air monitoring and smear samples. The other examples are appropriate. Room air monitoring and smear samples determine the adequacy of protective methods.

p. 2-113 par. 4 — Refers to the OSHA Threshold Limit Value for beryllium. The normal worker exposure concentration should be cited for comparison.

p. 2-113 par. 5 Refers to the various species of uranium that are processed at the Plant site. It should also refer to uranium 233, currently being processed at the Plant.

p. 2-114 par. 1 The first complete sentence needs to be restructured to properly reflect the intent of what actually happened, i.e., a break in the skin can cause damage to the kidneys, and inhalation can cause damage to the lungs but not necessarily vice versa.

p. 2-114 The procedures used for uranium processing are all done outside of glove boxes. The safety precaution taken to avoid inhalation exposures should be described.

p. 2-114 par. 4 These metal forming terms should be defined.

p. 2-115 Regarding the fabrication of other metals. The safety precautions used in these areas should also be described.

p. 2-116 par. 1 Refers to the State Board of Health as an appropriate agency having limits. The State Board of Health adopts or promulgates rules and regulations and standards for use by the Department of Health. The standards are the Colorado Department of Health's, not the Board of Health's.

p. 2-118 There should be included with the discussion on this page a description of the safety precautions and the amount of other materials released such as nitrogen, nitrates, and fluorides.

p. 2-118 par. 5 Residues may not have always been properly sampled by production people for determination of concentrations. Proper sampling requires special training.

p. 2-120 par. 3 Refers to restrictive regulations regarding clothing, eating, etc. It should also include the requirement for showering and respiratory protection.

p. 2-120 par. 6 Regarding coating operations: What ventilation procedures are used to protect the worker besides fume hoods? Are glove boxes used? Additionally, laboratories are not protected by air sampler heads. (A monitoring device is not a protective device.)

p. 2-122 par. 2 Refers to war reserves: A definition of this particular item should be included in the glossary.

p. 2-129 par. 4 References ERDA and contractor guidelines. There are also other applicable guidelines, regulations, etc. which are used by the Plant in maintaining the safe operation. These should also be specified.

p. 2-130	par. 5	Refers to a land management plan. What land area does this refer to?
p. 2-130		Regarding the health sciences and industrial safety group: What chapters of the ERDA manual apply to the various topics discussed here?
p. 2-133	par. 3	Refers to operators of the water treatment and sewage treatment plants <u>licensed</u> by the State of Colorado. The proper terminology is "certified".
p. 2-134,	par. 5	Refers to facilities handling beryllium, plutonium, and uranium being exhausted through HEPA filters. Are other materials also exhausted thorugh such filters and what are they?
p. 2-135		Under the topic "Building, Sanitation, Hosuekeeping and Services"; we have been concerned for considerable time regarding the proper relationship between street clothes storage, shower facilities, work clothes storage, and the work area. Currently, street clothes and work clothes are stored in the same locker. While smear samples taken of such facilities indicate the contamination is low, such smear samples are actually after the fact and essentially allow the tracking of contamination outside the Plant and into the worker residence. Construction of proper facilities would be far superior to the current system now in force.
p. 2-138	par. 5	Refers to provision of on-site emergency generators supplying critical functions. Please identify the functions considered critical for continued safe operation of the Plant under such circumstances. Have all substations been physically protected from the elements and have the use of PCBs as transformer coolants been eliminated? At one point in time, a considerable volume of PCB was stored at the Plant site for use as transformer coolant Hopefully, an alternative to the use of that particular material has been accomplished.
p. 2-139	par. 3	Should also reference the use of additional mercaptan for early detection of leaks at the Plant site.
p. 2-142	par. 2	Should also include storage capacities for these fuels.
p. 2-143	par. 4	Addressed manually controlled argon system. Please state the capacity of that particular system.
p. 2-143	par. 5	Refers to a proposed fluorine facility. Please indicate the particulars of that facility and in addition, specify the precautions used in the storage of metallic calcium.
p. 2-144		Regarding the total quantities of raw water purchased in 1974, 75 and 76, please describe why there was a reduced volume of water purchased in subsequent years. Additionally, please identify what happened to 60 million gallons of water. Is this the amount of water that is evaporated due to the many avenues open for that particular process?

p. 2-144	par. 7	Second from the last sentence should read as follows: "It normally is utilized by Rocky Flats from around November through April."
p. 2-148		Should really be page 2-147 and page 2-147 should be page 2-148 for the narrative to be in proper sequence.
p. 2-149		Information provided for FY 1975 indicates a total amount of raw water purchased of 115 million gallons. Of this, 31 million gallons of water was evaporated in the cooling tower and 56 million gallons was discharged leaving a difference of 28 million gallons lost by other processes. Is this due to seepage from the various ponds and reservoirs on the Plant site.
p. 2-154		Is uranium 234 supposed to be uranium 235? What about curium?
p. 2-155		Are other hazardous materials sent in combined shipments with plutonium etc?
p. 2-156		Why is uranium 234 left out of Table 2.6-7?
p. 2-156	table 2.6-7	For this Table to be more informative, curie-miles per year or pound-miles per year would be more useful.
p. 2-158	par. 3	Refers to the air shipments of plutonium due to national security. Attached, is a letter the Department sent to ERDA regarding 10 CFR 871 during the public comment period provided in the promulgation process. We feel the ERDA evaluation of the situation from a public health standpoint was inadequate.
p. 2-158	par. 5	Are the containers designed to safely withstand the maximum impact and heat created by an airplane crash?
p. 2-159	table 2.6-10	The reference to uranium 235 appears to be in error.
p. 2-160	par. 1 and 2	Refer to Type A and Type B packaging to withstand normal transportation conditions. Is this for air or land transportation circumstances?
p. 2-162	par. 1	In an airplane crash what is the probability of separate subcritical masses being rearranged, due to effects of extreme heat impact or immersion, into a critical configuration?
p. 2-162 & 2-163		It should be noted that DOT packaging regulations are designed primarily for gamma radiation emitting shipments and <u>not</u> alpha radiation. DOT labels identify materials that are properly packaged in accordance with their regulations. The labels may be irrelevant or even misleading if the package is damaged. For example, an alpha emitting substance may only require an "I" label which most individuals consider as a minimal hazard, but if the package is damaged and the alpha emitting substance is released serious contamination may result.

Since the Rocky Flats Plant ships considerable material of this type, the EIS should elaborate on the label limitations.

p. 2-163 par. 2 — States that the material shipped from Rocky Flats has little penetrating radiation. While it is well known that alpha and the low energy X-rays that are emitted from plutonium have little penetration power, neutrons are also produced by this material and have a great penetrating power. What are the values for neutron levels at the surface of packages currently shipped by Rocky Flats?

p. 2-163 par. 3 — Provides levels identified in a DOT regulation. These values for alpha, beta and gamma emitters are quite high when you consider that the appropriate value for alpha emitters is 10 pCi per square meter.

p. 2-164 par. 1 — Line 3-shouldn't uranium 234 be uranium 235? Table 2.6.11: What about uranium 234?

p. 2-166 figure 2.6-3 — Should also include a pictorial display of the internal design including the spacers.

p. 2-167 par. 1 — Refers to the use of steel drums in a number of sizes, including a 55-gallon size. Please describe the inner containers that are used to preclude the release of material.

p. 2-168 par. 4 — Refers to the use of at least one HEPA filtration stage for uranium handling. Alpha radiation from an insoluble particle, regardless of whether it is uranium or plutonium, is damaging to the lung, therefore, more than one HEPA filtration stage should be provided for uranium handling buildings.

p. 2-172 — The discussion on HEPA filters, should also describe the individual filter testing versus the installed filter bank testing. Discussion should also be provided regarding the multiple stage filtration effect and the reason why plutonium areas have at least four stages at Rocky Flats while other similar ERDA facilities only have three.

p. 2-174 par. 3 — Refers to a decontamination factor of 10^9 to be achieved at Building 371-374. Why, in this new facility can't 10^{12} be achieved?

Emission limits may not have been exceeded but breaches of the filter systems have occurred.

p. 2-175 par. 2 — Regarding the testing of filter banks in place by using a particle size of 0.7 micron: Since the particle size generally impacting on this filter is 0.3 micron why wasn't a 0.3 micron size used for testing purposes?

p. 2-175 — In addition to the items discussed, where scrubbers are used, the sludge disposal and the HEPA filter disposal procedure should also be discussed.

p. 2-176	par. 4	Standards for release of stack gasses are provided in addition to these for general population exposure. A statement should be added regarding ALARA, as it is hoped that ERDA does conform to that particular philosophy.
p. 2-177	table 2.7-1	While the information provided here is informative, a summary explanation should be given on each of the incidents involved.
p. 2-178	par. 1	Derivation of the dispersion factor should be shown or referenced here.
p. 2-178	par. 3	The dose to bone of a person at the nearest off-site location is the first mention of radiation dose other than whole body. All of the references to whole body radiation dose should be changed so that the proper organ doses can be referred to and the proper assessments made.
p. 2-179	par. 2	The last sentence should have the additional statement "since 1971" to clarify that particular fact.
p. 2-179	par. 5	States that curium releases are negligible. Please define the term "negligible" in numerical values. No mention is made of neptunium and thorium which are handled in significant quantities per Table 2.6-6.
p. 2-180	table 2.7-2	The isotope column refers to plutonium 241 and daughter products which includes americium 241. However, the alpha activity column does not provide the alpha activities for the americium 241.
p. 2-182	table 2.7-4	Under highly enriched uranium: Should thorium 234 be uranium 234?
p. 2-182	par. 1	Refers to a 1968 incident regarding several hundred curies of tritium. There is no description in this particular document as to the cause of that incident. Please describe the particulars.
p. 2-182	par. 2	It should be pointed out in the discussion regarding the release of tritium by evaporation that whether evaporation is used or not, the tritium will be released if it is in such a form that it can be either evaporated or released in liquid effluents. Therefore, the statement that the release will increase during evaporation is questioned.
p. 2-182	par. 4	The statement is made that a limit imposed regarding the release of tritium may be raised when the studies of the tritium release are completed. It should also be stated that if feasible, the limit might also be lowered.

p. 2-183 table 2.7-5 Should also include uranium-233 and perhaps thorium-230 thorium-232, neptunium-239 and curium.

p. 2-184 par. 3 Please describe onsite transportation problems regarding the transport of such liquids between facilities.

p. 2-184 par. 4 Addresses an exemption being obtained from ERDA for wastes with particular recovery problem. Please give examples of the number of occurrences per unit time.

p. 2-184 par. 4 and 5 Regarding toxic waste concentration, please provide the limits that are appropriate for comparison.

p. 2-185 par. 1 It should also be stated when you have mixtures, these values must be handled in a particular manner which is not described in the DEIS.

p. 2-185 par. 7 Refers to treated effluents that are held. When it is determined that they are within radioactive limits they may be further released or retained. Please specify the limits that are used in making these determinations.

p. 2-186 table 2.7-6 Refers to contaminants and the concentrations in wastewater evaporator overheads. Please provide the values used by ERDA in evaluating these releases to the environment.

p. 2-186 par. 1 Due to heavy metal particulate emissions in the evaporation stack gases, and drift losses from the coolant towers, there is a possibility of heavy metals buildup occurring over the long range in soils around the plant site. Most of this land is zoned for agricultural use. A heavy metals analysis of the soil should commence immediately and continue on an annual basis. This monitoring should include beryllium, cadmium, nickel, iron, zinc, chromium, mercury, phosphorous and potassium.

It is recommended that Rocky Flats Plant obtain a certificate of designation from the County Commissioner for their existing landfill and all future landfills at the plant. Additionally, Rocky Flats Plant should start preparing to comply with Section 3002 of RCRA Standards applicable to generators of hazardous waste.

p. 2-192 par. 1 Is LSA waste considered NTRU waste? Is LSA waste still shipped by "rag-top" trucks?

p. 2-192 par. 3 Describe the drum counting techniques, also the quality control program that spot checks waste packages after they've left the Plant.

p. 2-193	par. 1	Refers to the TRU's stored at Idaho. What is the current inventory of radioactive contaminants currently stored at the Idaho site?
p. 2-194		Why aren't beryllium, chromium and lithium listed?
p. 2-195	table 2.8-2	Please define 'trace' in numerical values.
p. 2-195		What is the potential hazard of the biocides and other water treatment chemicals?
p. 2-195	par. 2	Please describe the weed and pest control coordination with the Colorado Department of Health and other agencies.
p. 2-197	par. 2.9.1	What would happen to the water used to fight a large fire?
p. 2-198		There are three sludge sources listed. The sludge from settlement of the raw water supply goes to the plant landfill. The sludge from process waste treatment and sludge from sanitary wastewater treatment go to INEL or ERDA - approved storage facilities. Will this practice continue and if not,what will be done with this material?
p. 2-203		Regarding subsurface drainage, it should be pointed out that clay liners only delay the release and are not impervious. It should be stated that this is the reason for instituting complete recycle of all liquid effluents from the Plant.
p. 2-204	par. 1	It should be pointed out that the tritium incident in 1973 identified that release to groundwater in the Rocky Flats environs is not clearly understood. It was not clearly understood then, and it is not clearly understood now.
p. 2-206		Regarding potential sources of groundwater contamination and subsurface drainage, there is no table presented like this in the discussion of air releases, such as annual releases and incidents. Please identify such matters.
p. 2-206		Why doesn't air sampling include specific analysis for thorium, neptunium and curium?
p. 2-207	par. 2	Again the reference is made in this document that the Jefferson County Health Department has a continuous particulate air sampler on a site that is operated by the Colorado Department of Health . That sampler is operated by the Jefferson County Health Department and the samples collected are analyzed by the Colorado Department

		of Health. It should also be pointed out that the studies provided by EPA on this facility are normally provided at the request of the Colorado Department of Health.
p. 2-208	par. 1	It should be pointed out that the procedures also detect abnormal situations such as therapy doses of iodine-131 adminstered to Plant personnel or visitors.
p. 2-208	par. 3	As used elsewhere in this report, the word "independent" refers to an outside agency. In the context of the first sentence of this paragraph, it would be better to use the words "separate monitoring network".
p. 2-210	table 2.10.1	Should also include carbon tetrachloride, and other solvents, nitrate, and fluorides.
p. 2-211	par. 4	References lower figures than are observed by the Colorado Department of Health samplers. It is suspected that the samplers currently being used by the Rocky Flats Plant provide lower figures due to the construction of this sampler. The media used by both ERDA and the Colorado Department of Health have essentially an evaluated collection efficiency approaching 100 percent for small particle size particulate matter. The Colorado Department of Health values are a factor of two-to-eight times higher than those identified by the Rocky Flats facility for ambient air samples.
p. 2-214		In reference to the previous comment, there is a need for the qualification of all monitoring systems used in the surveillance efforts at Rocky flats, if the results from these sampling systems are to be used to properly calculate impacts due to the Plant's operation.
p. 2-214	par. 3	It should be pointed out that the Colorado Department of Health's five onsite air sampling stations operate continuously. In addition, the Jefferson County Health Department sampler, and Metropolitan area samplers belonging to the Air Pollution Control Network are run every fourth day for twenty-four hours. It should also be pointed out that there are four stations at sites within the State remote to the Rocky Flats Plant.
p. 2-217	par. 1	It should be stated that there are other meteorological stations currently in operation at Rocky Flats.
p. 2-217	par. 2	There was a statement earlier in this document which said that the Jefferson County Health Department routinely sampled the sanitary plant discharges. This should be also stated here, as appropriate.

p. 2-217	par. 4	Should include a statement regarding other anticipated reservoir projects which would increase the total retention pond system capacity.
p. 2-219	par. 3	Re: The statement made to the effect that there is no movement of plutonium into the Plant's groundwater. To be more technically correct, it should be stated that there is no obvious movement of plutonium into the Plant's groundwater.
p. 2-219		In view of the fact that some area soils have natural uranium and thorium and also that there are uranium mining operations above the plant water supply, it would appear judicious to include analyses for natural uranium and thorium in the raw water and other media.
p. 2-221		What is the rational for selecting chemicals for analyses in the test holes 2 and 46? Those holes should be located and identified on a topographic map.
p. 2-229		Applicable standards and detection limits for natural uranium should also be expressed gravimetrically since it is more toxic chemically than radioactively.
p. 2-230		The soil sampling program for the Federal Court Trial should be described and the controversy over sampling methods should be discussed.
p. 2-230	par. 3	The statement is made regarding the State of Colorado water monitoring program. In reference to specific analysis of samples having a total alpha concentration in excess of 40×10^{-9} microcuries per ml, this has to do with <u>individual</u> samples. Plutonium analysis is done on composite samples for an entire month as a routine procedure. The Colorado Department of Health no longer analyzes for ammonia on routine samples. Additional sampling for all parameters listed on the NPDES permit is conducted periodically by the Colorado Department of Health and the Jefferson County Health Department.
p. 2-231	section 2.10.4	Why was the Plant in operation 25 years before a comprehensive ecological monitoring program was initiated?
p. 2-234		Regarding the virus in water monitoring program: Apparently this program was a one time only effort. Is there any indication that this program should be repeated at routine intervals?
p. 2-235	par. 1	Reference is made to higher exposure rates recorded near or over buildings, which were caused by radioactive materials within the buildings. Higher exposure rates were also recorded due to deposits on the Plant site.
p. 2-235	par. 3	Pre-evaluation of potential emergency situations and classification of those with potential for requiring evacuation, would assist the decision making process during an actual emergency.

. 2-238	par. 1	Refers to Civil Defense Division of the Colorado Department of Military Affairs. The proper reference should be the Division of Disaster Emergency services. The statement also refers to a State plan, but it does not differentiate between the 1971 plan and the planned 1977 revision of that plan.
. 2-240	table 2.11-4	Does not reference Adams, Jefferson, and Boulder County plans and does not mention the St. Luke's plan for the care of radiation accident victims.
. 2-240	par. 2	Reference is made to the Atmospheric Release Advisory Capability system that the Rocky Flats Plant has. It should be pointed out, however, that while this system provides excellent detail capability, it does not have immediate response because of the complexity of the system. It should be further clarified that the first run calculations are similar to those already derived by the Colorado department of Health and its radiological emergency response effort for Rocky Flats.
. 2-241	par. 3	What is meant by Off-Site Radiological Incidents in Table 2.11-5?
. 2-243	table 2.11-6	Do written agreements exist for all of these agencies?
. 2-244	table 2.11-6	The fire protection groups previously mentioned as providing assistance were left out of this particular list (See Page 2-236). Current official designations of all Civil Defense Organizations should be used.
. 2-245	par. 2.11.3	How often are drills conducted? Who makes up the "Emergency Planning Review Committee" and how often does it meet?
. 2-245	par. 6	Mention should be made of the State Plan revision in 1977.
. 2-248	par. 4	The statement should be made that all classified documents are also stored appropriately.
. 2-253	A	At the bottom of the page there is a reference to "licensees". Is this a reference to handling of reactor fuels? Please clarify.
. 3-1	par. 1	Reference is made to the fact that the DEIS does not consider the effluents from non-radiological materials which are used in small quantities, and are not unique to Rocky Flats. However, it is appropriate that such materials be included here to illustrate just that point. Of particular interest would be the beryllium and chlorine that is used at the facility.
p. 3-3	par. 3	Should also reference what regulations or guidelines apply in this particular matter, and should reference the effect of the U.S. President's Executive Order regarding the requirements that Federal facilities meet state and local regulations except where specifically exempted.

p. 3-4	figure 3.3.3-1	Should also indicate the infiltration into the alluvium and the appropriate volumes. In addition, for the B Series Ponds, the evaporation should be stated or at least estimated if it is unknown, so that a complete water balance can be identified.
p. 3-5		Placement of the plant underground could reduce heating, cooling and maintenance costs as well as reduce security problems.
p. 3-6	par. 1	While the plan for total water recycle will accomplish many positive things, the materials already in the Great Western Reservoir sediment will continue to affect the quality of water in that reservoir.
p. 3-9	par. 1	Reference should be made to Rock Creek, which also starts on the Plant site.
p. 3-9	par. 4	Regarding the surface water diversion system around the landfill area: It should also be noted that some radioactive material is buried at this location.
p. 3-10	par. 2	Rock Creek should also be mentioned in this paragraph as it does originate on the Plant site.
p. 3-12	par. 1	Reference should be made to the micrometeorological effects due to buildings and other structures on the Plant site.
p. 3-313	par. 4	Reference should be made to the EPA drinking water standard in addition to the previous one of the U.S. Public Health Service.
3-19		Shouldn't dissolved oxygen be daily minimum instead of daily maximum?
3-26	par. 5	There is reference to two sections regarding the total source term for airborne and water release of radioactive materials. Please verify that the references to the sections are appropriate to the source term that was referred to. The 100 μCi per year airborne release is referred to in 2.7.2.
p. 3-26	par. 6	Reference is made to zero liquid discharge in 1979. Earlier in this document 1978 is stated. Please correct apparent error.
p. 3-27	par. 1	Reference is made to the tritium source term in Section 2.10.1. The reference should be checked.

p. 3-28	table 3.1.2-1	Why isn't the source of the tritium identified?
	**	This is the first mention of a uranium drum leakage. Is this different from the plutonium in oil drum leakage situation?
		Plutonium 241 needs a triple asterisk not a double in the table.
p. 3-29	par. 2	Reference is made to a calculated 50 year dose commitment for use in this DEIS. The Liquid Metal Fast Breeder Reactor Environmental Impact Statement uses 70 years. Why do two different efforts by ERDA use two different calculation procedures? Calculations are done regarding future releases; past releases should also be factored in. Again, the point is made here that although a calculation for a 50 year dose commitment is made, the population growth is only considered for 25 years. Something should be said to justify the difference in the time frames. Preferably the longer time frame for population growth and dose commitment would be used. Past releases due to plant operations should be factored into dose commitment calculations. Reference also is made in the last sentence of the second paragraph to the effect that a one hundred year dose commitment would be less than 10 percent. Is this on the basis of an acute or chronic exposed dose calculation and for what organ? The statement is also made in this paragraph that the dose delivered by substances that are not concentrated in the food chain comes from exposure in the first few years. It could be more simply stated that the doses delivered to the lung by inhaled substances comes from exposure in the first few years. Materials that have been inhaled but deposited in the bone deliver a dose throughout the period of deposit within the bone, which is a considerable period of time. (The biological half-life in the bone is one hundred years).
p. 3-29	par. 3	Reference is made to Appendix F. While detailed comments will be provided later regarding review of Appendix F, there should be a summary equation here which provides the reader insight as to all the matters considered in deriving a total dose commitment for the Plant's operation and accident potential.
p. 3-29	par. 4	Reference is made to the dispersion factors given in Section 2.4.4 which addresses ecology. Please identify the proper reference.

p. 3-32	par. 3	Reference should be made that the Colorado Department of Health also used a 1 x 10^{-9}/m factor in the 1976 document on risk evaluation for the State Plutonium in Soil Standard.
p. 3-33	par. 3	Reference is made to calculation under the new ICRP lung model. Why does the document in earlier chapters talk about whole body doses rather than the lung and other organ doses which are much more important and more appropriate than the whole body doses.
p. 3-34		Reference is made here in Table 3.1.2-3 to the different plutonium 239 dose conversion factors in Rem per μCi inhaled. Reference should be made to the Colorado Department of Health 1976 document previously referenced in the DEIS which goes further in the treatment of not only plutonium 239 but the other materials released by Rocky Flats. Reference should also be made to the Colorado Department of Health's Rocky Flats Protective Action Guide and its supportive information for the equation used in doing dose calculations. Apparently, this equation in its full form has never been published elsewhere. It might be wise to do so in this Environmental Impact Statement. (copy of PAG enclosed)
p. 3-36	par. 2	The statement is made in this paragraph that doses to single organs are much less likely to cause any health effects than whole body doses. Please describe in detail the background for such a statement.
p. 3-37	table 3.1.2-5	Please provide the equations which develop the dose conversion terms per microcurie of release. Tables A and B for airborne releases and A and B for waterborne releases use different units, i.e., rem per microcurie per cc released, and rem per microcurie inhaled or ingested. Please comment regarding the generation of an adjusted dispersion factor in man-seconds per cubic meter. Apparently, this factor is generated by multiplying 2.0 x 10^{-8} seconds per meter cubed by 1.4 x 10^{6} persons. It therefore is not an integrated population, but an initial population.
p. 3-38	table 3.1.2-6	A clearcut equation to generate these figures is needed to check the validity of these values. It should be pointed out that it appears that the population growth rate of about two percent per year has not been factored in.
p. 3-39	par. 1	Reference is made that the maximum organ dose to the maximum theoretical person is about two percent of the natural background whole body dose to an average individual. This is an improper comparison. It should be more properly stated that the maximum organ dose for the maximum individual is compared with the natural background organ doses for the average individual.

p. 3-40	par. 3	This would be more properly stated as the potential fifty year risk to the twenty-five year population within a fifty mile radius of the Rocky Flats facility from one year's operation.
p. 3-41	table 3.1.2-7	Regarding the genetic effect type: Appendix G states that Newcombe uses 10 x 10^6 from a 1975 reference rather than 20 x 10^6. Please resolve the apparent inconsistances.
p. 3-42	par. 1	The statement is made here regarding a population growth which is determined on the basis of population estimates through the year 2000. Please refer to our earlier comments regarding the use of a 25-year population growth for a 50-year risk calculation and a more proper addressing of the maximum population that may be in an urban area immediately surround the present Plant site. It may be far more appropriate to use the past releases from the onset of Plant operations, the associated population growth for a 50-year exposure to these materials, and a 50-year dose acquisition, (i.e. 1952 to 2002 releases, population growth, and dose aquisition).
p. 3-42	table	It should be stated at the top of the table that this risk is for normal operation, and does not take into account accidents.
p. 3-43	par. 1	Reference should be made to the Council on Environment Quality Guidance Statement on Maximum Credible Accidents. The listing of the various mechanisms for accidental dispersal should also include fire and terrorist activities.
p. 3-43	par. 3	Reference should also be made to the incident involving a three-way valve at the 774 Building area which resulted in a nitrate release to Walnut Creek and Great Western Reservoir in 1972.
p. 3-44	par. 2	Reference should also be made to the effect of corrosives on the filter holders. This reduces the effectiveness of the filters themselves in the removal of airborne material from the airstream. HEPA filters are specifically mentioned as filters for uranium handling buildings but not for air leaving plutonium glove boxes. Why not?
p. 3-44	par. 3	"Environmental releases from past evens have been quite small"; this is an improper statement because the oil drum storage area leakage cannot be considered in this category of being a small release typically less than 10 uCi of plutonium alpha activity.
p. 3-45	par. 1	The 1974 incident releasing 934 uCi is not described in Appendix H. It is, however, listed in Table 2.7-1, page 2-177.
p. 3-46	par. 2	Reference is made that process water is no longer released and that release of contaminated liquid is no longer an off-site problem: For this statement to be more correct, it should be pointed out earlier in this document that several valves need to be blocked. Additionally, the lining of the ponds or reservoirs is not absolute or impermeable and these reservoirs will contaminate the surface aquifers in particular to an unknown value at this time.

p. 3-47	par. 1	It was identified by the Colorado Department of Health that the 1972-73 plutonium levels released from the Plant site due to reconstruction of the B-series ponds has significant impacts on the sediments of Great Western Reservoir. Therefore, if these Series ponds were destroyed due to a flood, the failure would definitely have a significant impact on downstream waters.
p. 3-47	table 3.2.1-1	Reference should also be made to the nitrate and fluoride levels in the solar evaporation ponds.
p. 3-48	par. 2	Reference is made to the release of 80,000 microcuries of plutonium, 85,000 microcuries of americium, and 470,000 microcuries of uranium. If the figures in Table 3.2.1-1 were actually used, the statement would more properly be a release of about 85,000 microcuries of plutonium, 80,000 microcuries of americium and 470,000 microcuries of uranium.
p. 3-50	par. 1	If proper steps were taken following the 1957 fire, why was the loss in the 1969 fire so great, as many of the same factors contributed to the cause and effect relationship?
p. 3-51		Regarding Item No. 10: Under improvements subsequent to the 1969 fire it should also be pointed out that chlorinated hydrocarbon solvents create HCL (hydrochloric acid) when involved which will react with the filter plenum materials reducing their efficiency.
p. 3-52		Reference is made here to the recommendations of the fire surveys. Earlier references said that these surveys should be done periodically. According to these statements a fire survey protection should be scheduled for the 1977-78 period. Has this effort been initiated?
p. 3-54		How are plenum sprinkler systems tested? How well do the filters function when they're wet?
p. 3-55	Par. 2	The first sentence should also refer to the 1969 fire.
p. 3-55	par. 2	The last sentence of that paragraph, should also reference where this information came from so that it might be read in context.
p. 3-56	par. 2	Because of the fire potential, shouldn't room air also go through four stages of HEPA Filters?
p. 3-57	par. 1	This paragraph includes the generation of the 6.2 microcuries of alpha activity that would be released, and provides all the assumptions that were used in the generation of that figure. It should also be pointed out the amount of material released was of respirable size and not of a larger particle size that would preclude deposit in the lungs. This work was done by the Terra Corporation and is a reference cited in the document.

p. 3-58	par. 1	It might be useful to try a different approach to the accident scenarios. Start with failures and combinations of failures of support systems such as electriciy, gas and water and then construct a fire or explosion scenario.
p. 3-58	par. 4	Reference is made to four different environmental releases due to accidents. As discussed earlier in our comments on the document, this is the first time that these accidents have been referred to publicly. Please provide a better description of these particular incidents so that their impact may be more properly evaluated.
p. 3-59	par. 3	References the criticality incidents recorded in the literature: However, one wonders whether the totality of all criticality incidents are truly recorded in the literature and whether some information has been withheld.
p. 3-60		Under Item 1 in the fourth line,"nuclear reation inhibitors" should read "nuclear reaction inhibitors."
p. 3-64		Under Table 3.2.1-3, the reference to cesium-138 without the Xe-133 raises a question as to whether this list is complete. Wouldn't there be plutonium released in addition to the fission products? Why would gases be retained? Aren't krypton and iodine considered to be gaseous emissions.
p. 3-65	par. 2	The statement is made that there has never been a "criticality accident" at the Rocky Flats Plant. Please define the term criticality accident for the purposes of reporting.
p. 3-66	par. 4	Although the probablity of an intentional aircraft crash into the plant may be difficult to evaluate, this should be addressed either in this section or in conjunction with discussions of sabotage.
p. 3-71	table 3.2.2-1	Regarding total impoundment failure, please reference the comment made by the Department for Page 3-48 regarding the possible improper calculation of the amounts of the various materials.
p. 3-73	par. 2	It should also be pointed out that the ground level release is at the Plant height elevation and that there is an effective stack height change when considering the Metropolitan area due to the location of the Plant.
p. 3-75	par. 1	This should specify that the dose conversion terms are also needed. A <u>complete</u> set of dose conversion terms is not, however, included anywhere in this document.
p. 3-75	par. 2	Comparisons are made regarding the various organ doses and whole body dose due to natural background. This is an improper comparison. The lung doses resultant from the potential releases and the lung doses due to natural background must be compared, for the comparison to be valid.

p. 3-78	table 3.2.3-4	Without the provision of the entire set of equations used, appropriate validation of these figures cannot be accomplished. There are also other toxic substances used by Rocky Flats which are not considered in this summary statement.
p. 3-79	par. 2	While the number of shipments is small and the accident probability is also small, the possible impact may be considerable and this should be evaluated in a very thorough manner.
p. 3-93	par. 4	Assumes a Denver area population density of 160 people per square mile. Is this an appropriate population density for an urban area to calculate the maximum individual exposure or even the average population exposure for a maximum population?
p. 3-94	table 3.2-4	Should include any accidents that have actually occurred with Rocky Flats shipments.
p. 3-97	table 3.3.2-6	The accident history should be reviewed as related to the production schedules and a determination made as to whether the Plant is more accident prone during higher production rate periods or during periods of greater inventory.
p. 3-98	par. 3	Reference is made to a 100 meter release height and a maximum dispersion factor of 1.7×10^{-6} seconds per cubic meter. At what distance was this maximum dispersion factor estimated?
p. 3-99	par. 4 and 5	A statement should be made about the effect of what happens to the Plant when nuclear weapons are no longer needed ; or if there is a Nuclear Test Ban Treaty. What is the expected lifetime of the Plant and why was the year 2000 A.D. selected as a termination of population growth? Is that the anticipated end to the useful lifetime of this facility?
p. 4-2	par. 3	Should the complete Plant be removed, there would also be some ecosystem changes, both during the removal and subsequent to that removal.
p. 4-2	par. 4	As mentioned several times before, lung doses should be compared with lung doses as appropriate and the plutonium whole body dose comparisons are inappropriate due to the nature of plutonium deposition within the body.
p. 4-3	par. 1	The statement is made that credible accidents lead to a dose in the range of 1 to 5 rem whole body dose, however, the probability is low. Again the statement is made that whole body dose is an improper comparison and the 1-5 rem whole body dose an improper limit. The Colorado Department of Health in the development of a Protective Action Guide for the Rocky Flats Plant is using a dose of 30 rem over 70 years to the bone as a determination point for possible evacuation should the circumstances of the incident permit such an action to be effective. The last statement in paragraph 1 should be qualified by the statement that this is for the risk currently presented in this document.

p. 4-4	par. 1	A statement should also be made about terrorist threats to the Denver Metropolitan area due to the presence of the Rocky Flats Plant. Discussion should also be presented regarding the possibility of future releases and accidents and effect on land values. This should also be considered in the Socio-Economics Section.
p. 4-7	par. 7	Regarding a by-pass installed around Pond B-3, Figure 2.4-6 refers to a by-pass system around the entire B pond series. Which statement is correct?
p. 4-7	par. 5	The statement is made that Pond B-2 is not large enough to hold the total amount of laundry wastewater. This should also include a statement regarding process water that is also impounded in Pond B-2.
p. 4-9	par. 1	Should also include a statement regarding the reduction of water going into Great Western Reservoir due to the anticipated operation of Building 374 and also the complete recycle system involving the reverse osmosis operation on sanitary wastes. In addition, the impoundment of surface runoff water can reduce flows both to Great Western Reservoir and Standley Lake.
p. 4-9	par. 5	The first statement should be restated to the effect that all systems filtering air from plutonium glove box operations were upgraded and modified to insure a minimum of four stages of filtration before the air is discharged to the environment. All systems filtering air from plutonium work areas are passed through at least two stages of filtration before discharge.
p. 4-10	par. 1 and 2	There is a continuing question regarding the validity, accuracy, and precision of air measurements by all systems used in monitoring Rocky Flats. A study is proposed to evaluate that. However, no timetable has been identified as to the accomplishment of the requested study.
p. 5-2	table 5-1	There are a number of questions which arise from the information provided in this Table. 1) The approximate dollar value for completion of the plutonium recovery and waste treatment facilities is referenced as \$190 million, whereas in the footnote the reference is \$140 million. Please be consistent in your dollar figures. 2) No mention is made about changes in the goals which would increase the dose and would also increase the dollar amount and involve changing the facility to allow proper handling of additional material. 3) Cost estimate generation and dose reduction estimation procedures should be identified. 4) Under Alternative 4-C, complete decontamination to what levels? Under Alternatives 4-B and 5-A(1), the total man-rem reduction would be in excess of the potentials. Please explain how this was accomplished. 5) The effort contained in this Table should be compared against the changes in medical costs due to dose reduction. Please see the Appendix in the BEIR Report on the appropriate way of accomplishing this.

6) If Alternatives 4-B and 5-A(1) were accomplished, the total pro-rated annual income to the Metropolitan area to the year 2000 would be approximately the same amount as what the current Rocky Flats operation provides to this same community, i.e., $114.8 million. While this is an extreme case, it does point up the fact the complete Plant removal would not greatly affect the socio-economics.

p. 5-7	par. 5	Reference should also be made to the EPA Drinking Water Standard.
p. 5-16	par. 2	It is unclear as to whether the effort described here includes the removal of plutonium from offsite soils.
p. 5-18	par. 3	The first sentence refers to standby for all onsite activities while the second sentence of this section says that waste and scrap recovery operations will continue. Please clarify. Line 3 - 0.15 man-rem from normal operational releases. (Shouldn't this be 5.9 man rem?)
p. 5-19	par. 2 (2)	In reference to the one hundred and one thousand disintegrations/minute/gram of soil, how were these numbers selected?
p. 5-19	par. 4	The second to the last sentence refers to a HASL study that indicates 11,000 acres on and offsite that may exceed the two disintegrations/minute/gram of dry soil level. Please refer to the specific HASL study, as most HASL studies in this regard have been done for total inventory values. The comparison with the two disintegrations/minute/gram of dry soil surface soil contamination may be inappropriate.
p. 5-21		Statements should be made regarding the possible remissioning of the Plant, i.e., a change of goals which might increase or decrease health risk concerns.
p. 5-23, 5-24		Regarding standards for plutonium in soil, reference should also be made to the EPA guidance when that guidance is provided, and its impact should also be calculated.
p. 5-25	par. 4	Is 3" a reasonable clean-up depth for the ponds?
p. 5-26	par. 4	How deep are the disposals buried and what is the potential for burrowing animals bringing that material to the surface in a 50 or 500 year time frame?
p. 5-27	par. 3	Reference is made to the anticipated plutonium-in-soil guidance from EPA. Again, this document (DEIS) should contain an evaluation of that impact. A statement should be included in this paragraph regarding the commitment made to Governor Love by the AEC for the removal of the contamination under the asphalt pad when an approved transuranic repository has been established and operational.

p. 5-28	par. 4	Mention should be made that Rocky Flats may be one of the few remaining Federally owned, relatively undisturbed, high plains-mountain interface ecosystems. As such, it is worthy of consideration for preservation and enlargement as a National Grassland. Its proximity to a major metropolitan area makes it particularly useful as a study area and as an open space area. This proposition should be addressed so that soil removal and plowing programs and tree planting programs might be brought into conformity with that objective to the greatest extent possible. This approach to ultimate site utilization would also be supported by the fact that there may be site areas that can't be completely decontaminated.
p. 5-28		The last sentence - Refers to the more recent measurements using the Colorado Department of Health's soil sampling technique. Please reference these measurements in more detail as we are unfamiliar with the information you cite here. It might be that you are referring to the reduced area of concern bounded on the East by Simms Street as transmitted to Dr. Johnson by the State Health Department. Please clarify the basis on which such statements are made.
p. 5-29	par. 2	The Colorado Department of Health ambient air monitoring data is a factor of two to eight higher than that identified by the Rocky Flats surveillance effort. The Colorado Department of Health feels that use of whole body doses for plutonium exposures is an improper calculation due to the deposition patterns within the human body. Bone and lung dose figures are more appropriate.
p. 5-29	par. 4	It should be pointed out that it is required that crash-proof containers be obtained and used and that the only authorized air shipments are for national security.
p. 6-1 through 6-3		Extremely little is presented here of much value. Hopefully, the U.S. EPA will have considerable input here as to the expansion of this particular topic. When is it anticipated that the Plant will be declared obsolete?
p. 7-5	par. 2	Refers to projected population figures through the year 2000. The maximized urban population immediately adjacent to the Plant site is not envisioned for later years within the time frame of the calculation of dose commitment. This must also be considered.
p. 8-2	par. 1	Refers to a statement regarding employment projections. As population projections included in this document go to the year 2000 and dose projections go to the year 2025, it would be appropriate to extend the employment projections beyond 1985 as presented here.
p. 9-6	par. 3	Refers to the maximum annual dose to a single individual. It should be so stated.
p. 9-6	par. 4	Again the comment is made regarding the improper use of whole body exposures.

p. 9-16	par. 3	The exposure would be much more if urban development took place in this area. The 0.4 man-rem reduction is for ongoing operations and not for future accidental releases.
p. 10-1	par. 5	Colorado Department of Health continues to have concern regarding the demographic figures used in this report. The statement has been made that the maximized system should be evaluated for an urban population immediately adjacent to the Plant boundaries. A distance of up to fifty miles would be appropriate.
p. 10-3	par. 4	States that it should not be inferred from this recent land acquisition that there was any existing or potential hazard either to using the land acquired or using land beyond the buffer zone. However, the Environmental Impact Statement filed for the acquisition of such land comments on the contamination that is there and that is one of the reasons why it is purchasing the land. Also, see the document RFP-INV-10 which mentions specific values and recommendation that such land be purchased to remove contaminated lands from private ownership.
p. 10-4	par. 1	Reference is made to a two-mile expansion around the Plant site costing $135 million. During the Department's effort in generating a Protective Action Guide, the major concern for an incident extends two miles east of the current eastern boundary of the Plant site. Acquisition of this area would reduce significantly the cost and reduce impact to the surrounding community should a maximum credible accident ever occur.
p. 10-12		Regarding the discussion of possible health effects in Comment 12, Our Comments on Item #11 on page 10-12 should be referenced.
p. 10-17	par. 1	The response for Comment 18 regarding reliability of measurements: This has not been addressed in the DEIS and should be. Several comments have been made by this Department in our review of this document regarding the accuracy and precision of measurements, and in particular, airborne contamination measurements made by the various agencies involved in environmental surveillance around the Rocky Flats facility.
p. 10-18		Regarding the response in Comment 19 on models: There has been an inadequate presentation regarding the various models used, equations and so forth. Additionally, there is no justification for the use of whole body dose when considering plutonium exposures.
p. 10-19		Regarding the response to Comment 20: Please see our comments regarding page 10-18.
p. 10-24		Regarding paragraph 1 of the response to Comment 23: It should be stated that test well and surface water samples have <u>indicated</u> rather than <u>shown</u> that there is no detectable plutonium transport. It is questionable whether an absolute statement can be made regarding any lack of groundwater contamination

p. 10-28	par. 1	There is no mention regarding the 1977 revision of the State Plan. This should be included in the final EIS.
p. F-1	par. 5	The statement is made that the dose conversion factors can also be expressed in terms of rem per μCi released when the dispersion factor has been included. However, this is only for inhalation exposures and not for water releases. Additionally, the equations must be given to show how the rem per μCi inhaled or ingested is calculated and also how the rem per μCi released is calculated.
p. F-2	par. 1	A statement should be added regarding the use of chronic or acute dose commitment calculations and whether they are being used for routine and accidental release scenarios.
p. F-2	par. 3	Reference to a fifty-day half-<u>life</u> should be a 50-day half-<u>time</u> which is the terminology that is usually used regarding soil.
p. F-2	par. 3	Reference the equation provided: While this is a complex type of equation, the simple equations showing how the inhalation overall dose is calculated, including all the various components, is not given. Additionally, regarding the complex equations, the items λ_m and λ_1 are not identified.
p. F-3	par. 3	The proper terminology for dilution of concentrations involving ingestion does not include a term "dispersion". The sentence would more appropriately read "No dilution is included."
p. F-6	par. 3	Please give the reference for the effective 13-day weathering removal half-life from plant leaves.
p. F-7	par. 4	Please give all the equations for the total uptake for 50 years for all the ingestion pathways.
p. F-8	par. 3	It should also be stated that all calculations are based on the acute rather than chronic exposure calculation procedures, so that the estimates are conservative. Additionally, it's referenced here that only the inhalation case is addressed. Ingestion should also be addressed and ICRP 19 gives appropriate values for calculating such estimates.
p. F-8	par. 4	References to the ICRP publications 2 and 6, and updates due to later publications, apparently are in error and should be adjusted appropriately. Reference #8 does not belong in both reference situations.
p. F-9	table 2	Of the maximum permissable concentrations for water and air, are those for the 168 hour exposure properly adjusted for the general public, or are these the 40 hour a week values? Please note at the top of the table which values we are concerned with here.

p. F-10	par. 2	Reference is given to the rem per μCi per cc inhaled derived from the calculation of the maximum permissible concentration for air. In addition, the rem per μCi inhaled is generated from the Task Group on Lung Modeling. Please provide a comparison of these values or show how these terms might be used to compare procedures.
p. F-10	table 3	Reference the maximum permissible occupational dose in rem. Please provide the maximum permissible general public dose for these organs.
p. F-10	par. 3	Reference to ICRP #19 which is also appropriate for use when calculating dose conversion factors for ingestion.
p. F-11		The inhalation dose conversion terms, which have been referenced, have not been provided. Please provide a summary table of these. Please give an example of the total dose calculation procedure for an airborne release of plutonium 239 and also that from ingestion. These examples of total dose should include contributions which are due to resuspension, plume submersion, ground plane radiation, plus ingestion (which would include direct ingestion, that which is applied on vegetation, and that which is acquired through meat and milk). The entire pathway for both routine releases and an accident scenario should be laid out in summary form, with an example showing the approximate doses that are derived from each component part of the pathway..
p. F-16	par. 1	It is stated here that all dose calculations are on the basis of an adult male. Please explain why children and women, particularly pregnant women, were not considered.
p. F-16	par. 3	Following the third sentence in that paragraph, a statement should be added that the area doses are then added together to give the total population dose.
p. F-17		The reference to 160 persons per square mile: This would be an inappropriate population density for an urban area. This matter has been commented on before.
p. F-18		Regarding the virtual number of people per unit area for vegetation, meat, and milk: The number of people supported per unit area of agricultural land around Rocky Flats is wholly inappropriate and is biased so grossly that it raises questions as to any validity to be assumed by the reader. It must be pointed out that in the entire discussion of F-18, while some comparison with whole body dose commitments is necessary, the major mode of exposure is inhalation and the major dose deposited is in the lung or the bone. Why only use the whole body dose in the comparison provided in the narrative of the DEIS? This is inappropriate and should be adjusted in the final document.
p. G-1		Regarding the authors of this particular appendix: Please identify the authors as to their background and competence in this area.

p. G-3	par. 1	Reference the low measured value in the lymph nodes reflecting a greater solubility of fallout plutonium than was assumed in a model: It is also assumed that fallout plutonium is of extremely small particle size, therefore, giving in effect a larger apparent solubility. It also points up the problem with mathematical models. If in actuality, the total amount that is assigned to the lymph nodes does not go to lymph nodes, then there must be a greater dose to another portion of the body, such as the marrow bone.
p. G-3	table G-2	Gonads should also be included as an organ of reference and related to the number of samples and the values measured.
p. G-3	par. 2	It must be pointed out that because of the latent period involved it is much too early to see any effect. The greatest concentrations of plutonium in fallout were identified in 1955 to 1965, and to date 1977 only about 17 years have elapsed. Most of the latent periods involved in cancer induction have been approximately 20-3 years.
p. G-6	par. 3	It should also be pointed out that while quite a large number of people have been exposed, only a few to a very high concentration and, only a very few have been studied. As a result, you have a low population with poor statistics and therefore the data will have limited or "no" value. The population of people studied must be increased. Hopefully this is being accomplished by the efforts of the Los Alamos Scientific Laboratory.
p. G-6	par. 5	It is improper to compare the maximum exposed individual with natural background strictly on the basis of external radiation levels. Bone and lung doses must be compared in an appropriate manner.
p. G-7	table G-5	Regarding the lung dose due to inhaled radionuclides: The 100 millirem per person per year is far too low. A more appropriate level would be approaching 5000 millirem due to radon daughter inhalation and deposition within the lung.
p. G-9	table G-6	The dose to the skeleton is given in rad and rem. Apparently, the RBE times the distribution factor (n) gives a constant value of 50. Normally in research such as this, the adjustment factor does vary instead of being absolutely the same for all situations. Please comment.
p. G-11	par. 1	If we assume that man and dog have the same radio sensitivity and relative life span and latency periods, then for man with a 1000 gram lung the maximum permissible lung burden would be less than 5 nanocuries, rather than the currently stated 16 nanocuries. Is any adjustment of this figure contemplated?
p. G-12		Please identify in the legend what the circles and dots are for.
p. G-13	table G-8	If we take the reciprocal of the values given in that Table, they all approximate 1 cancer per 10,000 rem. As you can't have just a part of a cancer, does this information indicate that you cannot have a cancer from less than 10,000 rem per individual?

Please provide a range of figures that may be related to our knowledge of today which says that cancer can be produced at a lower dose than is referenced here.

p. G-14 par. 1 At the end of the first paragraph - The reference to total body average should be total organ average.

p. G-15 par. 1 Should also mention uranium miners and effects of radon daughter exposures in the carcinogenesis of lung cancer.

p. G-19 par. 1 Reference Newcombe's estimate of total genetic risk of 10×10^{-6} per man-rem. Page 3-41 of this document says 20×10^{-6}. Please reconcile (See also Page G-26).

p. G-28 table G-14 Thyroid should also be added to this, with its appropriate dose commitment of 338 man rem. The genetic effects should be proper footnoted as to where they were transferred from. (They are not Tables 3.2.3-3 and 3.3.2-6.) The values under effect for fatal cancers under the low situation and for the genetic effects under the high and low situations are in error. Apparently, the adjustment was not made from 1 million to 1.4 million in the population.

p. G-29 table G-15 The values in this Table are in error due to the errors in G-13 and G-14. We really cannot completely evaluate the numbers due to our limited manpower and our inability to review the entire literature on this situation. In addition, the entire equations have not been provided in this document for checking the validity of such manipulations.

p. H-3 Other incidents worthy of note were a sulphuric acid spill onsite, involving approximately 2,000 gallons of concentrated sulphuric acid which resulted in the release of sulphate to Great Western Reservoir. It should also be mentioned that the laundry in Building 771 used to discharge into the triangle area to the north of that particular building. It should be noted that this area has been cleaned up; however, a contaminated soil situation did exist for a period of time. In addition, an accident known as the "hotpot" incident occurred due to improper plumbing and the use of a high pressure pump to transfer liquids via a pipeline. Industrial waste plumbing and sanitary plumbing were interconnected in this case.

p. H-7 The data runs only through May of 1976. The 1977 death of a jogger on the east access road was not included and is considered a lost-time injury.

p. H-8 par. 2 The maximum permissible lung burden of 0.016 microcuries should also be stated. The accuracy, or the minimum detectable activity, of such measurements should also be provided.

table H-3 The 1976 data should also be included.

There are two footnotes on this page, both having single asterisks Please properly note the footnotes.

par. 3 A statement should be made regarding any agreement as to the body counting results and autopsy data.

In Table H-5 for the years 1966, 1968, and 1969, the number of terminated employees should be transferred over to the total; however, it should be noted that records were to be kept only on people who had exceeded the maximum permissible lung burden. The footnote G has been attached to a figure of 20. Please indicate whether this is an accurate number or not, or whether that footnote was to belong somewhere else. Please add data also for 1976.

Please identify Dr. Judith E. Selvidge as to her qualifications to address this particular subject.

The footnote at the bottom of the page references Buildings 4, 7 and 8. Are these actual buildings at Rocky Flats, or are these types of buildings under construction with her model?

In the table presented here, the buildings are again identified as 4, 5, 7 and 8. Please see the previous comment regarding the identification.

par. 1 Please address the intentional airplane crashes that might be caused by terrorists and such probabilities.

Referencing Catagory and Description number 10: It is hoped that all of these containers are stored in buildings having an equivalent protection of 16 inches of concrete to preclude release of plutonium by terrorists use of airplanes to crash into the building.

figure 4 Does not address terrorists hijacking of aircraft, and an intentional crash is not considered in this handling of the data. Please include this in the evaluation.

Factors, Equations and Considerations

Used

In Selecting the

Protective Action Guide

for the

State of Colorado

Rocky Flats Emergency Response Plan

June 1977

p. H-9

p. H-10

p. H-10

p. H-11

p. I-i

p. I-1-14

p. I-1-17

p. I-3-13

p. I-3-18

p. I-3-25

INDEX

Rocky Flats Protective Action Guide
REM/Incident

Category	Mineral Bone
I	< 6
II	6-30
III	> 30

Based on a 70 year dose commitment.

Category I requires increased surveillance.

Category II requires increased surveillance, the protective action of "Duck and Cover" procedures and consideration of access control of the affected area to preclude radiation exposure.

Category III requires, in addition to the requirements of Category II, consideration of mass evacuation of the populace to preclude radiation exposure.

In the event of a catastrophic incident which could possibly result in the release of radioactive materials, in significant amounts not readily assessible from any plant structure or activity involved with extensive quantities of plutonium, americium and/or other transuranics, initially a Category III situation shall be assumed. Upon the provision of definitive data, appropriate reassessment of the category assignment shall be made.

The Protective Action Guide (PAG) is equivalent to the Emergency Reference Levels identified in the Medical Research Council of Great Britain's "Criteria for Controlling Radiation Doses to the Public after Accidental Escape of Radioactive Material" (1974). Should fission products be involved with an atmospheric release of radioactive materials, the PAG's provided in the Fort St. Vrain Emergency Response Plan and the PAG's based on the Medical Research Council's Emergency Reference Levels, would be deemed appropriate for use in a Rocky Flats Plant incident.

AJH:bjw
6/17/77

I. NUMERICAL VALUES.

(PAG adopted from MRC-ERLs)

Tissue or Organ	Emergency Reference Level (ERL) REM/Incident*
Whole Body	10
Lung and Thyroid	30
Bone	
Endosteal tissue**	30
Marrow	10
Gonads	10
Any other organ or tissue	30

* Based on 2 times the MPAD of NCRP Report #43.

** Assumed that endosteal tissue and mineral bone are similar.

(MRC-ERLs are the Medical Research Council's Emergency Reference Levels, 1974).

Calculations identified that the long-term organ at risk was the mineral bone when equivalent dose estimates for Class Y and Class W RF Pu compounds when compared against the MRC-ERLs. (See Item V-C.)

II. CATEGORY DEFINITION.

Category I is approximately equivalent to a 70 year natural background dose to surface bone (national average).

Category III is equivalent to an approximate doubling dose for total bone cancer deaths prior to age 70 years (Colorado Vital Statistics, 1975).

The factor of 5 between Categories I and III was adopted from the EPA PAG's for light water reactors which was based on the risk versus cost of protective action analyses

The MRC states, "The emergency reference level of dose is the basic standard. It is briefly defined as the radiation dose below which countermeasures are unlikely to be justified. When it seems likely that a radiation dose will exceed the ERL, countermeasures would be undertaken provided that a substantial reduction of dose is likely to be achieved and provided that the countermeasures can be carried out without undue risk to the community." "The ERL's are put forward not as firm action levels but as dose levels at which the responsible authorities should judge whether countermeasures should be introduced, . . ." (Medical Research Council, 1974)

"The action appropriate after an accident cannot be decided solely on the basis of the radiation doses that might be received; it is also necessary to consider the practicability of instituting countermeasures, the risks the latter might incur and the size of the population affected." (Medical Research Council, 1974)

III. MAXIMUM CREDIBLE ACCIDENT (MCA).

(As proposed by Rocky Flats and used by the State of Colorado* for present planning purposes).

100 grams of 0.3 micrometer AMAD particle size distribution RF Pu completely dispersed and released from a 10 or 50 meter effective stack height during a Stability Category F and a wind speed of 6.7 miles per hour (3 meters/second) meteorological circumstances.

*The Colorado Department of Health does not approve or endorse in any manner the MCA proposed by RF due to the nature of the plant's operation.

IV. CATEGORY III AND II AREA ESTIMATION FOR PLANNING PURPOSES.

Category III and II areas were estimated using the Standard Dose Tables for Rocky Flats Plant Ambient Air Incident Releases, June 1977, Colorado Department of Health (V-B).

Using Table II B', a 100 gram release, 6.7 mph wind speed, a Category III area is estimated to be 4 miles from the center of the plant site for a 50 meter (H). The uncertainty of the MCA, the infrequency of a Stability Category F situation, the change in the effective stack height due to the land mass slope to the east of the plant proper, and the MRC narrative recommendation were considered in selecting the Category III area for planning purposes. The Category II area was selected in the same manner at a 10 mile distance from the plant center.

Based on a Stability Category D for conservatism, the plume width at a 4 mile distance would be 1.4 miles and at a 10 mile distance, 3.1 miles wide.

ITEM V

Additional Supportive Information

Item V-A. Acute Exposure Dose Calculations and Values Used by the Colorado Department of Health.

$$\text{Lung Dose (rem)} = 51.1\,(E_1)\,\frac{v\,c\,f_3\,D}{M_1}\left[\left\{(f_8)\,\frac{1}{\frac{\ln 2}{\frac{(T)(t_8)}{(T)+(t_8)}}}\left(1-e^{-\frac{\ln 2X}{\frac{(T)(t_8)}{(T)+(t_8)}}}\right)\right\} + \left\{(f_9)\,\frac{1}{\frac{\ln 2}{\frac{(T)(t_9)}{(T)+(t_9)}}}\left(1-e^{-\frac{\ln 2X}{\frac{(T)(t_9)}{(T)+(t_9)}}}\right)\right\} + \left\{(f_{10})\,\frac{1}{\frac{\ln 2}{\frac{(T)(t_{10})}{(T)+(t_{10})}}}\left(1-e^{-\frac{\ln 2X}{\frac{(T)(t_{10})}{(T)+(t_{10})}}}\right)\right\} + \left\{(f_{11})\,\frac{1}{\frac{\ln 2}{\frac{(T)(t_{11})}{(T)+(t_{11})}}}\left(1-e^{-\frac{\ln 2X}{\frac{(T)(t_{11})}{(T)+(t_{11})}}}\right)\right\}\right]$$

$$\text{Mineral Bone Dose (rem)} = 51.1\,(E_3)\,\frac{v\,c\,f_{15}\,D}{M_3}\,[B]\left[(f_{20})\,\frac{1}{\frac{\ln 2}{\frac{(T)(t_{20})}{(T)+(t_{20})}}}\left(1-e^{-\frac{\ln 2X}{\frac{(T)(t_{20})}{(T)+(t_{20})}}}\right)\right]$$

$$\text{Liver Dose (rem)} = 51.1\,(E_4)\,\frac{v\,c\,f_{16}\,D}{M_4}\,[B]\left[(f_{21})\,\frac{1}{\frac{\ln 2}{\frac{(T)(t_{21})}{(T)+(t_{21})}}}\left(1-e^{-\frac{\ln 2X}{\frac{(T)(t_{21})}{(T)+(t_{21})}}}\right)\right]$$

$$\text{Gonad Dose (rem)} = 51.1\,(E_5)\,\frac{v\,c\,f_{17}\,f_{18}\,D}{M_5}\,[B]\left[(f_{22})\,\frac{1}{\frac{\ln 2}{\frac{(T)(t_{22})}{(T)+(t_{22})}}}\left(1-e^{-\frac{\ln 2X}{\frac{(T)(t_{22})}{(T)+(t_{22})}}}\right)\right]$$

$$B = f_3 \left[f_{14} \left\{ (f_8)\left(1-e^{-\frac{\ln 2X}{\frac{(T)(t_8)}{(T)+(t_8)}}}\right) + (f_9)\left(1-e^{-\frac{\ln 2X}{\frac{(T)(t_9)}{(T)+(t_9)}}}\right) \right\} + \left\{ \left[(f_{10})\left(1-e^{-\frac{\ln 2X}{\frac{(T)(t_{10})}{(T)+(t_{10})}}}\right) \right] \left[(f_{12})\left(1-e^{-\frac{\ln 2X}{\frac{(T)(t_{12})}{(T)+(t_{12})}}}\right) + \right.\right.\right.$$

$$\left.\left.\left. (f_{13})\left(1-e^{-\frac{\ln 2X}{\frac{(T)(t_{13})}{(T)+(t_{13})}}}\right) \right] \right\} + \left\{ (f_{11})\left(1-e^{-\frac{\ln 2X}{\frac{(T)(t_{11})}{(T)+(t_{11})}}}\right) \right\} \right] + f_2 \left[(f_{14}) \left\{ (f_6)\left(1-e^{-\frac{\ln 2X}{\frac{(T)(t_6)}{(T)+(t_6)}}}\right) \right\} + \left\{ (f_7)\left(1-e^{-\frac{\ln 2X}{\frac{(T)(t_7)}{(T)+(t_7)}}}\right) \right\} \right] +$$

$$f_1 \left[f_{14} \left\{ (f_4)\left(1-e^{-\frac{\ln 2X}{\frac{(T)(t_4)}{(T)+(t_4)}}}\right) \right\} + \left\{ (f_5)\left(1-e^{-\frac{\ln 2X}{\frac{(T)(t_5)}{(T)+(t_5)}}}\right) \right\} \right]$$

B = 0.132 for Class W and 0.0793 for Class Y compounds.

Dose/uCi inhaled = rem ÷ [(v)(c)(D)]

Assumption: Adult reference man 70 year somatic doses (30 year genetic dose) results in equal to or greater than doses calculated for newborns, adolescents and adult females.

TABLE A-1

$E = \sum EF\ (RBE)n$ = effective energy (see Table A-2)

E_1 = Lung
E_2 = Pulmonary Lumph Nodes
E_3 = Mineral Bone
E_4 = Liver
E_5 = Male Gonads
E_6 = Female Gonads

v = volume inhaled per unit time, i.e., m^3/day

c = concentration per unit volume, i.e., uCi/m^3

D = duration of exposure in days

M = mass of the organ of reference in grams

M_1 = pulmonary lung = 570
M_2 = pulmonary lymph nodes = 15
M_3 = mineral bone = 5,000
M_4 = liver = 1,800
M_5 = male gonads = 40
M_6 = female gonads = 8

f = fraction translocated from one area or organ to another (see Table A-3)

t = biological half time in days (See Table A-4)

T = physical half time in days (see Table A-5)

X = dose commitment acquisition period in days

70 years is 25567.5 days
30 years is 10957.5 days

51.1 = factor for per day calculations

B = fraction reaching the blood

TABLE A-2

Organ	Pu^{238}	Pu^{239}	Pu^{240}	Pu^{241}	Am^{241}	Pu^{242}
E or Effective Energy $[\Sigma EF(RBE)n]$						
Lung	57	53	53	0.013	57	51
Mineral Bone	284	266	266	0.013	283	253
Liver	57	53	53	0.013	57	51
Gonads	57	53	53	0.013	57	51
PLN	57	53	53	0.013	57	51
T or Physical Half time						
'days	31,922,85	8,766,000	2,410,650	5,523.08	158,153	141,351,750
Rocky Flats Weapons Grade Plutonium Abundance						
Curies/gram RF Pu	0.0017	0.057	0.013	0.42	0.013*	0.000001
		$\underbrace{0.057 + 0.013}_{0.070}$				
Relative to $Pu^{239+240}$	0.02429	1		6	0.18571	0.00001429

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* at maximum ingrowth (80 years from time of manufacture at RF); the rest are abundances at the time of manufacture at RF.

PLN - Pulmonary Lymph Nodes.

TABLE A-3

f Notation

f_0 = fraction exhaled
f_1 = fraction inhaled to Nasopharyngeal (N-P) region
f_2 = fraction inhaled to Tracheobronchial (T-B) region
f_3 = fraction inhaled to Pulmonary (P) region
f_4 = fraction from N-P region to Gastrointestional tract (GIT) with t_4
f_5 = fraction from N-P region to blood with t_5
f_6 = fraction from T-B region to GIT with t_6
f_7 = fraction from T-B region to blood with t_7
f_8 = fraction from P region to GIT with t_8
f_9 = fraction from P region to GIT with t_9
f_{10} = fraction from P region to Pulmonary Lymph Nodes (PLN) with t_{10}
f_{11} = fraction from P region to blood with t_{11}
f_{12} = fraction from PLN to blood with t_{12}
f_{13} = fraction from PLN to blood with t_{13}
f_{14} = fraction from GIT to blood
f_{15} = fraction from blood to mineral bone
f_{16} = fraction from blood to liver
f_{17} = fraction from blood to other organs
f_{18} = fraction of other organs component to male gonads
f_{19} = fraction of other organs component to female gonads
f_{20} = fraction from mineral bone excreted with t_{20}
f_{21} = fraction from liver excreted with t_{21}
f_{22} = fraction from gonads excreted with t_{22}

Where:

$f_0 + f_1 + f_2 + f_3 = 1$

$f_4 + f_5 = 1$

$f_6 + f_7 = 1$

$f_8 + f_9 + f_{10} + f_{11} = 1$

$f_{12} + f_{13} = 1$

$f_{15} + f_{16} + f_{17} = 1$

f_{20}, f_{21} and $f_{22} = 1$

TABLE A-4

f and t Variables

	Class Y		Class W	
x	f_x	t_x	f_x	t_x
1	*0.08	NA	*0.08	NA
2	*0.08	NA	*0.08	NA
3	*0.42	NA	*0.42	NA
4	0.99	0.4	0.90	0.4
5	0.01	0.01	0.10	0.01
6	0.99	0.2	0.50	0.2
7	0.01	0.01	0.50	0.01
8	0.40	1.00	0.40	1.00
9	0.40	500.00	0.40	50.00
10	0.15	500.00	0.05	50.00
11	0.05	500.00	0.15	50.00
12	0.90	1000.00	1.00	50.00
13	0.10	1×10^{90}	0.00	1.00
14	**0.000001	NA	**0.00003	NA
15	0.45	NA	0.45	NA
16	0.45	NA	0.45	NA
17	0.10	NA	0.10	NA
18	0.005	NA	0.005	NA
19	0.001	NA	0.001	NA
20	1.00	36525.00	1.00	36525.00
21	1.00	14610.00	1.00	14610.00
22	1.00	1×10^{90}	1.00	1×10^{90}

NA = not applicable.

* for 0.3 um AMAD particle size distribution from TGLM, 1966.

** listed for the plutoniums; americium = 0.001.

TABLE A-5

	Total rem from inhalation of RF Pu/uCi Pu-239+240 measured in air
Lung (Class Y)	1100
Mineral Bone (Class Y)	2400
Mineral Bone (Class W)	4000
Liver (Class W)	1600
Gonads* (Class W)	60

* 30 year integral dose while rest are 70 year dose acquisition periods regardless of the age of the individual at the time of exposure.

Method of Calculation:

Σ(rem/uCi for each radioisotope present in RF Pu x its relative abundance in RF Pu)

ITEM V-B

Emergency Response
Standard Dose Tables
for the
Rocky Flats Plant

Ambient Air Incident Releases

June 1977

Colorado Department of Health

<u>Basic Calculation Equation Parameters to Generate the Standard Dose Tables</u>

<u>for Rocky Flats Plant Ambient Air Releases</u>

$Xu/Q \times Q \times DCF \times T \div u$ = dose over 70 or 30 years
or
$Xu/Q \times QT \times DCF \div u$ = dose over 70 or 30 years

Where:

Xu/Q = is in m^{-2} from Figures 3-5A through F of the PHS publication "Workbook of Atmospheric Dispersion Estimates".
Q = release rate in Ci/sec.
basic figure; 1 gm RF Pu = 0.07 Ci
1 hour release is equal to 1.94×10^{-5} Ci/sec.
QT = release (total) in Ci.
DCF = Dose Correction Factor in units of $\frac{1 \text{ rem/hr}}{(x)\text{Ci/m}^3}$

<u>RF Plutonium</u>

Lung (70 year dose) Class Y $\frac{1 \text{ rem/hr}}{1.1 \times 10^{-9} \text{ Ci/m}^3}$

Mineral Bone (70 year dose) Class Y $\frac{1 \text{ rem/hr}}{5.0 \times 10^{-10} \text{ Ci/m}^3}$

Mineral Bone (70 year dose) Class W $\frac{1 \text{ rem/hr}}{3.0 \times 10^{-10} \text{ Ci/m}^3}$

Gonads (30 year dose) Class W $\frac{1 \text{ rem/hr}}{2.0 \times 10^{-8} \text{ Ci/m}^3}$

Based on Table VII "A Risk Evaluation For the Colorado Plutonium-in-Soil Standard", January 1976, Colorado Department of Health.

<u>Americium-241</u>

Incident Dose Estimates using the Standard Doses for RF Pu will provide estimates 118% of those appropriate for pure Am-241 on an activity basis.

<u>Method of Calculation</u>

$$\frac{[(1100, 2400, 4000, \text{ or } 60 \text{ rem})/(70 \text{ or } 30 \text{ years}) \times (24 \text{ hrs/day}) \times (365.25 \text{ days/year})]}{[1 \times 10^{-6} \text{ Ci}/(70 \text{ or } 30 \text{ years}) \times (20 \text{ m}^3\text{/day}) \times (365.25 \text{ days/year})]} =$$

$$\frac{1 \text{ rem/hr}}{(x)\text{Ci/m}^3}$$

T = duration of exposure in hours (1 hour)
u = wind speed in meters/sec (1 mph = 0.447 m/s)

TABLE IA (Rocky Flats) Class Y
Standard* Lung Dose in Rem (70 years) from Acute Exposure
to Rocky Flats Plutonium [10 m(H) 300 m(L)]

MILES	STABILITY CATEGORY A	B	C	D	E*	F*
1	0.170	0.296	0.868	2.680	5.330	11.050
2	0.091	0.122	0.237	0.986	1.970	4.340
4	0.049	0.067	0.095	0.442	0.947	1.780
6	0.034	0.046	0.063	0.185	0.414	1.030
8	0.028	0.036	0.051	0.118	0.276	0.710
10	0.023	0.030	0.043	0.091	0.205	0.552
12	0.020	0.026	0.037	0.067	0.166	0.414
14	0.017	0.024	0.032	0.049	0.130	0.355
16	0.015	0.020	0.028	0.041	0.110	0.300
18	0.014	0.019	0.025	0.037	0.099	0.256
20	0.013	0.017	0.023	0.035	0.087	0.237

TABLE 1B (Rocky Flats)
Standard* Lung Dose in Rem (70 years) from Acute Exposure
to Rocky Flats Plutonium [50 m(H) 5000 m(L)]

MILES	STABILITY CATEGORY A	B	C	D	E	F
1	0.0323	0.2800	0.7500	1.420	1.263	0.379
2	0.0045	0.0710	0.2370	0.750	1.026	0.907
4	0.0024	0.0253	0.0947	0.371	0.631	0.769
6	0.0021	0.0085	0.0316	0.166	0.331	0.592
8	0.0013	0.0047	0.0189	0.110	0.229	0.454
10	0.0011	0.0031	0.0130	0.091	0.178	0.371
12	0.0009	0.0021	0.0095	0.067	0.146	0.308
14	0.0008	0.0016	0.0071	0.049	0.122	0.260
16	0.0008	0.0012	0.0055	0.041	0.099	0.233
18	0.0007	0.0009	0.0045	0.037	0.087	0.197
20	0.0006	0.0008	0.0038	0.031	0.079	0.150

* See Notes

TABLE IIA (Rocky Flats) Class W
Standard* Mineral Bone Dose in Rem (70 years) from Acute
Exposure to Rocky Flats Plutonium [10 m(H) 300 m(L)]

STABILITY CATEGORY

MILES	A	B	C	D	E*	F*
1	0.622	1.080	3.180	9.840	19.530	40.510
2	0.333	0.448	0.868	3.620	7.230	15.910
4	0.181	0.246	0.347	1.620	3.470	6.510
6	0.126	0.169	0.231	0.680	1.520	3.760
8	0.101	0.133	0.188	0.434	1.010	2.600
10	0.084	0.111	0.156	0.333	0.752	2.030
12	0.072	0.097	0.135	0.246	0.608	1.520
14	0.064	0.087	0.116	0.181	0.477	1.300
16	0.056	0.075	0.101	0.152	0.405	1.100
18	0.052	0.068	0.093	0.136	0.362	0.940
20	0.048	0.062	0.084	0.127	0.318	0.868

TABLE IIB (Rocky Flats)
Standard* Mineral Bone Dose in Rem (70 years) from Acute
Exposure to Rocky Flats Plutonium [50 m(H) 5000 m(L)]

STABILITY CATEGORY

MILES	A	B	C	D	E	F
1	0.1190	1.0270	2.749	5.208	4.629	1.389
2	0.0166	0.2600	0.868	2.749	3.761	3.327
4	0.0088	0.0926	0.347	1.360	2.315	2.821
6	0.0077	0.0311	0.116	0.608	1.215	2.170
8	0.0048	0.0174	0.069	0.405	0.839	1.664
10	0.0040	0.0113	0.048	0.333	0.651	1.360
12	0.0035	0.0078	0.035	0.246	0.535	1.128
14	0.0030	0.0058	0.026	0.181	0.448	0.955
16	0.0028	0.0043	0.020	0.152	0.362	0.854
18	0.0025	0.0035	0.017	0.136	0.318	0.723
20	0.0022	0.0029	0.014	0.113	0.289	0.550

* See Notes

Table II A[1] (Rocky Flats) Class Y
Standard* Mineral Bone Dose in rem (70 years) from Acute
Exposure to Rocky Flats Plutonium [10m (H) 300m (L)]
Stability Category

Miles	A	B	C	D	E *	F *
1	0.377	0.648	1.908	5.904	11.718	24.306
2	0.200	0.269	0.521	2.172	4.338	9.546
4	0.109	0.148	0.208	0.972	2.082	3.906
6	0.076	0.101	0.139	0.408	0.912	2.256
8	0.061	0.080	0.113	0.260	0.606	1.560
10	0.050	0.067	0.094	0.200	0.451	1.218
12	0.043	0.058	0.081	0.148	0.365	0.912
14	0.038	0.052	0.070	0.109	0.286	0.780
16	0.034	0.045	0.061	0.091	0.243	0.660
18	0.031	0.041	0.056	0.082	0.217	0.564
20	0.029	0.037	0.050	0.076	0.191	0.521

Table II B[1] (Rocky Flats) Class Y
Standard* Mineral Bone Dose in rem (70 years) from Acute
Exposure to Rocky Flats Plutonium [50m (H) 5000m (L)]
Stability Category

Miles	A	B	C	D	E	F
1	0.0714	0.6162	1.649	3.125	2.777	0.833
2	0.0100	0.1560	0.521	1.649	2.257	1.996
4	0.0053	0.0556	0.208	0.816	1.389	1.693
6	0.0046	0.0187	0.070	0.365	0.729	1.302
8	0.0029	0.0104	0.041	0.243	0.503	0.998
10	0.0024	0.0068	0.029	0.200	0.391	0.816
12	0.0021	0.0047	0.021	0.148	0.321	0.677
14	0.0018	0.0035	0.016	0.109	0.269	0.573
16	0.0017	0.0026	0.012	0.091	0.217	0.512
18	0.0015	0.0021	0.010	0.082	0.191	0.434
20	0.0013	0.0017	0.008	0.068	0.173	0.330

* See Notes

TABLE IIIA (Rocky Flats) Class W
Standard* Gonadal Dose in Rem (30 years) from Acute Exposure
to Rocky Flats Plutonium [10 m(H) 300 m(L)]

STABILITY CATEGORY

MILES	A	B	C	D	E*	F*
1	0.0093	0.0163	0.0477	0.1480	0.2930	0.6080
2	0.0050	0.0067	0.0130	0.0543	0.1090	0.2390
4	0.0027	0.0037	0.0052	0.0243	0.0521	0.0977
6	0.0019	0.0025	0.0035	0.0102	0.0228	0.0564
8	0.0015	0.0020	0.0028	0.0065	0.0152	0.0391
10	0.0013	0.0017	0.0023	0.0050	0.0113	0.0304
12	0.0011	0.0014	0.0020	0.0037	0.0091	0.0228
14	0.0010	0.0013	0.0017	0.0027	0.0072	0.0195
16	0.0008	0.0011	0.0015	0.0023	0.0061	0.0165
18	0.0008	0.0010	0.0014	0.0020	0.0054	0.0141
20	0.0007	0.0009	0.0013	0.0019	0.0048	0.0130

TABLE IIIB (Rocky Flats)
Standard* Gonadal Dose in Rem (30 years) from Acute Exposure
to Rocky Flats Plutonium [50 m(H) 5000 m(L)]

STABILITY CATEGORY

MILES	A	B	C	D	E	F
1	0.00178	0.01540	0.04120	0.0781	0.0694	0.0208
2	0.00025	0.00391	0.01300	0.0412	0.0564	0.0499
4	0.00013	0.00139	0.00521	0.0204	0.0347	0.0423
6	0.00011	0.00047	0.00174	0.0091	0.0182	0.0326
8	0.00007	0.00026	0.00104	0.0061	0.0126	0.0250
10	0.00006	0.00017	0.00072	0.0050	0.0098	0.0204
12	0.00005	0.00012	0.00052	0.0037	0.0080	0.0169
14	0.00005	0.00009	0.00039	0.0027	0.0067	0.0143
16	0.00004	0.00007	0.00030	0.0023	0.0054	0.0128
18	0.00004	0.00005	0.00025	0.0020	0.0048	0.0109
20	0.00003	0.00004	0.00021	0.0017	0.0043	0.0082

* See Notes

TABLE IV
Plume Width (miles)*

STABILITY CATEGORY

MILES	A	B	C	D	E	F
1	1.2	0.8	0.6	0.4	0.3	0.2
2	2.2	1.7	1.1	0.8	0.6	0.4
4	4.0	3.1	2.1	1.4	1.0	0.7
6	5.6	4.2	3.1	2.0	1.5	1.0
8	7.1	5.5	3.8	2.6	1.9	1.3
10	8.6	6.6	4.7	3.1	2.4	1.6
12	10.1	7.8	5.6	3.6	2.8	1.8
14	11.1	9.0	6.3	4.1	3.1	2.1
16	12.7	10.3	7.1	4.7	3.5	2.3
18	14.2	11.2	7.8	5.2	3.8	2.6
20	15.7	12.1	8.6	5.7	4.2	2.9

*Based on Figure 3.2 "Workbook of Atmospheric Dispersion Estimates", DHEW, page 8.

$\sigma_y \times 6 \div 1.609$ meters = plume width (miles)

NOTES:

Standard Dose is for 1 gram RF Pu release,
(1.94×10^{-5} Ci/sec for 1 hour)(Q); 1 mph (u); and 1 hour or 3600 seconds (T).

Calculation for incident (early-on).
1) Standard Dose x grams RF Pu released ÷ u = Incident Dose Estimate.
2) Standard Dose x Ci/sec release rate x T ÷ u = Incident Dose Estimate.

Stability Category A [Most unstable class (vertical mixing)]
D [Neutral class]
F [Most stable class (no vertical mixing)]

For Stability Categories E and F at the 10 m or less (H), a larger H should be used due to the slope of the land mass to the east of the Plant's production area. The B series tables would be appropriate for early-on dose estimates for those circumstances.

ITEM V-C

Organ	PAG MRC-ERL REM/Incident	RF Pu REM/uCi inhaled Class Y	RF Pu REM/uCi inhaled Class W	pCi RF Pu/m^3* Class Y	pCi RF Pu/m^3* Class W	REM/Incident** Class Y	REM/Incident** Class W
Lung	30	1100	(110)	27,300	273,000	14	0.8
Endosteal Bone	30	2400	4000	12,500	7,500	30	30
Gonads	10	(36)	60	282,000	167,000	0.4	0.4
Others (liver)	30	(960)	1600	31,200	18,800	12	12

* based on 1 m^3/hr minute volume and a 1 hour exposure to attain the PAG.

** based on the pCi/m^3 for endosteal bone for Class Y and W compounds.

Illustrates that a PAG set on endosteal bone for RF Pu properly provides for conservative (lower) dose estimates for other organs.

( ) estimates based on ratio of RF Pu to Pu-239 for known class compound and on known content of RF Pu assumed to be handled identically.

ITEM V-D

EPA Protective Action Guides for Light Water Reactors

	Thyroid* (Radioiodines)	Whole Body (Noble Gases)
Category I	<5	<1
Category II	5-25	1-5
Category III	>25	>5

Revised 1977.

Category I - incident requires increased surveillance.

Category II - incident requires consideration of protective action (i.e., evacuation of women and children and access control of the affected area).

Category III - incident requires mass evacuation.

COLORADO DEPARTMENT OF HEALTH

4210 E. 11TH AVENUE DENVER 80220 PHONE 388-6111

ANTHONY ROBBINS, M.D., M.P.A. EXECUTIVE DIRECTOR

June 29, 1977

Major General J. K. Bratton, USA
Director of Military Application
U. S. Energy Research & Development Administration
Washington, D.C. 20545

Dear General Bratton:

Because of our concern for the health and safety of our citizens, the Colorado Department of Health appreciates this opportunity to comment on the proposed revision of the regulations governing the air transportation of plutonium (10 CFR 871).

There appears to be considerable improvement in the National Security Exemption portion (871.1) that deals with specifying who may authorize air shipments and under what conditions. We are concerned, however, that plutonium air shipments apparently may be made, as in the past, under the label of national security - a term not defined in the context of the law or the regulations.

It is our interpretation of Congress' intent that the only acceptable plutonium air shipments would be those necessary to respond to an emergency situation involving the threat of war. Therefore, a definition of "purposes of national security" should read: "actions required to respond to an emergency situation involving a specific threat of war, which has been recognized by an action of the Congress." Other circumstances in which plutonium air shipments might occur are simply matters of convenience to the agency and its contractors.

Following our review of plutonium shipments into and out of the Jefferson County Airport, the Colorado Department of Health remains unconvinced that such shipments are necessary. We suggest that Paragraph 871.2 on the public health and safety exemption be reworded so that state health departments may review the claims of health and safety needs prior to the use of this exemption.

Paragraphs 871.3(Records) and 871.4(Limitations on Redelegation of Authority) appear to be appropriate and necessary.

In the regulations, as a whole, there is a significant omission. You will recall that plutonium shipments have been made for the Rocky Flats plant into and out of the Jefferson County Airport - an airport without the capability to handle accidents involving plutonium. No emergency response plan exists for the agencies responsible for the protection of the health and safety of our citizens should an accident occur at that airport. It is absolutely essential that the rules include a requirement for the adequate protection of the public health and safety before any more plutonium is shipped by air. It is clear to us that an airport which cannot meet such stringent safety standards must not be used for plutonium shipments.

We hope that our constructive criticism will be helpful to you in rewriting the regulations so that they provde the safeguards to which our citizens are entitled.

Sincerely,

Anthony Robbins

Anthony Robbins, M.D.
Executive Director
COLORADO DEPARTMENT OF HEALTH

AR:j

Department of Local Affairs
Colorado Division of Planning

Philip H. Schmuck, Director

Richard D. Lamm, Governor

November 10, 1977

Mr. Ron Simsick
Colorado Department of Health
4210 East 11th Avenue
Denver, Colorado 80220

SUBJECT: Draft Environmental Impact Statement
Rocky Flats Plant Site

Dear Mr. Simsick:

The Division of Planning has completed its review of the Rocky Flats Plant Site Draft Environmental Impact Statement. We submit the following comments:

The DEIS shows that the plant benefits the Denver Metro area economically, but does not conflict with local land use plans. However, the assessment of the plant site does not evaluate the programs housed there, nor does it consider program alternatives. The DEIS also fails to evaluate public controversy over the plant in its present location.

The objective of the DEIS is not clear. It appears to be a defense of the safety of the existing plant. However, it never defines clearly ERDA's program objectives at the plant. The DEIS describes the production and research which benefit national defense, as well as providing technical knowledge and expertise to many disciplines of science. The implications of this work, apart from health and safety, are not analyzed according to the guidelines for preparation of environmental impact statements issued by the Council on Environmental Quality: "Agencies engaging in major technology research and development programs should develop procedures for periodic evaluation to determine...the magnitude of Federal investment in the program, the likelihood of widespread application of the technology, the degree of environmental impact which would occur if the technology were widely applied, and the extent to which continued investment in the new technology is likely to restrict future alternatives." (CFR, Title 40, Chapter V, Part 1500.6) Alternatives should be explored to reduce adverse environmental impacts, including "alternative technologies that would serve the same function as the technology under consideration." (Part 1500.6) The Final EIS should reevaluate its intention and scope in order to address these concerns.

Although the DEIS concludes that radiation from the plant poses no threat to human health, it acknowledges that research remains incomplete and controversial. The Lamm-Wirth Task Force notes: "Public testimony...made it clear not only that many people had only rudimentary knowledge of the operations at RF, but also that there were grave misgivings about the Plant's safety and the potential for a cataclysmic accident." (p. J-1-10) A recent newspaper article describes the social tensions

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which arise sometimes between Rocky Flats employees and their neighbors due to public misunderstandings of the plant's safety. (Straight Creek Journal, June 16, 1977, pp. 1,3) Controversy extends to the production of components for nuclear weapons. The secrecy surrounding the plant and the relatively technical explanations concerning its operations compound public distrust and uneasiness. The physical buffer zone may add to the psychological distance the public feels. The Final EIS should consider this controversy as an adverse social impact which may or may not be unavoidable.

The DEIS demonstrates that the plant benefits the Denver Metro area economically by supporting directly or indirectly a significant number of jobs. Nevertheless, a number of corrections need to be made. The discussion on Marginal Propensity to Consume (p. 3-103) seems extraneous, and the DEIS fails to follow through with its methodology. If 69.7% of disposable incomes is spent each round,the total amount spent over successive periods totals only 49 million dollars, rather than 100 million (which represents the total annual disposable income attributable to the plant). The DEIS cites 1975 figures from the Denver Regional Council of Governments for gross personal income in the Denver Metro area, but provides no bibliographic references. Several other sources challenge the figures of 7.3 billion dollars which the DEIS uses. A report by the United Banks of Colorado, Inc. (November 12, 1974, p. 24) forecasts 9.6 billion dollars. The 1972 Obers Projections (U.S. Water Resources Council, Series E, p. 68) puts the 1971 figure at 8.1 billion (in 1975 dollars, or 5.0 billion in 1967 dollars); due to the Metro area's tremendous growth since then, the 1975 figure would be much higher. According to a survey published in the spring of 1976, per capita income in Colorado is $5,839 (p. 9-5). Using this number, gross personal income in the Metro area would be at least 8.2 billion dollars for 1975. The DEIS states that the average personal income of a Rocky Flats employee far exceeds Colorado's per capita income: "These figures suggest that employees at Rocky Flats have a considerable impact toward enhancing the area economy." (p. 9-5) However, these figures measure two different things and cannot be compared as such. The 1976 average employee income, $14,560, is lower than the median income for the Denver Metro area, $16,724. (Unpublished figures from DRCOG, current to January 1, 1977) The Final EIS should make these revisions to put the economic impact of the plant into more accurate perspective. (Other related figures also need correction: average family size according to DRCOG (1977 Population and Household Estimates) is 2.83, rather than 3.96 which the DEIS reports (p. 3-100); the DEIS reports 1975 retail sales in the Metro area as 6.8 billion dollars (p. 3-103), but the United Banks document (p. 24) estimates 8.7 billion.)

The Division of Planning checked with the Boulder County and Jefferson County planning offices to evaluate the impact of the plant on local land use plans. We concur with the DEIS in concluding that there are no conflicts. Jefferson County supports plans to leave the Federal property around the plant as an undeveloped buffer zone. Some controversy has occurred over rezoning areas east of the plant where plutonium levels in the soil exceed the State standard. Jefferson County plans seem to take into account that residential development should not be encouraged in the area at present, although several land owners in the area have plans for subdivision development.

Very truly yours,

Charles G. Jordan
Senior Planner

Reviewed: Phil Schmuck
Philip H. Schmuck, Director

CGJ/JB/vt

STATE DEPARTMENT OF HIGHWAYS

JACK KINSTLINGER EXECUTIVE DIRECTOR

DIVISION OF HIGHWAYS
E. N. HAASE
CHIEF ENGINEER

NIL SINE NUMINE
STATE OF COLORADO

COLORADO STATE PATROL
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November 22, 1977

Mr. Philip H. Schmuck
Director
Colorado Division of Planning
520 Centennial Building
1313 Sherman Street
Denver, Colorado 80203

Dear Mr. Schmuck:

The Colorado Department of Highways has reviewed the Draft Environmental Impact Statement issued by the Energy Development and Research Administration regarding the Rocky Flats Plant Site. While the document provides a comprehensive overview of present operations and future alternatives, it is lacking in discussion of several aspects.

1. Analyses of transportation impacts of Rocky Flats on all affected highways are not cited. State and local jurisdiction should be made aware of transport on public highways. The routing of hazardous materials on the state highway system is not specified. Due to recent accidents and incorrectly marked commodities involving dangerous materials on Colorado highways, more stringent monitoring of commodity flow seems necessary to ensure public safety.

2. In the case of an emergency, what are the procedures in regard to evacuation and transport of employees out of the Rocky Flats sites, out of the affected area? Does the Emergency Prepardness Program deal with this type of activity?

3. Based upon concern regarding safety and durability of air shipment containers, the Colorado Department of Health is considering related radiation standards for adoption. Air transport includes use of both Stapleton and Jeffco airports and public highway ground links.

4. On page 7-1, what land use plan is being specified as a State plan?

5. The source and data of the Land Use Planning Map on page 7-2 should be identified.

6. The Regional Land Use Plan, adopted by the Denver Regional Council of Governments, should have been examined along with County and Local plans and reflected in the document

Thank you for allowing the Colorado Department of Highways the opportunity of reviewing the Draft Environmental Impact Statement regarding the Rocky Flats site.

Very truly yours,

Jack Kinstlinger
Executive Director

By

Harvey R. Atchison
Staff Environmental Manager

BCS/jc

STATE OF COLORADO

NIL SINE NUMINE

RICHARD D. LAMM
GOVERNOR

JOHN W. ROLD
Director

COLORADO GEOLOGICAL SURVEY
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715 STATE CENTENNIAL BUILDING – 1313 SHERMAN STREET
DENVER, COLORADO 80203 PHONE (303) ~~892-2611~~ 839-2611

November 16, 1977

Mr. Philip H. Schmuck, Director
Colorado Clearinghouse

Dear Mr. Schmuck: RE: DEIS - Rocky Flat Plant Site

We have studied the DEIS with particular emphasis on geology-related aspects. We have several comments which are listed and explained below.

1) Irreversible and Irretrievable Committments of Resources. The DEIS does not appear to present any plan or committment to an end use for the site when the current usage for processing plutonium and associated materials ends. It would seem very probable that for some combination of political, environmental, and technological factors that the site will eventually be decommissioned. If such an eventuality is not an integral part of environmental planning, an effective job of final decontamination may well be impossible or prohibitively costly. In either case there would be very significant committments of resources either monetary or use of the land.

In providing for effective long-term decontamination it is absolutely essential that either ongoing or provisional plans be formulated for dealing with radioactive residue from past accidental releases as well as streambed sediments, oil-spill soils, old waste disposal areas, etc. In addition to such point sources there presumably are dispersal plumes of entrained radioactive materials adsorbed or incorporated in the soil and in ground water. A long term strategy for detailed identification and dealing with these contaminated soils and water in their geological environment is needed. Although many of these issues are discussed in the DEIS, there is no clear program or committment to final decontamination of affected lands.

GEOLOGY
STORY OF THE PAST . . . KEY TO THE FUTURE

2) Comments on Volume 1, Sections 2.4.6 and 2.4.7 (Geology and Seismology)

The following comments reflect our evaluation of Volume 1, Sections 2.4.6 and 2.4.7 of the Draft Environmental Impact Statement on the Rocky Flats Plant Site. The DEIS was prepared by the Energy Research and Development Administration and was released September 1977.

We find these sections inadequate in several respects. In general, our primary objections to the geology and seismology sections are: 1) The DEIS persistently omits key references which document evidence of recent fault movement both on faults in the Rocky Flats area and in the entire Southern Rocky Mountains. A few of these references are Upson (1938), Scott (1970), Knepper (1974), Epis and Chapin (1975), Izett (1975), Taylor (1975), Scott (1975), Kirkham (1977), Kirkham and Rogers (in preparation) and many others. 2) The DEIS repeatedly states and/or implies the lack of evidence of post-Laramide orogeny fault activity throughout the State. If the above mentioned references had been used in preparation of the DEIS, it seems unlikely that such a seismo-tectonic interpretation would have been proffered. 3) The DEIS states that there is no evidence of Quaternary movement on the Golden fault. Recently published work by Kirkham (1977) indicates there have been multiple movements on the Golden fault during the Quaternary. Personnel from the Rocky Flats Plant were informed of these findings in November 1976. 4) The DEIS states no macroearthquakes have occurred on the faults in the Rocky Flats area during recorded history. An intensity VII earthquake occurred somewhere in this region in 1882. This earthquake may well have occurred on one of the faults near the Plant Site. 5) The DEIS does not acknowledge the occurrence of possible microearthquakes on the Golden fault recorded by the Colorado School of Mines in 1976 and by the USGS (Osterwald and others, 1973). 6) The magnitude and epicenter distance specified for the maximum expected earthquake and safe shutdown earthquake are inadequate. If the DEIS had included the information summarized in the above general comments and the following specific comments, the values used for these critical design criteria would be significantly altered.

The following paragraphs are specific comments about statements contained in Volume 1, Sections 2.4.6 and 2.4.7 on geology and seismology.

In Paragraph 2 of Section 2.4.6.1. (pg. 2-43) the DEIS states: "During the Laramide orogeny of late Cretaceous and early Tertiary periods, the mountains along the western margin of the Basin were uplifted, and the Basin was tilted eastward and assumed its present slope." The mountains which were formed during the Laramide orogeny are believed to have been leveled by erosion during the late Eocene. The present-day mountains are the result of post-Laramide tectonism which originated in the Miocene and has continued to the present.

The DEIS also states in Paragraph 2, Section 2.4.6.1: "Along the mountain front the structural pattern is interrupted by anticlines that fall to the southeast." This statement is very unclear and perhaps completely inaccurate.

The DEIS in Paragraph 3, Section 2.4.6.1 states: "The present framework of the Rocky Mountains, a highly complex relationship of folds and faults, essentially took shape during the Laramide orogeny." Again, the present day Rocky Mountains developed during post-Laramide tectonism.

The fifth paragraph of Section 2.4.6.1 discusses the post-Laramide geologic history of the area. No mention is made of the period of block faulting and accompanying earthquakes that initiated in the Miocene and has continued to the present.

The sixth paragraph of Section 2.4.6.1 discusses the Golden fault and concludes the fault is a "Laramide-age fault" and is "not a capable fault." Work by Scott (1970), Kirkham (1977) and Kirkham and Rogers (in preparation) indicates the Golden fault likely is a "capable fault," as defined by the NRC. The DEIS also states in this paragraph "Microseismic events have been recorded by the U.S. Geological Survey as possibly related to the Golden fault, however it is believed that the microseismic activity was primarily the result of construction and mining activities in the area. The microseismicity therefore is not considered an indication of fault capability." In this paragraph the DEIS does not cite the reference for this information nor does it make any mention of the 38 earthquakes recorded by the Colorado School of Mines seismograph between 1965 and 1976 which were located near the Golden fault.

In Paragraph 8 of Section 2.4.6.1 the DEIS states "There is no historical record of macroseismicity associated with any of these faults." This statement contradicts the statements made in Section 2.4.7.3 (pg. 2-74) when the DEIS states that an earthquake of intensity VII occurred somewhere in the Denver area in 1882. There seems to have been no serious consideration that this earthquake and/or others (i.e. see Table 2.4-16) may have occurred on a fault near the plant site.

Tables 2.4-12 and 2.4-13 have conflicting time scales. Table 2.4-12 indicates the "Recent" period lasted 5,000 years, whereas Table 2.4-13 indicates the "Recent" period is approximately 30,000 years in duration. Fig. 2.4-17 is in conflict with Plate 1, Appendix D of Volume 2. Plate 1 of Appendix D shows the Golden fault to extend northwestward and connect with the Livingston shear zone. In this illustration the Golden fault comes to within about three miles of the Plant. Why does Fig. 2.4-17 not show this?

Section 2.4.6.4 discusses geotechnical investigations at the plant site. The site investigation for the new plutonium recovery facility (pg. 2-59 to 2-64) was a comprehensive investigation, but the possible existence of a northeast-trending fault in the southeast portion of the plant site was not adequately disproved. This problem results from their alignment of drill holes and trenches (see Figs. 2.4-18 and 2.4-20).

On pg. 2-66 the DEIS discusses the possible existence of a fault or shear zone which crosses the plant site. This feature should be thoroughly examined by trenching to see if the feature is a fault and if so what the age of most recent movement is. Furthermore, a fault which displaces Quaternary deposits in Sec. 23, T. 2 S., R. 70 W., about two miles from the plant, is shown on Plate 1 of Volume 2, Appendix D. No mention of this structural feature is made anywhere in the text of Volume 1.

On pg. 2-67 (Section 2.4.6.4) the DEIS describes the reflection seismic project in which they use an obsolete Vibroseis system of data collection. This system is incapable of detecting faults at depths less than 600 feet and provides data of significantly poorer quality than is currently available from industry.

Also on pg. 2-67 the DEIS states "The Rocky Flats Plant is located on the <u>seismically stable</u>, upthrown crustal block . . ." This statement is not supported by their data or the information included in our comments.

Table 2.4-15 is out-of-date. Recent accelerograph records have significantly altered the acceleration values shown in this table. This up-dated data should be used rather than the 1963 table.

On pg. 2-70 in Section 2.4.7.2 the DEIS states the November 7, 1882 earthquake is believed to have occurred at the Rocky Mountain Arsenal. It is extremely difficult to locate the epicenter of an earthquake based on a few felt reports. This earthquake easily could have occurred anywhere in the Denver-Golden-Boulder region. Elimination of the Golden fault or other faults in the area as being possible causative faults is totally unsupported.

In Paragraphs 3 and 4 of Section 2.4.7.2. (pg. 2-70) the DEIS discusses regional seismicity. It does not mention the seismic activity near Steamboat Springs which is shown in Fig. 2.4-21. The DEIS also states in this paragraph "<u>Detailed</u> studies of Colorado seismicity have been in progress since the installation, in 1962, of the World-Wide Standard Seismograph Station at the Observatory." This statement is misleading. Only one seismograph is in operation in the State. It does not provide adequate coverage of the State. A minimum of five or six seismographs, strategically located in the State are needed before one can adequately locate seismic events in Colorado. Fig. 2.4-21 is incomplete. Several significant earthquakes are omitted from Fig. 2.4-21, including the 1882 event centered in the Denver region and the 1891 event in Axial Basin.

In Paragraph 2 of Section 2.4.7.3 the DEIS describes microearthquake activity in the vicinity of the Golden fault. Additional earthquakes located near the Golden fault that are not mentioned in the DEIS were detected by the Colorado School of Mines during 1976 and by the U.S. Geological Survey (Osterwald and others, 1973).

The DEIS states in Paragraph 3 of Section 2.4.7.3 "Because there is no historical record of macroseismicity associated with the Golden fault . . . the Golden fault is considered inactive from a seismological viewpoint." This statement is not substantiated. The 1882 earthquake may well have occurred on the Golden fault. In this same paragraph the DEIS states that prior to 1962, little seismic activity was noted in the Rocky Mountain Arsenal area. This statement directly contradicts an earlier statement in Paragraph 1 of Section 2.4.7.3 which indicated the 1882 earthquake occurred in the vicinity of the Rocky Mountain Arsenal.

On pg. 2-76 in Paragraph 5 of Section 2.4.7.3 the DEIS states that the magnitude 5.3 Derby earthquake indicates "the maximum, local, tectonic-strain energy available in the crust." There is absolutely no substantiation of this statement anywhere in the DEIS and it is our opinion that it is incorrect.

The final paragraph of Section 2.4.7.3 describes the magnitude and epicentral distance of the maximum expected earthquake and the safe shutdown earthquake. These values are based on the incomplete data contained in the previous pages of Section 2.4.6 and 2.4.7 and Appendix C of Volume 2. In light of the comments of this review, the magnitude and distance values used in the DEIS are deemed inaccurate.

In Paragraph 2 of Section 2.4.7.4 (pg. 2-78) the DEIS states "When making such comparison, if the geologic studies indicate recent tectonic movement (within the past 35,000 years), then a fault zone must be considered active and capable of generating potentially destructive earthquakes." Nowhere in the DEIS are "active" or "capable" faults defined. The DEIS should define these terms and explain their rationale for selecting their definitions.

In Paragraph 3 of Section 2.4.7.4 the DEIS states ". . . recorded seismic history of an area. . . (is) frequently much shorter than the time-span the geologist is able to interpret from the Quaternary geologic history." The geologist is always able to examine a time-span longer than the recorded seismic history.

In Paragraph 9 of Section 2.4.7.4 (pg. 2-79) the DEIS states "neither the Golden fault nor any other fault poses a seismic threat to the Rocky Flats site." Work by Scott (1970), Kirkham (1977), and Kirkham and Rogers (in preparation) indicates this statement is not accurate and that the Rocky Flats site could experience a large, destructive earthquake.

In Paragraph 10 of Section 2.4.7.4 (pg. 2-79) the DEIS states "There is no way of determining if Quaternary faulting in the area was accompanied by ground breakage or if it resulted from the slow, imperceptible movement called creep." In many situations it is possible to differentiate between sudden rupturing and creep through careful geological interpretation. Also, creep is not "imperceptible." Numerous examples of creep and damage caused by creep can be observed in California.

In Paragraph 12 of Section 2.4.7.4 (pg. 2-80) the DEIS states "There are insufficient data to accurately evaluate these features," referring to evidence of recent movement on the Frontal fault. A recent study by West (1977) does include sufficient data to evaluate these features.

In Paragraph 13 of Section 2.4.7.4 (pg. 2-80) the DEIS states "There is no indication of this type of (fault-induced) physical change in the Rocky Flats-Denver area as a result of recent seismic activity; therefore, major destructive earthquakes, as defined by Louderback, may not be reasonably expected to occur in this area." As documented by Scott (1970), Kirkham (1977), and Kirkham and Rogers (in preparation) there is definitive evidence of fault-induced physical change in the Denver-Rocky Flats area which is the result of recent seismic activity. Therefore, the conclusion as to the potential for future earthqueakes is invalid.

The final paragraph of Section 2.4.7.4 states that "an earthquake of magnitude 5.6 is a reasonable estimate of the maximum earthquake activity expected to affect the Rocky Flats site." Our review comments above show our rationale for our general disagreement with their selection of maximum possible earthquake parameters.

A list of references is attached for your general information. If we can be of further assistance, please let us know.

Sincerely,

Robert M. Kirkham
Robert M. Kirkham by WPR
Engineering Geologist

William P. Rogers
William P. Rogers, Chief
Engineering and Environmental Geology

RMK/WPR/ls

Attachment

cc: Ron Sismick, Colorado Department of Health

REFERENCES:

Epis, R. C., and Chapin, C. E., 1975, Geomorphic and tectonic implications of of the post-Laramide, late Eocene erosion surface in the southern Rocky Mountains, in Curtis, B. F., ed., Cenozoic history of the southern Rocky Mountains: Geol. Soc. America Memoir 144, p. 45-74.

Izett, G. A., 1975, Late Cenozoic sedimentation and deformation in northern Colorado and adjoining areas, in Curtis, B. F., ed., Cenozoic hisotry of the southern Rocky Mountains: Geol. Soc. America Memoir 144, p. 45-74.

Kirkham, R. M., 1977, Quaternary movements on the Golden fault, Colorado: Geology, v. 5, p. 689-692.

Kirkham, R. M., and Rogers, W. P., in preparation, Earthquake potential in Colorado: Colorado Geol. Survey Inf. Series.

Knepper, D. H., Jr., 1974, Tectonic analysis of the Rio Grande rift zone, central Colorado: Colorado School Mines Ph.D. Thesis T-1593, 237 p.

Osterwald, F. W., and others, 1973, Preliminary investigation of seismic tremors in the general area of the Leyden coal mine-gas storage reservoir, Colorado: U.S. Geol. Survey open-file rept., 23 p.

Scott, G. R., 1970, Quaternary faulting and potential earthquakes on east-central Colorado: U.S. Geol. Survey Prof. Paper 700-C, p. C11-C18.

_____, 1975, Cenozoic surfaces and deposits in the southern Rocky Mountains, in Curtis, B. F., ed., Cenozoic history of the southern Rocky Mountain: Goal. Soc. America Memoir 144, p. 227-248.

Taylor, R. B., 1975, Neogene tectonism in south-central Colorado, in Curtis, B. F., ed., Cenozoic hisotry of the southern Rocky Mountains: Geol. Soc. America Memoir 144, p. 179-226.

Upson, J. E., 1938, Late Tertiary and Quaternary faulting in the San Luis Valley, Colorado (abstr.): Geol. Soc. America Proc. no. 1937, p. 316-317.

West, M. W., 1977, A preliminary evaluation of the Quaternary geology, reported surface faulting, and seismicity along the east flank of the Gore Range, Summit County, Colorado: Colorado School Mines M.S. Thesis T-1828.

Department of ...
Colorado Bureau of Investigation
Richard D. Lamm, Governor

November 14, 1977

Mr. Ron Simsick
Colorado Department of Health
4210 East 11th Avenue
Denver, Colorado 80220

CBI File #0521-77

Dear Sir:

Pursuant to a letter from Philip H. Schmuck, Director, Colorado Clearinghouse requesting a review of the Rocky Flats defense against acts of terrorism and sabotage, our investigation reveals the following facts.

Due to the vague information given in the environmental impact statement, it was necessary for one of our agents to meet with Mr. James R. Nicks, Energy Research and Development Division, Mr. Walter Nelson, and one of the investigators working in security. On November 11th the agent toured the plant with Mr. Nelson.

Security of the plant is very good; over 130 security officers are working at the plant. The guards are well trained and have regular training in the use of firearms. Guards are trained in the use of metal detectors and various radiation detecting devices to prevent the loss of radio active materials or the entry of weapons into the plant.

The report that Mr. Nicks gave our agent indicates that two armored personnel carriers equipped with .50 caliber machine guns are on the plant grounds to be used in the case of terrorist attacks. The agent was not allowed to see the units because they were classified.

Security guards are trained in riot control techniques, and selected officers are trained in specialized areas such as explosives and bomb threats.

Strategically located radiation detectors and routine checks of personnel purses and lunchboxes in high security areas are designed to prevent removal of any materials from within. Physical inventories of all radionuclides are also frequently taken.

A large plant arsenal is available to ward off any terrorist attack from without. Weapons maintained by the plant include machine guns, handguns, rifles, shotguns, grenades and tear gas.

The plant site is fenced with a six foot chain link fence topped with barbed wire. The fence encloses ten square miles and about 6,200 acres of open prairie. In the center of this area the plant is protected by a similar type of fence. The plant area covers about three-quarters of a square mile. A security guard house is located both on the outer gates and the inner gates.

Guards at all gates are supposed to touch the badges of employees, according to the report, but several employees were observed driving through the west gates with only a wave as the security guard ate his lunch. It is possible that the guard has been there many years and knew the parties that entered. On the negative side of this action, the employee may have been dismissed from his job and the guard would not know of his termination.

The investigators of Rocky Flats have good relations with law enforcement agencies in the area. Information of possible threats to the plant are immediately passed to security officers by police officers in the intelligence community.

Several years ago the investigating CBI agent received information that a certain militant group had obtained plutonium. To support this information, the group wrote an article in their underground paper explaining how easy it was to make an atomic bomb. Rocky Flats Security was contacted and an investigator immediately responded with detection equipment. All known areas the group frequented were checked with negative results. An inventory was made of all plutonium storage areas and the story was proven false, but it is proof of the cooperation that is given by plant security.

A helicopter pad is located within the plant that assisting police or hospitals could use in the case of an emergency. St. Anthony's Flight for Life service is under contract with the plant.

All concepts of the security system were not revealed to us to maintain secrecy. Alarm systems, intercoms, and telephone systems were observed along with closed circuit TV.

On the surface, the Rocky Flats security system appears to be outstanding. This does not mean it cannot be penetrated. Security is constantly being upgraded as weak links are found. Employees are screened, but this might be the most difficult problem of security. Sabotage in this area is hard to detect because it many times appears as an accident.

Once a month visitors are allowed to take a tour of the plant which includes the plutonium storage and handling area. Names are submitted in advance and are checked for this tour. It would be impossible to make a complete search of their backgrounds in the time available between tours. All sensitive items are removed from the areas covered by the tour.

Mr. Ron Simsick
Page Three
November 14, 1977

From available information, plant security appears to be excellent.

Please advise this agency if we can be of further assistance in this matter.

Sincerely,

John R. Enright
Director

By Bob W. Harmon

Bob W. Harmon
Agent
Investigation Section

STATE OF COLORADO
Richard D. Lamm, Governor
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE
Jack R. Grieb, Director
6060 Broadway
Denver, Colorado 80216 (825-1192)

November 7, 1977

Mr. Ron Simsick
Colorado Department of Health
4210 East 11th Avenue
Denver, CO. 80220

Dear Mr. Simsick:

Enclosed herewith is a copy of an earlier memo that resulted from review of the DEIS Rocky Flats Plant Site (ERDA-1545-D). Mr. Taliaferro's comments in that October 6, 1977 letter are still completely appropriate to Division of Wildlife position and will not be supplemented.

Again, we appreciate the opportunity to review this environmental statement.

Sincerely,

Bert Baker

Bert Baker
Land Use Coordinator

BB:jb
cc: Colorado Clearinghouse
R. Evans
R. Taliaferro
Enclosure:

STATE OF COLORADO
Richard D. Lamm, Governor
DEPARTMENT OF NATURAL RESOURCES

DIVISION OF WILDLIFE

Jack R. Grieb, Director
6060 Broadway
Denver, Colorado 80216 (825-1192)

October 6, 1977

TO: Colorado Division of Planning

FROM: Division of Wildlife

SUBJECT: Rocky Flats Plant Site Environmental Statement

Most of the wildlife impacts associated with the Rocky Flats Plant have already occurred. Since the plant is located in the Denver Metro area, human disturbance on the surrounding lands limits the wildlife value of plant lands.

Because of previous land mismanagement, the wildlife habitat in the buffer zone surrounding the plant may be in better condition now than before the plant was built. However, security measures limit the potential for public enjoyment of the wildlife present.

The Division considers the plant area of minor importance to wildlife although it does serve as a small refuge for about 100 mule deer and other wildlife species and provides an opportunity to study potential radio active assimilation by wildlife in the area.

Thank you for the opportunity to comment on this environmental statement.

RIT:cs
cc: Evans

DEPARTMENT OF MILITARY AFFAIRS

DIVISION OF DISASTER EMERGENCY SERVICES
CAMP GEORGE WEST
GOLDEN, COLORADO 80401

CODES

November 10, 1977

Mr. Ron Simsick
Colorado Department of Health
4210 East 11th Avenue
Denver, Colorado 80220

Dear Mr. Simsick:

In reviewing the draft Environmental Impact Statement for the Rocky Flats Plant, the Division of Disaster Emergency Services, Department of Military Affairs, offers the following comments on the major issues in the areas of State interests requested from this Department.

1. We are not aware of any data or facts which would refute or alter the assessment made in the draft EIS in the areas of transportation of radioactive materials, or in emergency response planning.

2. Consequently, we feel that there is no reason to dispute the conclusions drawn in the draft EIS regarding the continued need for the facility, or on the treatment of alternatives.

3. Additionally, we feel that the draft EIS is a document which describes the effects of the Plant on the environment, and that our review of the statement should not be examined in the light of resolving the issues which are outlined in the Work Plan.

We offer the following comments on what the State response should be if the draft EIS is accepted without major revision.

1. We believe that in the area of transportation the State should have more capability of monitoring the surface and air transportation of shipments to and from the Rocky Flats Plant in order to provide a more rapid and effective response to accidents involving these shipments, should they occur. Incidentally, we feel that this capability should be developed for all hazardous materials shipped within the State.

2. We feel additional planning is necessary to develop an adequate response to transportation accidents involving hazardous

November 10, 1977

materials at the State and local level.

We offer the following comments, which are minor issues:

1. On page 2-237 reference is made to Region 8 Headquarters for DCPA. This should be changed to Region 6.

2. On pages 2-238, 2-239, 2-240, and 2-244 reference is made to the State Civil Defense Division. This should be changed to the State Division of Disaster Emergency Services.

3. On page 2-244 the description of NAWAS and METS is incorrect.

a. The National Warning System (NAWAS) is a dedicated Federal voice telephone net used for the direct and simultaneous dissemination of warning information. It connects the National Warning Center, the State EOC, and the State Warning Points, and has additional outlets - two of which are at Rocky Flats.

b. The Metropolitan Emergency Telephone System (METS) is a conference telephone system of the Denver Office of Emergency Preparedness connecting the Denver EOC with their Fire Department, Law Enforcement Agencies, adjacent municipal Communications Centers, the National Weather Service, various news media, and Rocky Flats.

Sincerely,

William D. Weller
Major General Colo. ARNG
Director DODES

cc: Mr. Philip H. Schmuck, Director
Colorado Clearinghouse

RICHARD D. LAMM
Governor

C.J. KUIPER
State Engineer

DIVISION OF WATER RESOURCES

Department of Natural Resources
1313 Sherman Street - Room 818
Denver, Colorado 80203
Administration (303) 892-3581
Ground Water (303) 892-3587

November 9, 1977

MEMORANDUM

TO: MR. RON SIMSICK, COLORADO DEPARTMENT OF HEALTH

FROM: DR. JERIS A. DANIELSON, DEPUTY STATE ENGINEER

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT - ROCKY FLATS PLANT SITE

In accordance with the work plan, we are submitting our comments concerning the above referenced statement to your agency which has been designated lead agency by the Staff Working Group. In general, we find that the statement is well prepared from a water resources viewpoint. We do have a question concerning the proposal to reuse all plant effluent rather than to discharge it to Walnut Creek and Great Western Reservoir. While we appreciate the necessity of discontinuing off-site discharge of effluent to protect Broomfield's drinking water, we would like to see a statement from the Denver Water Board which indicates that the reuse concept is legally permissible for the raw water supplied from Ralston Reservoir and Gross Reservoir. With the inclusion of this statement, we would have no objection to the Draft Environmental Impact Statement.

Jeris A. Danielson

Jeris A. Danielson

JAD/HDS:mvf

COLORADO DEPARTMENT OF HEALTH

4210 EAST 11TH AVENUE · DENVER, COLORADO 80220 · PHONE 388-6111

Anthony Robbins, M.D., M.P.A. Executive Director

November 28, 1977

Dr. Anthony Robbins, Executive Director
Colorado Department of Health
4210 East 11th Avenue
Denver, Colorado 80220

RE: Comments on DEIS, Rocky Flats Plant

Dear Dr. Robbins:

The Draft Environmental Impact Statement for the Rocky Flats Plant accurately describes the past failures of the wastewater treatment aspects of the operation. The DEIS goes on to provide a number of mitigating measures dealing with liquid wastes which, in the opinion of the document's authors, should successfully eliminate or at least mitigate further threats to the human environment. In our opinion, these arguments are unconvincing due to the rather shabby history of the plant in dealing with liquid wastes, and the ever-present potential for human error and the very real probability of catastrophic results. In short, if this DEIS were for a proposed nuclear weapons facility at the Rocky Flats site, we would strenuously recommend against it.

However, since the facility is a reality, and since the decision on relocation is not ours to make, we offer the following specific comments regarding water and wastewater at the Rocky Flats site:

1. Page 2-219: The appearance of nitrates in the area of the solar evaporation ponds is strong evidence that other pollutants including plutonium are also entering the groundwater. We recommend that all ponds,including those to hold runoff, be completely sealed and properly sized to prevent discharge to either surface or groundwaters.

2. Page 2-190: It is not proper to conclude that total retention is achieved by discharge to unlined ponds.

3. Page 4-8: It appears from the discussion on landfill operations that the possibility of seepage from the landfill still exists. If so, measures should be taken to eliminate all seepage to groundwater.

4. Page 2-197: A significant potential for groundwater contamination exists with the wastewater piping system. More information is needed on the age, size, and material of the system, as well as information on routine inspection and maintenance of the system. Particular emphasis should be given to careful flow measurements on the system to assure that no liquid waste is being lost to groundwater from leakage.

5. Pages 4-8 and J-1-48: Our information indicates that technical difficulties may delay the completion of the complete wastewater recycle system by FY 1978. A complete description of the system should be provided along with a thorough status report. Expected buildup of any chemicals or pollutants within the recycle system should be analyzed.

6. Section 3.2: No description is given of the possibility of floods at Rocky Flats and the related damage potential. Such information should be provided for both building damage and dam breakage under flood conditions of various magnitude including the maximum probable flood.

Very truly yours,

WATER QUALITY CONTROL DIVISION

Frank J. Rozich

Frank J. Rozich, P.E., Director
Water Quality Control Division

FJR:emf

ROCKY FLATS MONITORING COMMITTEE
1100 - 14th Street
Denver, Colorado 80202
Telephone (303) 623-5672

December 24, 1977

RECEIVED
DEC 27 1977
GOVERNORS OFFICE
FILE NO.

The Honorable Richard D. Lamm
Governor of Colorado
State Capitol
Denver CO 80203

Dear Governor Lamm:

The members of the Rocky Flats Monitoring Committee have reviewed the "Draft Environmental Impact Statement, Rocky Flats Plant Site" prepared by the Department of Energy, and we submit to you the comments which our members have made on the EIS at our recent monthly meeting.

1. The report is a well-intentioned and well-meaning comprehensive piece of hard work involving the time, the expertise and the efforts of many people; however, by its very nature it is a self-serving document largely prepared with information obtained from the people most directly involved in the Rocky Flats Plant and its operations. This is logical, understandable and necessary. After all, who else can supply the facts? But, due to this self-serving nature of the EIS, some aspects of the Plant's continuing operation have either not been adequately covered or they have been overlooked.

2. The EIS does not present sufficient evidence from the available epidemiological studies to conclude and state categorically that there is no health hazard resulting from the plant emissions, both radiological and nonradiological (i.e. beryllium). In particular, the report does not show sufficient documentation on the subject of low-level radiation and its effects, nor does the EIS make any prediction on the effects of low-level radiation on the populace.

3. Additional study and testing on the effects of low-level radiation over and above background level radiation is essential. The question arises: Does the increase in exposure to radiation (above background) affect a person's health in a straight line relationship, in a geometric relationship, or in a logarithmic relationship? Also, could small additional amounts of low-level radiation act as a catalyst in the effects on a person's health because of cumulative buildup?

4. The EIS does not adequately discuss the problem of restrictions on land use planning in the areas adjacent to the plant, nor does it discuss the effects of continued plant operation on restrictions on housing development in the land adjacent to the plant boundaries.

5. The assumed Maximum Credible Accident and the resultant release of radioactive materials is exceedingly conservative.

6. The EIS does not discuss the possible occurrence of terrorism at the plant and its effect on the population.

7. The people preparing the report obviously had to set a cut-off date for the receipt and assembling of data from the plant. As a result, some of the data in the EIS may now be out of date; therefore, provision should be made for a periodic updating of the material.

8. We are aware of, and wish to underscore the Colorado Department of Health's comments which represent professional staff work we do not have the capability to perform ourselves, and we are looking forward to the Department of Energy's response.

9. The EIS states that "The Rocky Flats Plant's principal benefit is its contribution to national defense." The issue of national defense, important as it is, should not be the sole criterion for continued operations of the plant at its present site. The health, safety and welfare of the people living in the growing and heavily populated Denver metropolitan area is also of considerable importance, and, should subsequent development and operations at the Rocky Flats Plant (because of harm and danger to the health, safety and welfare of the Denver area population) lead to the need for plant relocation, then the issue of national defense should not alone dictate the continued operation of the plant at its present site.

Respectfully submitted,

THE ROCKY FLATS MONITORING COMMITTEE

By John P. Elliott, Jr.
John P. Elliott, Jr., Chairman

JPE,Jr:FC

cc: The Honorable Timothy E. Wirth, U.S. Congressman
2nd District, Colorado

Mr. Earl W. Bean, Assistant Area Manager for Operations
U.S. D.O.E., Rocky Flats Area Office

Mr. G. Christian Crosby, Vice-Chairman
Rocky Flats Monitoring Committee

DOE STAFF RESPONSES TO THE COLORADO DEPARTMENT OF HEALTH COMMENTS ON THE ROCKY FLATS DRAFT ENVIRONMENTAL IMPACT STATEMENT (ERDA-1545-D)

Response to Letter of December 19, 1977 from Anthony Robbins

1. Benefits of the Plant

Justification for the existence of the Plant is discussed briefly in the Foreword to Volume I of the FEIS. As noted in Section 1.1, the FEIS is site specific; thus, no attempt is made to justify national policy in the area of weapons production. The specific benefits of the Plant in its present location are discussed in Chapter 9 of Volume I.

2. Site Safety

The analysis presented in the FEIS gives no reason, based on the health and safety of area residents, to relocate the Plant (Chapter 3). The question of a present-day location of such a facility would depend to a large extent on nonquantifiable socio-political factors.

Concerning the question of nuclear power plant siting at the Plant location, it is the policy of the Nuclear Regulatory Commission not to site a power plant within 5 miles of an active fault. Work by Davis (Appendix C, Volume II) indicates no active faults in the Plant vicinity, and Blume (cf references, Chapter 2, Volume I) concludes that the Golden Fault, the only major fault that may lie within 5 miles of the Plant, is not capable (active). Kirkham and Rogers (Colorado Geological Survey), however, have concluded that two fault movements have occurred within the last 500,000 years, rendering the Golden Fault (by definition) capable. Hence, a contract is scheduled to be let in the near future whereby an independent consultant will determine the location and activity of any faults in the Rocky Flats vicinity.

3. Low Level Radiation

Low-level radiation hazard has been fully evaluated in Volume I of the FEIS (Sections 1.3, 3.1.2, and 3.2.4) and in Appendix F (Volume II). A shift of emphasis from whole body dose calculations to organ dose calculations may be noted. Future doses associated with past, present, and future releases are computed as noted in the above-mentioned sections. Also, disposal systems as they currently exist at the Plant are described in Sections 2.7, 2.8, 2.9, and 2.10. The question of radioactive material removal (primarily soil) is considered in Sections 1.5.2, 1.9.5, 5.2.4, 5.5.1, and 9.5 where it is noted that soil removal operations are currently in progress. Inasmuch as radioactive waste material is not stored at the Plant, only issues related to shipping and handling are discussed in the EIS (Section 2.7.4).

4. Health Protection

The commitment of DOE is to keep radiation exposures as low as practicable and within guidelines provided in ERDA Manual Chapter 0524. The policy is that DOE "operations shall be conducted in a manner to assure that radiation exposure to individuals and population groups is limited to the lowest practical levels technically and economically practicable." This philosophy, called ALAP, is discussed in Section 2.7.2 (Volume I) of the FEIS.

5. Emergency Plans

With regard to questions concerning adequacy of the emergency plan, we submit that the results of our thorough and objective analysis of accident and risk potential indicate that, indeed, emergency planning is reasonable. The maximum credible accidents are discussed in Section 3.2.2.7 (Volume I) of the FEIS. For the release of plutonium, the maximum credible accident might occur as the result of an airplane crash accompanied by breaching of a filter plenum. The criticality accidents have been analyzed in great detail, and the FEIS includes revisions that are the result of additional studies in this area. Similarly, the transportation accident potential (Section 3.3) has been reviewed and revised. The effects of sabotage are not discussed in the EIS because to do so would weaken the effectiveness of the Plant's defense against these incidents. The actions that are taken to cope with accidents are expected to parallel the cooperation and effective teamwork seen in the past during normal operations between the State and the DOE. The DOE in the EIS assures the people of Colorado repeatedly that emergency response at the Rocky Flats Plant is something that is planned and practiced. History shows several examples in which the emergency team at Rocky Flats has responded to emergencies in an extremely effective manner. Federal resources on Plant site committed to response to emergency situations are discussed in Section 2.11. A Federal nuclear accident control program is available to respond to any accident involving nuclear materials (Section 2.11).

6. Transportation

Air shipments of plutonium to and from Rocky Flats were terminated in April 1977. In the future, air shipments of plutonium to or from the Rocky Flats Plant would be expected to resume only if made in containers certified as meeting aircraft crash, accident safety criteria, or as otherwise permitted for National Security purposes in accordance with 10 CFR Part 871 "Air Transportation of Plutonium."

Response to Letter of November 28, 1977 from A. Hazle to R. Simsick

I. Plant Location

The comment that the present Plant location is inappropriate is felt to be incorrect. It should be noted that (1) there is no perceptible increase in health effects for populations surrounding the Plant that could credibly be associated with continued Plant operations (as indicated by the FEIS analysis, Chapter 3), and (2) that levels of transuranics indicated by Plant vicinity air and water monitoring data are in compliance with all applicable health standards and regulations.

The Colorado Health Department (CDH), in the collection of monitoring information, has had full access to routine Plant environmental data. In addition, when transuranics-in-soil data downwind of the Plant are corrected for depth distribution (cf Report HASL-318), less than 1000 acres of off-site land exceed the State standard, which was described as "ultraconservative" by the State (Section 2.3.9.2). Under the USEPA screening level for transuranics-in-soil, no off-site land would need further assessment before full-time occupancy would be permitted. For these reasons, no incompatibilities are seen with the Plant in its present situation and its environment. The factors that work toward any perceived incompatibility are social and political, not technical.

II. Methodology for Dose Calculations

This concern has been addressed in the FEIS by extensive revisions of the dose calculations and discussions of the methodology (cf Sections 1.3, 3.1.2.3, 3.1.2.4, 3.2.4, and 3.3.2.2 of Volume I and Appendix F of Volume II). The emphasis has been shifted to organ dose calculations for both background and Plant impact assessment purposes.

III. Dose and Risk Estimates of Other Agencies

The assements mentioned are referenced and briefly described in Sections 2.3.9.2 and 2.11.4.3, respectively, of the FEIS (Volume I). The philosophy, however, of the FEIS is to present an independent detailed dose and risk evaluation. CDH may wish to compare their dose calculations with the methods described and used in the FEIS.

Similarly, the EPA guidance for environmental transuranics is described in Section 2.3.9.2 and comparisons given with its guidelines. Again, no methodological comparisons are made as it is felt the revised FEIS dose evaluations are not only more detailed and site-specific than other evaluations but should stand alone. The assessment of the Rocky Flats site with respect to the EPA Guidance is presented in Appendix G-4.

IV. Demographic Projections

Regarding demography, more current and more detailed demographic data and projections are used in the FEIS (cf Sections 2.3.3 and 3.1.2.4, especially Table 3.1.2-9). Also, assessments have been provided of high population densities immediately downwind of the Plant on calculations of population dose. Dose calculations may be done for other sectors following the examples given in Appendix F (Volume II).

V. Overestimating Health Risk

Several "conservatisms" and other required dose and source calculation assumptions are presented in Sections 3.1.2, 3.2.1, 3.2.2, 3.2.4, and 3.3.2.2 (Volume I) and Appendix F (Volume II) of the FEIS. Because of the complexity of the analysis, a single summary of approximations and assumptions was not attempted.

VI. Referencing of Standards and Guides

Standards, guides, regulations, and laws are identified and referenced as appropriate throughout the FEIS. The ERDA Manual Chapter 0524 requirement that mixtures of radionuclides be evaluated by comparing the sum of their fractional RCG levels to unity is stated in Sections 1.2.10 and 2.10.

VII. Cross References

The FEIS has been checked and corrected to avoid erroneous cross references. In addition, an index is included that should further assist the reader in this area.

VIII. Liability for Contamination

The decision of DOE to defend against this suit was based on points of legal liability and proof of damage. Any discussion of this matter in the FEIS is inappropriate as the case is currently under consideration in the courts.

IX. Waste Disposal

Rocky Flats uses DOE-approved waste repository sites (currently either the Idaho National Engineering Laboratory or the Nevada Test Site) for disposal of all of its low level radioactive wastes. The Plant generates no high level waste such as is associated with spent reactor fuel. The discussion of waste management appears in Section 2.7.6 (Volume I) of the FEIS.

Radioactive waste materials currently are not stored at Rocky Flats. In the past, when materials were disposed of on-site, these methods met regulations existing at that time.

Waste-site monitoring wells at Rocky Flats were placed according to the recommendations of the USGS regional hydrologist. These wells reflected elevated tritium concentrations in the groundwater in 1973. Since that time these concentrations have diminished to background levels except for several wells in the vicinity of the solar evaporation ponds. Water in Walnut Creek shows tritium concentrations distinguishable from background, but at the low levels observed, surface runoff is the probable source; consequently, it is considered at present that the aquifer is not contaminated.

Removal of soil containing plutonium activity is currently in progress. The actions regarding soil removal and activity concentrations are discussed in Sections 1.5.2, 1.5.5, 5.2.4, and 5.5.1 of the FEIS. Methods for removal of soil under the asphalt pad are being studied.

X. Air Transport of Plutonium

Air shipments of plutonium to and from Rocky Flats were terminated in April 1977. In the future air shipments of plutonium to or from the Rocky Flats Plant would be expected to resume only if made in containers certified as meeting aircraft crash, accident safety criteria, or as otherwise permitted for National Security purposes in accordance with 10 CFR Part 871 "Air Transportation of Plutonium."

XI. Seismic Design Criteria

A seismic evaluation of existing plutonium-operating buildings will be conducted in 1979 to determine the buildings' capability to withstand predicted loading. The results of this investigation will be incorporated in building Safety Analysis Reports. These documents will be published separately from the FEIS and will contain descriptions of each important facility. See Section 2.3.4.

XII. Nuclear Blackmail

The DOE has an elaborately structured organization and procedure for responding to nuclear blackmail threats, sabotage, and/or terrorist actions. The organization includes both DOE personnel and representatives from many DOE contractors. The procedure provides for rapid evaluation of the threat, investigation of the terrorists, and searching for and rendering safe the threatening hazard.

The plan has been tested and continues to be developed and perfected. The specific means and effects of possible sabotage, nuclear blackmail, or other terrorist activities and the many factors that are, or would be used to preclude such occurrences or to mitigate the effects thereof, are not appropriate for discussion in an EIS.

XIII. Health Effects

The estimated number of health effects to area residents over 70 years from 70 years of Plant operation, both in 1977 and 2000, are given in Table 3.1.2-11 (Volume I) of the FEIS. The doses from accident risk over 70 years are estimated to be 2 to 4 times smaller (cf Section 3.2.4.1). Hence, approximately one health effect would be expected over the 70 years.

XIV. Dose Calculations and Past Plant Releases

Dose calculations (cf Section 3.1.2.3, Volume I, FEIS) include past release effects by including conservative source terms including the results of past Plant airborne and waterborne releases (Sections 3.1.2.1, 3.1.2.2, and Table 3.2.4-9).

XV. Cutoff Point for Data Presented

This comment is answered in the Foreword to Volume I of the FEIS, where it is noted that information is current to December 1977, except where noted.

XVI. Review of Comments on the DEIS

Comments on the DEIS and the staff responses to them are presented in Volume III of the FEIS. A copy of the FEIS is being made available for information.

Specific Comment Page iii

The reference to WASH 1517 has been corrected in the Foreword to Volume I of the FEIS.

Page xxvii

The definition of "aquifer" has been modified in the FEIS (Volume I) Glossary. The definition of "briquette" was adequate as stated.

Page xxx

The definition of fuel cycle material was considered unnecessary and deleted from the Glossary of Volume I of the FEIS.

Page xxxi

The definition of a one-hundred-year storm has been corrected in the Glossary of the FEIS (Volume I). Note that the correct definition does not imply a probability of unity for the occurrence of this storm in a 100-year period. Also, the exact description of the storm for any area comes from an examination of whatever historical weather records exist for that area.

Page xxxiv

The requested change in the definition of "plutonium" has been made in the Glossary (Volume I, FEIS).

Page xxxv

A revised definition of "stack" has been incorporated in the FEIS Glossary (Volume I, FEIS).

Page xxxvii, Question 1

The definition of "uranium" has been modified in the Glossary (Volume I, FEIS).

Page xxxvii, Question 2

The definition of "Maximum Credible Accident" has been revised in the Glossary (Volume I, FEIS) and the term "Worst Case Condition," with an appropriate definition, has been substituted for "Worst Case Accident" in the FEIS.

Page 1-3

The reference in question has been deleted from Section 1.2.2 (Volume I) of the FEIS. No specific references are made in Chapter 1, as it is a summary. Appropriate references are made to standards in the remainder of the FEIS.

Page 1-3, paragraph 3

Section 1.2.10 (Volume I) of the FEIS has been modified to delete the reference to "as part of the statewide effort."

Page 1-3, paragraph 4

Section 1.2.10 (Volume I) of the FEIS has been modified to clarify the relative roles of CDH and Jefferson County Health Department in the operation of air sampler 56.

Page 1-4, paragraph 1

No shipments from the Rocky Flats Plant have been made that do not conform to limits mentioned in this DEIS reference (cf Section 2.6.10.1, Volume I, FEIS).

Page 1-5, paragraph 1

Section 1.2.3 (Volume I) of the FEIS has been changed in accordance with the comment concerning Standley Lake as a recreation area. (cf Section 2.3.1, Volume I, FEIS).

Page 1-6, paragraph 2

As noted in the answer to General Comment 2, text references addressing dose calculations have been modified to emphasize organ doses. These include estimates made of background radiation doses.

Page 1-7, paragraph 1

In Section 2.10 (Volume I) of the FEIS, mention is made of the method evaluating radionuclide mixtures.

Page 1-7, paragraph 2

As noted in revised Section 2.10 (Volume I) of the FEIS, although the correct procedure of treating radionuclide mixtures is recognized, the simplifying assumption of referring to single component concentrations and limits can be made with negligible error when the fractions of the RCG are very small. The practice is continued in the FEIS.

Page 1-7, paragraph 4

Organ dose calculations are emphasized in the FEIS (cf responses to General Comment 3 and the specific comment on Page 1-6, paragraph 2).

Page 1-8, paragraph 2

The most toxic nonradioactive substance handled in kilogram amounts at the Plant is beryllium; accordingly, (Sections 3.2.1 and 3.3.2.1, Volume I) in the FEIS, both a Plant operations-related and a transportation accident involving beryllium are included. Concerning sabotage, Section 1.3.2 notes that for security reasons, no accident scenarios are given. Section 2.11.3.1 discusses emergency plans to deal with terrorist attacks. Regarding floods, the impoundment-release accident (Section 3.2.2.3) is caused by flooding and is considered the maximum consequence in this area.

Page 1-8, paragraph 4

Reference to CDH Protective Action Guides has been included in Section 2.11.4.3 of the FEIS. Maximum rem doses to organs and whole body from all types of accidents, as well as from routine operations, are given together with health implications (cf Section 3.2.4, Volume I).

Page 1-9, paragraph 1

The dose calculations are referenced in the FEIS (Volume I, Section 3.3). Despite the high background radioactivity and one of the two worst smog situations in the country, the State of Colorado has a cancer death rate that is 68% of the national average.

Page 1-9, paragraph 5

This question suggests that the Rocky Flats Plant, in the person of Rockwell International Corporation, pay taxes to Jefferson County based on the assessed value of land occupied by the Rocky Flats Plant and that doing such would lessen an unavoidable adverse impact that now exists.

It should be recognized that the U.S. Government owns and fully controls all the land, buildings, equipment, and supplies that comprise the Rocky Flats Plant. Rockwell International Corporation, by virtue of its Rocky Flats Plant operating contract with the Department of Energy, is precluded from paying any seemingly applicable state and local taxes without prior approval from the Government. The matter of Rockwell paying a tax to Jefferson County based on Colorado requirements (C.R.S., Section 39-3-112) and on Rockwell's presence at Rocky Flats was referred to the Department of Energy in 1977 and approval for making the tax payment was refused. The question of whether Jefferson County's Rocky Flats Plant possessory interest tax assessment was properly imposed on Rockwell was placed before the U.S. District Court in Denver, Colorado for resolution. In a November 1978 opinion, the court ruled that the Colorado tax statute, as applied to the Rocky Flats Plant, was unconstitutional. The State of Colorado has appealed the decision to the 10th Circuit Court of Appeals.

Page 1-10, paragraph 2

Section 1.4.4 (Volume I, FEIS) has been modified to refer to the buffer zone in general terms regarding development near the Plant site. Also note changes in Section 4.4.1.

Page 1-10, paragraph 3

Section 1.4.4 of the FEIS (Volume I) has been modified. The comment is no longer pertinent to this chapter. See Section 5.5.4.

Page 1-11, paragraph 2

A modified and more conservative demographic approach to dose calculations has been adopted (Sections 3.1.2 and 3.1.2.4, Volume I, FEIS). Population dose calculations are made for the years 1977 and 2000, and for assumed high-density downwind populations. No projection has been made to the year 2047 (1977 +70 years) as projections this far in advance are too speculative.

Page 1-12

The intent of the discussion in the DEIS was that plans call for the new waste treatment facility to have capacity to handle our predictable maximum production needs. Revision of this Section has been made to avoid misunderstanding.

Page 1-12, paragraph 2

The FEIS has been modified to emphasize organ dose calculations and to use background radiation dose as a reference framework.

Page 1-12

The present actions regarding soil removal at the Plant site, including studies of activity concentration techniques for the soil beneath the pad, and are discussed in Sections 1.5.5, 5.2.4, 5.5.1, and 9.5.

Page 1-13, paragraph 2

Information presented in the DEIS (cf FEIS, Volume I, Sections 1.5.3 and 5.3) adequately addresses this question. The level of threat to the Denver metropolitan area from the Plant's existence in its present location is demonstrated to be orders of magnitude less than commonly accepted risks in everyday life (Chapter 3).

Page 1-13, paragraph 3

Levels of decontamination are discussed in FEIS (Volume I), Sections 5.4.2 and 5.4.3. In the latter section, it is postulated that all Plant structures and facilities would be demolished, crated, and shipped for storage, leaving only contaminated soil. The actions concerning contaminated soil are discussed in Section 5.4.2.

Page 1-13, paragraph 5

Cost factor references appear in Section 5.6 (Volume I, FEIS). Standby condition is described in Section 5.4.1. As noted in the answers to several other questions, emphasis in the FEIS is on organ dose. Details of the dose calculations as to demography and populations considered are given in Sections 2.3.3, 3.1.2.3, and 3.1.2.4. Three populations were considered: the 1977 area population, the DRCOG predicted year 2000 area population, and a hypothetical high-density year 2000 population near and downwind of the Plant. In the FEIS dose calculations are based on 70 years, as this is an average person's lifetime. This is a conservative estimate of the time (requiring lifetime residency) over which an individual would receive radiation dose from internally deposited radionuclides. The main significance of the year 2000 is that population projections beyond that time are felt to be highly uncertain.

Page 1-14, paragraph 4

The FEIS (Section 1.5.5 with Chapter 5, Volume I) is modified to account for the depth distribution associated with the EML measurements. Section 2.3.9.2 contains a detailed discussion of soil standards, and 2.3.9.3 gives information on various sampling techniques.

Page 1-15, paragraph 2

Section 1.5.5 (Volume I) of the FEIS has been changed to emphasize that any hazardous materials will be collected by the surface water control project. Materials and chemicals handled at the Plant are discussed throughout Chapter 2 of the FEIS.

Page 1-15, paragraph 4

In the FEIS (Volume I, Section 3.1.2.4), are the results of dose commitment calculations for 11.4 persons per acre in the area in question. As mentioned previously

(General Question 8), it is believed that the current land litigation is a matter of proof of (1) legal liability on the part of Dow, Rockwell, and/or the federal government; (2) negligence on the part of the defendants; and (3) measurable damage resulting from the alleged negligence. The government's decision to defend against a lawsuit is not an action affecting the environment, and does not necessitate the preparation of an environmental impact statement under the National Environmental Policy Act.

Page 1-16, paragraph 1

The dams are sized to contain runoff from the 100-year storm and to retain structural integrity with a probable maximum precipitation event. The project is described in Section 5.5.4 (Volume I) of the FEIS.

Page 1-17, paragraph 1

In the FEIS (Section 1.7.1, Volume I), the term has been changed to "low-density residential development."

Page 2-1, paragraph 2

In response to this question regarding weapons production prior to the construction of the Rocky Flats Plant, a lead-in to the first paragraph of Section 2.1 (Volume I) of the FEIS is added giving some additional history concerning the Rocky Flats site selection and noting the previous weapons production at Los Alamos, New Mexico, and Richland, Washington.

Page 2-3, paragraph 4

The requested information concerning Plant activities has been incorporated in Section 2.2 (Volume I) of the FEIS.

Page 2-8, Figure 2.3-3

Figure 2.2.2-2 in the FEIS (Volume I) has been corrected to show the area in question.

Page 2-9, paragraph 5

The material in this section appears in Section 9.1.2 (Volume I) of the FEIS. It is believed that the knowledge and ability to handle and process materials such as uranium and plutonium safely and efficiently is important to the effective development of nuclear power. The technology that has been developed at Rocky Flats has made significant contributions in this area.

Page 2-11, paragraph 3

The corresponding section in the FEIS (2.3.2, Volume I) has been retitled "Current Area Development" to emphasize the fact that the section refers to present area development. Projections as to future demography and area use are noted in Sections 2.3.3 and 7.1.

Pages 2-15 and 2-16

This concern was addressed in the answer to the question on page 1-13, paragraph 5. As indicated in Section 2.3.3 (Volume I, FEIS), updated area population projections are included. In addition, a third high-density-year 2000 population (11.4 per acre) immediately downwind and adjacent to the Plant has been considered (Section 3.1.2.4).

Page 2-21, Figure 2.4-6

The three-way valve in question is mentioned in Section 2.7.3.2 (Volume I) of the FEIS. As indicated in Figure 2.3.9-3 in the FEIS (Figure 2.4-6 in the DEIS) several valves, including the ones in question, north of B-3 and east of A-2 are sealed or plugged.

Page 2-22, paragraph 2

The suggested correction appears in Section 2.3.10.3 (Volume I) of the FEIS.

Page 2-23, paragraph 3

A draft land management plan has been completed and presently is being used to determine permitted activities on open-space lands within the Plant site. No additional EIS's are planned at this time.

Page 2-66, paragraph 5

The statement is from an E.G.&G. report concerning the interpretation of remote sensing imagery. Additional work is planned (cf Section 2.3.4, Volume I, FEIS) to investigate faults in the vicinity of the site and also the Golden Fault. A report by Kirkham (1977) indicates that the Golden Fault may be capable (active) because it has had two displacements within the last 500,000 years.

Page 2-73, Table 2.4-16

Both Figure 2.3.4-8 (Volume I) in the FEIS and Table 2.3.4-1 have been updated through 1977. No significant (Richter body wave magnitude greater than 3.7) earthquakes have occurred within 200 miles of the Plant since 1971.

Page 2-74, paragraph 3

The microseismicity related to construction and mining activities is caused by blasting and by a phenomenon similar to rock bursts, which is associated with the blasting (cf Section 2.3.4.7, Volume I, FEIS).

Page 2-82, paragraph 1

As noted in Section 2.3.5.1 (Volume I) of the FEIS, the direct discharge of treated sanitary sewage into South Walnut Creek was, in fact, discontinued in 1974, and discharge now is first through the B-series holding ponds. The question of pond seepage is discussed in Section 2.3.5.3 and 2.10.2.2. Also note the hydrologic test hole near Pond A-2 in response to the concern regarding seepage from this pond.

Page 2-82, paragraph 2

The surface drainage pattern associated with Woman Creek is discussed in Section 2.3.5.1 (Volume I) of the FEIS where it is noted that the creek receives water from South Boulder Diversion Canal leakage as well as clay pit dewatering. Subsurface water flow associated with the Woman Creek drainage is discussed in Section 2.3.5.2. Associated material movement, both surface and subsurface, is addressed in Section 2.3.5.3.

Page 2-82, paragraph 4

Prior to 1974, a small earth embankment was used sporadically to temporarily dam creek flow so that nitrate concentrations could be determined during periods of excessive runoff. Reference to pond construction has been included in the FEIS (Volume I), Section 2.3.5.1.

Page 2-83, Table 2.4-18

No measurements on inflow or outflow are available. Seepage and evaporation could be estimated but the uncertainties involved make such data of limited value. Hence, no water balance for Pond A-2 was attempted.

Page 2-84, paragraph 1

Groundwater hydrology and the movement and monitoring of material in the groundwater are discussed in FEIS (Volume I), Sections 2.3.5.2 and 2.3.5.3. Section 2.10.2.2 also provides additional information on groundwater monitoring.

Page 2-88 and 2-89

No immediate removal of sediment is planned. Specific controls and actions to prevent health hazard would be defined during the planning process.

Page 2-89, paragraph 1

A description of this specific storm drainage ditch has been deleted from the FEIS. A detailed description of the entire surface drainage system appears in Section 2.9.2. The discharges of the storm ditch are dropped in two steps from the surface of the Rocky Flats alluvium into the channel of South Walnut Creek. The first step drops the discharge from the storm ditch into a lower ditch that runs along the south side of South Walnut Creek. The drop between the two ditches is across the lower part of the Rocky Flats alluvium and the upper part of the underlying Arapahoe Formation. Erosion in this drop (Step 1) has produced a 7-foot gully. Flow is conveyed for about 708 feet in the lower ditch until the second-step drop of about 15 to 20 feet into the creek.

Page 2-89, paragraph 3

The comment is correct. The section was modified and replaced in the FEIS (Volume I) by Section 2.3.5.3, which subsequently omits the particular reference as it is not relevant to the intent of the discussion.

Page 2-90, paragraph 1

Recharge of the Arapahoe Formation aquifer is discussed in Section 2.3.5.2 (Volume I) of the FEIS. Little of the recharge is expected to come from ponds on Plant site, but would be included in the statement "... and groundwater movement from the overlying alluvial deposits." Also (cf Sections 2.3.5.3 and 2.10.2.2), several hydrologic test holes penetrate into the Arapahoe Formation, and recent samples from those holes (e.g., the 1977 Plant Monitoring Report) have not indicated transuranic movement into this aquifer.

Page 2-90, paragraph 2

The section on background radioactivity in the DEIS has been revised and estimates of dose have been removed (cf Section 2.3.8, Volume I, FEIS). Dose estimates from background radioactivity now appear as "frame of reference" numbers in Table 3.1.2-6 and are also expressed as organ doses.

Page 2-91, paragraph 1

The whole body dose number for fallout plutonium (intended to read (mrem/yr)) had been deleted.

Page 2-91, paragraph 4

In Section 2.3.9.1 (Volume I) of the FEIS, the word "inventories" is replaced by "concentrations."

Page 2-92, paragraph 1

In Section 2.3.9.2 (Volume I) of the FEIS, "1971" is changed to "1973."

Page 2-92, paragraph 2

The information in Section 2.3.9.2 (Volume I) of the FEIS has been modified in accordance with this comment. The estimated land area above the State guideline and outside the Plant site has been appropriately reduced.

Page 2-92, paragraph 3

Section 2.3.9.2 (Volume I) of the FEIS has been modified to omit the reference to soil measurements being made for the CDH and also to specify the names of the housing developments in question.

Page 2-92, paragraph 4

The discussions of soil sampling in Sections 2.3.9.1 through 2.3.9.3 are included to clarify the issue.

Page 2-94, paragraph 1

An edited version of this comment has been incorporated into Section 2.3.9.2 (Volume I) of the FEIS.

Page 2-94, paragraph 3

Section 2.3.9.2 (Volume I) of the FEIS has been modified to include mention of measurement made by the CDH, using the 1/8-inch sampling depth, for the Good Financial Corporation and other developers.

Page 2-96,

Additional information concerning waterborne transuranic releases from the Plant is included in Sections 2.3.9.4 and 2.3.9.5 (Volume I) of the FEIS. A table (2.3.9-2) of historical transuranic activity release amounts through the B-series of ponds and into Walnut Creek is provided. The old burning pits referred to have recently been excavated and the material shipped for disposal.

Page 2-97, paragraph 1

The change from "stream" to "steam" is made in Section 2.3.9.4 (Volume I) of the FEIS. In the DEIS, the discharge of treated sanitary waste to the B-ponds and hence into Walnut Creek was mentioned in Section 2.9.1, as it is in the FEIS. The fact is also mentioned in Section 2.3.9.4, per this comment.

Page 2-101, paragraph 1

The CSU measurements referred to were laboratory studies made with B-series pond water and sediments. The FEIS has been modified in Section 2.3.9.4 (Volume I) where the 1973 EPA sediment measurements are summarized.

Page 2-101, paragraph 3

Section 2.3.9.4 (Volume I) of the FEIS is modified to recognize the potential contribution of americium to release-water activity.

Page 2-101, paragraph 4

Section 2.3.9.4 of the FEIS (Volume I) has been reviewed in accordance with the comments. The information presented is a summary of a referenced report. The sediment transfer is slow, and, as noted, is diluted by sediment deposits from other sources. Both airborne transfer and pond reconstruction activities have contributed plutonium to the sediment of Great Western Reservoir. We do not attempt to address the relative magnitude of the contributions.

Page 2-103, paragraph 1

The paragraph in question has been deleted from the FEIS (Section 2.3.9.4, Volume I) as being too speculative to be reliable.

Page 2-103, Table 2.4-20

This table (2.3.9-2 in Volume I of the FEIS) has been modified to answer this question. "Total Alpha" has been replaced by "Alpha Activity" and an explanation given of what this means for different time periods.

Page 2-104, paragraph 3

Section 2.3.9.4 (Volume I) of the FEIS has been modified to indicate that the EPA standard of 15 pCi/l activity in water applies to drinking water. Also, the reference to background area radioactivity has been omitted, thereby de-emphasizing whole body doses and comparisons with background radiation levels.

Page 2-104

The FEIS (Volume I, Section 2.3.9.4) includes a more detailed description and the dates involved in the release and the subsequent monitoring for tritium in Great Western Reservoir.

Page 2-105, paragraph 1

The 1 μCi/l limit applies to waters to which the general public has access. This distinction, together with the answer to the first part of this question, is given in Section 2.3.9.4 (Volume I) of the FEIS.

Page 2-105, paragraph 2

The location of hydrologic test holes were selected on the basis of consultation with R. T. Hurr, of the United State Geological Survey, who investigated the hydrology and geology of the Rocky Flats area (cf Section 2.3.4, Volume I, FEIS). The test holes are located down gradient from known disposal sites and should collect representative samples of material migrating into the subsurface water.

Page 2-105, paragraph 3

These occasional anomalous readings are due to surficial activity. As noted in Section 2.3.5.3 of the FEIS (Volume I), improved sampling techniques have shown these data to be erroneous.

Page 2-106, paragraph 2

The oil drum storage area containing plutonium contaminated soil was covered with clean gravel and asphalt paving material in 1969. The present actions regarding this area are discussed in Sections 1.5.5, 4.4.3.1, 5.2.4, 5.5.1, and 9.5.

Page 2-106, paragraph 3

The comment that Plant originated background radiation due to past releases is increasing is not correct. The converse is to be expected, in that transuranics in the soil become increasingly weathered into the soil. Studies by Volchok of EML in Report HASL-318 (1977) on the time decrease of airborne plutonium concentrations near Rocky Flats demonstrate this. As noted previously, the revised text of Volume I emphasizes comparison of organ doses for radionuclides released from the Plant with organ doses of natural origin.

Page 2-107

Buildings 776 and 777 are still plutonium fabrication and assembly areas which are modularized. Section 2.5.1.1 (Volume I, FEIS) adequately describes them.

Page 2-109

Reference to FEIS (Volume I) Sections 2.5.1.2 and 3.2.2.6 should be made for information regarding air concentration monitors and criticality alarms.

Page 2-109, paragraphs 4 and 6

The waste storage site at the Idaho National Engineering Laboratory Radioactive Waste Management Complex is approved for storage of low level waste. There is, as noted, no federally approved high level waste repository.

Page 2-111, paragraph 1

Degreasing operations using carbon tetrachloride are conducted in glove-box enclosures. Glove-box containment totally eliminates solvent exposure to operating personnel. Several environmentally acceptable alternatives to carbon tetrachloride have been evaluated as possible replacements. Of those evaluated, none were found to be as well suited when product compatibility, flammability, toxicity, and photochemical reactivity were considered. These evaluations did result in eliminating the use of trichloroethylene in favor of 1,1,1-trichloroethane, a less toxic, less photochemically reactive solvent.

Concerning the amounts of carbon tetrachloride being released in the gaseous effluent discharges, theoretical mass emissions based on total consumption were calculated for a typical rooftop exhaust. Assuming all the carbon tetrachloride used at Rocky Flats is discharged through the single rooftop exhaust, an emission rate of 6.25 pounds per hour is calculated. Under the Colorado Air Pollution Control Commission Regulation No. 7 governing emissions of hydrocarbon vapors, atmospheric discharges to 450 pounds per hour, not to exceed 3,000 pounds per day, are permitted.

Page 2-111, paragraph 5

Employees in plutonium areas who work with radioactive materials are required to wear protective clothing and to perform self-monitoring when leaving radiation control areas. All employees who have been in a radiation control area must be checked for contamination by a radiation monitor before leaving the security control area. Personnel that are required to wear protective clothing are required to shower at the end of the shift.

The Health, Safety, & Environment Manual and the Rocky Flats Plant policies state that management is responsible for enforcement of Plant rules.

Page 2-111, paragraph 7

A separate section (2.5.6.1, Volume I) has been added to the FEIS to describe americium recovery operations.

Page 2-112, paragraph 2, question 1

In Section 2.5.3.2 (Volume I, FEIS) average production area beryllium values in air are mentioned.

Page 2-112, paragraph 2, question 2

In the paragraph cited (now in Section 2.5.3.1, Volume I, FEIS), a wet sawing/machining operation is described. Local exhaust ventilation is not required for wet machining beryllium. Note that a special machine shop for dry machining of beryllium is described three paragraphs later. In the latter instance, a high-speed down-draft/collection system is used to isolate beryllium dust from the atmosphere. Reference should also be made to Section 2.5.3.2 where Industrial Hygiene measures concerning airborne beryllium are discussed.

Page 2-112, paragraph 6

Two types of laboratory beryllium residues may be generated. Liquid waste containing beryllium is pumped to the waste treatment facility (Building 774). The operation of the facility is discussed in Section 2.7.3.2 (Volume I, FEIS). Solid waste is handled as described in Sections 2.7.4.2 and 2.7.4.3. In Section 2.5.3.1, section cross references are made.

Page 2-113, paragraph 4

Air and smear sampling are used to evaluate the effectiveness of the protective measures. Section 2.5.3.2 (Volume I, FEIS) is modified to include this fact. Also as noted in Section 2.5.3.2 (Volume I, FEIS), air samples collected on beryllium operations consistently average less than 10% of the TLV.

Page 2-113, paragraph 5

Uranium-233 is processed and handled intermittently on a special order basis. Mention of this was made in Section 2.5.4.1 of the FEIS (Volume I).

Page 2-114, paragraph 1

The sentence in question has been restructured in Section 2.5.4.2 of the FEIS to clarify its intent.

Page 2-114

Section 2.5.4.2 (Volume I, FEIS) has been modified to include the ventilation requirements needed when uranium is handled.

Page 2-114, paragraph 4

In Section 2.5.5.1 (Volume I) of the FEIS, the metal forming terms which are not self-evident have been added to the Glossary.

Page 2-115

The fabrication of other metals receives general control commensurate with the associated hazard. Coolants are used to control airborne emissions; Industrial Hygiene surveys other operations such as the use of dye penetrants, welding, cleaning, heat treating, oil quenching, etc., to ensure personnel exposures to toxic or noxious materials are kept to well below recommended standards. A section (2.5.5.2 in Volume I, FEIS) has been added describing these precautions.

Page 2-116, paragraph 1

In Section 2.5.6.1 (Volume I, FEIS) the reference to the State Board of Health is changed to the Colorado Department of Health.

Page 2-118

The program for monitoring nonradioactive effluents in water and air and typical monitoring results from this program are described in Section 3.1.1.3 (Volume I, FEIS). A cross reference to Section 3.1.3 is not consistent with the purpose of Section 2.5.6.1.

Page 2-118, paragraph 5

Concerning residue sampling and analysis, all Plant Analytical Laboratories have approved quality programs for analysis of all different types of materials including "residues." Such quality programs include use of control and blank samples, standardized procedures, and consensus sampling. A brief discussion is given in Section 2.6.1. Also there are extensive training programs for personnel involved with sampling.

Page 2-120, paragraph 3

The health and safety regulations regarding handling of beryllium and uranium for research and engineering purposes are described in Sections 2.5.3.2 and 2.5.4.2 (Volume I, FEIS) respectively, and cross referenced in Section 2.5.7.1.

Page 2-120, paragraph 6

Plutonium coating operations are contained inside glove boxes. Air sampling is conducted at operations involving toxic materials outside glove boxes to ensure that controls are adequate. These precautions and procedures are described in Section 2.5.7.2 (Volume I, FEIS).

Page 2-122, paragraph 2

The term "war reserve" has been deleted from the FEIS and is therefore not included in the Glossary.

Page 2-129, paragraph 4

Section 2.6.2 (Volume I, FEIS) is changed to include mention of other regulations, limitations, and guidelines under which the Plant operates.

Page 2-130, paragraph 5

The Land Management Plan applies to all open space areas on the Plant site but particularly to the approximately 6,200 acres of land surrounding the fenced security area and known as the buffer zone.

Page 2-130

Section 2.6.2.4 (Volume I, FEIS) specifies the ERDA Manual Chapters and other documents which guide the operation of the Health Sciences and Industrial Safety Department.

Page 2-133, paragraph 3

The requested change ("licensed" to "certified") has been made in Section 2.6.4 (Volume I, FEIS).

Page 2-134, paragraph 5

Other materials exhausted through HEPA filters are listed in Table 2.8-2 in Section 2.8 (Volume I) of the FEIS.

Page 2-135

Street clothes and work clothes are not stored within the same locker. Personal clothing is stored inside the locker and work clothing on the outside. At lunch time, protective clothing is self-monitored, changed, and freshly laundered protective clothing is put on. At the end of the shift each individual is required to be monitored by a radiation monitor and, if the protective clothing is not contaminated, it is hung on the outside of the locker for use the following shift. Such personnel protection practices are outlined in the Plant Health, Safety & Environment Manual (referenced in Section 2.5.2.2, Volume I, FEIS).

The comment regarding smearing of locker room facilities is correct in that smearing is after the fact. Therefore, self-monitoring and personnel monitoring is required before persons leave radiation control areas. The smears provide assurance that the controls are working.

DOE Appendix 6301 states a change room should be provided for changing into and from protective clothing. The area should be adjacent to shower facilities. Essentially the same thing is stated in 29 CFR 1910. This is what exists.

Page 2-138, paragraph 5

The functions considered as critical are those whose absence could potentially result in a hazard to the employee or damage to the product. Such functions would include process building heating, ventilation, and humidity control, public address capabilities, all alarm systems, and building lighting. In the same section it was asked if Plant-site substations are physically protected. The answer here is that the switching gear is housed, but the transformers themselves are in the open as they are designed for such service. Finally, regarding your question on PCB use at the Plant, all transformers currently containing PCB oil will be converted to a non-PCB oil as replacement is required for maintenance purposes.

Page 2-139, paragraph 3

As per the recommendation, information regarding the amount of mercaptan added to the fuel at the Plant site is included in Section 2.6.6.1, Volume I, of the FEIS.

Page 2-142, paragraph 2

The storage capacity for diesel fuel has been added in Section 2.6.6.3, Volume I, of the FEIS.

Page 2-143, paragraphs 4 and 5

The argon system storage capacity has been added in Section 2.6.6.3 (Volume I) of the FEIS.

The fluorine storage facility will be used to supply fluorine to the new chemical processing facility for use in the conversion of plutonium oxide to plutonium fluoride. The system will have a capacity of about 150 pounds of fluorine. This information has been added to the FEIS in Section 2.5.6.4 (Volume I).

Special storage facilities are used to store calcium metal. The metal is stored in a drum with a specially fitted lid equipped with a fitting to allow the drum to be purged with argon before it is opened and after it is resealed to minimize the danger from hydrogen gas accumulation. This drum is stored in a specially designed metal shed to protect it from water from the sprinkler system.

Magnesium oxide sand is provided in case of a calcium fire. Information on calcium storage has been included in Section 2.6.7.

Page 2-144

The answers to these questions regarding Plant water consumption and water balance appear in Section 2.6.8 (Volume I) of the FEIS.

Page 2-144, paragraph 7

The requested change has been included in Section 2.6.8.1.

Page 2-148

An interchange of pages occurred in the DEIS.

Page 2-149

Various reasons for water losses in the overall Plant water system are identified in Section 2.6.8. Subsurface drainage is discussed in Section 2.9.3.

Page 2-154

Uranium-234 is corrected to read uranium-235 in Table 2.6.10-1 (FEIS, Volume I). The information on curium-244 shipments is included in an added paragraph in Section 2.6.10.1.

Page 2-155

Other hazardous materials such as flammable gases, poisons, or reactive chemicals are not, per the requirements of 40 CFR 172, shipped with plutonium shipments.

Page 2-156

Table 2.6.10-1 (Volume I, FEIS) was amended to delete uranium-234, which also is absent in Table 2.6.10-2.

Page 2-156, Table 2.6-7

The table (2.6.10-3, Volume I, FEIS) is more understandable as it is. The exact number of curies shipped to each location in a year is classified information.

Page 2-158, paragraph 3 and Page 2-158, paragraph 5

Air shipments of plutonium to and from Rocky Flats were terminated in April 1977. In the future air shipments of plutonium to or from the Rocky Flats Plant would be expected to resume only if made in containers certified as meeting aircraft crash, accident safety criteria, or as otherwise permitted for National Security purposes in accordance with 10 CFR Part 871 "Air Transportation of Plutonium."

Page 2-159, Table 2.6-10

Table 2.6.10-5 in Section 2.6.10.2 (Volume I, FEIS) replaces Table 2.6-10 of the DEIS and corrects this error.

Page 2-160, paragraphs 1 and 2

The transportation safety information presented in Section 2.6.10.2 of the FEIS (Volume I) applies to land and air shipments.

Page 2-162, paragraph 1

Fissile material shipping containers and container shipments are designed so that subcriticality is maintained even under expected accident conditions. Severe accidents which could rupture shipping containers (cf Section 2.6.10.2, Volume I, FEIS) would disperse rather than concentrate the material. The heat generated would terminate an excursion in a short time.

Page 2-162 and 2-163

The label is to alert persons handling these shipping containers that the containers may require special handling because of penetrating radiation. It is not intended to differentiate between beta/gamma and alpha emitters. If the container were violated, the consequences would not necessarily be more serious because the material involved was an alpha emitting isotope. All shipments from Rocky Flats are labeled per the requirements of 49 CFR 172 and 173.

Page 2-163, paragraph 2

The neutron dose rate from a container with the quantities and types of material described in Section 2.6.10.2 would be less than 1.0% of the maximum allowed per 49 CFR 173. The calculated neutron dose rate from 4.5 kg (limit quantity) of plutonium-239 oxide at 3 feet from the surface of the shipping container is approximately 0.6 mrem/hour.

Page 2-163, paragraph 3

49 CFR 173.397(a) gives the maximum removable contamination level for nonexclusive use packages as 10^{-12} Ci plutonium alpha activity, which is in agreement with the DEIS values. The levels for beta/gamma emitting nuclides are also correct.

Page 2-164, paragraph 1

This error is corrected in Section 2.6.10.2 (Volume I) of the FEIS.

Page 2-166, Figure 2.6-3

A revised version of DEIS Figure 2.6-3 (Figure 2.6.10-2 in Section 2.6.10.2, Volume I, FEIS) has been supplied which shows spacers. The 10-gallon steel drum as shown is used as the outer container in the 6M (RF-1518) container. Both drums may contain varied internal design packaging depending on material being shipped. All packaging is DOT Design or DOE Certificate of Compliance Containers according to ERDA Manual Chapter 0529.

Page 2-167, paragraph 1

The inner containers used in these steel drums are all either DOT design according to 49 CFR 178 or DOE Certificate of Compliance Containers per ERDA Manual Chapter 0592. Section 2.6.10.2 has been modified to delete mention of these various size Type A containers as it is not pertinent to the purpose of the section.

Page 2-168, paragraph 4

The concentration of uranium in airborne effluents exhausted through HEPA filters in a single stage currently average below the recommended concentration guides for air in an uncontrolled area. These concentration guides have been adopted by DOE (ERDA MC 0524) and are identical to the Colorado Department of Health Rules and Regulations pertaining to Radiation Control regarding concentration in air in uncontrolled areas. Section 2.5.3.1 (Volume I, FEIS) has been modified to discuss beryllium building exhaust systems. Section 2.7.1 contains a comment on HEPA filtration in uranium buildings.

Page 2-172

Revisions have been included in Volume I, Section 2.7.1, of the FEIS that discuss the material in question. The installed filters are tested as a bank, following individual filter testing. The two tests serve different purposes. The individual filter testing verifies the integrity of each filter with respect to the specified particle size. The testing of the installed filter ensures that the installation is safe and effective. The comparison of Rocky Flats with other facilities is not made in the FEIS. A discussion of the desirability of at least four stages of filters is included in the FEIS. A fourth stage ensures that filtration will be done with an efficiency of 99.8 percent even though one stage may be breached or damaged. See Section 2.7.1.

Page 2-174 paragraph 3

This question is discussed in Section 2.7.1 (Volume I, FEIS). The filter system design goal is a DF (decontamination factor) of 10^9 or greater, as is standard for DOE facilities. The factor for Building 371 will conform to this. The question of emissions and air monitoring is considered in Section 2.10.1. The record of airborne emissions is given in Table 2.7.2-1.

Page 2-175, paragraph 2

The 0.7 value was an error. In-place filter testing is done using a particle size of 0.3 micron. The text has been altered accordingly in Section 2.7.1 (Volume I, FEIS). Note that the 0.3 micron aerodynamic diameter test particle size is used because it is the most penetrating size whereas the impacting plutonium particles may have a wide range of sizes.

Page 2-175

No special disposal methods for sludge on HEPA filters are required where scrubbers are in use. The scrubber effluent is passed through a demister before entering the HEPA filter modules. The demister section is cleaned periodically before "sludge" buildup occurs. The material collected is returned to the process stream. Downstream HEPA filters are handled in the same way as other HEPA filters. Lightly contaminated filters are disassembled and packaged for off-site burial. More highly contaminated filters are processed on Plant site to recover the plutonium for reuse in the process.

Page 2-176, paragraph 4

A paragraph is added in Section 2.7.2 (Volume I) of the FEIS to describe the Plant's adherence to the DOE policy of As Low as Practicable (ALAP) regarding Plant effluent emissions.

Page 2-177, Table 2.7-1

No additional incident summary information will be included in the FEIS, because the information given is sufficient for the intended use.

Page 2-178, paragraph 1

In Section 2.7.2, a reference is made to Appendix B-2, where dispersion factors are discussed and tabulated.

Page 2-178, paragraph 3

As previously noted (response to General Question II, Letter from Hazle to Simsick), the text related to radiation doses has been redone to emphasize organ doses and not whole body doses.

Page 2-179, paragraph 2

Section 2.7.2 (Volume I) of the FEIS has been modified to make it consistent with the information on past plutonium alpha activity releases.

Page 2-179, paragraph 5

Concentrations of curium have been measured in the ducts which are located between the glove boxes where the curium is handled and the filter plenums through which air passes before release to the environment. All concentrations measured in the time period during which curium activities occurred were less than 0.00032 pCi/m^3 in the duct. Since 99.98% of this material would be removed by HEPA filters, the quantities of curium in the stacks cannot be measured because they are too small.

In the development of the source terms for dose calculations, a source term was included for miscellaneous isotopes (cf Section 3.1.2.1, Volume I, FEIS) which includes thorium, neptunium, and curium isotopes. Note also that Table 2.6.10-1 now does not list thorium, neptunium, or curium shipments but discusses them in text (Section 2.6.10-1).

Page 2-180, Table 2.7-2

The comment is correct and Table 2.7.2-2 in the FEIS (Volume I) has been changed accordingly. Alpha activities for americium are included as a separate item wherever these are required since these alpha activities vary considerably in the context of use.

Page 2-182, Table 2.7-4

This table is now 2.7.2-4 (Section 2.7.2, Volume I, FEIS). The error noted has been corrected.

Page 2-182, paragraph 1

The incident you refer to did occur and did involve the quantities of materials indicated. The tritium was released from a glove box through the stack.

Page 2-182, paragraph 2

This comment regarding evaporative release of tritium is correct. The sentence in this paragraph, which states that "this evaporation will result in the release of tritium contained in the contaminated waters" addresses this concern adequately. In the FEIS (Section 2.7.2, Volume I), the discussion has been modified to avoid this point of contention.

Page 2-182, paragraph 4

A change has been made (cf Section 2.7.2, Volume I, FEIS) to reflect more accurately the present status of the tritium administrative control. Monitoring for tritium has been conducted during past years, and the control level discussed in the DEIS and the FEIS appears to be appropriate, practical, and fully consistent with the ALARA (as low as reasonably achievable) policy.

Page 2-183, Table 2.7-5

A revised version of this Table (3.1.2-1, Volume I, FEIS) appears in Section 3.1.2.1 where it is noted that these isotopes are handled in quantities producing negligible releases. A source term of one microcurie for such miscellaneous isotopes has been included in the dose calculations.

Page 2-184, paragraph 3

Highly toxic process waste is shipped intraplant in double containment to minimize the probability of leaks. Low toxicity materials may be moved in stainless steel dumpster equipment.

Page 2-184, paragraphs 4 and 5

These two questions have been addressed in Section 2.7.3.1 (Volume I) of the FEIS.

Page 2-185, paragraph 1

The method of establishing minimum permissible levels of radionuclide mixtures in environmental media is specified in the Code of Federal Regulations 10 CFR 20 and interpreted in ERDA Manual Chapter 0524. These methods are stated briefly in Section 2.10 (Volume I) of the FEIS.

Page 2-185, paragraph 7

The radioactive limits for effluents which are referred to in paragraph 7, page 2-185 of the DEIS, are those specified under ERDA Manual Chapter 0524. This has been so designated in the text of the FEIS (Volume I) in Table 2.10.3-2.

Page 2-186, Table 2.7-6

Concentrations of nonradioactive materials are judged against the threshold limit values (TLV) published by the American Conference of Governmental Industrial Hygienists (ACGIH). Threshold limit values refer to airborne concentrations of substances and represent conditions under which it is believed that nearly all workers may be repeatedly exposed without adverse effect.

Concentration guides for radioactive materials are contained in the ERDA Manual Chapter 0524 entitled "Standards for Radiation Protection."

Page 2-186, paragraph 1, question 1

The impurities shown in Table 2.7-6 on page 2-186 represent analysis of soluble contaminants in steam condensate samples, not suspended solids. Hence, they will follow the hydrologic cycle.

Regarding heavy metal analysis in surrounding soils, the concentrations shown in Table 2.7-6 are far below the threshold limit values (TLV) established for the release of these materials. The concentrations indicate that, except for iron, the steam condensate meets the 1962 USPHS drinking water standards. As such, the contention that surrounding soils should annually be sampled for heavy metals is not required by law and has no merit.

Page 2-186, paragraph 1, question 2

No certification is required under Title 30, Article 20, Part 1 of the 1973 Colorado Revised Statutes.

Page 2-192, paragraph 1

The distinctions between solid waste types is made in Sections 2.7.4 and 2.7.4.1, Volume I, of the FEIS. Briefly, DOT and DOE have different methods of classification. DOT divides plutonium wastes into Not Otherwise Specified (NOS) (>100 nCi Pu/g) and LSA (<100 nCi Pu/g) wastes while DOE calls plutonium wastes less than and greater than 10 nCi Pu/g NTRU and TRU wastes, respectively. All wastes are shipped to DOE-approved storage sites by semitrailer or ATMX car.

Page 2-192, paragraph 3

Additions to Section 2.7.4.2 of the FEIS (Volume I) have been made describing the drum counting technique. Regarding a quality control program for waste packages in transit, the shipping vehicle is radiation surveyed after loading and prior to leaving the Plant.

Page 2-193, paragraph 1

The quantities of radioactive material stored at the Idaho site is not relevant information for the Rocky Flats Plant Site EIS. Please refer to the "Environmental Impact Statement Waste Management Operations," Idaho National Engineering Laboratory, Idaho, Report ERDA-1536 (September 1977).

Page 2-194

Beryllium is a production material and therefore is not listed. Several lithium compounds are used in less than one pound per year amounts for atomic absorption analysis and hence are not listed. Dichromate compounds are used in small amounts in laboratory analysis while other chromium compounds are used to a limited extent as rust inhibitors in cooling towers or in other laboratory analyses. Consumption of these latter chemicals is listed in a revised version of the table (Table 2.8-1, Section 2.8, Volume I) in the FEIS.

Page 2-195, Table 2.8-2

Table 2.8-2 (Section 2.8, Volume I) of the FEIS lists quantities for each item avoiding use of the word "trace."

Page 2-195

The use of biocides at Rocky Flats is coordinated with the Jefferson County Extension Service and the Colorado State Department of Agriculture. The application of pesticides and herbicides is in accordance with guidelines issued by the Federal Working Group on Pest Management and the local authorities. The information requested on the potential hazards of biocides can best be obtained by contacting one of the local authorities mentioned above. For information regarding the potential hazards of biocides used in water treatment facilities, Betz Laboratories, Inc., Somerton Road, Trevose, PA, 19047 may be contacted.

Page 2-195, paragraph 2

The FEIS (Section 2.8, Volume I) is amended to note that the weed and pest control activities described in this section are coordinated with the Colorado State Department of Agriculture and the Jefferson County Extension Service. The coordination is primarily advisory and consultive in nature so that these agencies are notified of the Plant's schedule and methods for weed and pest control.

Page 2-197, paragraph 2.9-1

Water used to fight fires in process areas would be treated as process liquid waste (cf Section 2.7.3.1, Volume I, FEIS).

Page 2-198

This comment is answered in Figure 2.9.1-1 (Section 2.9.1, Volume I) of the FEIS. Salty wastes from the process waste treatment plant and dried sludge from the sanitary waste treatment plant are sent to a DOE-approved waste storage site. This practice will continue in the foreseeable future.

Page 2-203

This comment has been addressed in Section 2.3.5.3 (Volume I) of the FEIS. It should be noted that clay liners provide a surface for ion exchange of insoluble heavy metals such as plutonium and americium. The reason for the institution of a total Plant water recycle system is primarily to avoid releasing any hazardous material to public water supplies via surface waterways, not by subsurface drainage as there is presently no indication of subsurface transuranic transport into area waters.

Page 2-204, paragraph 1

The tritium incident in 1973 was investigated by the AEC and the EPA and reports were prepared. Any possible involvement of the groundwater system was not confirmed.

Page 2-206, Question 1

Air releases involve the measurement of radioactivity in particulates. All radioactivity concentration guidelines (RCG's) for airborne concentrations are given for either soluble or insoluble particulates. With the exception of some uranium isotopes, the RCG's for soluble particulates are more restrictive and are used by Rocky Flats. Once the airborne effluent reaches the ground, then the solubility characteristics as given in Table 2.9.3-2 (Section 2.9.3, Volume I) of the FEIS would be appropriate.

For these reasons, the FEIS will not include any additional tables for solubility of airborne particulates.

Page 2-206, Question 2

Primary control over these isotopes (neptunium-237, curium-244, and thorium-228) is exercised at the source of emission. All of these are currently handled in gram amounts for research or analytical purposes, but may be analyzed for in-stack air samples if this is considered necessary. In the case of neptunium-237, monitoring is done for the parent isotope (americium-241), as this may be more easily observed in the effluent stream.

Page 2-207, paragraph 2

Sections 2.10.2.4 and 2.10.1.3 (Volume I) of the FEIS have been modified to clarify the role of Jefferson County in the Plant ambient air sampling program. References to EPA routine monitoring have been deleted.

Page 2-208, paragraph 1

Section 2.10 (Volume I) of the FEIS has been changed to note that Plant gamma analysis techniques measure any unusual amounts of fission products in Plant effluents.

Page 2-208, paragraph 3

In accordance with this suggestion, a change has been made in Section 2.10.1 (Volume I) of the FEIS.

Page 2-210, Table 2.10.1

Stack detection limits for nonradioactive material, other than beryllium, are not relevant to actual practice. Compliance with State Regulations is based on the rate of consumption. Released quantities are not measured.

Page 2-211, paragraph 4

Appendix I (Volume II of the FEIS) has been added in which the results of an inlet efficiency (and filter paper effectiveness) study on the Plant ambient air sampler are given. Modifications have also been made to Section 2.10.1.2 (Volume I) of the FEIS to summarize these measurements. Briefly, the Rocky Flats Plant sampler was found to be approximately the same in collection efficiency as the EPA design sampler used by the Colorado Department of Health.

Beginning in 1975, the Rocky Flats designed air samplers have been in continuous service. Since that time, there has not been sufficient plutonium-in-ambient-air data reported by the CDH to support the comment that Rocky Flats values are lower than those measured by CDH. It is felt that when such data are available, a comparison to Rocky Flats data would not show a difference in values ranging from 2 to 8 times as suggested by the limited amount of CDH data presently available.

Page 2-214

Calibration and qualification of environmental sampling systems at Rocky Flats is standard practice.

Page 2-214, paragraph 3

The fact that the Colorado Department of Health's (CDH) five on-site air sampling stations operate continuously has been incorporated into the FEIS (Volume I, Section 2.10.1.3) as has acknowledgment of the remote stations operated by CDH.

Due to flexibility necessary in all monitoring programs, it is preferable not to include details which are highly subject to change. The information given is indicative of the scope of the CDH monitoring program.

Page 2-217, paragraph 1

Section 2.10.1.4 (Volume I, FEIS) has been modified to list the additional meteorological monitoring at the Plant.

Page 2-217, paragraph 2

This paragraph was correct and was not changed in the FEIS.

Page 2-217, paragraph 4

See Sections 2.10.2.1 and 5.5.4 for a description of the Surface Water Control project.

Page 2-219, paragraph 3

The extensive monitoring of groundwater conducted by Rocky Flats is technically more than a judgment of the "obvious." Please see Sections 2.3.5.3 and 2.10.2.2 for a more detailed discussion than was presented in the DEIS.

Page 2-219

Uranium has been measured in raw water received at the Plant, with the objective of estimating the relative contribution of the Plant and the filtration efficiency of the raw water treatment plant. Additional measurements will be made when well-justified objectives require it.

Page 2-221

Test hole #2 in the landfill is sampled and the water is tested for strontium-90 This radioisotope has been identified in the past in water from this well, but from no other well.

Test hole #46 in the landfill was found to contain water having the greatest tritium concentration of the more than 50 holes drilled in the landfill in 1973 and 1974. It was therefore selected as the routine monitoring location. Test holes are identified in Figure 2.10.2-1.

Page 2-229

The table is intended to convey Rocky Flats operational parameters with regard to detection limits and administrative action guide values. At the present time, uranium analyses are done by alpha pulse height analysis, and result in radioactivity concentrations. This analytical method, appropriately used, is more accurate than gravimetric techniques.

Page 2-230

A discussion of various soil sampling methods has been added in Section 2.3.9.3.

Page 2-230, paragraph 3

These comments have been incorporated into Section 2.10.2.4 of the FEIS.

Page 2-231, Section 2.10.4

The author of the comment is perhaps unaware of the many studies which were done from the initial time of operation of the Plant to the present day. The organizational designations of the personnel in this area have changed in the course of the history of the Plant. The designation of Environmental Sciences Department was made in the early 70's, gathering into one organization the continuing efforts of researchers from various groups. The magnitude of the surveillance program has increased in the 70's because of changes in the concerns of the public nationwide with respect to the environment.

Page 2-234

This virus study was in connection with the new reverse osmosis facility. Virus are normally associated with high turbidity and suspended solids. Both of these are normally low in our effluent, so it is not currently planned to repeat the program.

Page 2-235, paragraph 1

See Section 2.10.5.5 for information on the Aerial Radiological Survey in the FEIS.

Page 2-235, paragraph 3

The pre-evaluation which you suggest has been done. Chapter 3 of the EIS discusses the potential accidents. The conclusion is that only in the case of the maximum credible accident, based on the Colorado Protective Action Guides (Section 2.11.4.3), might evacuation be considered within a 4-mile radius of the center of the Plant.

Page 2-238, paragraph 1

The proper reference to the Division of Disaster Emergency Services has been included in the complete revision of Section 2.11.

Reference is made in the FEIS, Section 2.11.4, to the Colorado Radiological Response Plan for Rocky Flats, which was finalized in 1979.

Page 2-240, Table 2.11-4

In the revised Section 2.11, this listing has been deleted. The Rocky Flats Emergency Plan's only interface is at the State level via the Colorado Radiological Response Plan. The latter interfaces with county and local emergency plans.

Page 2-240, paragraph 2

ARAC is described in Section 2.11.3.1. The plan of the State is described in 2.11.4.

Page 2-241, paragraph 3

Such an incident is one in which radioactive material (not related to Rocky Flats) is released to the environment from a location outside the boundaries of the Rocky Flats facility, and assistance is requested from Rocky Flats Plant personnel.

Page 2-243, Table 2.11-6

The table has been deleted from the Section 2.11 revision because it was obsolete. Written agreements exist only between Rocky Flats and the Jefferson County Sheriff's Department, the St. Anthony Hospital Systems, St. Luke's Hospital, and the University of Colorado. These agreements are for additional support in the event of an on-site emergency. Other off-site coordination for support or assistance is defined in the Colorado Radiological Response Plan.

Page 2-244, table 2.11-6

The table has been deleted from the revised Section 2.11 because it was obsolete. As a matter of clarification, local city and county fire departments are not considered for support in the event of a fire involving radioactive material. One reason is that such material is located within internal security areas requiring government issued security clearance. Of greater importance, the Rocky Flats Fire Department is specially trained in the fighting and containment of fires involving nuclear material. Local fire departments do not have such training. Official designations of Civil Defense organizations are not listed because direct formalized interface have been superseded by interface through the State Emergency Response Plan.

Page 2-245, paragraph 2.11.3

There is a policy statement requiring a minimum of two exercises annually, one of which must include a building evacuation. The program is closely monitored by the Rockwell Emergency Planning Office. As operations vary from building to building, each building superintendent is permitted to select exercise scenarios most beneficial to his building and operations. Certain response departments, i.e., Plant Protection and Fire Department, perform numerous department exercises during the year, in addition to providing support for building exercises. All test exercises are reviewed and approved by the Emergency Planning Review Committee (EPRC).

The EPRC consists of the Director, Safeguards & Security; the Director, Health Safety & Environment; and the Manager, Security Administration and Emergency Planning. The EPRC meets as required.

Page 2-245, paragraph 6

The November 1977 Working Draft of the Colorado Radiological Response Plan for Rocky Flats is the official State plan. The final form of the Plan was issued in 1979. See Section 2.11.4.

Page 2-248, paragraph 4

This information is contained in Section 2.12.2.1 of the FEIS.

Page 2-253, A

Definitions of "license" and "licensee" have been added to the Glossary. Rocky Flats does not handle reactor fuel.

Page 3-1, paragraph 1

The DEIS considers the normal impact of nonradiological hazards (see Section 3.1.1.3).

Page 3-3, paragraph 3

The applicable regulations and guidelines have been further described in the FEIS, Section 3.1.

Page 3-4, Figure 3.3.3-1

R. T. Hurr, USGS hydrologist, states that infiltration into the alluvium involves only insignificant volumes of liquid from the storage reservoirs on Plant site.

No precise evaporation value for the B-series ponds is given since water in these ponds is transient and is released into Walnut Creek at various periods of time depending on input volumes. Data from the USGS (Ralston Reservoir) and Rocky Flats Plant solar ponds information gives 5% of the total volume for the annual evaporation. The 5% is a fair number for ponds like B-2 and B-4, but not for B-1 and B-3, because they are drained 3 times a week. Since Figure 3.1.1-1 refers to B-1, B-3, and B-4, an evaporation value can be estimated using 2 or 3% of the total volume of liquid, or about 47-thousand to 70 thousand gallons a year. (B-1, B-3, and B-4 have a capacity of $\sim 2.3 \times 10^6$ gal).

Page 3-5

Underground relocation is noted in the last paragraph of Section 5.3.1.

Page 3-6, paragraph 1

The quality of water in Great Western Reservoir is discussed in the FEIS in Section 2.3.9.4. It is further discussed in the annual Environmental Monitoring Report, RFP-ENV-77, April 25, 1978. It will be noted that the concentration of plutonium and americium in Great Western Reservoir and in the drinking water from it are not measurably different from those concentrations in other locations. They are small fractions of the limits set by the EPA and the State of Colorado for drinking water and of the RCG's established by DOE in ERDA Manual Chapter 0524.

Page 3-9, paragraph 1

Rock Creek has been included in Section 3.1.1.2 of the FEIS.

Page 3-9, paragraph 4

Information concerning low level radioactivity in the landfill is contained in Sections 2.9.4 and 3.1.1.2 of the FEIS.

Page 3-10, paragraph 2

See Section 3.1.1.2.

Page 3-12, paragraph 1

In response to your observation that Plant buildings may have micrometeorological effects, the Meteorology subsection of Section 3.1.1.2 of the FEIS has been modified.

Page 3-13, paragraph 4

See Section 3.1.1.3 of the FEIS. The information is intended to be historical, and is therefore compared in the FEIS to the Standard in effect at the time.

Page 3-19

The comment that dissolved oxygen is a daily minimum limit is correct. This has been indicated in a footnote in the DEIS.

Page 3-26, paragraph 5

The proper reference in the DEIS for airborne release is 2.7.2, and for waterborne release from B-series ponds is 2.4.9. Sections 3.1.2.1 and 3.1.2.2 of the FEIS also discuss source terms for normal operation.

Page 3-26, paragraph 6

The DEIS, page 3-26, is correct. Changes have been made in other locations in the FEIS to indicate that the scheduled goal for zero liquid discharge is 1979.

Page 3-27, paragraph 1

The reference in the DEIS should have been to Section 2.7.2. The tritium source term is discussed in Section 3.1.2.1 of the FEIS.

Page 3-28, Table 3.1.2-1

The tritium source in Table 3.1.2-1 is not identified by point of origin because it is emitted by evaporation from Plant ponds, process water, and cooling water, as well as from building stacks. The quantity specified for tritium in this table also includes the estimated residual tritium from the 1973 release.

The uranium release mentioned in the footnote is also from the plutonium oil-drum leakage. The footnote has been modified to clarify this. Plutonium-241 has been identified as a beta emitter in the FEIS, Table 3.1.2.1.

Page 3-29, paragraph 2

The Rocky Flats Plant FEIS integrates the dose commitment over a person's lifetime (70 years). This number is independent of the time over which population doses are computed.

Future releases considered in the FEIS include resuspension of on-site material released in the past. This FEIS, however, assesses the impact from future operations of the Plant and does not consider past operations per se.

The population dose is assessed to the population existing in the area surrounding the Plant for the years 1977 and 2000. The growth of the population is not considered over the dose time. During the 25 years in which the Plant has been in operation, the demographic patterns of the area have changed substantially. The estimates for the growth in the next 25 years were based on data from the U.S. Census Bureau, but projections are very speculative. It is questionable whether growth data for a 25-year period beyond that given would provide meaningful decision-making information.

The comparison between a 50-year dose commitment and a 100-year dose commitment in the DEIS is not used in the FEIS.

The dose delivered to an organ from a single intake of radioactive material depends upon the effective clearance time of the material from that organ. The 70-year dose commitment is such that even for very long effective organ clearance times, a realistic upper limit for the dose to an organ is obtained.

Page 3-29, paragraph 3

There is no simple summary equation that can adequately describe the dose calculation methodology. A description of the process is given in Section 3.1.2, a detailed description is given in Section F.1, and sample calculations are given in Sections F.1.1.2, F.1.2.2, F.1.3.1, and F.1.4.3.

Accidents are treated similarly in Sections 3.2.4, F.2, F.2.16, F.2.2.1, F.2.2.2, 3.3.2.2, and F.3.

Page 3-29, paragraph 4

Dispersion factors are presented in Appendix B-2 and are discussed in Sections F.1.1.1 and F.2.1.1.

Page 3-32, paragraph 3

This document was considered and is referenced in Volume II of the FEIS (Section F.1.1.1).

Page 3-33, paragraph 3

The new ICRP lung model, often referred to as the "Task Group Lung Model," only models deposition and clearance from the respiratory tract. Models outlined in ICRP Publication #2 are used (with some parameters from other sources; see Appendix F) to calculate whole body and other organ doses in both the DEIS (see Table 3.1.2-6) and the FEIS (see Table 3.1.2-8). Whole body dose is de-emphasized in the FEIS.

Page 3-34

The dose conversion factors for inhalation used in the FEIS were generated by the DACRIN computer code as discussed in Section F.1.1.1 and F.2.1.1. This well-documented and often used computer code is considered to be sufficient for this type of assessment.

The equations used for the FEIS dose calculations are presented in Appendix F of the FEIS.

Page 3-36, paragraph 2

This statement is not included in the FEIS. In the FEIS the total body dose, as well as the dose to the liver, bone, lungs, and thyroid, are considered. Health effects as a result of the dose to each of these organs are considered (see Table 3.1.2-10).

Page 3-37, Table 3.1.2-5

The dose conversion factors used in the FEIS are presented in Appendix F for both routine (Section F.1) and accidental (Section F.2) releases. The equations to generate these dose conversion factors are either given in the Appendix or, if a computer code was used, the code documentation is referenced. Units associated with these factors are discussed as well. A dose is calculated for each of eight distances in each of 16 directions (Table 3.1.2-3) based upon dispersion modeling to each location (Section F.1.1.1). The concept of an adjusted dispersion factor was dropped. The radiological impact is calculated to the initial population group (the year 1977) and, using the best demographic projections available, to population distributions for the year 2000. No further projections were made as it is questionable whether growth data for a 25-year period beyond that given would provide meaningful decision-making information.

Page 3-38, Table 3.1.2-6

The complexity of these calculations prohibits the presentation of a "clear cut equation" used to generate these figures. The methodology that was used is given in Section F.1. A sample calculation for one specific sector and distance is shown in

Section F.1.4.3. This type of calculation for each sector and distance is combined to yield the population dose of FEIS Table 3.1.2-8 as explained in Section F.1.5.3. The effect of an increase in the population is shown in the FEIS (Table 3.1.2-8) for the years 1977 and 2000.

Page 3-39, paragraph 1

See Tables 3.1.2-5 and 3.1.2-6 for information which will aid in comparison of dose commitment due to the Plant with dose commitment due to natural radiation.

Page 3-40, paragraph 3

This concept and approach has been modified for the FEIS. See Section 3.1.2.3.

Page 3-41, Table 3.1.2-7

Table 3.1.2-10 includes the correction, as suggested.

Page 3-42, paragraph 1

The method of estimating population doses has been modified in the FEIS. See Section 3.1.2.3. The impact of a maximized urban population 2-5 miles east of the Plant has been included in the FEIS (see Table 3.1.2-14 and accompanying text). The future impact of past releases has been included in a somewhat different manner from that suggested. See Section 3.2.4.3 in the FEIS.

Page 3-42, Table

Corresponding tables in the FEIS (Table 3.1.2.8 and 3.1.2.11) have headings which clarify this point.

Page 3-43, paragraph 1

The document referenced by the commenter could not be located. As a credible accident, "fire" has been added to the list. However, in a discussion of possible accidents, terrorist activities will not be included. Such activities would create emergency situations, but these would be in a category with riots, demonstrations, etc., as listed in Section 2.11.

Page 3-43, paragraph 3

Nonradioactive effluents are discussed in Section 3.1.1.3. The increase in nitrate effluents to Walnut Creek is shown in Tables 3.1.1.2 and 3.1.1.3.

Page 3-44, paragraph 2

The effects of corrosive materials on the filters have been incorporated in Section 2.7.1. The filters for glove-box air are also HEPA filters, as shown in Figure 2.7.1-3.

Page 3-44, paragraph 3

A paragraph has been added to the end of Section 3.2.2.1 explaining this omission.

Page 3-45, paragraph 1

The reporting criteria for the Appendix H data base did not require inclusion of the 1974 release. The proper DEIS reference is Table 2.7-1. The same information is in Table 2.7.2-1 of the FEIS.

Page 3-46, paragraph 2

This section of the EIS is concerned with accidents and not routine operations. As discussed in Section 2.7.3.1 of the FEIS, the solar evaporation ponds are being cleaned. Measurement of radioactive materials in both shallow and deep groundwater test wells is discussed in Section 2.3.5.3 of the FEIS.

Page 3-47, paragraph 1

The possible release of sediments from the B-series ponds is discussed in Section 3.2.2.3 of the FEIS.

Page 3-47, Table 3.2.1-1

This section is only concerned with the effect of radioactive releases.

Page 3-48, paragraph 2

The values have been corrected.

Page 3-50, paragraph 1

While plutonium was the ignition source for both fires, many of the factors were dissimilar between the 1957 and 1969 fires. The 1957 fire started on a rack inside a Plexiglas glove-box, with the Plexiglas serving as the initial fuel. Many of the recommendations following the 1957 fire pertained to filter plenums, which contributed to the prevention of exterior release of plutonium in the 1969 fire. Following the 1969 fire, it was determined that all cans containing plutonium must be fitted with tight fitting lids for fire control purposes.

Page 3-51

A discussion of the effect of chlorinated hydrocarbon solvents on filter plenum materials has been incorporated into Section 2.7.1 of the FEIS.

Page 3-52

The fire surveys of the Plant are scheduled to be done at three-year intervals and, as you note, one should occur by the end of 1978. However, as the Factory Insurance Association no longer conducts these audits, a new organization (the Shirmer Engineering Company, Chicago) has been engaged to perform them. Representatives of this Company have been on Plant site this year (1978) for orientation tours but, owing to this change, a full scale survey is not anticipated until late 1979.

Page 3-54

The comments regarding plenum sprinkler system testing and filter plenum efficiency when wet have been noted and appropriate information added in Sections 3.2.1.4 and 2.7.1 of the FEIS.

Page 3-55, paragraph 2

The sentence has been revised to refer to all past fires.

Page 3-55, paragraph 2

The fire probability estimate of 0.0001 per year was made by TERA, a consulting firm, based upon a fault tree analysis. A reference has been supplied in the text (TERA, 1976).

Page 3-56, paragraph 2

From past experience, plutonium released into room air by a fire contributes very little of airborne particulate. Most of the contamination released from a damaged glove-box remains within the room. See Section 2.7.1 and especially Figure 2.7.1-1.

Page 3-57, paragraph 1

It should be noted, regarding the question of radionuclide particle size associated with the postulated fire accident, that in obtaining the dose conversion factors, particles of 0.3-μm aerodynamic diameter are assumed. Hence the observation that particles passing the HEPA filters should be enriched in particles of this size is taken into account in the accident analysis.

Page 3-58, paragraph 1

The comment concerning a different approach to the construction of accident scenarios has been reviewed. This approach (assumed failures of various combinations of support services) was used to a limited extent in the hypothetical fire accident, where a cooling/cutting oil line ruptured and coincidentally a spark ignition source was present. Administrative controls were assumed to fail in the postulated criticality accidents, and acts of God were held responsible in the case of tornados or high winds. Service failures may accompany these accidents but are not capable of causing many of them. It is thus felt that the concept of multiple service failures would probably be no more useful than the causative factors presently hypothesized.

Page 3-58, paragraph 4

The statement in the DEIS could not be substantiated on further research. Since there is no documentation to support the comment, a revision is made in the FEIS deleting reference to these accidents.

Page 3-59, paragraph 3

All available information has been reviewed. We are not aware of any information which may have been withheld.

Page 3-60

The term "absorber" has been used in the FEIS.

Page 3-64

The amounts of all fission products produced in the hypothetical criticality accidents have been recalculated and are included in Tables 3.2.2-3 and 3.2.2-4 of the FEIS. In particular, xenon-138 is included.

Plutonium releases have been included in both the metal and solution criticality MCA (maximum credible accident) analyses. Krypton and iodine releases were included in Tables 3.2.1-3 and -4 of the DEIS. The methods and assumptions used to calculate the production and release of fission products are included in Section 3.2.2.6 of the FEIS.

Page 3-65, paragraph 2

A definition of the term "criticality accident" has been included in the Glossary.

Page 3-66, paragraph 4

This section is concerned with the consequences of accidents. Matters concerning safeguards and security are discussed in Section 2.12 of the FEIS. The DOE has an elaborately structured organization and procedure for responding to nuclear blackmail, threats, sabotage, and/or terrorist actions. The organization includes both DOE personnel and representatives from many DOE contractors. The procedure provides for rapid evaluation of the threat, investigation of the terrorists, and searching for and rendering safe the threatened hazard. The plan has been tested and continues to be developed. The specific means and effects of possible sabotage, nuclear blackmail, or other terrorist activities and the many factors which are or would be used to preclude such occurrences or to mitigate the effects thereof are not appropriate for discussion in an EIS.

Page 3-71, Table 3.2.2-1

The values concerning total impoundment failure have been corrected.

Page 3-73, paragraph 2

This fact is mentioned in Section 3.2.4.2 of the FEIS. Table 3.2.4-4 includes the effective stack height change for the SE sector.

Page 3-75, paragraph 1

Appendix F in the FEIS has been revised to include a complete set of dose conversion factors.

Page 3-75, paragraph 2

In the revised FEIS, 70-year organ doses for the lung, liver, bone, and total body from 70 years of routine Plant operations is calculated. These doses are put into perspective by comparison to Denver-area organ background for 70 years (see Section 3.1.2.4).

Page 3-78, Table 3.2.3-4

The risk dose to individuals living in the area surrounding the Plant are presented in Section 3.2.4 of the FEIS. The methodology used to obtain these numbers is thoroughly discussed in Section F.2.

Accidents involving nonradioactive hazardous materials are discussed in Section 3.2.1. The consequences of the maximum credible accident for nonradioactive material, a beryllium fire, are given in this section. See Section 2.5.3.2 for a discussion of the health effects of handling beryllium.

Page 3-79, paragraph 2

The consequences of postulated transportation accidents are discussed in Section 3.3.2.2 of the FEIS. Futher details are given in Appendix F.

Page 3-93, paragraph 4

In the FEIS, a separate calculation is done which specifically addresses an accident in the urban environment (Section F.3.2.2). The population density used in that assessment is that of New York City.

This assessment calculates a population dose and the resultant health effects.

Page 3-94, Table 3.2-4

Shipments of radioactive material from Rocky Flats have never been involved in any accidents.

Page 3-97, Table 3.3.2-6

There is a history of no transportation accidents associated with Rocky Flats Plant under either "high" or "low" production rates. Therefore we can make no determination of transportation accident probabilities as a function of production rate.

Page 3-98, paragraph 3

In the FEIS, assuming a 100-meter release height, the maximum dispersion factor has been calculated to be 1.82×10^{-6} sec/m^3 at a distance of 3.55 miles. This information is in Section 3.3.2.1 and Appendix F of the FEIS.

Page 3-99, paragraph 4 and 5

A statement regarding the effects of a Nuclear Test Ban Treaty would be highly speculative. Such a treaty would not necessarily terminate the need for nuclear weapons production. The postulate, no need for nuclear weapons, is hypothetical situation which would require much greater definition before its effects on Rocky Flats and the community could be described. The reader should understand that this section of the FEIS is intended to discuss the effects of the Rocky Flats Plant on the community, rather than the effects of political variability on Rocky Flats. If the reader is concerned about events which would curtail operations at Rocky Flats Plant, he is referred to Chapter 5 for a discussion of the costs and impacts of curtailment.

The expected lifetime of the Plant is not projected at this time. Population projections in the FEIS are made to the year 2000 only, because the data are available to that date only. The data were obtained from the Denver Regional Council of Governments. Any extension of the data would be highly speculative, and, therefore, of questionable value. If, at a future date, projections of populations become available to dates beyond 2000, the readers of the EIS will be able to apply them by multiplication of the calculated dose per resident given in the FEIS. The year 2000 A.D. is not the anticipated date of termination of the Plant.

Page 4-2, paragraph 3

This consideration is not applicable to the current Environmental Impact Statement. If a decision were made to cease weapons components production at Rocky Flats, proposed future uses of the Plant site would be subject to NEPA review at that time. Included within that review would be a detailed discussion of decontamination of the Plant site and facilities and any associated ecological effects. Any attempt to discuss these issues in detail at this time would be too speculative to be meaningful.

Page 4-2, paragraph 4

The revised FEIS calculates organ dose.

Page 4-3, paragraph 1

The impact of the maximum credible accidents is assessed several ways in the FEIS. All methods assess the dose to the lung, liver, bone, and total body. Criticality accidents also impact the thyroid. A dose is calculated in this case. The accidents considered in the FEIS are discussed in Section 3.2.

Page 4-4, paragraph 1

The DOE response to terrorist threats is described in the answer to the question concerning page 3-66, paragraph 4.

A summary on the control of radioactive contaminants is presented in Section 4.4.3.1. Because of improvements in the Rocky Flats operations, future releases of radioactive materials to the environment are expected to be considerably smaller than past releases.

The effect of past or future events on land values in the Rocky Flats area cannot be addressed because the Plant is involved in land litigation in Federal District Court. Speculation on such matters would be prejudicial to the case.

Page 4-7, paragraph 7

Section 4.4.2.2 has been corrected to agree with the figure (Figure 2.3.9-3 in the FEIS).

Page 4-7, paragraph 5

No process water is impounded in Pond B-2. Section 2.10.2.1 has been corrected.

Page 4-9, paragraph 1

An addition has been made in Section 4.4.3.1 reflecting the comment on the effect of the water recycle and surface water control programs on the flow to Great Western Reservoir. Note that effluents of the type processed by Building 374 have not been discharged off-site in several years. Note also that the surface water control project is intended to contain surface water only when the quality of the water makes this necessary.

Page 4-9, paragraph 5

Revisions have been made in accordance with the suggestion.

Page 4-10, paragraph 1 and 2

An efficiency study has been completed by Colorado State University on the 40-cfm air samplers used by Rocky Flats. The study indicates that the sampler collection efficiency lies within the range of efficiencies reported for the sampler which is used by the Colorado Department of Health (see Section 2.10.1.3 and Appendix I, FEIS). The Rocky Flats Plant Standards Laboratory routinely calibrates the flow rate of these samplers, as well as stack air monitors.

Page 5-2, Table 5-1

(1) The value in the footnote has been corrected.

(2) With respect to changes in goals which would increase dose, dollar costs, and facility requirements, no major changes of this type are anticipated. Levels of operation fluctuate requiring varying levels of cost input. All foreseeable actions of this kind have been included in the FEIS and considered as current activities.

(3) The cost estimation procedures appearing in Table 5-1 and elsewhere are based on a report and addendum by the Plant Facilities Engineering and Construction Department, prepared in January 1976 and May 1976, respectively, entitled "Cost Estimated for Relocation of Rocky Flats Plant." The FEIS Section 5.3.1 has been modified to include this reference (Rockwell, 1976). The dose reduction estimates follow in a straightforward way from the organ dose estimates of Chapter 3.

(4) The level of decontamination referred to under alternative 4-C in Table 5-1 is background level, and the FEIS text has been amended to clarify this point. The observation that the total man-rem reductions listed in Table 5-1 of the DEIS are more than the total potential dose reductions given is not correct. The potential population doses from on- and off-site sources given in the DEIS are 24.1 and 2.0 man-rem/yr, respectively. No dose reduction in excess of these values is given.

(5) Normal Plant operations would contribute an estimated 0.63 health effects over 70 years. Medical costs due to Plant operations are currently too small to measure (see Chapter 3).

(6) Your comment about the completion of alternatives 4-B and 5-A(1) in Table 5-1 of the DEIS, and the annual income prorated to the year 2000 equaling the $114.8 million that Rocky Flats provides to the community, is in error. The cost of doing alternatives 4-B and 5-A(1) totals $2.1 billion and prorated over a period of 24 years (1976 to 2000) is $87.5 million per year. This is compared to the $114.8 million per year that Rocky Flats provides to the community each year in the form of annual disposable income, goods and services, utilities for the Plant, and revenue from property, sales, and income taxes. In addition, any benefits to the area from the Plant's present location would be permanently lost after complete shutdown and soil removal were accomplished.

<u>Page 5-7, paragraph 5</u>

Section 5.2.2 involves a discussion of process wastewater that is <u>not</u> discharged off site. Therefore, it would be inappropriate to use drinking water standards in this section.

<u>Page 5-16, paragraph 2</u>

The discussion in this section is based on the removal of on-site soil only. In the FEIS this is indicated in Section 5.3.2, first paragraph.

<u>Page 5-18, paragraph 3</u>

The definition of standby status for the Plant is given in Section 5.4.1 as discontinuation of <u>production</u> and <u>research and development</u> operations but continuation of waste and scrap recovery as required.

The second comment, that the 0.15 man-rem savings should be 5.9 man-rem, is not true. The 0.15 man-rem refers only to routine operational releases, while the 5.9 man-rem number includes contributions from wind-blown contaminated soil.

<u>Page 5-19, paragraph 2</u>

The plutonium in soil concentrations of 100 and 1000 d/m/g were selected on an arbitrary basis.

<u>Page 5-19, paragraph 4</u>

The FEIS has been updated to include the use of recent data which were acquired by the method prescribed by the State Regulation.

<u>Page 5-21</u>

No major changes in goals of the Plant are anticipated.

<u>Page 5-23 and 5-24</u>

Section 2.3.9.2 of the FEIS discusses the EPA draft guidance document.

Page 5-25, paragraph 4

The 3-inch depth is a first estimate, based on limited depth profile information.

Page 5-26, paragraph 4

This topic is discussed in Section 5.5.1 of the FEIS. The actions of small mammals are discussed in Section 2.10.4.2.

Page 5-27, paragraph 3

The effect of the proposed Environmental Protection Agency guidance on transuranics in the environment has been included in Section 5.5.1 of the FEIS, per your recommendation. The current actions regarding removal of the soil underneath the pad are discussed in Sections 1.5.5, 4.4.3.1, 5.2.4, 5.5.1, and 9.5.

Page 5-28, paragraph 4

Potential future uses of the Rocky Flats land would be addressed at the time of decommissioning from the present function. Consideration of the suitability of the site as a National Grassland is not adversely affected by current land management practices. Section 2.3.10.4 addresses the Rocky Flats Land Management Plan.

Page 5-28

These measurements were made by private contractors for land developers in the area and include Good and Associates and Walnut Creek Subdivision. The 1000 acres is located immediately east of Indiana Street in Sections 7 and 18.

Page 5-29, paragraph 2

Beginning in 1975, the Rocky Flats designed air samplers have been in continuous service. Since that time, there have not been sufficient data reported by the Colorado Department of Health to statistically support the comment that concentrations of plutonium in ambient air reported by the Colorado Department of Health exceeds Rocky Flats by a factor to two to eight. The question concerning the use of whole body doses has already been answered.

Page 5-29, paragraph 4

Air shipments of plutonium to and from Rocky Flats were terminated in April 1977. In the future air shipments of plutonium to or from the Rocky Flats Plant would be expected to resume only if made in containers certified as meeting aircraft crash, accident safety criteria, or as otherwise permitted for National Security purposes in accordance with 10 CFR Part 871 "Air Transportation of Plutonium."

Page 6-1 through 6-3

The material presented in this section is detailed elsewhere in the FEIS and is referenced. It is not anticipated that the Plant will be declared obsolete in the foreseeable future.

Page 7-5, paragraph 2

The population-dose calculation, and ultimately the cancer risk, has been calculated for the existing population for the next 70 years (i.e., 70-year dose commitment for the 1977 population). This has also been done for the projected year 2000 population, using more accurate population growth projection for the nearby areas. In addition, calculations have been done assuming a hypothetical high density population east of the Plant.

Page 8-2, paragraph 1

Projections of future workloads and funding that will be authorized by Congress have limited the Department of Energy's employment estimates at Rocky Flats to only the year 1985. Currently, even those projections are highly speculative and may easily change with changes in Congressional priorities.

Page 9-6, paragraph 3

This paragraph has been deleted from the FEIS. The dose to the maximum individual is now given as the 70-year organ dose for 70 years of Plant operation (see Table 3.1.2-5).

Page 9-6, paragraph 4

Lung, bone, and liver doses, in addition to total body dose, were considered in the DEIS (see Table 2.2.3-4 for instance).

Total body dose is de-emphasized in the FEIS, although still calculated along with the other organ doses. Comparisons that were previously based upon whole body background dose are now made in terms of Denver-area organ background doses (see Table 3.1.2-11).

Page 9-16, paragraph 3

In the recalculations of dose commitments to the area population, the demographic projections have been revised to reflect the higher growth rate of urban development. The new population dose is calculated both for ongoing operations and future accidental releases in Appendix F and is interpreted in Chapter 3, for all sectors of land, to a 50 mile radius.

Page 10-1, paragraph 5

The impact on the population dose of a postulated maximized population 2-5 miles east of the Plant has been included in the FEIS (see Section 3.1.2.3 and Table 3.1.2-9). Extending the maximized population out to 50 miles was considered to be unrealistic.

Page 10-3, paragraph 4

The Environmental Statement on Land Acquisition, Rocky Flats Plant, Colorado, April 1972 (WASH 1518) stated on page 13: "The AEC and CDH independently appraised the plutonium contamination around the Rocky Flats Plant in 1970 and concluded that no public health hazard then existed."

Page 10-4, paragraph 1

If the comment means that land acquisition is necessary only east of the Plant site, it is correct that this would reduce the cost from $135 million to about $50 million.

Page 10-12

Appendix G discusses possible health effects of plutonium. Several additional sections have been added to the FEIS version of Appendix G.

Health effects of beryllium are considered in Section 2.5.3 of the DEIS and Section 2.5.3.2 of the FEIS.

Page 10-17, paragraph 1

The reliability of measurements of samples analyzed at Rocky Flats is discussed in the Annual Environmental Monitoring Reports of 1974, 1975, 1976, and 1977 under Quality Control. With regard to the reliability of measurements conducted by outside agencies, the request may be directed to the respective agencies. It is outside the scope of this document to provide information on other facilities in such detail.

Page 10-18

Appendix F has been completely revised so that the models and methodology could be sufficiently presented. The total body dose is retained in the FEIS because of tritium and ground shine exposures, but the use of total body dose has been appropriately de-emphasized.

Page 10-19

The FEIS thoroughly describes the models used in the radiological impact assessment (Appendix F). Organ doses are calculated for total body, lung, liver, bone, and thyroid.

Page 10-24

It is agreed that test well and surface water samples have indicated rather than shown that there is no detectable plutonium transport.

Page 10-28, paragraph 1

The interface between the Rocky Flats Emergency Plan and the Colorado Radiological Response Plan (draft of July, 1978) is described in Section 2.11.4.

Page F-1, paragraph 5

This statement has been dropped from the FEIS. The dose factor used for water ingestion (Section F.1.3.1) is in units of rem per day per microcurie ingested (Table F-8). The calculation methodology, along with a sample calculation, is also given in this section.

Page F-2, paragraph 1

Appendix F has been rewritten for the FEIS. Seventy-year doses from 70 years of chronic exposure were calculated for routine releases, and the 70-year dose from an acute exposure was calculated for accidental releases. This is discussed throughout Appendix F and in Sections 3.1.2 and 3.2.4.

Page F-2, paragraph 3

This statement is not included in the FEIS. Half-time rather than half-life is used where appropriate.

This equation is not used in the FEIS. A derivation of the equation used is given in Section F.1.1.1. A simple equation of how inhalation organ dose is calculated is given in Appendix F (equation 1).

Page F-3, paragraph 3

This sentence does not appear in the FEIS. The water-ingestion exposure pathway is discussed in Sections F.1.3 and F.2.1.3.

Page F-6, paragraph 3

The weathering half-time for radioactive materials on plant leaves is part of the FOOD computer code, discussed and referenced in Section F.1.2.1 (14 days is the value used in the FEIS).

Page F-7, paragraph 4

The equations used to determine radionuclide uptake via ingestion are included in the FOOD computer code referenced in Section F.1.2.

Page F-8, paragraph 3

The FEIS does not include this statement. The present assessment uses both chronic and acute dose calculation procedures where appropriate. This is true for all exposure pathways.

Page F-8, paragraph 4

This paragraph is not included in the FEIS. References for dose conversion factors are included in Appendix F where appropriate.

Page F-9, Table 2

This table is not included in the FEIS. Dose conversion factors are now derived by a different method which is independent of MPC (maximum permissible concentration) values.

Page F-10, paragraph 2

The inhalation dose conversion factors are no longer calculated by the MPC method in the FEIS. All inhalation dose conversion factors are now calculated using the DACRIN computer code (Sections F.1.1.1 and F.2.1.1), which is based on the Task Group Lung Model.

Page F-10, Table 3

This table is not included in the FEIS. Dose conversion factors are determined by other modeling methods explained throughout Appendix F.

Page F-10, paragraph 3

This paragraph is not included in the FEIS. ICRP Publication 19 is used and referenced in Section F.1.2 describing the food ingestion pathway methodology.

Page F-11

The referenced methodology was not used in the FEIS. Inhalation dose conversion factors are shown in Table F-1 (chronic) and F-26 (acute).

Sample calculations of organ dose received from chronic releases are given in Sections F.1.1.2, F.1.2.2, F.1.3.1, and F.1.4.3. A sample calculation for the risk dose is shown in Section F.2.1.6. A sample calculation for the 70-year organ dose commitment from the maximum credible accident is shown in Section F.2.2.1. A sample calculation for the 70-year thyroid dose commitment from the maximum credible solution criticality is given in Section F.2.2.2.

Pathways are summarized in Sections 3.1.2 for routine releases, 3.2.4 for accidental releases, and 3.3.2.2 for transportation-related releases.

An organ-dose pathway breakdown from routine operations is given in Table 3.1.2-5.

Page F-16, paragraph 1

Newborns, 10 year olds, and females are considered in the FEIS (see Sections 3.1.2.4 and 3.2.4.2).

Pregnant women are not considered because well-accepted (ICRP) metabolic models for this case are not available.

Page F-16, paragraph 3

This paragraph was not included in the FEIS. Population dose assessment methodology is given in Section F.1.5.3.

Page F-17

In the FEIS a separate calculation is done which specifically addresses an accident in the urban environment (Section F.3.2.2). The population density used in that assessment is that of New York City.

This assessment calculates a population dose and the resultant health effects.

Page F-18

The crop yield and associated value for eggs, milk, and meat used in the FEIS are given in Table F-4 and are referenced in Section F.1.2.1.

The narrative in the FEIS has been updated with less emphasis on whole body dose and more on bone, liver, lung, and thyroid dose.

Page G-1

Drs. Thompson and Bair have been active in research on transuranic behavior and effects in experimental animals, and in the evaluation of transuranic hazards to man, for many years. Dr. Thompson has published more than 35 papers and reports on these subjects, dating back to 1953. Dr. Bair has published more than 70 papers and reports on these subjects, dating back to 1958. Some of these are referenced in Appendix G. Both men were employed during this period by contractors at DOE/ERDA/AEC laboratories at Richland, Washington. Dr. Thompson is a Senior Staff Scientist in the Biology Department and Dr. Bair is Manager of Environment, Health, and Safety Research Programs at Battelle, Pacific Northwest Laboratory. Both are members of the National Council on Radiation Protection and Measurements, and of Committee 2 on Secondary Limits of the International Commission on Radiological Protection. Dr. Bair is a recipient of the E. O. Lawrence Memorial Award (1970).

Page G-3, paragraph 1

The low measured values for plutonium in lymph nodes are those reproduced in Table G-2, which are referenced in the DEIS to Bennett (HASL-278, 1974). Bennett extracted the data from a Los Alamos Scientific Laboratory Report (LA-4875, 1973). More recent compilations of autopsy data, included in the EIS (LA 6898-PR, pp. 42-50, 1977) are essentially in agreement with the quoted values for lymph nodes.

There is good agreement between the solubility measurements of fallout plutonium in Colorado and New Mexico residents and the calculation of fallout plutonium in man based on the ICRP model (ICRP, 1966) using New York air concentrations. The measured lymph node burden is smaller than predicted in the model, and the bone and liver burdens are accordingly higher than predicted. Those measured organ burden values indicate that the fallout plutonium has a greater solubility than was assumed in the ICRP model. It is true that mathematical models are imprecise and may, under certain circumstances, lead to erroneous conclusions. In this case, however, the predicted quantity in the lymph nodes is less than 25% of the total, and its redistribution to other organs could have no major effect on doses to these organs.

The primary site of deposition of soluble plutonium translocated from the lung is the endosteal surfaces of the bone. Over any period of time only a very small fraction of the plutonium is associated with the bone marrow. Thus, the increased bone dose would be to the endosteal cells in the region of the bone surface where plutonium accumulates.

Page G-3, Table G-2

Gonads were not included in Table G-2 of the DEIS because of uncertainties with regard to the precision of the analytical results obtained at the very low levels encountered. Methods have improved and the latest compilation (LA-6898-PR, pp. 42-50, 1977) of Colorado data gives a 50th percentile value of 0.05 pCi/kg or about 0.001 pCi total in gonads. These are data from 64 samples and are lower than the average of all U.S. data (172 samples), which was 0.13 pCi/kg.

Page G-3, paragraph 2

The latent period for induction of all types of cancers is not constant but is unique for each exposure and cancer type. For leukemia, the latent period ranges from 5-20 years (Reisman and Trujillo, 1963; Shimaoka and Sokal, 1978); for bone tumors, 5-50 years (Polednak et al., 1978; Stehney et al., 1978); for liver tumors, 20-40 years (Van Kaick et al., 1978); 10-30 years for thyroid tumors (Conrad, 1977); and 10-25 years for lung tumors (Archer et al., 1976). Thus, the statement that the latent period for most cancers induction is 20-30 years is not supported by the data.

It is true that the potential latent period for development of cancers produced by plutonium in fallout has not expired. This fact, however, does not alter the "relative" conclusion that effects due to Rocky Flats operations would be insignificant compared to the effects from fallout plutonium.

References

Archer, V. E., J. D. Gillam, and J. K. Wagoner, "Respiratory Disease Mortality Among Uranium Miners," from Occupational Cancinogenesis, Annals of the New York Academy of Science, Vol. 271, pp. 280-293, (1976).

Conrad, R. A., "Summary of Thyroid Findings in Marshallese 22 Years After Exposure to Radioactive Fallout," Radiation-Associated Thyroid Carcinogens, DeGrott, J. Ed., pp. 241-257, Grume and Stratton, New York, 1977.

Polednak, A. P., A. F. Stehney, and R. E. Rowland, "Mortality Among Women First Employed Before 1930 in the U.S. Radium-Painting Industry." Am. J. Epidemiol, Vol. 107, p. 197, (1978).

Reisman, L. E. and J. M. Trujillo, "Chronic Granulocytic Leukemia of Childhood," J. Ped., Vol. 62, p. 710, (1963).

Shimaoka, K. and J. E. Sokal, "Radiation-Associated Chronic Myelogenous Leukemia in Younger Individuals," Int. Atomic Energy Agency Symposium, 1978.

Stehney, A. F., J. R. Lucus, and R. E. Rowland, "Survival Times of Woman Radium Dial Workers First Exposed Before 1930," Int. Atomic Energy Agency, 1978.

Van Kaick, G. A. Kaul, D. Lorenz, H. Math, D. Wegner, and H. Wesch, "Late Effects and Tissue Dose in Thorotrast Patients: Recent Results of the German Thorotrast Study," International Atomic Energy Agency, 1978.

Page G-6, paragraph 3

Efforts are being made to study larger populations. Most populations having relatively high plutonium burdens were included in the groups identified earlier, and adding large numbers of people with very low and ill-defined depositions is not expected to improve the reliability of the statistics.

The analysis of plutonium in human tissues and the epidemiologic studies of plutonium workers being conducted at Los Alamos Scientific Laboratories should provide more information on the toxicity of plutonium. Additional studies which will provide useful information on the effects of low levels of radiation on man are being supported by government agencies. Additional studies on the effects of low level radiation are given in the response to the letter of John Elliott (Rocky Flats Monitoring Committee), December 24, 1977, which is also addressed in this section of Volume III of the FEIS.

Page G-6, paragraph 5

As suggested by the comment, bone and lung doses are more appropriate for comparison and these are included in Section 3.1.2.3. Both Table 3.1.2-6 and Table G-5 of the DEIS include doses from inhaled and ingested radionuclides as well as dose from external irradiation.

Page G-7, Table G-5

The 100 millirem per person per year is an average organ dose from inhalation. Higher values, such as the 5000 millirem per year suggested in the comment, have been calculated for the segmented bronchial epithelium. Such doses are relevant to the exposures from radon daughters, but animal models indicate that plutonium is deposited in the deep lung, and exposures may be better considered as an average lung dose.

Estimates of the dose from radon and its daughters to the whole lung and of the local dose to the basal cells of the bronchial epithelium have been made by a number of workers including Chamberlain and Dyson (1956), Haque and Collinson (1967), Jacobi (1964, 1972), Harley and Pasternak (1972), UNSCEAR (1972), and NCRP (1975). A number of those dose estimates are listed in the table below for a background concentration of 100 pCi/m^3 radon in equilibrium with its daughters. Variables which can affect the estimate of average dose to the whole lung include the local soil emanation rate of radon, the amount of dispersion by wind, the fraction of the daughters attached to particles, and the fractional deposition of daughters in the lung. An average dose rate of 100 mrem/year per person for the dose to the whole lung from inhalation is listed in Table 3.1.2-6, Volume I of the Rocky Flats FEIS. Since most human lung tumors arise in the brochial epithelium, the local dose to the basal cells of the bronchial epithelium is generally considered of more relevance than the average dose to the whole lung for estimating lung cancer risk. The local dose to the segmental bronchioles from a natural background radioactivity is estimated by the NCRP (1975) to be 450 mrem/year. Higher or lower values have been obtained using different assumptions about radon release rates and the microanatomy of lung. The primary anatomical characteristics that alter dose are the thickness of the mucous layer and the depth of the basal cells of the bronchial epithelium. The analysis of Haque and Collinson (1967) assumes the cells at risk are 30 μm from the surface of the mucous layer. This yields a dose from background levels of radon and daughters (100 pCi/m^3) of 1380 mrem/year. The dose estimated can be doubled by assuming the basal cells are 17 μm deep or reduced to one-third by assuming the basal cell are 40 μm deep. The dose to the bronchial epithelium has been estimated to be 200 mrem/year from natural background levels of radon and its daughter by Chamberlain and Dyson (1956), Radford and Hunt (1964), and Altshuler et al. (1964). The range of the estimated doses can be increased by assuming different solubilities and distributions of the radon daughters in the mucous layer (James, 1977) or by assuming a quality factor other than 10 for alpha radiation. The maximum dose to the bronchial epithelium could approach 5000 mrem/year under special conditions.

Estimated Dose to the Lung and Bronchial Epithelium From Inhaled Background Radionuclides
(100 pCi/m^3 Radon in Equilibrium With Daughters)

Whole Lung (mrem/yr)	Bronchial Epithelium (mrem/yr)	Reference
11	200-380[a]	Altshuler et al. (1964)
44	56-1400[b]	Jacobi (1964)
100	450	NCRP-45 (1975)
	28-225[c]	Harley and Pasternack (1972)
	200	Chamberlain and Dyson (1956)
	200	Radford and Hunt (1964)
	1380[d]	Haque and Collinson (1967)

[a]Lower dose corresponds to depth of 37 μm for basal layer of bronchial epithelium. Higher dose is for 22 μm cell depth.

[b]Lower dose is to the terminal and respiratory bronchioli. Higher dose is to the secondary and quaternary bronchi.

[c]Lower dose calculated using Harley and Pasternack's model and deposition fractions. Higher dose calculated using Harley and Pasternack's model and Altshuler's deposition fractions.

[d]Dose to the basal cells of the bronchial epithelium at a 30-μm cell depth.

References

Altshuler, B., N. Nelson, and M. Kuschner, "Estimation of Lung Tissue Dose From the Inhalation of Radon and Daughters," Health Phys., 10, 1137-1161, 1964.

Chamberlain, A. C., and E. D. Dyson, Br. J. Radio., 29, 317-325, 1956.

Haque, A. K. M. M., and A. J. L. Collinson, "Radiation Dose to the Respiratory System Due to Radon and its Daughter Products," Health Phys., 13, 431-443, 1967.

Harley, N. H., and B. S. Pasternack, "Alpha Absorption Measurements Applied to Lung Dose from Radon Daughters," Health Phys., 23, 771-782, 1972.

Jacobi, W., "The Dose to the Human Respiratory Tract by Inhalation of Short-Lived ^{222}Rn- and ^{220}Rn-Decay Products," Health Phys., 10, 1163-1174, 1964.

Jacobi, W., "Relations Between the Inhaled Potential Alpha Energy of ^{222}Rn- and ^{220}Rn-Daughters and the Absorbed Alpha Energy in the Bronchial and Pulmonary Region," Health Phys., 23, 3-11, 1972.

James, A. C., "Bronchial Deposition of Free Ions and Submicron Particles Studied in Excised Lung," Inhaled Particles and Vapours IV, Ed. H. W. Walton, Pergamon Press, Oxford, 1977.

NCRP, National Council on Radiation Protection, "Natural Background Radiation in the United States," NCRP Report No. 45, 1975.

Radford, E. P., Jr. and V. R. Hunt, "Polonium-210: A Volatile Radioelement in Cigarettes," Science, 143, 247-249, 1964.

UNSCEAR, Report of the United Nations Scientific Committee on the Effects of Atomic Radiation, Ionizing Radiation Levels and Effects, United Nations, New York, 1972.

Page G-9, Table G-6

The data in Table G-6 are from C. W. Mays and T. F. Dougherty (1972). The RBE of 10 for alpha radiation and 5 for the distribution factor apply for all entries in the table. The animals all received the same isotope (^{239}Pu) in a constant chemical form (citrate) by the same route of administration (intravenous injection). It is true that the measured values for the distribution factor differ for different radioisotopes, different routes of administration, or different chemical forms of the radioisotope. However, in the application of these research findings to development of radiation protection standards, the distribution factor for radionuclides in bone is normally taken to be 5. This excludes isotopes of radium, daughter products of radium isotopes, and x-ray or gamma radiations. For these radiations the distribution factor is assumed to be 1.

Reference

Mays, C. W. and Dougherty, R. F., "Progress in the Beagle Studies at the University of Utah," Health Phys., 22, 793-801, 1972.

Page G-11, paragraph 1

An extrapolation of the data in Figure G-1 indicates that 5 nCi/g of lung may be a plutonium burden which does not cause life shortening in beagle dogs. A concentration of 5 nCi per gram lung tissue corresponds to a total lung burden of 500 nCi in beagle dogs (100-g lungs) and 5000 nCi in humans (1000-g lungs). This 5000 nCi burden is 312 times greater than the maximum permissible lung burden of 16 nCi for humans exposed occupationally to insoluble forms of plutonium.

In any case, there are data which suggest that dogs may be more radiosensitive than man. It is entirely probable that exposure limits will change as better information becomes available, but any such changes would be based upon consideration of a wide variety of relevant data, rather than an extrapolation of data from a single experiment with dogs.

Page G-12

The open circles represent individual dogs who died of pulmonary fibroses. The closed circles represent dogs who died with pulmonary neoplasia. The symbols are identified in the FEIS.

Page G-13, Table G-8

The practice of expressing health risk in terms of "cancer incidence per rem" is used for large groups of individuals exposed to low levels of radiation and is based on the concept that exposure to any amount of radiation carries with it some finite probability of damage to an individual's health. A cancer incidence per rem of 10×10^{-5} means an individual has roughly one chance in 10,000 of developing a cancer for every rem of exposure he receives. If he receives only a fraction of a rem, he has only a fraction of that risk. In a group of 10,000 individuals, each exposed to a 1 rem, statistically one individual might develop cancer as a result of the exposure. In a group of 1,000,000 individuals, each exposed to 0.01 rem, again statistically, one individual might develop a cancer as a result of the exposure. The statistical risk loses its meaning when the group becomes very small, when all the dose is given to a single individual, or when the dose becomes very large. Very high exposures to single individuals would produce acute radiation death.

Page G-14, paragraph 1

The reference to "total body average" at the end of the paragraph was intentional. More recent data indicate that the concentration of fallout plutonium in human gonads is about equivalent to the total body average (LA-6898-PR, pp. 42-50, 1977, Reference 9, Appendix G-1), and that the inhomogeneities of distribution observed in the mouse would not have a significant effect on the dose to spermatogonial stem cells in man (LF 56, pp. 399-403, 1976, Reference 32, Appendix G-1).

Page G-15, paragraph 1

Because of the very different pattern of deposition of radon daughters and plutonium in the lung, the relevance of the uranium miner data is questionable. Dose estimates for uranium miners are also very poor. While such data were considered by the BEIR Committee (Reference 35, Appendix G-1), they were considered less significant than other inputs. Use of data on uranium miners in the BEIR Report is mentioned on page G-20 of the DEIS (page G-1-20 of the FEIS).

Page G-19, paragraph 1

The correct statement of Newcombe's estimate of total genetic risk is 10×10^{-6} per man-rem. The inconsistency has been corrected.

Page G-28, Table G-14

The radiation dose to the thyroid is essentially all from exposure to radioisotopes of iodine, and were therefore not included in this appendix on transuranic effects. The contribution of thyroid cancer to predicted mortality would be quite insignificant in comparison to the transuranics. This is because thyroid cancers are seldom fatal and because internal irradiation of the thyroid by radioiodine appears to have a much lesser effect than external irradiation of the thyroid.

As explained in footnote c of Table G-14 of the DEIS, the dose commitment to the gonads was assumed to be equivalent to that listed in Tables 3.2.3-3 and 3.3.2-6 of the DEIS for total body.

Except for rounding errors of a conservative nature, the entries in Table G-14 all appear to be correct. A population of 1.4 million was assumed in deriving the dose commitments taken from Tables 3.2.3-3 and 3.3.2-6.

Page G-29, Table G-15

See the previous response concerning errors in Table G-14. Equations used in dose calculations have been provided in Appendix F of the FEIS.

Page H-3

The incidents you mentioned were not included in the table because the only incident causing an expenditure of more than $5000 was the soil removal, which is not considered as a property loss.

Page H-7

The data have been updated to December 31, 1977, which is the uniform data cutoff point. The death of the jogger was not ruled a lost time injury by OSHA.

Page H-8, paragraph 2

The maximum permissible lung burden is given in the FEIS, Table H-8. A discussion of the reliability of body counting techniques is given in the preceding paragraph. Data were included as requested.

Page H-9, Table H-3

The table has been revised and updated as requested.

Page H-10

Revision has been made to avoid the confusion mentioned in the comment.

Page H-10, paragraph 3

A statement has been included, as suggested.

Page H-11

The table (H-8 in the FEIS) has been modified in response to the comment.

Page I-1

Dr. Selvidge has had considerable experience in a specialized area of statistical analysis dealing with the statistics of infrequent events. Her qualifications include a D.I.C. in Statistics and Operational Research from the Imperial College of Science and Technology in London. Her thesis was entitled "Lognormal and Gamma Distribution in Experimental Data." Dr. Selvidge later completed a D.B.A. dissertation at Harvard University entitled "Assigning Probabilities to Rare Events." Her special field was Prescriptive and Behavioral Decision Theory. Among her subsequent efforts were the following:

(1) Mathematician in the Lunar and Planetary Sciences Section of the Jet Propulsion Laboratory in Pasadena, California.

(2) Supervisor of Statistical Programming and Staff Analyst at the Harvard University Computer Center.

(3) Designed and taught a course in decision theory and quantitative methods, which was required for MBA students at the University of Montreal.

(4) Research (at Harvard University Graduate School of Business) in Managerial Economics investigating experimental determination of subjective probabilities and practical techniques for dealing with uncertainty.

(5) Assistant Professor of Management Science at the University of Colorado College of Business and Administration, teaching courses in business information and the computer, decision analysis, administration controls, and introduction to management science at the graduate and undergraduate level.

(6) Participated in a NASA-sponsored study to assess the risk of contaminating the planet Mars with terrestrial micro-organisms during unmanned exploration (Stanford Research Institute at Menlo Park, California).

Page I-1-14 and I-1-17

An explanatory sentence has been added to the effect that these numbers do refer to actual Plant buildings which, for security reasons, are not explicitly identified.

Page I-3-13, paragraph 1, I-3-18, and I-3-25, Figure 4

The specific means and effects of possible terrorist activities and the many factors which are or would be used to preclude such occurrences or to mitigate the effects thereof are not appropriate for discussion in an Environmental Impact Statement.

Response to Letter of Anthony Robbins to Major General J. K. Bratton, USA dated June 29, 1977

The most current form of the Public Law 94-187 concerning air shipments of plutonium is included in Section 2.6.10 of Volume I.

Response to Letter of Charles G. Jordan to Ron Simsick dated November 10, 1977

Paragraph 2

It is the intent of the EIS to present factual information which would be useful in making decisions related to the Plant's continuing operation and the impact of that operation on the Plant's environment. The material presented in the FEIS serves that intent, as discussed in the Foreword and in Section 1.1. Also discussed on those pages is the concept that the FEIS does not evaluate the national nuclear weapons program, of which Rocky Flats is a small, but important, part. Alternatives to the national policy on nuclear weapons is, therefore, not a subject to be included in the Rocky Flats FEIS, but alternative actions to the existing operation are discussed in Chapters 5 and 9. With regard to public controversy, the FEIS presents and mathematically evaluates the plethora of data and evidence, but it does not undertake evaluation of speculations or inferences in the Volume I text. Volume III of the EIS contains letters of comment and responses, which address controversial issues which were brought to DOE's attention by means of formal letters. Concerns were also expressed at public hearings. Each specific concern has been addressed within the 3 volumes of the FEIS.

Paragraph 3

The objective and intent of the FEIS is presented in the Foreword. Every effort has been made to present information which will comply with the NEPA requirements. The FEIS will provide the environmental imput to future decisions concerning the Plant. The scope of the information is accordingly very broad since the precise nature of these decisions is not known at this time.

Paragraph 4

Aspects of the controversies with which the Plant is associated have been discussed in various contexts in the FEIS. Some nontangible aspects of these controversies are not discussed because of the intention for the EIS to be a factual document.

Paragraph 5

The discussion on Marginal Propensity to Consume (FEIS, Section 3.4.3.1) is necessary in order to understand the impact that the disposable income of the Rocky Flats employees has on the community. It demonstrates how the direct and secondary employment, through each successive round of spending, will add approximately $100 million to the economy.

If the geometric progression, as defined in Economics by Paul Anthony Samuelson, 8th Edition, 1970, is followed until the amount to be consumed approaches zero, the final sum will be approximately $100 million or 3.3 times greater than the original amount of disposable income.

The retail sales figure of $6.8 billion and the gross personal income figure of $7.3 billion stated in Section 3.4.3.1 are for only four counties: Adams, Boulder, Denver, and Jefferson. The figures listed in the United Banks' document for the Metro area cover an eight-county area. This accounts for the discrepancy between the figures used in the FEIS and the figures quoted in the letter of comment. See Section 3.4.3.1 of the FEIS.

The average family size of 3.96 reported in the DEIS is incorrect. The correct figure, 2.83 as reported by the DRCOG, is used in the FEIS.

The criticism about comparing per capita income of $5,839 in Colorado with annual earnings of $14,560 per Rocky Flats employee is well taken and has been deleted from the EIS (see FEIS Section 9.1.2). The comparison in the comment letter of the average income of $14,560 per Rocky Flats employee with the median income of $16,700 for the Denver Metro area is not a valid comparison. The DRCOG and United Banks' documents reflect household income which is not comparable to the Rocky Flats individual employee income.

Response to Letter of Harvey R. Atchison to Philip H. Schmuck dated November 22, 1977

1. Detailed analysis of transportation impacts are given in Section 3.3 of the FEIS. Various state and local agencies are aware that these shipments are being made. The routing and scheduling of these shipments cannot be made public for security reasons. See FEIS Section 2.6.10.2 for a discussion of transportation safety.

2. The existing Rocky Flats National Preparedness Plan (see FEIS, Section 2.11.6) details the plan for evacuation of the Plant in the event of a threatened or actual nuclear attack by a foreign power. The primary relocation area is currently specified as Pactolus Lake, located 3 miles west of Pinecliffe, Colorado. Evacuation would be accomplished by personal vehicles via Highway 72 through Coal Creek Canyon. An alternate route is specified as Highway 93 to Boulder, Colorado and then per instructions of Civil Defense officials. The Rocky Flats National Preparedness Plan is being revised and updated.

In the event an operational incident of such magnitude should occur that would require evacuation of the Plant, the Colorado Emergency Radiological Response Plan would be placed in effect. Evacuation would be accomplished by personal vehicle but under the requirements of the State plan.

Areas on the Plant site that might require local evacuation to another part of the Plant would be evacuated on foot, personal vehicle, or government furnished vehicles, as the situation may dictate. Such evacuations would be made through control points of the secured affected area.

The Rocky Flats Emergency Plan (see FEIS, Section 2.11.3) contains specific procedures for Plant building evacuations.

3. Air shipments of plutonium to and from Rocky Flats were terminated in April 1977. In the future air shipments of plutonium to or from the Rocky Flats Plant would be expected to resume only if made in containers certified as meeting aircraft crash, accident safety criteria, or as otherwise permitted for National Security purposes in accordance with 10 CFR Part 871 "Air Transportation of Plutonium."

4. Section 7.1.1 of the FEIS details the source of information on State land-use plans.

5. Figure 7.1-1 is a composite map developed from specific land-use plans and zoning maps covering the area and compared to the Regional Development Plan map of the DRCOG.

6. The "Regional Growth and Development Plan for the Denver Region" adopted in June 1978 by the DRCOG was used in the preparation of FEIS Section 7.1, in addition to the county and local land use plans and municipal zoning maps.

<u>Response to Letter of William P. Rogers and Robert M. Kirkham to Philip H. Schmuck dated November 16, 1977</u>

1) Various alternatives to the current use of the Rocky Flats Plant have been considered (see Chapters 5 and 9 of the FEIS). Termination of the Rocky Flats operations and decontamination are discussed in Section 5.4. It is premature at this time to speculate on a plan or commitment to an end use of the site. It should be noted, however, that there are ongoing programs for identifying and dealing with radioactive residues from past releases through removal and other practices (see Sections 2.3.9.1 and 5.5.1).

2) General comments on the geology and seismology sections of the DEIS:

1. Most of the references listed in the comment letter have been used by Woodward-Clyde Consultants in the preparation of Section 2.3.4 of the FEIS. Fault movement in the Rocky Flats area is discussed in Section 2.3.4.6.

2. Post-Laramide Orogeny fault is discussed in Section 2.3.4.2 and 2.3.4.6.

3. Movements on the Golden fault are discussed in Secion 2.3.4.6.

4. The 1882 earthquake is discussed in Section 2.3.4.7.

5. See Section 2.3.4.7.

6. The documentation for selection of the maximum expected earthquake and safe shutdown earthquake based on state-of-the-art and state-of-the-knowledge data for 1972/1974 is presented in the Blume report. Data that have become available since the 1974 update of the Blume report were considered in rewriting Sections 2.3.4.7 and 3.2.2.10; however, criteria for the maximum expected and safe shutdown earthquakes will be re-evaluated and discussed in the Safety Analysis Report for the Rocky Flats Plant.

Specific Comments:

DEIS Paragraph 2 of Section 2.4.6.1

The concept of the Southern Rocky Mountains being a post-Laramide geomorphic feature is relatively new. The concept was described in the literature in 1973 in a series of abstracts presented at the Geological Society of America, Rocky Mountain Section Meeting. The concept of post-Laramide faulting, based on these abstracts is discussed on pp. 63-64 of the Blume report. The data presented at the meeting were later documented in a series of papers published in 1975 as GSA Memoir 144 entitled "Cenozoic History of the Southern Rocky Mountains." This was well after the completion of the Blume report. The significance of these data with respect to the Rocky Flats Plant site was analyzed.

The literature (i.e., Epis and Chapin, 1975) generally refers to the age of the block faulting as "Miocene and later" (with the exception of the Rio Grande Rift), which is different from "Miocene to present." See Section 2.3.4.2, paragraph 4 and Section 2.3.4.6 of the FEIS.

Also, paragraph 2, Section 2.4.6.1

The sentence in question has been deleted from the FEIS.

Paragraph 3, Section 2.4.6.1

The sentence in FEIS Section 2.3.4.2, paragraph 6 now reads "Detailed studies of displacements on this and later erosional surfaces, Tertiary deposits and paleovalleys (Epis and Chapin, 1975; Scott, 1975; Izett, 1975; Taylor, 1975) have shown that the present Rocky Mountains are largely the result of post-Laramide tectonism."

Paragraph 5, Section 2.4.6.1

Block faulting and accompanying earthquakes initiated in the Miocene are discussed in FEIS Sections 2.3.4.2 and 2.3.4.6.

Paragraph 6, Section 2.4.6.1

In the discussion of the Golden fault in FEIS Section 2.3.4.6, it is acknowledged that the Kirkham and Rogers (1978) report concludes that the Golden fault is active. The capability of the Golden fault is to be determined and will be discussed in detail in the final Safety Analysis Report for the Rocky Flats Plant.

Paragraph 8, Section 2.4.6.1

The question of earthquakes having occurred on a fault near the Plant site is considered in Sections 2.4.3.7 and 2.3.4.6. This question will be re-evaluated and discussed in the final Safety Analysis Report for the Plant.

DEIS Tables 2.4-12, 2.4-13, and Figure 2.4-17

There was a drafting error in Table 2.4-13. The correct information appears in the FEIS, Figures 2.3.4-2 and 2.3.4-5.

The correct location of the Golden fault is shown in Figures 2.3.4-4 and 2.3.4-7 of the FEIS.

DEIS Section 2.4.6.4: Northeast-Trending fault

FEIS Figure 2.3.4-4 shows the northeast-trending fault in question. (The fault is discussed in "Other Possible Faults" of Section 2.3.4.6). The fault is shown to displace Verdos Alluvium. A careful field check of the area indicated that the apparent displacement might be a channel contact and not a fault. The feature will be investigated and the findings discussed in more detail in the Plant Safety Analysis Report.

DEIS, page 2-66

As discussed in Section 2.3.4.6, "Other Possible Faults," the significance of these lineaments to surface rupture will be studied for the Safety Analysis Report for the Rocky Flats Plant.

Page 2-67

See Section 2.3.4.6, paragraph 25 for a discussion of Davis' findings. If the data do preclude faults at depths greater than 600 feet, it is unlikely that faults are present at depths of less than 600 feet based on the tectonic setting of this area.

Page 2-67

The statement has been deleted from the FEIS.

Table 2.4-15

The FEIS refers only to intensity and not to specific acceleration values. Therefore, DEIS Table 2.4-15 has been deleted from the FEIS.

Page 2-70

Discussion of the 1882 earthquake can be found in Section 2.3.4.7.

Page 2-70, paragraph 3 & 4

The general discussion of seismography is in Section 2.3.4.7. Information about seismic activity near Steamboat Springs is included in Table 2.3.4-1.

DEIS Figure 2.4-21

DEIS Figure 2.4-21 is in error. The 1882 earthquake was mislabeled "32" instead of "82". This figure has been replaced by Figure 2.3.4-8 in the FEIS.

Section 2.4.7.3, paragraph 2

Some microearthquake activity has been recorded in the vicinity of the Golden fault. However, the location accuracy of the microearthquakes is poor and it is not possible to relate them to a specific geologic structure (Osterwald and others, 1973 given in the letter of comment reference list).

Section 2.4.7.3, paragraph 3

The capability of the Golden fault is to be determined and will be discussed in detail in the final Safety Analysis Report for the Rocky Flats Plant.

This discussion of the 1882 earthquake (FEIS Section 2.3.4.7) gives the postulated location of this earthquake as approximately 7 miles north of the Rocky Mountain Arsenal.

Page 2-76

The statement in question has been deleted from the FEIS.

Last paragraph of DEIS Section 2.4.7.3

Documentation for specifications on the maximum expected earthquake and the safe shutdown earthquake are given in Section 2.3.4 and are discussed in Section 3.2.2.10. These specifications will be re-evaluated and discussed for the final Safety Analysis Report for the Plant site.

Section 2.4.7.4, paragraph 2

There is no generally accepted definition of an active fault. The definition of a capable fault is given in the FEIS Glossary.

Paragraph 3, Section 2.4.7.4

The comment is correct. Refer to the rewrite of this section which is in Volume I of the FEIS as Section 2.3.4.

Paragraph 9, Section 2.4.7.4

The capability of the Golden fault is to be determined and will be discussed in the final Safety Analysis Report for the Rocky Flats Plant.

Paragraph 10, Section 2.4.7.4

Where the only data available are a displaced geologic unit tens of thousands to hundreds of thousands of years old, it would be extremely difficult to determine if the displacement was caused by surface rupture or a series of creep events closely spaced in time. The word "imperceptible" refers to the rate of movement and not the results of the movement.

Paragraph 12, Section 2.4.7.4

West (1977) concluded that these features are the result of mass movement and not recent faulting (see FEIS Section 2.3.4.2, paragraph 8).

Paragraph 13, Section 2.4.7.4

The potential for future earthquakes will be studied and the results discussed in greater detail in the Safety Analysis Report for the Rocky Flats Plant.

Last paragraph, Section 2.4.7.4

Refer to Sections 2.4.7 and 3.2.2.10 of the FEIS.

Response to Letter of Bob W. Harmon to Ron Simsick dated November 14, 1977

The Colorado Bureau of Investigation (CBI) felt that the information on security in the DEIS was "vague." After an agent of the CBI toured the Plant, Mr. Harmon concluded that "... Plant security appears to be excellent."

Section 2.12 of the FEIS provides details on safeguards and security that can be given without jeopardizing the safety and security of the Plant.

Response to Letter of Bert Baker to Ron Simsick dated November 7, 1977 and Letter of R. Taliaferro (Division of Wildlife) to Colorado Division of Planning dated October 6, 1977

The letter concluded that the "... Plant area (is) of minor importance to wildlife.... and provides an opportunity to study potential radioactive assimilation by wildlife in the area." For information on wildlife in the Rocky Flats Plant area, refer to the FEIS, Sections 2.3.10.2 and 2.10.4.

Response to Letter of William D. Weller to Ron Simsick dated November 10, 1977

1. The statement has been corrected in the FEIS, Section 2.11.3.2 to read "The Rocky Flats Plant is located in Radiological Assistance Region 6..."
2. The reference has been corrected in the FEIS (Section 2.11.4.1) to the Colorado Division of Disaster Emergency Services.
3. The corrections have been made in FEIS Section 2.11, to appropriately describe the NAWAS and METS communications systems.

Response to Letter of Jeris A. Danielson to Ron Simsick dated November 9, 1977

According to the Denver Water Department, the current contract which exists between the Denver Water Board and Dow Chemical Company (the former Plant contractor) does not now legally permit total reuse of the Plant water supply due to the component of "native" or Eastern Slope water in the present Plant raw water. A new contract has been drawn up by the Denver Water Board and is being reviewed by the Department of Energy. Negotiations associated with this contract will address the total recycle of the Plant water supply from Gross Reservoir and Ralston Reservoir.

Response to Letter of Frank J. Rozich to Anthony Robbins dated November 28, 1977

Past actions of the Plant with regard to the handling of liquid waste were within the control levels established by controlling agencies existing at that time and, in general, even within the limits of restrictions which we have by today's standards. The operations of the Plant at the present time are within compliance with existing laws and regulations. The potential for human error and the probability of catastrophic results is the subject of involved and elaborate analyses presented in FEIS Chapter 3.

Specific Comments:

1. While the appearance of nitrates in the area of the solar ponds indicates a possible pathway for trace element migration, the different sorption/leaching behavior of plutonium in soil indicates a much slower migration rate than for the more soluble nitrate compounds (cf E. H. Essington and E. B. Fawks, Distribution of Transuranic Nuclides in Soils: A Review, LASL Report, 1976). Also, the surface water control project assures proper sizing of catch basins and the resultant retention of runoff surface water so that minimal off-site impacts are anticipated from this source. See Section 2.3.5.3.

2. The statement that the liquid from the unlined ponds is not allowed to flow off-site is meant to imply that no direct discharge of this liquid to regional water courses is permitted.

3. Precautions taken to halt either infiltration of groundwater to the landfill, or leaching of material from the landfill by surface water are discussed in FEIS Sections 2.9.2, 2.9.3, 2.9.4, 2.10.2.1, and 4.4.2.2.

4. The sanitary sewage piping system does not handle radioactive waste and is hence not subject to the monitoring and maintenance requirements and precautions necessary for the process waste handling network. The sanitary sewage treatment piping system is composed of vitrified clay and cast iron forced main piping of 4 inches to 15 inches in diameter. The original piping, installed in 1952, is still in use. To date, there are no routine inspections or maintenance procedures in operation. Flow measurements are taken at the completion of the tertiary treatment process as the effluent is discharged to the B-series ponds. Any significant leaks from the sanitary waste system would be detected by unusual flow discharge patterns and any resultant groundwater contamination would manifest itself in the results of the routine groundwater monitoring.

5. The wastewater recycle system is scheduled for completion in 1979.

6. Section 3.2.2.3 discusses impoundment failure. Such failure could not logically occur as a result of floods. Since Rocky Flats' facilities are located mostly on or near the top of a mesa, flood damage to buildings would be very minimal. Flood waters would tend to flow rapidly off-site to the east via the deep drainageways in Walnut and Woman Creeks.

Response to Letter of John Elliott (Rocky Flats Monitoring Committee) to Governor Lamm dated December 24, 1977

1. Since the DEIS has been revised, additional questions about the Plants' continued operation have been discussed in the FEIS. Please see the Foreward to

Volume I, and the introductory paragraphs of Chapters 2, 3, and 5 for a listing of some of the major changes.

2. The radiation doses to Denver-area residents which can be related to releases of radionuclides from Rocky Flats are a small fraction of the normal radiation exposures (Section 3.1.2, Tables 3.1.2-6 through 3.1.2-11). It is, therefore, difficult to design epidemiological studies which would conclusively define the health risks associated with Rocky Flats Plant releases. In addition to the natural and fallout radioactivity present in the Denver environment, nearby coal plants also release significant quantities of radioactive isotopes, beryllium, and other potentially toxic metals such as cadmium, mercury and lead. Other toxicants in the Denver air include the NO_x, CO, lead and hydrocarbons from auto emissions, trace metals and chemicals from industries, and pesticides and herbicides from agriculture.

Epidemiological studies must be scientifically designed. This includes (1) the formulation of a cause-effect hypothesis, (2) definition of the statistical data on ill health which are to be measured, (3) definition of the population exposed to the added risk, (4) definition of the control population which is similar to the exposed population in age distribution, socioeconomic structure and medical care but not exposed to the risk in question, (5) definition of the manner in which data collection is to be accomplished, and (6) design of the statistical evaluation of the data obtained from the two populations to determine if real differences exist in their incidences of ill health. The EPA has recently initiated studies to assess the health risks to nearby populations from the Rocky Flats facility.

3. Additional studies on the effects of low levels of radiation on man are receiving support from government agencies at the present time. Studies supported by the Department of Energy include:

1. Radiation Effects Research Foundation (Japan) - continued studies of health and mortality data on the Hiroshima and Nagasaki survivors and of genetic characteristics of children born of A-bomb-exposed parents.

2. Brookhaven National Laboratory - continued surveillance of populations of the Marshall Islands exposed to high levels of weapons fallout to detect late effects, thyroid abnormalities, cancers, and hematologic disorders.

3. U.S. Transuranium Registry - continued studies of transuranium elements deposited in nuclear industry workers and associated health effects.

4. Los Alamos Scientific Laboratory - analysis of plutonium in tissues and epidemiologic studies of plutonium workers.

5. Oak Ridge Associated Universities - mortality studies of workers in nuclear industries.

6. Argonne National Laboratory - collection and analysis of health and mortality data on former radium dial painters and former thorium workers.

7. National Academy of Sciences - studies of participants in the Nevada nuclear tests including mortality and health records of troops present at the nuclear test "Smokey."

8. John Hopkins University - detecting and characterizing dose and effects from low-dose radiation exposure in shipyard workers.

These studies will develop health effects statistics on human populations exposed to low levels of radiation. Perhaps these will eventually result in better definition of the dose-response relationship at low radiation levels. However, in the meantime, a linear extrapolation of risks from high dose levels to low dose levels, as done in the FEIS, will continue to be used for industry impact evaluations. This practice is generally thought to result in overestimates of the health risks for given exposure levels and thereby to be a conservative evaluation of risks. This is discussed in the National Academy of Sciences BEIR Report (1972).

An example of the conservative result which generally follows from the use of the linear hypothesis was given by Mays (1973). Children living on the Rongelap Islands exposed to nuclear weapons fallout were estimated to receive 1200 rads of radiation to the thyroid. This resulted in a 79% incidence of thyroid tumors. Children in St. George, Utah exposed to weapons fallout received about 120 rads (Weiss, 1971) to their thyroids. Based upon a linear extrapolation of the Rongelap data on thyroid tumor incidence, we would have expected 110 cases in the 1378 exposed children. To date, 11 thyroid nodules have been observed. This is within the normal range of 4 to 17 nodules per 1000 for this population. Thus, even if all these nodules develop into thyroid tumors, the linear extrapolation would be high by a factor of 10.

According to the linear hypothesis, small amounts of additional radiation could not result in a disproportionately larger incidence of health effects over those attributed to background radiations. All people have different exposures to radiations during their lifetimes. This includes background radiations described in Table 1, medical radiations for diagnosis or therapy, and exposures related to their employment. The range of these exposures of different people is much greater than the small increments of exposure relatable to the Rocky Flats facility. Studies which have attempted to relate background exposure levels to health have not produced significant correlations (Frigerio, 1976). We have vast human exposure experience at these background dose levels. The only human populations exposed to radiation which have resulted in increased incidences of disease were discussed in the National Academy of Sciences BEIR Report.

References

Frigerio, N. A. and R. W. Stowe, "Carcinogenic and Genetic Hazard from Background Radiation," in Biological Effects of Low Level Radiation, Vol. 2, pp. 385-393, International Atomic Energy Agency, Vienna, 1976.

NAS, National Academy of Sciences, National Research Council Report on the Biological Effects of Ionizing Radiations, "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation," Washington, D.C., 1972.

Mays, C. W., "Cancer Induction in Man from International Radioactivity," Health Phys., Vol. 25, pp. 585-592, (1973).

Weiss, E. S., M. L. Rallison, W. T. London, and Thompson, G. D. Carlyle, "Thyroid Nodularity in Southwestern Utah School Children Exposed to Fallout Radiation," Amer. J. Public Health, Vol. 61, pp. 241-249, (1971).

4. As discussed in Section 1.7 and Chapter 7 of the FEIS, a review of the land-use plans available from the city and county governments which control the lands immediately adjacent to the Plant shows these areas zoned for commercial and agricultural use. The operation of the Plant does not limit the usefulness of the adjacent lands for these purposes.

Mention of the controversy concerning proposed housing developments requiring rezoning adjacent to the Plant boundaries is also made in Sections 1.7 and 7.2. However, since the specific question of government liability for alleged damage of values of lands adjacent to the Plant is currently under litigation, it is not discussed in the FEIS.

5. Conservatism is acknowledged in the FEIS (Section 3.2): "This Statement does not attempt to evaluate all possible accident scenarios that might occur, but by considering maximum credible accidents, does present overestimates of the largest releases that might occur for each of the different types of accidents.

6. Matters concerning safeguards and security are discussed in Section 2.12 of the FEIS. The Department of Energy (DOE) has an elaborately structured organization and procedure for responding to terrorist actions. The organization includes both DOE personnel and representatives from many DOE contractors. The procedure provides for rapid evaluation of the threat, investigation of the terrorists, and searching for and rendering safe the threatened hazard. The plan has been tested and continues to be developed. The specific means and effects of terrorist activities and the many factors which would be used to prevent such occurrences or to mitigate the effects thereof are not discussed in an FEIS.

7. The FEIS has been updated through December 1977. There is, at this time, no plan or provision for periodic updating of the material.

8. Responses to CDH comments are contained in Volume 3 of the FEIS.

9. The Rocky Flats Plant objective in the National Defense program is to produce nuclear weapons components in a safe, environmentally acceptable manner. The FEIS evaluates the impacts of continued operation of the Plant and of various alternatives (Chapters 5 and 9) and provides environmental input for decisions on the continuation of ongoing and proposed future activities at the Rocky Flats site.

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230
(202) 377-3111

December 19, 1977

Mr. W. H. Pennington
Director
Office of NEPA Coordination
United States Energy Research and
Development Administration
Washington, D.C. 20545

Dear Mr. Pennington:

This is in reference to your draft environmental impact statement entitled, "Rocky Flats Plant Site Golden, Colorado." The enclosed comments from the National Oceanic and Atmospheric Administration are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving nine (9) copies of the final statement.

Sincerely,

Sidney R. Galler

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs

Enclosure - Memo from Environmental Data Service,
December 6, 1977

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
ENVIRONMENTAL DATA SERVICE
Washington, D.C. 20235

6 DEC 1977

TO: William Aron

FROM: Douglas LeComte

SUBJECT: DEIS 7709.35 - Rocky Flats Plant Site, Vols. I and II

Section 2.4.5.3, Page 2-42, 3rd Paragraph:

For "short-term airborne effluent releases" the DEIS uses Pasquill E diffusion and a 3.0 meter-per-second wind speed to represent expected environmental conditions. These choices may be "conservative," but they do not represent worst-case conditions, and perhaps this should be emphasized. The worst pollution problems usually occur during or immediately following strong inversions, and Pasquill E diffusion does not represent this situation. Whether "worst-case" situations--with their low probability of occurrence--should be modeled is debatable, but the reader should probably be made aware of the fact that the diffusion model for short-term releases does not represent the "worst-case" atmospheric conditions, and other lapse-rate and wind conditions would result in greater effluent concentrations near the ground than those postulated in this study.

DOE STAFF RESPONSE TO THE LETTER FROM SIDNEY R. GALLER, DEPARTMENT OF COMMERCE

The nearest downwind fenceline for the Plant site is approximately 3 km away from and 100 m below the level at which a hypothetical release from an accident could occur. For such an elevated source, the Pasquill Type E category gives a higher concentration at a distance of 3 km than would the use of more stable weather classes. Section 2.3.6.3 of the impact statement has been modified to make this clear.

COLORADO ENVIRONMENTAL HEALTH ASSOCIATION

COLORADO ENVIRONMENTAL HEALTH ASSOCIATION

P. O. Box 4061 • Denver, Colorado 80204

December 20, 1977

Mr. W. H. Pennington, Director
Office of NEPA Coordination
Department of Energy
Mail Station E-201
Washington D.C. 20545

Re; Rocky Flats EIS

Dear Mr. Pennington,

The Environmental Planning Committee of the Colorado Environmental Health Association wishes to offer comments concerning the off-site soil contamination at the Rocky Flats nuclear weapons plant near Golden, Colorado. We feel that the discussion of soil contamination in the environmental impact statement has not thoroughly addressed the controversy pertaining to the amount of radioactivity in the soil. In addition, if the scientific community finds the EPA proposed Guidelines for Transuranium Elements in the Environment (FR 60956) to be appropriate, then the standard should be applied to Rocky Flats and discussed in the Final EIS. Our specific comments are as follows:

1. Although there is some controversy about the amount of soil contamination near Rocky Flats, Jefferson County Health Department has conducted extensive soil sampling and reported the results as shown in the attached figure. Areas proposed for residential development have been found as high as 170dpm/g (1.2 uCi/m^2) in respirable dust on the surface of the soil, (Johnson, 1977). This is about 6 times the proposed EPA guideline (see below).

2. The proposed EPA guideline for persons exposed to transuranium elements in the environment is 0.2 uCi/m^2 for soil. Although the guideline fails to recommend a specific sampling technique, it appears that the respirable dust technique offers the most practical method of estimating exposures to human populations since dust-borne plutonium may be inhaled and is thought to cause lung carcinomas and leukemia.

As for the guideline itself, Johnson (1977) in a paper presented to the Annual American Public Health Association has reported increased leukemia death rates in the eight census

COLORADO ENVIRONMENTAL HEALTH ASSOCIATION
CEHA
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P. O. Box 4061 • Denver, Colorado 80204

tracts nearest Rocky Flats as compared to nineteen census tracts located in southern Jefferson County. These death rates range from 2 to 3 times the rates from southern Jefferson County. The census tracts nearest Rocky Flats range from 3 to 33 mCi/km^2 or 0.003 to 0.033 uCi/m^2 in plutonium contamination of the soil. The proposed guideline of 0.2 uCi/m^2 is from 6 to 66 times the level associated with increased leukemia rates according to the study.

3. If the proposed guideline of 0.2 uCi/m^2 is affirmed by EPA and the scientific community, we recommend that all land areas with soil contamination exceeding the guideline be mitigated as described under "Remedial Actions and Economic Evaluation" (FR 60956). Applying the 0.2 uCi/m^2 guideline to the attached figure of soil contamination would require that any area exceeding 30 dpm/g would require mitigation. Approximately 1 square mile outside the Rocky Flats boundary and about 1.5 square miles inside the boundary exceed the guideline.

Sincerely,

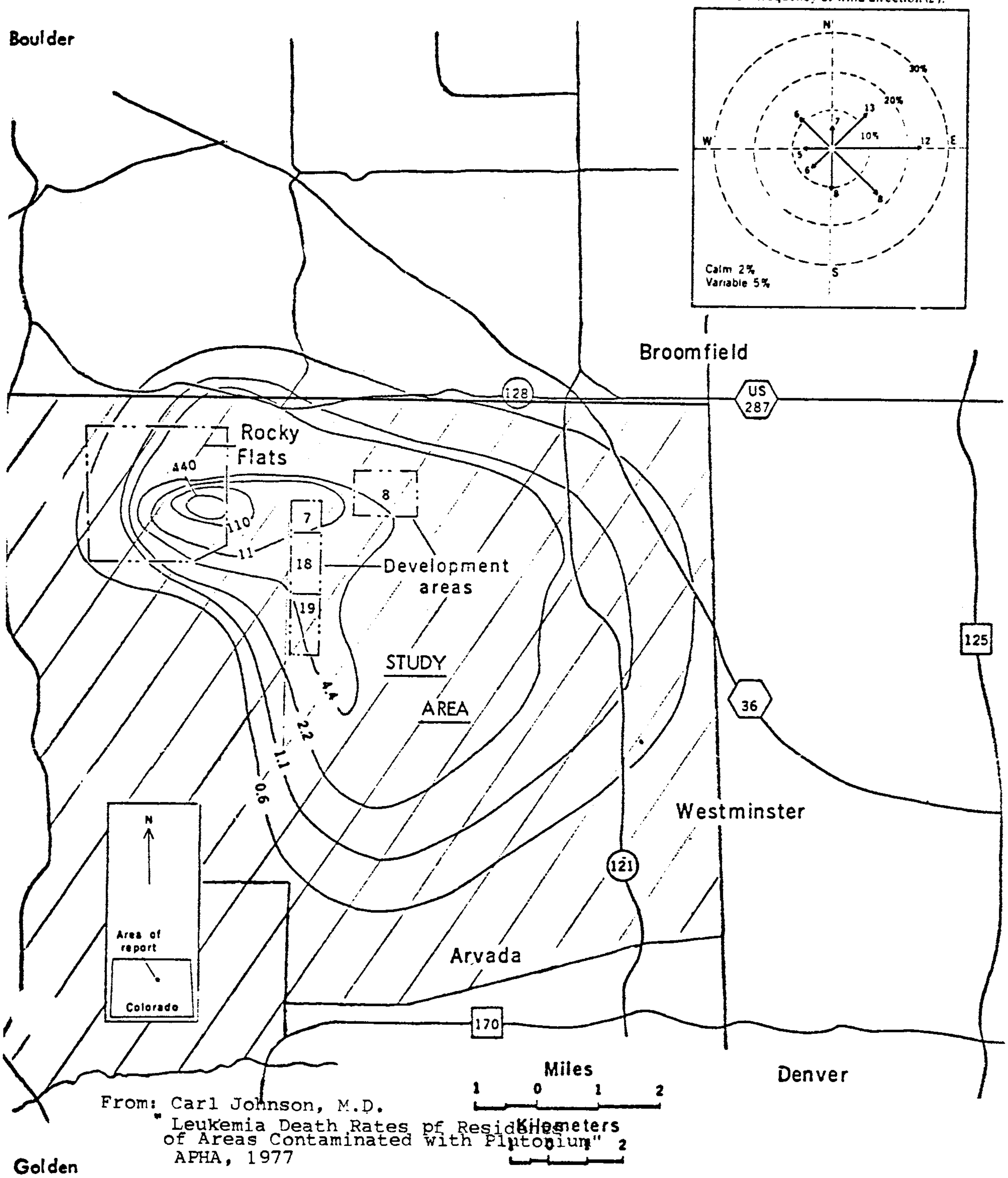
Karl Ford

Karl Ford
CEHA Environmental
Planning Committee

cc: Director, Criteria and Standards Div.
Offc. of Radiation Programs AW-460/CM-2
U.S. Environmental Protectionn Agency

ig. 1. Rocky Flats Nuclear Weapons Plant and proposed housing development area. Isopleths are labeled in disintegrations per minute per gram of whole soil, calculated from values in (2).

Fig. 2. Rose diagram showing average direction and velocity of wind at Rocky Flats for 1953 to 1970. Arrows point in the direction of wind movement; velocity (miles per hour) is given at the end of each arrow; concentric circles show frequency of wind direction (2).



From: Carl Johnson, M.D.
"Leukemia Death Rates of Residents of Areas Contaminated with Plutonium"
APHA, 1977

DOE STAFF RESPONSE TO THE COLORADO ENVIRONMENTAL HEALTH ASSOCIATION COMMENTS ON THE ROCKY FLATS PLANT DRAFT ENVIRONMENTAL IMPACT STATEMENT (ERDA-1545-D)

1. Soil Contamination; EPA Guidelines

Section 2.3.9, Volume I, in the FEIS contains a discussion of the objectives of soil sampling programs and descriptions of different sampling methods including that of EPA. The proposed EPA guidance for transuranics in soil is discussed. In Section 5.5.1, the application of the EPA guidance to Rocky Flats soils containing transuranic activity is also discussed. Appendix G-4 contains the EPA assessment of the Rocky Flats site with respect to the proposed guidance.

2. Jefferson County Health Department (JCHD) Soil Sampling Results

The JCHD studies of plutonium in soil near the Plant and a description of the JCHD sampling methods and sample analysis procedures appear in FEIS (Volume 1) Sections 2.3.9.2 and 2.3.9.3.

The purported high levels of activity detected by C. Johnson (JCHD Director) in respirable dust are not to be compared with concentrations of activity in soil. In his method, soil particles are separated by ultrasonic vibration, and hydrogen peroxide (an oxidizing material which destroys the organic binders) is added to the soil as a pretreatment prior to analysis. This pretreatment separates most of the small (~ 0.3 μm diam) plutonium oxide particles from the larger host dust particles and may or may not break up the dust particles. During the final sedimentation step (in which particles greater than 5 μm diam are removed) a large, but variable fraction of the small plutonium particles remain, but a smaller (0.2 to 0.4) fraction of the original host dust particles are included. Hence when the contamination level for this soil sample is determined by dividing the amount of plutonium in the sample (a relatively large number) by the amount of "respirable" dust remaining (a relatively small number), misleadingly large activity levels in terms of disintegrations per minute per gram of respirable dust are often obtained. The public is often not aware that Dr. Johnson discarded most of the soil from the original sample and computes concentrations as described above. Because of the variability involved with the use of his sampling and analytical procedures (see Section 2.3.9), data cannot be directly compared to standards, such as the State soil standards, which were not developed using the same procedures and soil fractions.

3. Sampling of Respirable Dust for EPA Guidance Compliance

As noted in Section 2.3.9.2 (Volume 1) of the FEIS, the respirable dust sampling technique as advocated by C. Johnson is not compatible with the EPA recommended procedure for evaluating soil activity concentrations for comparison with EPA Guidance. Many differences between Johnson's methods and EPA's recommendations exist but the most obvious are (1) that EPA recommends a 1-cm deep whole soil sample with 2 mm or larger particles seived out and (2) if a soil particle size distribution is to be obtained, it should be done by sedimentation, using a method which does not cause the breaking up of soil aggregates. Johnson's procedures are (1) a surface sweeping dust collection and (2) a harsh pretreatment to remove the transuranic particles from the soil particles followed by sedimentation to separate into respirable and nonrespirable fractions. Johnson does not quantify the relationships between the concentrations of plutonium in respirable dust and the concentrations of plutonium in air. His results are not reproducible, and his method has not been accepted by EPA.

4. Leukemia Studies

C. Johnson's 1977 study does not demonstrate increased leukemia death rates associated with transuranic activity levels near Rocky Flats. Johnson's results are based on a sample too small to be statistically meaningful. It included only two cases of leukemia in the 19 control census tracts in the south end of Jefferson county, four cases in the eight census tracts near Rocky Flats and a total of eight cases in Golden, Colorado over a period of 1969-1975. Although the population of Golden grew from 9,817 at the 1970 census to 14,900 in 1975, Johnson's study did not discuss the history of residency for members of the exposed population. Many of these people have moved there only recently. He also failed to consider other factors pertinent to an epidemiological study such as the ethnic origin of the individuals, their marital and socioeconomic status, smoking history, and occupations. It is possible that no epidemiological studies could be designed to relate the incidences of disease and exposures to Rocky Flats plutonium. Plutonium released from Rocky Flats is responsible for only a very small fraction of the total exposure to alpha-emitting radionuclides experienced by residents in the Plant vicinity. In Section 3.1.2.4 (Volume 1) of the FEIS, it is noted that a full-time resident at the plant's boundary would get approximately 100 times more dose from inhaled natural radionuclides than from Plant transuranic emissions.

Also, radiation doses to blood and bone marrow cells after exposures to plutonium are small compared to the doses to lung, liver, bone, and endosteal cells. Since the cancer incidence is related to dose, lung, liver, and bone cells should be at greatest risk. Thus, leukemia would be a poor choice for epidemiological studies as it has only very rarely been associated with exposures to plutonium and then only in studies in which laboratory animals were exposed to very high levels of soluble plutonium. In these studies, the predominant health effects noted were lung cancer and osteogenic sarcomas.

5. Plant Vicinity Areas Requiring Decontamination

The plutonium contours shown in the attachment to the letter (Ford to Pennington; 12/20/77) are incorrectly converted from units of mCi/Km^2 to d/m/g. A unit soil density and unit sampling depth is assumed whereas the actual soil density varies somewhere between approximately 1.5 and 2.0 g/cm^3 and the sampling depth was 20 cm. Thus all these numbers in d/m/g should be divided by a factor of between 5 and 10 before comparison with the EPA guidance is possible. The actual factor depends on the depth distribution of transuranic activity and the correct soil density. In the

FEIS (Section 5.5.1, Volume 1), it is estimated that no off-site, and approximately 300 acres on-site exceed the proposed EPA guidance. More accurate information can be obtained from the original report (HASL-235). Reliable data indicate that no areas would require remedial action (see Appendix G-4).

December 19, 1977

Mr. Pennington, Director:

I have studied your Rocky Flats Draft Environmental Impact Statement and consider it to be inadequate. There are numerous errors in the Statement's perspective and it proves to be incomplete and misleading in many of its sections.

The statement's biggest failure is the authors' disregard for the environmental and socio-economic impacts of the plant's only reason for existence --- the building and utilization of nuclear weapons. This is a glaring error for which I will recommend the termination of employment of the Director and all of his assistants who helped draft this Statement. Although, through your own admittance, on p. 10-29 of Vol. 1, Comment 27, you were specifically requested to deal with this, the very PURPOSE and RESULT of the plant's existence, you have failed to do so. For this I will recommend your dismissal to the President. It is to your great shame that you have sought to mislead the public in this regard, into believing that what is produced by the plant in its 'normal operation' has no impact on the environment, the economic system, or peoples' lives. By your own criteria, as stated in "Response" under Comment 27, Vol. 1, p. 10-29, "...assessing the environmental impacts of Plant operations...", you have ignored this impact; the intended purpose of the plant is to conduct nuclear war.

The effects of this colossal error on the part of the authors pervades the entire discussion of impacts, and it produces erroneous or misleading conclusions. I will catalog several examples of this:

In the Foreword, on p. iv, the first paragraph expresses several assumptions, none of which are discussed or analyzed in the report. Many of the terms used are not even in the Glossary! Such terms as

"The United States" (are they 'united'? is there a 'nation', or only an agglomeration of unrelated individuals who do not recognize each other as citizens? --- let's have the TRUTH!), "current defense posture" (what is this? it is not discussed, and is meaningless to most readers!), "the world situation" (really!.a vague and stupid phrase, from off of a newspaper editorial page --- trivial poop!), "a strong defense" (nuclear weapons cannot by any stretch of the imagination be regarded as 'defensive' weapons; by their very nature they are offensive --- VERY offensive).

Furthermore, in analyzing the syntax of this paragraph, these vague terms and phrases, undefined and unexamined, do not provide me with any way to verify the meaning of the sentences that embody them! For example, the first sentence states that "U.S. current defense posture dictates the need for nuclear weapons", and the second states that it is THIS which has resulted in a "mandate" of governmental agencies. How can a meaningless phrase 'dictate' anything? It can't. How can a meaningless phrase 'result' in anything? Only as a tool in the massive propaganda and lobbying effort by corporate officers and stockholders who will benefit economically and politically if 'the Administration, Congress, and the Dept. of Defense' see fit to transfer money from peoples' bank accounts, or print it if necessary, into their own! THIS is what 'dictates' the 'need' for nuclear weapons. FACTS, please, not bullshit theories, is what you are supposed to be dealing with! And yet, you use this knowledge to ignore, and defuse, any discussion of the most important impact of the Plant's continued operation.

In the Summary, on p. 1-4, first paragraph, Ifind another term which is not defined and is not in the Glossary, "national security".

This has been so often found to be a meaningless phrase, used to further the economic and political ends of those who speak or write it, that it no longer adds anything to the understanding of those who hear or read it. This phrase is the subject of many jokes among those who are most aware of 'the world siuation'. There is no 'nation', and there is no such thing as 'security'. Unless you define it. In the Glossary.

On p. 1-1, last paragraph, two corporations are mentioned as "prime contractors". This term is not defined in the Glossary, and the role of these corporations in the plant's continuing operation and in influencing the appropriation and expenditure of public monies by the Congress and Administration, through their influence on the political parties or otherwise, is not discussed. It would be interesting to relate that role to its impact on 'the world situation' through the effects of the weaponry produced by the plant in its 'normal operation'. It would also be interesting to have the Statement analyze interlocks, academic and otherwise, between ERDA and the two corporations mentioned, as well as the many subcontractors for plant equipment, fuel, etc.

On p. 1-4, third paragraph, I find the phrase 'national defense'; this is not defined in the Glossary, and its meaninglessness would be quite harmless except for the second sentence, which states that the plant is "unique" in that it produces nuclear weapons. If this is true, then the first sentence contains an error, the use of the word "benefit". There can be no 'benefit' in the production of nuclear weapons. There can only be losses.

Similarly, we are told in the next paragraph that "technological benefits" are good. This is also an error. The chief technological result is more information on how to make more weapons faster. This is not a benefit, but a detriment. It is a negative impact. It negates lives.

On p. 6, there is a very obvious and serious error. In the last paragraph, I see the statement that "normal plant operation (has) no significant impact on the environment". However, it is obvious that 'normal' plant operation results in the production of nuclear bombs. The purpose of these bombs is to release radiation into the air, water, soil, and to contaminate people, plants and animals with radiation. These bombs are merely stored radiation, waiting to be released. The section does not deal with this at all.

In the section on "Accidents", the probability of an 'accidental' nuclear war is not listed, and once again the DEIS is inadequate. But since you have not dealt with nuclear war as an accident, I will propose some possible impacts of the 'in-plant' accidents referred to. Apparently , nuclear war is considered part of the 'normal plant operation'. In that case, an accident would have a beneficial impact. For example, a fire which rendered the plant inoperable would be a definite plus! So also would be an "administrative failure" in which the plant director developed an ethical perspective and ordered all his employees to go home with full pay, and they complied with his directive because they perceived their jobs as unethical, worthless, boring and dangerous. But the possibility of these beneficial impacts are not dealt with. The 'worst-case accident' at Rocky Flats would be an atomic bomb dropping on it from a low-flying aircraft. Do you disagree with that?

On p. 3-99, the last paragraph is an obvious lie. Once again, it is difficult to judge what is meant, since the terms used are so vague and unscientific. It is, however, misleading to be sure. The "benefits" of a "defense" based on nuclear weapons are indeed quantifiable --- they are ZERO! The adverse impacts are very quantifiable, and it was within your ability to estimate here, based on the kill ratio, fallout patterns, radiation exposure, interruption of socioeconomic activity, etc. for each of the several thousand bombs produced at Rocky Flats. By multiplying these effects, with due attention paid to maximum-minimum death and destruction possibilities, you could have come up with a range of estimates the public could use to compare the results of maintaining or terminating operations at the plant.

The second statement defies logic by any modern definition of physical reality. There is a direct physical relationship betweeen the Rocky Flats facility and the impact of its products, namely nuclear bombs. Your failure to deal with this physical reality is a failure of citizenship, and a danger to 'national' and HUMAN security.

In Section 3.4.6, you hit an especially low-level of absurdity in your failure to deal with this, the most important impact. How is it possible to assess participation in the Boy Scouts as a beneficial impact when they are busy making nuclear bombs?!? This is an outrage! Or in buying U.S. Savings Bonds, which only get recycled into the War Industries?!? This is not beneficial! Your perspective is very warped! Nowhere do you consider the benefits of turning the entire Rocky Flats budget over to the Boy Scouts, or of discontinuing Savings Bonds altogether!

Your response to Comment 5; Socio-economic Issues, I find inadequate also, in that it fails to label the money spent for what it is: a serious drain on the U.S. Treasury and economy and on the people of the Denver metropolitan area. All of the money spent for weapons is money that must be printed by the U.S. Mint, money that is not used for productive purposes by any decent human standards, but is, in fact, wasted. This fact points to an error in your Response to Comment 5: Alternatives, pp. 10-4,5 and 6. Two possible alternatives to continuing operation were not discussed: 1) either shutting it down and using the entire budget to build and operate an industry that is needed: solar cells or heating components, electric automobiles, bicycles, etc. Or 2) if this cannot be done, it would still be more beneficial to shut down the plant, decontaminate it, and pay all the people to do nothing, pay them all their wages and salaries as before --- without 'producing' ANY nuclear weapons! All transactions could continue as before. In 'value of goods and services', the Gross National Product would not be affected, since nuclear weapons are neither good nor a service, and the savings in resources --- materials and energy --- would help to hold down the inflationary spiral, as well as extend the life of the industrial system and improve the 'nation's' strategic position with respect to scarce minerals and fuels. This impact would be substantial, for without Rocky Flats, a vast number of supporting and connecting operations would no longer be necessary. This would be a very positive and beneficial impact.

With these impacts considered, the report reveals, once again, glaring errors and misleading statements. On p. 1-17, third paragraph, the authors have failed to state that all of the sources detailed are wasted and serve no human purpose. The authors fail to detail the benefits that could be derived from the use of those resources. The last sentence in the paragraph is especially disastrous, from a factual point of view --- it is not possible to waste resources "more efficiently".

In addition, the next paragraph on that page is a direct lie. The lives of the people in the "labor pool" are being wasted. The clock clicks slowly onward as the minutes go -- minutes they will never know as worthwhile, but only as emptiness. Most of those people would rather be fishing or hunting or playing the horses than working at the plant. It would be more beneficial to pay them to do nothing. Most of them would be quite happy with the new arrangement. I would like to see you detail the benefits of this alternative in terms of decreased ulcers, decreased depression, decreased broken homes and alcoholism, increased child-rearing capability, increased educational opportunity, increased spiritual and ethical perception, increased participation in democracy, etc. on the part of the people involved. Most people would jump at the chance to leave a bad job at full pay and these people should be given the chance. A better alternative, though, would be to pay them to do something constructive. This is an alternative you haven't even touched upon.

Even the $15,000 benefit from cattle-raising, mentioned on p. 1-14, far outweighs the $114.8 million per year loss to the local and national economy for anti-productive purposes.

You and your group have done a very shoddy job on this, to the extent of actually making misleading and incorrect statements. For this, I will demand your dismissal by the President. This is a serious matter, and as a citizen it is my duty to do so. I trust that the economic impact will not be too severe. If it is, you can always get a job at 'The Plant'.

Sincerely,

Steve Tabor

Steve Tabor

DOE STAFF RESPONSE TO THE LETTER FROM STEVE TABOR, SAN FRANCISCO, CALIFORNIA

The scope of the EIS is discussed in the Foreword, in Section 1.1 and in Section 3.4.1. The intent of the EIS is to assess "the environmental effects of continued operation of the Rocky Flats Plant" (Foreword). In Section 1.1 you will find the following quotation:

"Consequently, a decision on the continued operation of the Rocky Flats Plant site does not require consideration of issues associated with maintenance of a nuclear weapons stockpile or the possible environmental effects of nuclear war. Therefore, this Environmental Impact Statement does not assess the environmental impacts of the U.S. policy to produce nuclear weapons but rather focuses on the site specific environmental impacts of conducting nuclear weapons production activities at the Rocky Flats Plant and alternatives for the conduct of such activities."

Your attention is redirected to the Foreword, Paragraph 7, in which is discussed the role of the RFP in the Nation's nuclear weapons program. It explains that the DOE has been entrusted with its part of the nuclear weapons program by the President, acting in consultation with the National Security Council, and authorized by the legislative and appropriations processes of both Houses of Congress.

The Environmental Impact Statement contains revisions, additions, and updated estimates and data.

The purpose of the Plant is not, as you allege, "to conduct nuclear war", but rather "the production of materials for the nuclear weapons program and other work directly related to national defense" (Section 1.2.2). The description of the operation of the plant as related to the achievement of this purpose is found in Chapter 2 in detail.

For a discussion of the effect of nuclear war you are referred to (1) National Research Council, Committee to Study the Long-Term Worldwide Effects of Multiple Nuclear Weapons Detonations, Assembly of Mathematical and Physical Sciences, Long Term Worldwide Effects of Multiple Nuclear Weapons Detonation, National Academy of Sciences, Washington, D.C. (1975) and, (2) Samuel Glasstone and Philip J. Dolan, The Effects of Nuclear Weapons, Third Edition, USDOD and USDOE, 1977.

Your proposal that "the 'worst-case' accident at Rocky Flats would be an atomic bomb dropping on it from a low-flying aircraft" was not accepted for the following reasons: (a) The scenario is not an accident, in that it requires deliberate premeditation on the part of an individual outside the control or influence of the DOE; (b) It is questionable whether Plant releases would make a significant contribution relative to the environmental impact of the detonation of the nuclear weapon.

AMERICAN FRIENDS SERVICE COMMITTEE

JUDY DANIELSON, *Field Secretary*
PAM SOLO, *Field Secretary*
ARTHUR WARNER, *Field Secretary*
VIVIAN ROTHSTEIN, *Middle East Program*
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December 22, 1977

W.H. Pennington, Director
Office of NEPA Coordination
Mail Station E-201, ERDA
Washington, D.C. 20545

Dear W.H. Pennington,

The American Friends Service Committee - with its 60 year history of concern that war be abolished as a means of settling political and social conflicts, that human needs be met and that life be respected - began involving itself in Colorado in the issue of the Rocky Flats nuclear weapons plant in 1974. As a result of our initiative, the Rocky Flats Action Group, a local coalition of environmental, peace, religious, scientific and community groups and individuals was formed to study and raise the question of Rocky Flats in the metropolitan area and the state. We have educated ourselves, participated in hearings and investigations, held numerous meetings with state and federal officials about the plant, supported the Rocky Flats Monitoring Committee, met with Rockwell and United Steelworkers representatives, and demonstrated our mounting concern with vigils and actions. The concerns which have led us to these activities are not adequately addressed by the Environmental Impact Statement for Rocky Flats. We therefore strongly request that public hearings on the EIS be held in the Denver area in the immediate future.

The following are among our concerns. First, the "mission" of the plant is intentionally not discussed in the EIS. The citizens of Denver and environs are being asked to bear a burden of health and safety risks for the purpose of producing weapons which could destroy all life on this planet, but which everyone hopes will never be used. The costs of this plant to our community cannot in fact be measured unless they are viewed in the context of the insanity of nuclear weapons production and deployment. Alternatives to the present plant operations are enumerated in the EIS, but none suggests alternatives to nuclear weapons production. A thorough analysis requires that this be done. The Service Committee shares the concern of many that the more nuclear weapons that are produced, the greater the likelihood of catastrophic accident or chance that they will be used. We find the neutron bomb, produced at Rocky Flats, particularly deplorable, as it accelerates the arms race, makes "limited" nuclear war more possible and, therefore, global nuclear war as well, and it is a symbol of a society which has lost its respect for life. The human race cannot endure such risks.

Secondly, the EIS makes the assumption that low level radioactivity is less dangerous to humans than high level radioactivity. It does admit to low level contamination and releases which cannot be prevented. Not enough scientific studies have been done to prove the above assumption. There are indications that exposure to low levels is actually more harmful and this must be researched thoroughly before we commit ourselves to live with Rocky Flats. An extensive discussion of the effects of low level radioactivity on people should be included in the EIS.

North Central Region: Colorado, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota

An EIS for Rocky Flats is also not complete without studies of cancer found in all past and present workers at the plant and their families, and in residents of nearby communities. Genetic studies should also be done on families of all workers (past and present) and nearby residents. Short-term studies are not valid for cancer and genetic deformities, due to the latent period, so assurances of safety are likewise misleading and invalid. The EIS makes risk estimates without these studies having been done. A study is about to be undertaken on Rocky Flats employees, conducted by the Los Alamos Laboratories. It would seem more appropriate to assign this very important research to an independent scientist with no ties to the nuclear industry. It is also critical that we know the long-term genetic effects of radioactivity, particularly plutonium with its bonding characteristics in the gonads, and this should be included in the Los Alamos study. It is not presently included. Since these results are not in, we cannot conclude the plant is safe for future generations. We already know that any radioactivity can be a dangerous thing, yet the EIS makes the assumption that such dangers can be controlled. In summary here, we recommend that the Los Alamos study be transferred to an independent contractor, that it include genetic research, and that the results be included in any environmental impact statement on the plant.

Another concern is transportation hazards associated with Rocky Flats and constant shipping of plutonium in and out of our communities. I do not find the statement in the EIS that air shipment containers do not meet accident safety requirements, though that was publicly announced this past year, and though they hopefully will be available by 1978. Particularly with air shipments coming into the Jefferson County Airport, which is buffeted by high gusty winds, accidents over the populated area nearby would have a significant environmental impact given this problem. Such inadequecies should be clearly stated in the EIS. Transport of radioactive materials throughout the United States subjects countless populations unknowingly to the possibility of contamination. All such communities should be notified by the Department of Energy of such a possibility.

The development of a state Emergency Response Plan is touched on in the document. A 100-gram release of plutonium is given as the maximum credible accident at Rocky Flats. Yet in the inadvertent contamination of soil from waste-oil drums stored on the property, 86 grams of plutonium was released and contaminated 11,000 acres of land. The air space over the plant is also not restricted and serious accidents could occur with a plane crash. Given that tons of plutonium are stored and handled at Rocky Flats each year, it is difficult to even guess at a maximum credible accident. We do not know if the land would be habitable again if one occurred. The many unanswered questions should be listed for citizens to review and choices should be left to citizens affected by these hazards.

Because of these concerns, the Colorado American Friends Service Committee and the Rocky Flats Action Group believe that the Rocky Flats nuclear weapons plant should be closed; that such a move would make global nuclear disarmament a real possibility and should be embraced; that workers should be guaranteed union wages until they are re-employed in our state; and that the economic stability of the surrounding communities should also be guaranteed by the federal government. We feel that the impact is too great for the land, the people and the global community to bear. We also again urge that you hold public hearings in Colorado on this EIS.

Sincerely,

Judy Danielson

Judy Danielson

cc: Rocky Flats Monitoring Committee
Colorado Congressional Delegation

DOE STAFF RESPONSES TO THE AMERICAN FRIENDS SERVICE COMMITTEE COMMENTS ON THE ROCKY FLATS PLANT DRAFT ENVIRONMENTAL IMPACT STATEMENT (ERDA-1545-D)

1. Mission and Location

The EIS for the Rocky Flats Plant is specific to the operation of that site. The environmental and health effects and the financial costs to citizens and government of detonating nuclear weapons have not been addressed because these are not activities in which the Plant is engaged. These issues have been addressed in several references such as the following:

1. National Research Council, Committee to Study the Long-term Worldwide Effects of Multiple Nuclear Weapons Detonations, Assembly of Mathematical and Physical Sciences, LONG-TERM WORLDWIDE EFFECTS OF MULTIPLE NUCLEAR WEAPONS DETONATIONS, National Academy of Sciences, Washington, D.C. (1975).
2. Samual Glasstone and Philip J. Dolan, THE EFFECTS OF NUCLEAR WEAPONS, Third Edition, USDOD and USDOE 1977.

Those aspects of the question which pertain directly to Rocky Flats have been included in the FEIS. Information that is not directly related to Rocky Flats, but rather to the nuclear weapons program as a whole, is not covered in the FEIS. As explained in the Foreword, the EIS is a site-specific document and is not intended to cover the entire nuclear weapons program for this country or for other nations.

Health and safety risks are discussed in the FEIS, Chapter 3. It is not anticipated that radiation doses related to releases of radioactive materials from the Rocky Flats facility will cause measurable health effects in the Denver population.

2. Low Level Radiation

The FEIS uses a scientifically, well-accepted model relating risk to dose; i.e., a linear relationship between the dose level and magnitude of health response. This concept, called the linear hypothesis, is thought to result in an overestimate of the risk, as discussed in the National Academy of Sciences BEIR Report (1972), and therefore would result in overestimates of health effects.

Studies on the effects of low levels of radiation on man are receiving support from several government agencies at the present time. The values of the risk estimators are not expected to undergo a major change as a result of these studies. Studies supported by the Department of Energy include

1. Radiation Effects Research Foundation (Japan) - continued studies of health and mortality data on the Hiroshima and Nagasaki survivors and of genetic characteristics of children born of A-bomb-exposed parents.

2. Brookhaven National Laboratory - continued surveillance of populations of Marshall Islands exposed to high levels of radioactive fallout from nuclear weapons tests to detect late effects, thyroid abnormalities, cancers, and hematologic disorders.

3. U.S. Transuranium Registry - continued studies of transuranium elements deposited in nuclear industry workers and associated health effects.

4. Los Alamos Scientific Laboratory - analysis of plutonium in tissues in epidemiologic studies of plutonium workers.

5. Oak Ridge Associated Universities - mortality studies of workers in nuclear industries.

6. Argonne National Laboratory - collection and analysis of health and mortality data on former radium dial painters and former thorium workers.

7. National Academy of Sciences - studies of participants in the Nevada nuclear tests including mortality and health records of troops present at the nuclear test "Smokey."

8. John Hopkins University - detecting and characterizing dose and effects from low-dose radiation exposure in shipyard workers.

Please notice that the above list includes the Los Alamos studies which were mentioned in the letter. The reliability of the studies should be judged on the extent and applicability of the data, rather than the affiliation of the investigator.

No meaningful, conclusive epidemiological studies have been done with residents of the Denver area or workers at the Rocky Flats facility to assess the health impacts of this industry. No such studies are likely to be completed in the near future because of the extremely low probability that these studies could be conducted in a statistically significant manner to show either a positive or negative health impact.

The radiation doses to Denver-area residents which can be related to releases of radionuclides from Rocky Flats are a small fraction of the normal radiation exposures. It would, therefore, be extremely difficult to design epidemological studies to investigate the health risks associated with these releases. This is true for radiation doses to lung and bronchial epithelium related to the development of lung cancers; for doses to bone endosteal cells related to bone sarcomas; and for doses to bone marrow cells related to leukemia development.

Since radiation exposures produce no unique forms of disease, it would be difficult for an epidemiological study to separate the effects of the small Rocky Flats contribution related to releases from Rocky Flats from the total health risks to residents in the Denver area. In addition to the natural and fallout radioactivity present in the Denver environment, nearby coal plants also release quantities of radioactive isotopes, beryllium, and other potentially toxic metals such as cadmium, mercury and lead. Other toxicants in the Denver air include the nitrous oxides, carbon monoxide, lead, and hydrocarbons from auto emissions, trace metals and chemicals from industries, and pesticides and herbicides from agriculture.

Properly conducted epidemiological studies imply a great deal more than performing a cursory scan of a limited number of standard disease incidence statistics. To accomplish epidemiological studies in a meaningful way, they must be carefully and scientifically designed. This includes (1) the formulation of a cause-effect hypothesis, (2) definition of the statistical data on ill health which are to be measured, (3) definition of the population exposed to the added risk, (4) definition of the control population which is similar to the exposed population in age distribution, socioeconomic structure, and medical care but not exposed to the risk in question, (5) definition of the manner in which data collection is to be accomplished, and (6) design of the statistical evaluation of the data obtained from the two populations to determine if real differences exist in their incidences of ill health. Then, the epidemiological study may be initiated. Serious obstacles exist to conducting such studies in those locations where Plant emissions can be measured. First, the populations living near Rocky Flats are growing rapidly so that many people living in this area today have had little local exposure but have had long-term contacts with toxicants in other environments. Only a few people have lived near Rocky Flats for long periods of time in a epidemological sense. This must be taken into account in collecting health statistics.

In the surveys of health statistics conducted by Dr. Johnson, only small populations were available for evaluation and only a limited number of tumors were identified. In Golden, Colorado, 27 lung cancer deaths were observed over a 7-year period (Johnson, November 20, 1977). Without a knowledge of the socioeconomic status, health care, smoking, and work histories or time of residence of the population, meaningful conclusions cannot be drawn from these observations. In addition to the above problems, the leukemia studies conducted by Dr. Johnson (November 1, 1977) do not relate the proper radiation dose and risk. The bone marrow contains the cell populations which give rise to leukemia. However, the major radiations from plutonium are delivered to the bone surfaces and to the lung. Very little radiation is received by the bone marrow. Health effects observed in animal studies following high level exposures to plutonium were lung cancers and osteogenic sarcomas. The same types of diseases would occur in humans if exposed to large quantities of plutonium. Thus, it is most unlikely that any of the leukemia incidences discussed by Dr. Johnson were related to emissions from the Rocky Flats Facility.

With regard to genetic effects, considerable research has been done since 1970. Evidence that a small fraction of the body burden (2×10^{-4}) can reach the reproductive organs (Richmond and Thomas, 1975; Campbell et al., 1974) and be concentrated in the interstitial tissue of the testes, the ovarian follicles, and ovarian interstitial tissue (Richmond and Thomas, 1975; Green et al., 1975; Taylor, 1977) has resulted in an increase in research on potential genetic effect of plutonium. Evidence for genetic damage has been evaluated by staying mutation frequencies _in vitro_ (Barnhart and Cos, 1977), chromosome aberrations in cells both _in vivo_ and _in vitro_ (Brooks, 1975; DuFrain et al., 1978), dominant lethal events in plutonium-239 exposed animals (Lünning et al., 1976), chromosome translocations in testes cells of animals injected with plutonium-239 (Beechey, et al., 1975), and specific locus mutations transmitted to offspring. This research represents a unified battery of tests to determine if a unique or unexpected genetic response could result from plutonium deposition.

The results of these studies indicate that for mutations in mammalian cells in tissue culture, plutonium is five times as effective per rad as acute gamma irradiation (Barnhart and Cox, 1977). Measurement of chromosome damage in liver and blood indicate that plutonium is from 15-40 times as effective as protracted cobalt-60 gamma ray exposure in producing aberrations (Brooks, 1975 and DuFrain et al., 1978). In studies measuring dominate lethal events, plutonium-239 was about 10 times as effective as protracted gamma exposure (Lünning et al., 1976). Translocations and mitotic aberrations measured in the testes after plutonium exposure increased slightly over the background level and remained constant with little increase as a function of time or dose (Beechey et al., 1975). For specific locus mutations, a measure of genetic damage resulting in specific mutations seen in the offspring, the relative effectiveness for plutonium may be as high as 3.5 in early weeks after plutonium injection and decreases to 1 at later times. Thus, for gene mutations and small chromosome deletions, the biological hazards from plutonium are similar to that expected from exposure to acute x-rays. All of these changes were measured following very large doses of intravenously injected plutonium that would also produce marked life shortening and increased cancer incidence. The total battery of tests indicate that no unexpected increase in genetic risk from plutonium exists and that the effectiveness factor used for other high LET radiation, such as neutrons and alpha particles, is appropriate for plutonium.

Other tissue measurements and dose calculations indicate that the value used to define effectiveness for alpha emitters, including plutonium, is in fact conservative for genetic change. Since americum-241 has an alpha emission with an energy very similar to that of plutonium-239, it is possible to estimate genetic effects of americium-241 by knowing the body burden and distribution of the isotope.

References

Barnhart, B. J. and S. H. Cox. "Mutagenesis of High LET Alpha Radiation," Somatic Cell Genetics Conference, Los Alamos Scientific Laboratory, October 3-5, 1977.

Beechey, C. V., D. Green, E. R. Humphreys, and A. G. Searle, "Cytogenetic Effects of Plutonium-239 in Male Mice," Nature (London), Vol. 256, pp. 577-578, (1975).

Brooks, A. L., "Chromosome Damage in Liver Cells From Low Dose Rate Alpha, Beta, and Gamma Irradiation: Derivation of RBE," Science, Vol. 190, pp. 1090-1092, (1975).

Campbell, E. E., J. F. McInroy, W. D. Moss, B. C. Eutsler, and H. F. Schulte, Annual Report of the Biomedical and Environmental Research Program of the LASL Health Division 1973, LA-5633-PR, Los Alamos Scientific Laboratory Report, pp. 27-33, (1974).

DuFrain, B. J., L. C. Littlefield, and E. E. Joiner. "Cytogenetic Dosimetry for ^{241}Am Alpha Particle Irradiation of G. Stage Human Lymphocytes," Rad. Res., Vol. 74, p. 523, (1978).

Green, D., G. R. Howells, E. R. Humphreys, and J. Jennant. "Localization of Plutonium in Mouse Testes," Nature (London), Vol. 255, p. 77, (1975).

Johnson, C. J., "Leukemia Death Rates of Residents of Areas Contaminated With Plutonium," Proceedings of the 105th Annual Meeting of the American Public Health Association, Washington, DC, November 1, 1977.

Johnson, C. J., "Death Rates from Lung Cancer in the Eight Census Tracts Near Rocky Flats and in Golden, and in Nineteen Census Tracts at the South End of Jefferson County," report to Jefferson County Board of Health at Lakewood, Colorado, November 20, 1977.

Lünning, K. G., H. Frolen, and A. Nilsson, "Dominant Lethal Tests of Male Mice Given ^{239}Pu Salt Injections," Biological and Environmental Effects Low-Level Radiation, STI/PUP/409, pp. 48-53, IAEA, Vienna, 1976.

Richmond, C. R. and R. L. Thomas, "Plutonium and Other Actinide Elements in Gonadal Tissue of Man and Animals," Health Phys., Vol. 29, pp. 241-250, (1975).

Taylor, D. M. "The Uptake, Retention, and Distribution of Plutonium-239 in Rat Gonads," Health Phys., Vol. 32 pp. 29-31, (1977).

United Nations Scientific Committee on the Effects of Ionic Radiation, Ionizing Radiation: Levels and Effects Annex E: Genetic Effects of Ionizing Radiation Volume II, pp. 199-302, (1972).

3. Transportation

Air shipments of plutonium to and from Rocky Flats were terminated in April 1977. In the future air shipments of plutonium to or from the Rocky Flats Plant would be expected to resume only if made in containers certified as meeting aircraft crash, accident safety criteria, or as otherwise permitted for National Security purposes in accordance with 10 CFR Part 871 "Air Transportation of Plutonium."

4. Plutonium Releases

Most of the plutonium released from approximately 1965 to 1969 as a result of leakage from oil storage barrels is confined and contained on site. The small amounts which are potentially available to cause public exposure are considered in the calculation of the dose calculation (see Appendix F). A recurrence of the oil-drum incident was not considered as a credible accident because the practice of storage of radioactive materials with only single containment has been discontinued (FEIS Section 3.2.2.1).

It is correct that considerably more plutonium is handled within Plant buildings than is assumed to be released in the maximum credible accident. The salient consideration is, however, how much material could credibly be expected to breach the several levels of containment in each building and travel significant distances downwind. The analysis in the DEIS, the FEIS, and also past Plant accident experience, indicates that with these restrictions the postulated 100-g release is a very high estimate.

That air space over the Plant is not restricted is true for high flying aircraft. However, the probability of the crash of all types of aircraft into Plant buildings has been considered in detail; in fact, the crash of a large aircraft into an especially vulnerable area of Plant buildings is the maximum credible accident. The 100-gram release is discussed on p. 3-67 of the DEIS, where the consequences of a plane crash are described. In Paragraph 1 on p. 3-67, it is stated that the release of larger quantities of plutonium was considered, but the probability of such a release was found to be less than 1×10^{-7} per year, and therefore such an event was not considered credible. An analysis of probability of aircraft crashes at Rocky Flats is presented in Volume II, Appendix E-1 of this FEIS.

The selection and analysis of the maximum credible accident was made with all of the factual knowledge available to the analyst. From many years of research, and more than 25 years of operational experience, we are confident that the land will not be made unhabitable by Plant activities or accidents.

5. Global Disarmament

The issue of global disarmament is not addressed in the FEIS. Such an analysis would be germane and within the required scope of the EIS only if the possible, reasonable alternatives to the continuation of the type of work done at Rocky Flats included either (i) total worldwide nuclear disarmament, or (ii) unilateral nuclear disarmament by the United States. In the present state of international relations, however, the former unfortunately is not considered possible, and the latter is not reasonable.

Jefferson
County
Colorado

December 20, 1977

W.H. Pennington, Director
Office of National Environmental
Policy Act Coordination
U.S. Department of Energy
Washington, D.C. 20545

Re: ERDA-1545-D "Rocky Flats Plant Site, Golden, CO".

Dear Mr. Pennington:

I wish to thank the Department for a copy of the Environmental Impact Statement for the Rocky Flats plant site in this county, and wish to make the following comments.

On page 1-4, first paragraph, reference is made to the shipment of radioactive materials (including plutonium) by air. It is my understanding that these shipments at the present time are made in containers which will not resist an impact of an aircraft with the ground. Shipments of these materials in unsafe containers pose a threat to public health.

Page 1-4, the last paragraph. Reference is made under "Benefits" to personnel at the plant who offer technical knowledge, expertise and advice in health physics and environmental science (among other subjects) which "is disseminated throughout the local communities, the United States, and the world". However, the major offsite contamination with plutonium was not discovered by these experts at Rocky Flats but rather by other interested parties. In addition, a major release of tritium by the plant to the drinking water of a local city was not discovered by these experts, in fact these experts denied responsibility for the release for three months after the contamination with tritium was discovered. A recent survey indicates contamination of the environment around Rocky Flats with radioactive cesium by the Rocky Flats plant. Responsibility for this release was denied by these experts, who still fail to acknowledge the existence of these increased levels of radiocesium (cesium 137). These experts supported the residential development of land contaminated with plutonium, as much as 3,390 times the background level in surface respirable dust(1). These experts have not been able to protect plutonium workers in the plant from measurable effects due to exposure to plutonium. A recent study shows that plutonium workers at the plant who have received only one percent to ten percent of the body burden of plutonium permitted by federal guidelines have significant chromosome changes in circulating lymphocytes(2). In a 1957 fire, about 948 picocuries of plutonium per cubic meter were still being released from one stack eight days following the fire. This was 19,000 times the present E.R.D.A. guidelines for stack effluents(3). Amounts released in the air during the fire and for seven days after are not known. Local communities were not alerted to this hazard. In view of the past record of the plant, the benefit from these experts would seem to be somewhat less than that implied by the environmental impact statement.

Page 1-6. Third paragraph. The statement is made that plant operations have not increased the exposure of any member of the Denver area population by more than a fraction of one percent of the natural background exposure level (200 millirem per year). The assumptions on which this estimate is based are not stated here. It seems likely that persons living near the plant site will have an exposure in excess of this. Those receiving greater than two percent of the natural background exposure level will have received more than four millirem per year, a value in excess of that permitted by the 1976 U.S. Environmental Protection Agency (EPA) regulation which sets limits for radionuclides in water.

This EPA regulation is based on estimates of organ and/or total body dosage and subsequent risk to health".

Pages 1-6, 1-7. Concentrations of radioactivity in liquid effluent from the plant are said to be well below applicable limits, with an average plutonium concentration of 0.1 picocuries per liter. However, the radioactivity concentration guide (RCG) quoted for plutonium, 1,667 picocuries, does not appear to correspond in any way with the 1976 EPA regulation for radioactivity in water which does not permit more than five picocuries per liter for radium, a radionuclide considered to be much less harmful than plutonium. Some authoritative estimates suggest that plutonium may be 200 times as hazardous as radium[5,6]. If they are correct, plutonium concentrations of 0.1 picocuries per liter are excessive.

Page 1-7, second paragraph. It is reported that the exhaust air from normal operations has less than 1×10^{-5} picocuries per liter of long-lived alpha-emitting radionuclides. This is about 0.01 picocurie per cubic meter, reportedly less than 2 percent of the RCG value of 2 picocuries per cubic meter in the air of controlled areas for a 40 hr. work week. The "maximum resulting concentrations in the air accessible to a suitable sample of population are a fraction of one percent of the RCG value of 0.02 picocuries per cubic meter for uncontrolled areas because of dilution and dispersion". However, a recent study has shown that plutonium workers receiving between one percent and ten percent of a body burden of plutonium permitted by such standards have significant increases in chromosome aberrations in circulating lymphocytes[2]. This suggests that the RCG value is not sufficiently conservative to protect the plutonium workers or the public. In fact, amounts of long-lived alpha-emitting radionuclides (including plutonium) may be producing measurable effects on the population downwind from the plant site.

Page 1-7. Third paragraph. The estimate of the maximum individual whole body dose committment of 0.18 millirem is based on assumptions which are not given here. Estimates made by myself for populated areas near the plant indicate that much larger doses are possible[7]. The fourth paragraph on this page may also be questioned on the same grounds.

Page 1-8. The report notes that an aircraft accident resulting in a nine rem whole body exposure to an individual 1.25 miles from the release point would occur less than once in a million years. It must be noted that Atomic Energy Commission experts reported that the possibility of a re-entry of the Snap-2 satellite with burn-up of its 17,000 curies of plutonium 238 would be less than one in ten million. However, on the first such launch, the anticipated one in ten million disaster occurred, with resulting world-wide contamination with plutonium 238[8].

Page 1-8, last paragraph. Reference is made to the EPA proposed guidelines of five rem that, if exceeded, would require evacuation or other protective action. The report notes that a postulated nine rem dose would exceed the proposed five rem action limit but would be below the level at which any short-term effect would occur. This underlines a basic problem of many health physicists of discounting long-term effects. The statement in this paragraph that the total integrated accident dose committment to the Denver area population to the year 2,000 would be 633 man-rem to the total body appears to be a gross underestimation.

It seems quite likely that releases of radioactive materials from the plant have already made some measurable impact on the health of populations so exposed. An examination of death certificates of residents dying in 1975 in eight census tracts near the plant site and in the city of Golden, compared with 19 census tracts in the south end of the county, showed a significant increase in deaths from leukemia in the areas near the plant site[3]. In addition, examination of death certificates shows an increase in age-specific death rates from lung cancer (see attached)[9]. Estimates of risk to health have been published in the proceedings of the IVth International Congress of the International Radiation Protection Association (enclosed)[5]. Better estimates of such risks to health may be made by use of respirable dust samples on the surface of the soil[10,11]. This method, which provides a more conservative estimate of the hazard, has been rejected by the Rocky Flats personnel in favor of their whole soil or agricultural soil samples.

On page 2-90, the report notes that the plutonium concentration in the soil from weapons fallout is about 1,500 pCi/M^2 or 0.33 dpm/g (1,000,000 pCi/M^2 is about equivalent to 222 dpm/g, assuming a soil density of 1 gram per cc and a soil sample depth of one centimeter. However, soil actually has a density of about 1.5 g/cc). The Colorado Department of Health has established a value of 0.08 dpm/g in soil measured to a depth of 1/8 inch. The plant has released offsite, according to Krey of the Health and Safety Laboratory, about 11 curies of plutonium, 99% of which came from leaking oil drums. About 5,000 gallons of oil containing 86 grams or 6.3 curies of plutonium are thought to have been lost.

Page 2-92, the levels of plutonium reported by the Colorado Department of Health are misleadingly low, and should not be accepted for the purpose of risk estimates to persons living in such areas[10,11].

Page 2-94, reference is made to the air-born concentration of plutonium determined by the air monitoring devices. The inadequacy of the air monitoring devices has been noted and it is incorrect to say that "the only valid way to define soil concentration is to use the state soil-measurement technique" In fact, the Colorado guidelines do not define what is meant by "soil". The use of resuspension factors is very questionable, since such factors vary by as much as a million.

Page 2-95, an estimated 5,000 gallons of cutting oil leaked from barrels, containing 86 grams or 6.3 curies of plutonium. However, no mention is made of over 1,000 barrels of cutting oil (over 50,000 gallons) contaminated with metal millings of uranium that were burned in an open ditch.

Page 2-96, plutonium 241 is a contaminant in the plutonium 239. It has a short half life of 13 years. Over a period of about 70 years most of the beta-emitting plutonium 241 will have decayed to long-lived americium 241 (half life of 433 years). Americium emits powerful gamma radiation as well as alpha radiation. Rocky Flats plutonium has about 0.44 percent plutonium 241. At present, the total activity of americium 241 is about 10% of the total plutonium activity. Within a few decades, the radiation hazard from americium will be equal to that from plutonium 239.

Page 2-97, there is a total inventory of about 3 curies of plutonium in the sediment of the B-series ponds. This represents an increase by a factor of 22 in the past six years.

Page 2-101, the assumption is made that the alpha activity in water not explained by plutonium is due almost entirely to the natural uranium content of water. This assumption may be difficult to prove, since the Rocky Flats plant has been careless in its handling of uranium from wastes in the past.

The average plutonium concentration in sediment in Great Western Reservoir is 3.13 dpm/g (1973), less than 0.1 percent of that in the B-1 pond, indicating a very slow transfer of plutonium downstream.

Page 2-104, in the 1976 EPA drinking water regulation, gross alpha activity is limited to 15 pCi/L and radium is limited to 5 pCi/L. There has been an average concentration of 0.15 pCi/L of plutonium in the Great Western reservoir and 0.1 pCi/L in Standley Reservoir. Americium 241 levels in the Great Western Reservoir are about equal to those of plutonium, perhaps due to the greater mobility of the americium. Because of the greater biological effectiveness of both plutonium and americium compared to radium, these concentrations may be excessive.

The background level of tritium in the water is 500 pCi/L. After the release of 100 to 1,000 curies of tritium in 1973, tritium reached levels of 12,000 pCi/L in the Great Western Reservoir. Wells at the plant site show levels of plutonium as high as 2 to 3 pCi/L, values that are clearly excessive in view of the greater biological effectiveness of plutonium. There is some evidence of contamination of the Arapahoe formation (to 2.5 pCi/L of plutonium). Americium concentrations have been less than half that for plutonium.

Page 2-130, why does not the medical department have a written agreement with Lutheran Hospital for the care of radioactively-contaminated injured employees? In a major accident, a number of seriously injured personnel would need to be distributed among more than three hospitals (St. Anthony's, St. Luke's, and Colorado General Hospital).

Page 2-168, gasous radioactive waste is produced in the processing of plutonium. There is no filtration system that can guarantee a complete capture of all the radioactive particles. Gases will pass through filters. A list of gasous radioactive compounds is attached. Needless to say, radioactive gases will not be detected by the filters in air monitoring devices. The same concern may be given to the orders of sizes of particles of plutonium oxide smaller than 0.1 micron.

Page 2-172, the high efficiency particulate air (HEPA) filters consist of fiberglass and asbestos filter media and a fire-retardant wooden frame. They are tested with 0.3 micron particles, and if more than 0.03 percent of the particles pass through the filter the filter is rejected. However, the number of extremely small sub-micron particles (the orders of sizes smaller than 0.1 micron) passing through the filter is very difficult to evaluate .

Page 2-175, as of 1975, the total site release from Rocky Flats has been reduced nearly 1,000 times from the 1965 levels (6,518 microcuries of plutonium). It must be noted that formerly more than 100 grams of plutonium oxide were found on individual filters (about 7½ curies).

Page 2-176, it is noted that a tritium control system can be built but is costly. ERDA allows a maximum concentration of plutonium in air for workers of 2 pCi/M^3, and 0.02 pCi/M^3, or 100th as much for the general population. The yearly alpha releases to the air from plutonium facilities was minimal between 1953 and 1955. The first major releases began in 1956 with the release of 229 million pCi or 229 microcuries of plutonium. In 1957 there was a release of nearly 26,000 microcuries (26 billion picocuries) associated with a fire. Release of plutonium in high levels continued until 1965, when about 6,500 microcuries were released. Plutonium was released at lower levels until 1970, when there was an apparent sharp drop in the rate of release. Following a 1969 Rocky Flats fire there was an increase in the routine plant release because of warpage of the filter plenums. At present, the release of more than 500 microcuries of plutonium will exceed the routine release limit. This limit per calendar year corresponds to a dose of less than 10 millirem per year to the bone of a person at the nearest off-site location. This doseage exceeds the 1976 EPA regulation (4 millirem). During the year of the 1957 fire such a person could have received over 500 millirem to the bone.

Page 2-179, the plutonium processed at Rocky Flats is usually about 10 years old, i.e. created by a reactor about 10 years ago. This suggests an americium-to-plutonium activity ratio of from 0.1 to 0.2. In addition to plutonium releases there are also airborne releases of radioactive uranium, americium, tritium and curium. Americium releases are about 1 tenth of the plutonium released.

Page 2-181, depleted uranium contains protoactinium 234, thorium 231 and 234, and uranium 234, 235 and 238, with a total alpha activity of 430,000 pCi/gram and a total beta activity of 670,000 pCi/gram.

Page 2-183, there will be a yearly atmospheric release of 100 curies of tritium per year. Nearly 1,200 microcuries of plutonium, thorium, and uranium will be released yearly. In terms of activity, about as much thorium 231 and 234 are released as is plutonium 239 into the atmosphere. About as much protoactinium 234 is released as plutonium 239. Eight times as much plutonium 241 will be released as plutonium 239.

Page 2-208, air exhausted from the stacks of the process and research buildings should also be sampled for the presence of radioactive gases and ultra submicron particles of plutonium.

Page 2-214, the Colorado Department of Health should operate air sampling stations which will detect the presence of radioactive gases and ultra submicron particles of plutonium oxide.

Page 2-230, soil samples collected by the operating contractor give misleadingly low results, because an agricultural soil sample is used to evaluate a respirable dust hazard. The same is true for the sampling performed by the State Health Department.

Page 2-235, the area radiological survey within the plant perimeter showed exposure rates of 20 to 100 microroentgens per hour due to radioactive material within the buildings. This gamma radiation is primarily in the low-energy region (less than 500 kev). This much radiation would appear to be sufficient to produce long-term effects after long exposures.

For the remaining sections of the Draft Environmental Impact Statement, I have confined my remarks to the representation of those sections in Section 1.

In summary, I believe that the environmental impact statement for the Rocky Flats plant has serious flaws in that it grossly underestimates the amount of radioactive material that may be released, the potential for effects on health, and the size of the maximum credible accident which could occur.

Sincerely yours,

Carl J. Johnson

CJJ:gw

Carl J. Johnson, M.D., M.P.H.
Director of Health

REFERENCES

1. Johnson, C.J.: Offsite distribution of plutonium in the respirable dust on the surface of the soil in the vicinity of the Rocky Flats plant. Unpublished report to the Jefferson County Board of Health, Lakewood, CO 80226 (March 30, 1977).
2. Brandom, W., Bloom, P., Archer, P. and Bistline, R.: Chronic irradiation effects in blood lymphocyte chromosomes of plutonium workers (abstract). Proceedings of the Second International Conference on Environmental Mutagens, Edinburgh, Scotland, July 11-15, 1977.
3. Johnson, C.J.: Leukemia death rates of residents of areas contaminated with plutonium. Proceedings of the 105th Annual Meeting of the American Public Health Association, Washington, D.C. Nov. 1, 1977.
4. Anon.: E.P.A., Part 141 - Interim primary drinking water regulations. Promulgation of regulations on radionuclides. Federal Register, Vol. 41, No. 133, 28402-28409, July 9, 1976.
5. Morgan, K.Z.: Suggested reduction of permissible exposure to plutonium and other transuranium elements. Am. Ind. Hyg. Ass. J. 567-574 (August, 1975).
6. Myers, D.S.: A plea for consistent lung burden criteria for insoluble alpha-emitting isotopes. Health Physics 22: 905 (June, 1972).
7. Johnson, C.J.: Evaluation of the hazard to residents of areas contaminated with plutonium. Proceedings of the IVth International Congress of the International Radiation Protection Assoc., in Paris 2: 243-246 (April 24-30, 1977).
8. Morgan, K.Z.: Radiation-induced health effects. Science 195: 344, January 28, 1977.
9. Johnson, C.J.: Death rates from lung cancer in the eight census tracts near Rocky Flats and in Golden, and in nineteen census tracts at the south end of Jefferson County. Unpub. report to the Jefferson County Board of Health at Lakewood, Colorado, Nov. 20, 1977.
10. Johnson, C.J., Tidball, R.R. and Severson, R.C.: Plutonium hazard in respirable dust on the surface of the soil. Science 193: 488 August 6, 1976 .
11. Johnson, C.J., Tidball, R.R. and Severson, R.C.: Measuring plutonium concentrations in respirable dust. Science 196: 1126, June 3, 1977.

1. REMOVED LETTER TO DR. BURLY, EPA - 12 PAGES
2. LETTER TO MR. LAWTON, DMA - 5 PAGES
3. REMOVED ARTICLE BY CARDOZO - 3 PAGES
4. REMOVED ARTICLE BY DR. JOHNSON - 4 PAGES

The above enclosures were not included in this section because they do not directly address the DEIS. They are on file with DOE.

DOE STAFF RESPONSE TO DR. CARL J. JOHNSON'S COMMENTS ON THE ROCKY FLATS PLANT DRAFT ENVIRONMENTAL IMPACT STATEMENT (ERDA-1545-D)

Page 1-4, first paragraph, Air Shipments and Safety of Containers

Air shipments of plutonium to and from Rocky Flats were terminated in April 1977. In the future air shipments of plutonium to or from the Rocky Flats Plant would be expected to resume only if made in containers certified as meeting aircraft crash, accident safety criteria, or as otherwise permitted for National Security purposes in accordance with 10 CFR part 871 "Air Transportation of Plutonium."

Page 1-4, last paragraph, Internal Expertise and Knowledge of Environmental Problems

Rocky Flats employees have made many contributions to the technical and professional literature in a variety of disciplines. The many articles which have stood the test of peer review published by Plant personnel in established and referenced journals (some of which appear in the EIS reference list) adequately establish the credibility of the Plant Health, Safety, and Environment Staff. They have contributed to the international knowledge of methods of handling and control of nuclear materials by participation in IAEA, international professional journals and symposia. Although it is true that off-site conditions of an elevated plutonium level were not announced by these individuals, the plutonium levels did not exceed then existing control limits. Even the subsequently enacted State limit is now exceeded only in very limited areas. The release of tritium likewise did not exceed any limits which existed at that time, or even the more restrictive EPA Interim Drinking Water Standard adopted more recently. These two instances do not in any way reduce the numerous scientific contributions made by Rocky Flats employees. The suggested interpretation of cesium survey data is not supported by independent researchers at CDH or EML (formerly HASL). The Rocky Flats Plant experts, still acting within the reason of established international knowledge of nuclear materials and effects of radiation, believe that "respirable dust" data, which have not been validated, and lack support in the international community, are not adaptable to a realistic estimate of health hazard. (See attached letter of EPA to Johnson dated February 27, 1979.) The technique does not characterize the natural distribution or respirable surface particles resuspended in the air.

The purported high levels of activity detected are not to be compared with concentrations of activity in soil. As soil particles are separated by ultrasonic vibration, hydrogen peroxide is added to the soil as a pretreatment prior to analysis. This pretreatment separates most of the small (~0.3 μm diam) plutonium oxide particles from the larger host dust particles and may or may not break up the dust particles. During the final sedimentation step, a large but variable fraction of the small plutonium particles remain, but a smaller fraction of the original host dust particles are included. Hence, when the contamination level for this soil sample is determined by dividing the amount of plutonium in the sample (a relatively large number) by the amount of "respirable" dust remaining (a relatively small number), misleadingly large activity levels in terms of disintegrations per minute per gram of respirable dust are often obtained. The public is often not aware that most of the soil from the original sample is discarded. Because of the variability involved with the use of the sampling and analytical procedures (see Section 2.3.9), data cannot be directly compared to standards, such as the State soil standards, which were not developed using the same procedures and considering the same soil fractions. For the same reasons, the data derived cannot be compared to background data presented by other agencies. We are not aware of any specific effort to determine a State or regional background value in support of values expressed as differing from "background." The numbers presented in the comment letter on ERDA 1545-D are of questionable reporducibility and validity. There is very little discussion of this in the "science" publication where the data interest is presented.

Lymphocyte chromosome effects are definitely measurable but cannot be correlated with health effects as researchers both at Rocky Flats Plant and an independent institution have emphasized.

The comment on the release of plutonium at the time of the 1957 fire is the concentration (948 pCi/m^3) which was first measured after the stack fans resumed action following the fire. The fans were not run in the interim between the fire and the first sampling; therefore, to infer a release during this interim time is unwarranted.

Assumptions made for the calculated fire release are not repeated in the DEIS, but it should be noted that the concentration of 948 pCi/m^3 was utilized in the fire release value given in the DEIS.

Page 1-6, paragraph 3, Attempt to apply the EPA 4 mrem dose to whole body exposure

The method of computing doses has been revised. The estimated increase in whole body exposure is described in greater detail in Chapter 3 and Appendix F. Chapter 1 of the DEIS and this FEIS is intended to be a summary, as its title conveys, thus the details were intentionally left to the main text. The mixing of continuous exposure standards to man-made radiation, natural radiation, accidental exposures, and background is illogical. The EPA drinking water regulation is not applicable to this discussion. There is an abundance of data for plutonium in water to demonstrate our compliance with this standard.

Page 1-6 and 1-7, EPA Water Regulation and Misinterpretation to Include Plutonium

For comparison, radium and plutonium must be considered in the same context. This comment fails to do that.

The relevant context is the radionuclide in drinking water. To determine the health effects from such an exposure, the fraction of the radionuclide reaching the organ of reference from ingestion, f_w, must be considered. This value has been determined by the ICRP (1959) to be 1250 times greater for radium than for plutonium. This means that an individual could ingest drinking water with 1250 times as much plutonium as radium to receive equal amounts of the nuclide (by activity) within the body tissues.

Even if the references in the comment are relevant, (they were not accepted by the EPA in their formulation of the drinking water standard) the 200-fold increase in the hazard within the body does not negate the 1250-fold decrease in the hazard due to differences in gastrointestinal uptake of the nuclide.

Therefore, the RCG of 1667 pCi/l for plutonium is meaningful, and is not in conflict with the 1976 EPA regulation for radium in drinking water.

Page 1-7, paragraph 2, Lymphocyte Aberrations and the Inappropriateness of the RCG

Chromosome damage in blood lymphocytes has been used to determine the level of radiation exposure following acute exposures to external radiation (Dolphin et al., 1973) and exposures to internally deposited radioactive materials (Fisher et al., 1966). Brandon et al., (1978) reported an increase in chromosome aberration frequency in blood lymphocytes in Rocky Flats plutonium workers. However, chromosome aberrations exist in the lymphocytes of many worker populations and are by no means limited to plutonium workers. Chromosome aberrations are produced by a variety of environmental factors including external radiation exposures (Brewer and Preston, 1975), industrial chemicals (Fishbein, 1976), anesthetics (Grant et al., 1977), heavy metals (DeKundt et al., 1977) and virus (Bartsch, 1970). The increase in incidence of abnormal chromosomes in Rocky Flats plutonium workers may or may not be related to plutonium exposures. In fact, the workers with the greatest chance for plutonium exposure may also receive the greatest exposure to external gamma rays or chemical factors that produce chromosome damage. It is thus important to further analyze the workers to determine their exposure histories for the agents which break chromosomes.

The deposition of plutonium in the lung, liver, and bone, combined with the short range of the alpha particle in tissue, makes it difficult to postulate a mechanism that would result in a significant radiation exposure of blood lymphocytes by very low burdens of plutonium. Production of chromosome aberrations in Chinese hamsters (Brooks et al., 1974) or Rhesus monkey (McClellan et al., 1977) requires at least one-hundred body burden equivalents of plutonium. This supports the hypothesis that aberrations recorded in the Rocky Flats workers may not be related to plutonium exposures. It also would indicate that persons downwind from the Plant site would not have measurable biological effects from plutonium released to the environment by Rocky Flats. The dose to the lung received by persons within 50 miles of Rocky Flats is 0.0005 to 1.2 mrem/yr and only a small fraction of that dose is to blood lymphocytes.

The presence of aberrations in blood lymphocytes are an indication of exposure to an agent that interacts with the nucleus of the cell. However, the significance of these aberrations in terms of risk to a population or possible health effects has not been established for any of these agents.

References

Bartsch, H. D. "Virus Induced Chromosomal Alterations In Mammals and Man," Chemical Mutagenesis in Mammals and Man, pp. 420-432, Springer-Verlag, Berlin-New York, 1970.

Brandon, W. F., A. D. Bloom, P. G. Archer, V. E. Archer, R. W. Bistline, and G. Saccomanno, Somatic Cell Genetics of Uranium Miners and Plutonium Workers: A Biological Dose-Response Indicator, IAEA-SM-224-310, IAEA, Vienna, Austria, 1978.

Brewer, J. G. and R. J. Preston, "The Use of Chromosome Aberrations for Predicting Genetic Hazards to Man," Rad. Res. Biochemical Chemical and Physical Perspectives, Edited by O. F. Nygand and W. K. Sinclair, pp. 926-936, Academic Press, London, 1975.

Brooks, A. L., R. J. LaBauve, R. O. McClellan, and D. A. Jensen, "Chromosome Aberration Frequency in Blood Lymphocytes of Animals with ^{239}Pu Lung Burdens", In: Radiation and the Lymphatic System, CONF-740930, U.S. Energy Research and Development Administration, pp. 106-111, 1974.

DeKnudt, G., Y. Manuel, and G. B. Genber, "Chromosomal Aberrations in Workers Professionally Exposed to Lead". Journal of Toxicology and Environmental Health 3:885-893, 1977.

Dolphin, G. W., D. C. Lloyd, and R. J. Purrott, "Chromosome Aberration Analysis As A Dosimetric Technique in Radiological Protection", Health Phys., 25, 7, 1973.

Fishbein, L., "Industrial Mutagens and Potential Mutagens. I. Halogenated Alphatic Derivatives". Mutation Res. 32:267-308, 1976.

Fisher, P., E. Golob, E. Kunze-Munn, A. Benham, R. M. Dudley, T. Mullner, R. M. Parr, and H. Vetter, "Chromosome Aberrations in Peripheral Blood Cells in Man Following Chronic Irradiation from Material Deposits of Thorotrast", Radiat. Res. 29, 505, 1966.

Grant, C. J., J. N. Powell, and S. G. Radford, "The Industry of Chromosomal Abnormalities by Inhalation Anesthetics". Mutation Research 46:177-184, 1977.

McClellan, R. O., A. L. Brooks, R. J. LaBauve, H. C. Redman, J. L. Mauderly, and W. H. Halliwell, "Biological Effects of $^{239}PuO_2$ Inhalation in the Rhesus Monkey", Rad. Res. 70:638, 1977.

Page 1-7, third paragraph, Comment on DEIS Assumptions on dose calculations

Supporting information is not presented in the Summary, Chapter 1. Please refer to Chapter 3 and Appendix F in the FEIS for a description of the calculation and the assumptions made.

Page 1-8, Snap Reactor Re-entry Probability and Aircraft Accidents

The probability of any particular event occurring is always quite low whereas the likelihood of one of a class of events occurring is orders of magnitude higher. Thus, prior to occurrence, it was highly unlikely that the SNAP-2 would crash but much more likely that some satellite would crash.

The probabilistic approach to the estimation of risk is commonly used. It affords a method for quantitatively determining weak links in a system and for determining which items should be given more detailed analysis. The aircraft accident discussed in the DEIS was not dismissed but rather regarded as a credible happening.

It was therefore included in the potential accidental impacts for which analysis is given. Note also that at the present time, air shipments of plutonium to and from the Plant have been discontinued.

Page 1-8, last paragraph, Long-term, Low-level Radiation Causing Leukemia and Lung Cancer

The particular actions to be taken at various radiation dose limits are dictated by regulatory agencies. The analysis of long term dose effects is presented on Pages 3-66 and 3-67 of the DEIS as well as in Chapter 3 of the FEIS. As shown in the following paragraphs, there is overwhelming evidence that no measurable health effects of the magnitude referenced in the comments are to be expected. Appendices F and G in both the FEIS and the DEIS represent the latest analysis of health effects produced by plutonium.

In the FEIS the dose calculation has been done in a slightly different way, consequently no number in the FEIS will be directly comparable to the 633 man-rems whole body commitment through the year 2000 (total, integrated, accident releases to the Denver area population) which was presented in the DEIS. The results of the two calculations are similar, i.e., within an order of magnitude, for most comparable parameters.

The Summary of the Rocky Flats Draft Environmental Impact Statement contains a statement that the postulated 9-rem dose to individuals within 1.25 miles of a serious accident is below the level at which acute health effects would occur. This is true. Another assessment, that of the total population dose commitment for all area residents, is contained in Section 3.2 on Plant Accidents. The long-term health risks from accidents are included in this analysis.

The total Denver area population dose commitment from 1975 to 2000 is expected to be less than 633 man-rem. This includes 5.9 man-rem per year from routine operations and 18.2 man-rem per year from possible accidents. It also assumes a 2% annual growth in the Denver area population. These numbers are derived in Section 3.2 of the Draft Environmental Impact Statement. These dose commitment estimates were based upon detailed analyses and have been reviewed by many informed scientists. They are not considered to be "gross underestimates".

Releases of radioactive materials from the Rocky Flats Facility have not measurably increased any harmful effects occurring among Denver area residents. As described in Appendix G-2 "Cancer Risks from Focal Deposits of Alpha-Emitting Radionuclides in Lung Tissue," the exposures to plutonium-238 and -239 result in very small increases in the total exposures to alpha-emitting radionuclides for people in the Denver area. It is impossible to measure health effects caused by these plutonium exposures.

The risk for developing radiation-induced lung cancer is 16 to 110 per 10^6 man-rem as stated in the National Academy of Sciences' BEIR Report (NAS, 1972). Dr. Johnson suggested that the cancer mortality rate in people age 45 to 64 is 38 per 100,000 higher near Rocky Flats than in the southern part of Jefferson County (Johnson, November 20, 1977). Also, the mortality rate was 51 per 100,000 higher in Golden, Colorado than in the southern part of the county. The average annual doses to lung for individuals exposed to Rocky Flats plutonium was estimated in the Rocky Flats DEIS to be 0.04 rem per year or about 0.6 mrem per person in 15 years. For 100,000 persons, this exposure level results in a population dose commitment of 60 man-rem. If the 38 additional lung cancers estimated in the comment were related to the 60 man-rem dose, it would represent a lung cancer incidence rate of 630,000 per 10^6 man-rem. This is not consistent with our experience with the known levels of exposure to natural background levels of alpha radiation.

The lung cancer incidences described in the comment are based on a small number of observed lung tumors. In Golden, this was 27 lung cancer deaths in 7 years. This cannot be age-adjusted to compare with any control or unexposed population because these are not significant numbers either in the total group or in the age-specific subgroups. Dr. Johnson did not account for differences between his exposed and unexposed populations in socioeconomic status, health care, smoking histories or times of residence.

Similar considerations apply to Dr. Johnson's reported leukemia incidences. In addition, the radiation doses from internally deposited plutonium to bone marrow cells and lymphatic cells which give rise to leukemia are very small compared to the doses to lung, liver, and bone endosteal cells. Consequently, leukemia has only been a rare finding after exposures to plutonium (Vaughan, 1976) and has occurred only in studies where laboratory animals were given very high levels of soluble plutonium (Jee, 1974; Park et al., 1975). In these studies, the primary health effects were overwhelmingly lung cancers and osteogenic sarcomas. Thus, the prominent types of cancers to be expected in populations exposed to sufficiently high levels of plutonium would be lung cancers and osteogenic sarcomas but not leukemia.

The specific fine particle soil sampling technique suggested in the comment, rather than whole soil analysis to assess the hazards from plutonium contamination, has not been recommended or accepted by the EPA. The Environmental Protection Agency (1977) recommends that whole soil be sampled. The EPA also has calculated a soil screening level, 0.2 $\mu Ci/m^2$, below which no further analyses are required. This whole soil activity measurement is reasonable and conservative, because it considers all of the plutonium to be with respirable size particles, practical, and reproducible. The fine particle soil analysis separates and disregards the plutonium associated with larger soil particles. Therefore, the use of this technique is less conservative than when all of the plutonium is considered available for inhalation and ingestion.

References

Environmental Protection Agency, Proposed Guidance on Dose Limits for Persons Exposed to Transuranium Elements in the General Environment, September 1977.

Jee, W. S., Toxicity of Animals, Research in Radiobiology, University of Utah Report, COO-119-249, 1974.

Johnson, C. J., Death Rates From Lung Cancer in the Eight Census Tracts Near Rocky Flats and Golden, and in Nineteen Census Tracts at the South End of Jefferson County, Unpublished report to Jefferson County Board of Health at Lakewood, Colorado, November 20, 1977.

NAS, National Academy of Sciences, "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation", National Research Council Report on the Biological Effects of Ionizing Radiations, Washington, D.C., 1972.

Park, J. F., D. L. Catt, P. L. Hackett, J. E. Lund, G. J. Powers, H. A. Ragan, and C. R. Watson, Late Effects of Inhaled ^{238}Pu in Beagles, BNWL-Pt 1, UC-48, Batelle, Pacific Northwest Laboratory, Richland, Washington, 1975.

Vaughan, J., Plutonium - "A Possible Leukemic Risk," The Health Effects of Plutonium and Radium, J. W. Press, Salt Lake City, 1976.

Page 2-90, Background Concentration of Plutonium in Soil

This comment is a restatement of what is reported in the DEIS. In the FEIS a soil density of 1.5 is used. No one claims that the 11 Ci were released off-site; this is an upper estimate of the total plutonium radioactivity in the environment including that which is under the asphalt pad, on-site and off-site. Krey estimated that 2.4 Ci were released off-site. The 6.3 Ci mentioned in the final comment represents an alternative estimate of the oil drum release based on the amount of plutonium available in the drums. This is not in addition to the 11 curies.

Page 2-92, CDH Estimates of Risk

The Colorado Department of Health has justified the conservativeness of the State soil standard in their 1976 paper, "A Risk Evaluation for the Colorado Plutonium-in-Soil Standards." In summary, they state "From the values calculated in this paper, the present standard can still be considered to be ultraconservative" (Staff's underscore). The data reported are unique to the method of sampling and analysis and the data have been evaluated by the State in light of that fact.

Page 2-94, Airborne Plutonium and a Soil Standard

The reference to the inadequacy of air monitoring devices is not clear. Air monitoring devices have been used by many agencies (e.g. HASL, CDH, EPA) over more than a decade to estimate the quantities of plutonium available for inhalation. The quotation in the comment is incomplete because it is only a part of the sentence. The sentence in the DEIS actually reads "Thus, the only valid way to define soil concentrations for comparision with the Colorado guideline is through the use of the State soil measurement technique upon which the guideline is based." The State soil standard is predicated on an estimate of the risk incurred when a given concentration of plutonium is present in the 1/8-inch surface layer of agronomic soil. The concentration of plutonium in "respirable dust" as defined by Dr. Johnson is obtained by a technique different from that determined by the CDH; the two units of concentration are not interchangeable. We are unaware of documentation applying the CDH estimate of risk to a "respirable dust" parameter. Nor are we aware of data which correlates "respirable dust" measurements with the amount of dust actually available for inhalation. Appropriate use of the Colorado guidelines would include sampling by the technique used by CDH within their definition of that technique. Conversations held with CDH representatives confirm this interpretation.

Use of resuspension factors is commonly accepted by EPA and CDH. Any soil standard which considers risk associated with inhalation must include some assumption with regard to the relative concentrations of air and soil. The range of resuspension values has been documented and because of the wide range experienced, the collection of air samples is indicated to estimate the real exposure of persons to airborne radioactive materials.

Page 2-95, Burning of Uranium Cutting Oil

Burning waste oil from over 1000 drums produced residues of depleted uranium estimated at about 1800 grams. These residues, previously buried in the eastern portion of the Plant site, are currently being excavated for shipment to a waste disposal site. The DEIS is intended to present an evaluation of existing sources and future potential sources of contamination. The burning of machining oil used for uranium is not a current practice; it does not provide a source of on-going or future airborne contamination.

Page 2-96, Americium Hazard

The statement "within a few decades, the radiation hazard from americium will be equal to that from plutonium-239," may have originated with data given in the DEIS, Table 2.7-5, p. 2-183. There, the estimated future yearly releases for the two isotopes are 50×10^{-6} Ci and 80×10^{-6} Ci, alpha radiation respectively. The relative radiation hazard from the two materials was given quantitative consideration in the dose calculations. Reference is directed to Table 3.1.2-5, p. 3-37. The maximum alpha activity concentration of americium in plutonium will be no more than 25%.

Page 2-97, Increase of Plutonium in B-pond Sediments

This statement is correct as the values in the comments are taken directly from Table 2.4-19 on p. 2-97 of the DEIS. This does not mean that there is an unknown release or increased hazard. Continuing on p. 2-97, the plutonium increase resulted from pond reconstruction activities which redistributed bottom sediment from the channel upstream of pond B-1. There was no major release from the Plant during this time. If fact, from p. 2-104, "Actual measurements over the past five years in Great Western Reservoir have shown an average concentration of plutonium in the water of about 0.15 pCi/l." In comparision, the EPA standard for drinking water is 15 pCi/l alpha activity.

Rocky Flats is in the final stage of completion of a Reverse Osmosis Facility. After completion and startup testing, water will be recycled for Plant use. When a water balance can be achieved discharges from the B-series ponds will cease. Finally, a surface water control construction project has begun. This project includes dams east of the Rocky Flats drainage basins that will be capable of containing runoff from a 100-year flood. Therefore, if the plutonium sediments in the B-series ponds were released during such a flood, they will be contained by the dam on the Walnut Creek drainage.

Page 2-101, Plutonium and Uranium in Water and Sediment

There is large variability of uranium content of water upstream from the Rocky Flats Plant; therefore, we will not attempt to prove the assumption. The allegation that Rocky Flats Plant has been careless with uranium wastes is a generalization for which no specifics are presented, and is therefore considered to be merely a conjecture.

The comment on the relative concentrations of plutonium in sediment in Great Western Reservoir and the B-1 pond is based on information given in the DEIS and we agree that transfer from the ponds is very slow.

Page 2-104, Drinking Water Standards

The statement of concentrations of americium and plutonium being below the EPA standard is correct. To infer that the concentration of these radionuclides in the reservoirs are excessive is an opinion which is not shared by the Colorado Board of Health, or the EPA, the agencies which set the standard.

The information presented in the comment on tritium is acknowledged. It might be noted that an annual average of 20,000 pCi/l is allowed by the latest EPA drinking water standard, by way of comparison with the 12,000 pCi/l of tritium in Great Western Reservoir which was present for a few days in 1973 as a result of Rocky Flats Plant activities.

The concentration of 2.5 pCi/l plutonium in Well 2-66 is not conclusive evidence for contamination of the Arapahoe Formation. Other nearby wells did not show these concentrations and subsequent resampling and re-analysis of water from Well 2-66 has indicated levels of 0.2 pCi/l or less. The 1976 values were both 0.014 pCi/l. As was pointed out in the DEIS, it is thought that most readings above 1 pCi/l are caused by contamination of the water samples during collection and/or analysis and not actual contamination of the groundwater.

Page 2-130, Medical Agreements

The emergency medical resources available through formal agreements with three area hospitals are believed to be adequate. This position is based on an evaluation of the number of people who might be affected in an accident and the capabilities of the agreement institutions to support the Rocky Flats Plant needs.

St. Anthony's is considered as the primary support contractor; St. Luke's and Colorado General Hospital are backup facilities.

In the event of a major disaster affecting the off-site communities, additional medical facilities and resources would be activated under the Colorado Radiological Emergency Response Plan for Rocky Flats.

Page 2-168, Gaseous Radioactive Wastes

The caption in the DEIS is not appropriate to the text presented under it. The caption is changed in the FEIS. Gaseous radioactive materials are not released from Rocky Flats in measurable quantities.

Following are (1) a list of gaseous radioactive materials which are produced at Rocky Flats, (2) a discussion of air cleaning with particular reference to HEPA filters, (3) a literature review of the filtration of microparticles, (4) a discussion of radioactivity of plutonium oxides versus particle size, (5) discussion of effluent air sampling, and (6) a description of the testing of HEPA filters at Rocky Flats.

GASEOUS FISSION PRODUCTS PRODUCED BY 1 KG OF RF PLUTONIUM, ENRICHED URANIUM, OR NATURAL URANIUM IN ONE YEAR

J. M. McCarthy

I. Gaseous Fission Products Produced After One Year

The ORIGEN Code (reference: M. J. Bell, ORIGEN - The ORNL Isotope Generation and Depletion Code. ORNL-4628, May, 1973) was used to calculate the amount of fission products produced by the spontaneous fission rates calculated in Section II.

Isotope or Element	Amount (Ci) Produced in One Year by 1 kg of: RF Pu	Enriched Uranium	Natural Uranium
Kr-85	6.4×10^{-11}	3.4×10^{-15}	2.3×10^{-14}
Kr-85m	4.5×10^{-9}	2.5×10^{-13}	1.7×10^{-12}
Total Kr	5.1×10^{-8}	4.1×10^{-12}	3.8×10^{-11}
I-131	3.0×10^{-8}	6.2×10^{-13}	6.2×10^{-12}
Total I	2.9×10^{-7}	7.6×10^{-12}	9.0×10^{-11}
Xe-133	5.0×10^{-8}	1.2×10^{12}	1.2×10^{-11}
Xe-133m	7.3×10^{-9}	1.7×10^{-13}	1.7×10^{-12}
Total Xe	2.6×10^{-7}	6.9×10^{-12}	8.1×10^{-11}
Total of All Fission Products*	4.0×10^{-6}	1.1×10^{-10}	1.3×10^{-9}

* Includes Se, Kr, Rb, Sr, Y, Zr, Nb, Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Sb, Te, I, Xe, Cs, Ba, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Ho.

II. Initial Composition of Materials

A. RF Plutonium

Isotope	Weight-Percent	Spontaneous Fissions per kg per Second
Pu-238	0.01	1.1×10^{6}
Pu-239	93.62	1.0×10^{1}
Pu-240	5.90	4.6×10^{5}
Pu-241	0.44	---
Pu-242	0.03	8.2×10^{5}

Total spontaneous fission rate = 2.75×10^{4} f/kg/sec.

Convert to MW. 1 MW = 3.1×10^{16} f/s.

Power level = $\frac{2.75 \times 10^{4}}{3.1 \times 10^{16}} = 8.87 \times 10^{-13}$ MW.

B. Enriched Uranium

Isotope	Weight-Percent	Spontaneous Fissions per kg per Second
U-234	1.01	3.5×10^{0}
U-235	93.23	3.1×10^{-1}
U-236	0.43	2.8×10^{0}
U-238	5.33	7.0×10^{0}

Total spontaneous fission rate = 7.1×10^{-1} f/kg/sec.
Power level = 2.29×10^{-17} MW.

C. Natural Uranium

Isotope	Weight-Percent	Spontaneous Fissions per kg per Second
U-234	0.0058	3.5×10^{0}
U-235	0.71	3.1×10^{-1}
U-238	99.28	7.0×10^{0}

Total spontaneous fission rate = 7.0 f/kg/sec.
Power level = 2.3×10^{-16} MW.

A DISCUSSION OF AIR CLEANING WITH PARTICULAR REFERENCE TO HEPA FILTERS

R. E. Yoder

June 5, 1978

INTRODUCTION

The removal of aerosols from gaseous media can be achieved in several ways. The mechanisms available for particle removal include particulate diffusion, particle interception, particle impaction, electrical attraction, gravitational settling, thermal precipitation, sieving, and centrifugal acceleration. No single air or gas cleaner uses all of these mechanisms and any particular removal process must optimize the removal mechanisms considering the characteristics of the aerosol to be removed. In the nuclear industry, the removal of radioactive particulates has been extensively studied and removal devices developed to achieve the best performance possible.

Systems which achieve very high removal efficiencies under all operating conditions are always selected. The challenge aerosol to an air cleaning system in nuclear operations usually consists of particles less than a few nicrons in diameter so that the selection of air cleaning devices becomes more limited. The High Efficiency Particulate Adsorber or HEPA filter is the air cleaning device of choice because through years of research, its development has been optimized to make maximal use of the removal mechanisms available.

REMOVAL MECHANISMS

Diffusion:

Particulate material in air is constantly bombarded by gas molecules and, if observed under a microscope, can be seen to move erratically as a result of the collision. The phenomenum of diffusion is theoretically and experimentally well established. The general form of the particle removal relationship in a collector is shown in Figure 1. High efficiencies are achieved with lower air flow velocities and particles having diameters less than a few tenths of a micron. Particles less than a few tenths of a micron do not exist in air very long because they diffuse to collecting surfaces or coagulate and grow to larger sizes more effectively removed by other mechanisms or sieving.

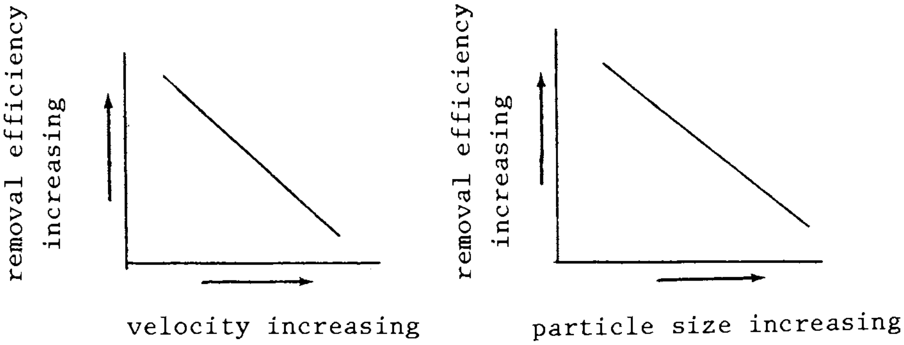


Figure 1. Particle removal efficiency by diffusion versus velocity and particle size.

Interception:

This mechanism relates to the fact that very small particles follow a fluid stream line of air and at low velocities do not deviate from the streamlines when it changes direction. Particles within one radius of an object or collector will touch it and be retained if they stick. Studies regarding this collection mechanism indicate that the attachment of a particle collected by interception is quite high for solid particles (~90%) and near 100% for liquid particles. Figure 2 illustrates the relationship of particle size and velocity to collection efficiency.

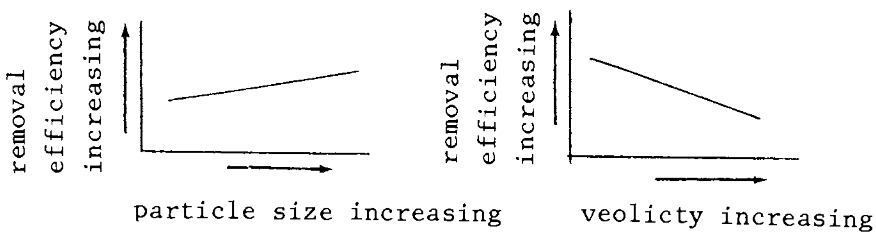
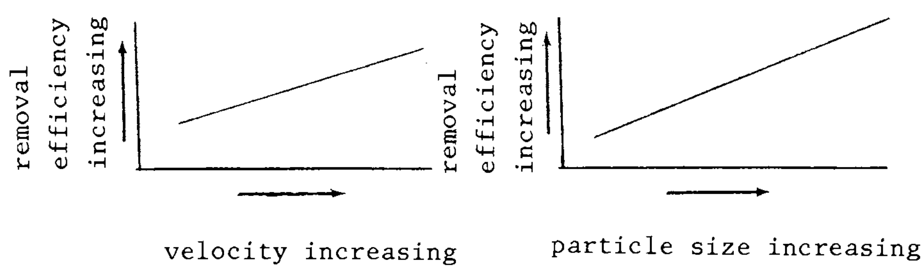


Figure 2. Particle removal by direct interception relationship in a collector.

Impaction:

This mechanism of particle removal is similar to interception described above, but is more important at larger particle sizes which have sufficient inertia to deviate from a gas stream line when it changes direction or when the velocity of the gas stream is sufficiently great to effect shart turning angles when the air stream changes direction. The relative effects are shown in Figure 3. Note that this effect increases as both velocity and particle size increase.



Gravitational Settling:

This removal mechanism is only effective when a particle has an appreciable settling velocity and sufficient time is available to permit gravity to move the particle downwind to a collecting surface. Particles having sizes less than 10-20 microns are poorly removed by settling in air cleaning systems. In the nuclear application, this mechanism is not used because the particles to be dealt with in air are smaller than the minimum size for efficient removal although some deposition on horizontal pipes does occur.

Electrical Attraction:

This mechanism is effective for the removal of particles having a substantial electron charge when introduced into an electric field, i.e., an electrostatic precipitator. The efficiency of removal depends upon the electrical characterization of the particle or its ability to be charged, the time a charged particle remains in the electric field, and the intensity of the electric field. This mechanism is not used in high efficiency gas cleaning systems requiring continuous operation because of the unreliability of electrostatic precipitators themselves coupled with the fact that if the electric power fails for any reason, the air cleaner is useless.

Thermal Precipitation:

Particles in a gas will move in a thermal gradient to a cooler or warmer surface depending upon the thermal properties of the particle itself. The mechanism is not used in air cleaning as much as in sampling because of the energy required to heat the carrier gas and cool the collector to produce the necessary thermal gradient--usually 1000°C/cm or greater.

Centrifugal Separation:

This collection mechanism is only useful for particles having sufficient inertia to be radially accelerated by a rotating gas stream. The cyclone used in conventional industry uses this mechanism quite effectively if the particles being separated are greater than 10-20 microns in diameter. The energy required to separate smaller particles is so great that it is economically unattractive and again if the electric power fails the device is useless.

DISCUSSION

The device selected for nuclear installations is the HEPA filter which is a passive air cleaner that remains functional in all operating or static conditions. This filter is cmposed of a glass fiber mat supported in a metal or wood frame. The glass fibers are sized to take the best advantage of the three removal mechanisms operating--interception, impaction, and diffusion. Attempts to theoretically calculate the efficiency of a HEPA filter have not been completely successful, but experimental data and test data are used to ascertain their performance. The combination of the removal mechanisms predict a particle size of maximum penetration and this has been verified in the operating data. At Rocky Flats HEPA filters are individually tested with a 0.3μ aerosol before installation and are leak tested after installation. The acceptance test of a filter utilizes a laser particle size analyzer to measure the efficiency in ten size increments from ~ 0.1μ diameter particles to >1.0 micron diameter. Figure 4 illustrates the mechanisms and their relationships.

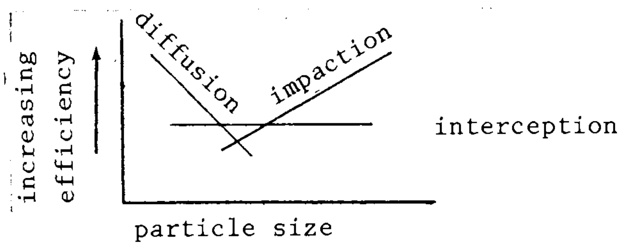


Figure 4. HEPA filter particle removal mechanisms relationship to particle size.

Test data in the cited references show that the overall efficiency is greater than 99.97% removal of all particles except those at the most penetrating size at which the efficiency must be at least 99.97%. Experiments using up to three HEPA filters in cascade or series support the basic theory that each stage functions separately and the efficiency is described by an equation of the type:

$$E_f = 1 - \exp (kzn)$$

where E_f = efficiency

exp = natural logarithm base

k = coefficient depending upon the physical parameters of the filter media

z = thickness of the media

n = number of stages of filtration

REFERENCES

1. Dennis, R., Handbook on Aerosols, TID26608, U.S. Energy Research and Development Administration, 1976.
2. Green, H. L. and Lane, W. R., Particulate Clouds, Dust, Smoke and Mists, D. VanNostrand Co., New York, 1964.
3. "Removal of Particulate Matter from Gaseous Wastes - Filtration," American Petroleum Institute, 1961.
4. Friedlander, S. K., Smoke, Dust, and Haze, Wiley and Sons, New York, 1977.

LITERATURE REVIEW
FILTRATION OF MICRO PARTICLES
GEER, TERADA

A review of the Utility Department files which address the topic of filtration of sub-micron particles has been conducted. The topic has been of interest to Rocky Flats for many years and the Utilities Department as operators and specifiers of air cleaning equipment have been generally appraised of the local correspondence and experimental work which bears on the subject.

In the review, particular emphasis was placed on the topics which would most closely address two concerns of Dr. Carl Johnson as expressed in his critique of the DEIS, ERDA-1545-D, Rocky Flats Plant Site, Golden, Colorado.

The concerns addressed are as follows:

Page 2-168 "Gaseous radioactive waste is produced in processing of plutonium. There is no filtration system that can guarantee a complete capture of all the radioactive particles. Gases will pass through filters. Needless to say, radioactive gases will not be detected in plutonium smaller than 0.1 micron."

Page 2-172 "The number of extremely small sub-micron particles (the orders of sizes smaller than 0.1 micron) passing through the filter is very difficult to evaluate."

Kirchner[1] studied the plutonium particle size in production areas of Rocky Flats. A table listing his findings is included below.

Hayden, [2][3][4][5][6] in several service reports at Rocky Flats, has sampled room air from several production buildings, effluent air, outside air and soil, sewage sludge, and pond sediments. Optical and electron microscopy and nuclear track techniques were variously used on the samples.

Stack effluent samples showed a mean diameter of 0.09 μm with a very narrow range (δ_g 1.6). This measured mean is equivalent to an aerodynamic size of 0.3 μm. Samples examined from a filter plenum prior to filtration were analyzed for particle size during the course of other determinations. The particle size range during this study was found to be 0.07 to 0.15 μm.

TABLE I
Plutonium Particles Size from Production Operations

Operation	Chemical Form Assumed	Mass Median Diameter (microns)	Count Median Diameter (microns)[a]	σ_g	Number of Particles Evaluated
Machining	PuO_2	0.62	0.23	1.77	375
Machining	PuO_2	0.81	0.22	1.94	263
Chemistry (oxide crushing)	PuO_2	0.48	0.18	1.79	90
Chemistry (oxide crushing)	PuO_2	0.52	0.15	1.91	84
Chemistry (oxide crushing)	PuO_2	1.72	0.24	2.26	337
Chemistry (oxide dissolving)	PuO_2	1.05	0.34	1.85	161
Chemistry (oxide dissolving)	PuO_2	0.98	0.11	2.36	77
Chemistry (metal breakout)	PuO_2	0.99	0.23	2.02	191
Chemistry (metal breakout)	PuO_2	0.36	0.03	2.46	294
Chemistry (americium separation)	PuO_2	0.94	0.21	2.04	179
Chemistry (oxide reduction)	PuO_2	1.13	0.29	1.96	224
Chemistry (pump maintenance)	PuO_2	0.33	0.06	2.14	283
Chemistry (fluorination)	PuF_4	0.82	0.20	1.99	136
Chemistry (fluorination)	PuF_4	1.35	0.42	1.87	343
Chemistry (fluorination)	PuF_4	1.08	0.38	1.81	257
(fluoride reduction)	PuF_4	0.96	0.15	2.2	215
Average		0.88	0.21	2.02	219

[a]Calculated from MMD by: $\ln CMD = \ln MMD - 3(\ln \sigma_g)^2$.

TABLE II
Plutonium Particle Size Related to Personnel Exposures

Exposure	Cause	Mass Median Diameter (microns)	Count Median Diameter (microns)[a]	σ_g	Number of Particles Evaluated
"A"	Glove failure on plutonium metal burning box	4.1	0.45	2.36	256
"B"	Leaking polyethylene bag containing oxidized plutonium metal	1.2	0.39	1.84	482

[a]Calculated from MMD by: $\ln CMD = \ln MMD - 3(\ln \sigma_g)^2$.

Analysis of smear samples taken from various exhaust ducts downstream of the filtration system indicated particles in the range of 0.08 to 0.19 μm. Alpha tracking technique (1.65×10^5 sec.) showed a maximum of nine particles in the 0.39 μm range. Fission tracking (1.44×10^{15} n) indicated a maximum of twenty-seven particles in the 0.08 μm range.

R. W. Woodard,(7) working at Rocky Flats, determined the efficiency of HEPA filters against plutonium fume produced by burning plutonium chips. Particles were collected by electrostatic precipitator and by use of membrane filter.

Both methods of collection revealed a size range of 0.01 to 0.1 μ for individual particles. However, the particulate matter was typically found in aggregates containing hundreds to thousands of particles. The penetration of the HEPA filter ranged from 0 to .0003%.

References to work performed at other installations which had some bearing on the subject were also reviewed.

W. J. Megaw[8] demonstrated that the Type AA Millipore filter had essentially no penetration when measured with particles much smaller than 0.1 μm.

W. J. Megaw[9] in writing to L. A. Matheson of Rocky Flats speaking of the effect of Brownian motion on small particles states that his calculations indicate that the oscillations of 0.01 μm particle will behave as though its diameter were 20 percent greater than it really is. He states that the effect rapidly becomes more significant for smaller particles. A particle of diameter 0.01 microns will make 1.5 x 10^8 changes of direction per second and, having an apparent mean free path of 0.03 microns, will in its passage through the filter trace out, to a first approximation, the envelope of a cylinder 0.07 nicrons in diameter. It will therefore almost certainly be intercepted by any filter fibre within 0.035 microns of its mean path, and the filtration efficiency is consequently increased over the value which would have been expected in the absence of Brownian Motion.

Dyment[10] working with NaCl Aerosol was able to produce particles as small as 0.02 μm. He stated that the most reliable method of size determination was inspection under the electron nicroscope. He presents graphs relating the particle diameter to penetration in the particle size range 0.04 to 0.4 μm. At each of three velocities (2.4, 5, and 20 CM/Sec.) his graphs indicate the greatest penetration at approximately 0.12 μm. Dyment used Aerosolve 95 media in these tests. Dyment also stated that particle density seemed to have little effect on filtration efficiency in the area of 0.1 μm.

Ettinger,[11] et al., have done extensive sampling of the Rocky Flats effluents in an endeavor to characterize the plutonium aerosol. They state that particles as small as 0.1 μm have been identified. However, they have not been able to produce particles this small in the laboratory to be used in filter efficiency testing.

Gonzales[12] has related work wherein very small particles have been produced from dilute solutions. He states that gold, holmium, and yttrium have produced satisfactory particles for filter efficiency testing. Gold particles in the range of 0.02 to 0.03 μm have also been used. Yttrium particles as small as 0.01 μm have also been used. He states that the efficiency of HEPA filters to these particles has been demonstrated at 99.99%. He further stated that the most penetrating particle has an aerodynamic diameter of 0.4 μm which relates to the 0.12 actual diameter found by other investigators.

REFERENCES

(1) Kirchner, R. A., "A Plutonium Particle Size Study in Production Areas of Rocky Flats," American Industrial Hygiene Assoc. Journal, Vol. 27 (August 1966).

(2) Hayden, J. A., "Particle Size Analysis - 776 Building Effluent Air," Report No. 317-72-188 (November 1972).

(3) Hayden, J. A., "Particle Size Analysis - Building 771 Effluent Air," Report No. ES-376-74-118 (May 1974).

(4) Hayden, J. A., "Review of Particle Size Data Accumulated at Rocky Flats," Report No. ES-376-76-178 (February 1976).

(5) Hayden, J. A., Reiser, J. L., Woodard, R. W., "HEPA Filter Study," Summary of Data obtained 7/8/76-10/6/76, Report No. ES-376-76-192 (October 1976).

(6) Hayden, J. A., "Particle Size Analysis, Smear Samples 776 Building," Report No. ES-376-76-195 (December 1976).

(7) Woodard, R. W., et al., "Performance of High Efficiency Particulate Air Filters for Fume From Burning Plutonium Metal," CONF-710401, U.S. Atomic Energy Commission (April 1971).

(8) Megaw, W. J., Wiffen, R. D., "Efficiency of Membrane Filters," Int. J Air Wat. Poll., Vol. 7, pages 501-509 (1963).

(9) Megaw, W. J., Personal Communication from W. J. Megaw, Health Physics and Medical Division, AERE, Harwell to L. A. Matheson, Rocky Flats.

(10) Dyment, J., "The Penetration of Fibrous Media by Aerosols as a Function of Particle Size," the Int. Conf. on Radioactive Pollution of Gaseous Media, CEN Saclay, France Conf. 337-51.

(11) Ettinger, H. J., Elder, J. C., Gonzales, M., Tillery, M., "Performance of Multiple HEPA Filters against Plutonium Aerosols Progress Report," June 1974, LA-5784-PR, Los Alamos Scientific Laboratory.

(12) Gonzales, Manuel, Private communication to J. A. Geer, (6/2/78) of as yet unpublished work being performed at Los Alamos Scientific Laboratory as part of the HEPA filter efficiency studies.

RADIOACTIVITY OF PLUTONIUM OXIDES VS PARTICLE SIZE

E. A. Putzier

In general, respirable particles are those whose aerodynamic diameter is less than 5 μm. Systemic and lung burden standards are published in terms of a quantity of radioactivity and air standards in terms of radioactivity concentration. In considering the impact of a particular size or size range of particles to the contribution of body or lung burden or to air concentrations, it is necessary to relate radioactivity to particle size. Since PuO_2 has a density on the order of 11 grams per cm^3, the aerodynamic diameter is actually larger than the physical diameter by probably 2 to 3 times. To calculate radioactivity one needs to use physical sizes and by further assuming the particles are spherical the following relationships can be determined.

Size (μm)	Radioactivity (dpm)
5.	112.5
1.	0.9
0.1	0.0009
0.01	0.0000009
0.001	0.0000000009

The insignificance of particles <0.1 becomes obvious from the above table and if one considers the aerodynamic vs physical size a 0.1-μm aerodynamic diameter particle would be even less significant.

A second approach which also shows the insignificance of the radioactivity associated with <0.1-μm particles is to consider the period of emanation for each of the sizes. Again these are calculated for physical size, whereas aerodynamic size would show even longer periods.

Size (μm)	Period (days)
5.	.0000062
1.	.00078
0.1	.78
0.01	780
0.001	780,000

The above shows a 0.1-μm particle emits an alpha every 18.7 hours and the period increases to 2.14 years for 0.01 μm and 2,137 years for 0.001 μm.

Since it is generally accepted that particle size distributions in air are log-normal, radioactivity collected on a filter paper first of all represents at least that portion of the distribution that is not so small as to pass through the filter if any does indeed pass through. The discussion above on the significance of the very small particles shows that if any radioactivity is collected, the very small particles, whether collected or not, would probably not have any statistical impact on the calculations to determine air concentrations.

EFFLUENT AIR SAMPLING

M. R. Boss and J. R. Handschy

Conventional methods of filtration are utilized in the collection of effluent air samples at the Rocky Flats Plant. Filter media of fine glass fibers have a high collection efficiency and low burial losses, both are advantages when direct alpha counting assay methods are used.

Final effluent air samples are collected downstream of the final stage of HEPA filters prior to the effluents release to the atmosphere. Pre-exhaust air samples, from pollutant generating operations, are taken prior to their introduction into the main effluent exhaust stream. Air samples are drawn from in-place sampling tubes, through filter holders of standard Rocky Flats design, by a centrally located vacuum pump. The diameter of the tube entry is sized so that sampling is near isokinetic at a volumetric flow rate of 2 cfm. A volumetric flow rate of 2 cfm is maintained by use of a needle valve through a calibrated orifice-manometer. The needle valve allows the adjustment of flow rate at any time. The volumetric collection rate is certified on a quarterly schedule.

Ventilation effluent samples are collected three times each week on alternate days. The collected filter media are counted and the radioactive concentration is subsequently determined. The filter media are held for compositing and subsequent radiochemical separation and analysis.

Air sampling at Rocky Flats is conducted in accordance with those recommendations shown in ANSI N13.1 entitled "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities."[1]

Important requirements to be satisfied by any monitoring system include:

1. Accuracy - The method must provide an accurate indication of the concentration, composition, and particle size of the aerosol being sampled.
2. Sensitivity - High sensitivity is required when samples are collected downstream of multiple stage HEPA filters. High sensitivity can be obtained through high collection efficiency, high air sampling rates, long sampling times, and high radiation detection efficiency for those materials being sampled.
3. Timeliness - Sample analysis must be rapid and accurate in order that necessary controls may be implemented.

Techniques that may be used for aerosol sampling while retaining those essential requirements listed above include: filtration, impaction, impingement, electrostatic and thermal precipitation methods.

Filtration is the simplest and least costly of the methods commonly used. A wide variety of filter media is available including cellulose, glass, polymer fiber, and several membrane types. Each has certain advantages.

Filtration is well suited to radiometric assay. No preparation or processing is required. The collection efficiency of typical filter media approaches unity for particles greater than a few nicrometers in diameter and is usually higher at high face velocities. Collection efficiency versus aerosol particle size passes through a minimum for diameters of a few tenths of a micrometer or smaller[2]. Below this, the efficiency curve increases to near unity for particles of a few hundredths of a micrometer in diameter or smaller. Brownian motion is an important mechanism in the collection of these small particles. Brownian motion is effective for very small particles and the use of fiber filters is one of the most effective means for collecting submicron-size particles from aerosols[3].

Impaction samplers include those in which a high velocity air stream is directed against a collecting surface, or the collection surface is rapidly moved through the aerosol being sampled. This sampling method has traditionally been used in conjunction with gravimetric or nicroscopic assay, but have been adapted for radiometric assay. Commercial units are multiple stage instruments and are used primarily for particle size distributions. The collection surface may be coated with a thin layer of adhesive to enhance the collection efficiency. Collection efficiency for the impaction devices is poor for particles less than about one micrometer in diameter[4]. Impaction appears to offer few advantages over filtration when used in a routine sampling program.

Impingement is similar in principle to impaction, except the high velocity air jet is submerged in a liquid. Some of the particles may be collected on the impacted surface, but most are suspended in the liquid. Assay is usually by microscopic analysis although occasionally the exposed liquid is dried and the residue is weighed. When the liquid is compatible with a liquid scintillation phosphor, assay by scintillation counting is possible. Collection efficiency is good for particles greater than one micrometer[5]. The added complications imposed by sample handling renders this method less attractive than the impaction method as a routine sampling technique.

Electrostatic precipitators are generally considered to have collection efficiencies of 0.99 or higher; this probably holds for particles greater than about 0.01 micrometer diameter[6] when air flow through the instrument is maintained within the laminar regime. The main disadvantage to this method is the high initial cost of each unit. One or more instrument could be used as a reference method for comparing results obtained through filtration. These devices show a relative minimum in the curve of collection efficiency vs particle sizes for sizes near one micrometer in diameter[6].

In the thermal precipitator, the sampled aerosol flows through a strong thermal gradient region where the particles experience a force moving them onto a collection surface. Collection efficiencies are near unity for particles from 0.001 to 10 micrometers in diameter[7]. Efficiencies decrease for larger particles. As was true for electrostatic precipitators, these instruments are large, expensive, and not readily adaptable for routine use. Furthermore, the air sampling rates are usually quite low, thus limiting their sensitivity. Thermal precipitation may be adapted for radiometric assay and would appear to be the method of choice for checking results obtained through the filtration method.

REFERENCES

1. Guide to Sampling Airborne Radioactive Meterials in Nuclear Facilities ANSI N13.1-1969. American National Standards Institute, Inc.
2. Thomas T. Mercer, Aerosol Technology in Hazard Evaluation, Academic Press, New York, 1973, p. 123-132.
3. Richard D. Cadle, The Measurement of Airborne Particles, John Wiley and Sons, New York, 1975, p. 50.
4. S. A. Roach, "Sampling Air for Particulates," in The Industrial Environment, Its Evaluation and Control, National Institute for Occupational Safety and Health, U.S. Department of Health, Education, and Welfare, Washington, D.C., 1973, p. 143.
5. Environmental Instrumentation Group, Instrumentation for Environmental Monitoring, Vol. 1, Part 2, Section AIR-MAS, p. 38.
6. IBID, p. 41.
7. IBID, p. 43.

TESTING OF HEPA FILTERS AT ROCKY FLATS

C. D. Skaats

June 5, 1978

All HEPA filters and respiratory equipment used at Rocky Flats are tested and certified by the DOE Central Division Test Facility.

The test equipment used for this purpose is certified by the Rocky Flats Physical Metrology Lab. This equipment is re-certified on a frequency from once a month to once every three months, depending on nature of equipment.

Measurement of the 0.3 micrometer particle size is verified by a Laser Aerosol Spectrometer (LAS 200), with the capability of measuring a particle size range from 0.1 micrometer to 1 micrometer. The Laser is calibrated by using polystyrene latex particles. For instance, latex particles measuring 0.3 micrometers has a standard deviation of 0.0022 and 0.1 micrometers has a standard deviation of 0.0027. Periodically the Laser is returned to the manufacturer in Boulder, Colorado for certification of calibration.

The LAS 200 is therefore a standard piece of equipment used daily to monitor and assure that the test equipment is producing the 0.3 micrometer particle.

Filters and respiratory equipment are tested at their rated flows. Filters are also subjected to a flow of 20% of their rated flow. Filters and respiratory equipment tested at 0.3 micrometers cannot exceed 0.030% penetration of such particles; in other words, the filter cannot be less than 99.97% efficient or it is rejected.

Complete test records are maintained on each unit or units tested. These records indicate that the majority of units tested have efficiency ratings from 99.988% to 99.998%.

The A. D. Little, Inc. of Cambridge, Mass. has a contract with Edgewood Arsenal to study the light scattering means of measuring percent penetration versus the use of the Laser Aerosol Spectrometer.

The rocky Flats Test Facility is being updated periodically by a representative of A. D. Little, but we do not expect any conclusions from this study for a year followed by an additional year or actual field testing.

Page 2-172, Efficiency of HEPA Filters for Small Size Particles

This subject is discussed in the preceding comment concerning page 2-168. The efficiency is greater than the 99.9% test value for particles both larger and smaller than the 0.3 micron test particle.

Page 2-175, Releases and Filter Loading

The information in the comment is correct and is taken from the DEIS. The accident analysis used the plutonium content of HEPA filters ready to be changed as the source term for the released fraction of material.

Page 2-176, Tritium Controls and Releases of Plutonium

As noted on page 2-176, the predominant method of controlling tritium emissions is to limit the total amount of tritium that will be present in any materials processed by Rocky Flats.

Commercial decontamination systems for tritium in air are available. These systems have an ultimate tritium removal capability down to a tritium concentration of about one part per billion ($\sim 10^9$ pCi/m^3). Tritium decontamination of gettering systems capable of removing the residual elemental gas or oxide from an atmosphere are highly concentration dependent. For tritium concentrations of 100-400 pCi/m^3, the removal efficiency of any system is only a few percent and is further reduced with decreasing concentration.

Rocky Flats is equipping one glove-box facility with a tritium decontamination system. Materials that are known to be or have the potential for tritium contamination will be initially processed within this facility. Air effluents from these operations will undergo tritium decontamination prior to their release to the outside atmosphere.

The suggestion that there exists a "routine release limit" for release of radioactive materials from the stacks, and that this limit has been violated, is misleading. No limit exists. The limiting dose which is quoted is improperly applied in the case of the 1976 EPA regulation. An error in calculation of the commenter appears in the estimate of dose. The DOE concentration guide for soluble plutonium-239 in air (CG_a) in a controlled area is 2×10^{-12} μC/ml (2 pCi/m^3), while the corresponding uncontrolled area CG_a is 6×10^{-14} μC/ml (0.06 pCi/m^3). The CG_a applicable to a potentially exposed population is 2×10^{-14} μC/ml (0.02 pCi/m^3). The DOE guide, as shown in the DOE Manual Chapter 0524, is identical to the plutonium-239 guide of 10 CFR 20 entitled "Nuclear Regulatory Commission Standards for Protection Against Radiation." For purposes of evaluating the quality of radioactive releases to unrestricted (i.e., uncontrolled) areas, both DOE and NRC (Nuclear Regulatory Commission) permit concentrations to be averaged for periods up to one year. The guides of DOE and NRC correspond to the 1971 NCRP dose recommendations for genetic and somatic population dose limits of 0.17 rem average per year. The State of Colorado has also adopted these guide values and procedures in their regulations.

The yearly alpha releases in the comment are as stated in the DEIS.

The annual release of 500 microcuries of plutonium used in the DEIS refers to an upper boundary condition at which action would be taken.

In view of the redundancy and improvements in the air treatment and exhaust ventilation systems, annual releases of more than 500 μCi of plutonium from routine production activities are highly unlikely. The continuous release of this quantity of plutonium would ultimately produce an annual dose to the bone of 0.19 mrem/yr to a continuously exposed individual at the nearest off-site location. The commenter is referred to the bone dose conversion factors for the maximum individual which appear in Table 3.1.2-5 on page 3-37 of the DEIS. The number from the table for plutonium-239 is 3.83×10^{-7} rem/1 μCi plutonium released to air, so that a 500-μCi release gives a 0.19-mrem bone dose. This is indeed much less than 10 mrem and is also much less than the 4-mrem EPA value for drinking water. Even the 26,000-μCi plutonium-239 release from the 1957 fire gives slightly less than 10 mrem bone dose to the maximum exposed individual. The concept of maximum permissible nuclide concentration in air is predicated on the dose-limiting recommendations of the Federal Radiation Council (FRC) and National Council on Radiation Protection (NCRP). These dose limiting recommendations, as implemented through DOE Manual Chapter 0524 and 10 CFR 20, set the permissible dose limits for individuals and occasionally exposed individuals at 0.5 rem (500 mrem) in any one year.

The assertion that EPA promulgated a radiation dose limitation of 4 mrem and therefore a maximum contamination level for radionuclides in air is incorrect. The 1976 EPA regulation applies only to the interim primary standard for radioactivity in drinking water, not airborne emissions. These radioactive standards in water were promulgated under Public Law 93-523, pursuant to Sections 1412, 1445, and 1450 of the Public Health Service Act. The 1977 amendments to the Clean Air Act indicate the intent of Congress to include radioactive discharges as category pollutants which are to be controlled and regulated by EPA and the states. EPA is expected to propose updated guidance for occupational radiation exposure in late 1978 (43 FR 14602).

Page 2-179, Releases of Radioactive Materials

This comment is correct, and is taken directly from the information presented in the DEIS.

Page 2-181, Depleted Uranium

This comment is correct, and is taken directly from the DEIS. The implication here is not understood.

Page 2-183

The estimates of yearly atmospheric releases were deliberately chosen to be "upper bounds" (DEIS, p. 2-179), i.e., higher than is actually expected, so that the impact of the Plant would not be underestimated. The relationships of the activities of the several named isotopes of plutonium is taken from the DEIS.

As stated during the DEIS public hearing on May 25, 1978, the source terms for dose estimate and subsequent dose calculations have been thoroughly reviewed and revisions have been made for the FEIS.

Page 2-208, Radioactive Gases

This subject is discussed in the response to the comment concerning page 2-168.

Page 2-214, Sampling for Radioactive Gases by CDH

Technical analysis does not support the idea that radioactive gases and ultra-submicron particles emanating from the Plant constitute a hazard to the populace. The subject is discussed in relation to the comment on about page 2-168 of the FEIS.

Page 2-230, Soil Sampling

The interpretation of soil data in terms of the associated health hazard has been discussed extensively, and is under objective review by the EPA. For the CDH soil standard, we refer you to the CDH's 1976 paper, "A Risk Evaluation for the Colorado Plutonium in Soil Standards." The EPA has presented a discussion of risk estimate as related to plutonium inventories in soil in their document, "Dose Limits for Transuranium Elements," July 1977. This subject is also discussed in relation to the comments concerning pages 2-92 and 2-94 in the DEIS. A section (Section 2.3.9) has been added to the FEIS on this subject.

Page 2-235, Effects of Low Energy Gamma Radiation

Electron and photon emissions from plutonium-239 and americium-241 account for only 10^{-3} to 10^{-5} of the total energy released per disintegration. More than 99.9% of the total energy deposited in surrounding tissue is due to the alpha particles.

All observations of plutonium toxicity in laboratory animals and alpha radiations in man have included the weak beta and gamma radiations referred to. These occur from natural background and medical x-rays. The average medical exposure for people living in this country is about 70 mrem/year (NAS, 1972). Obviously, when the exposed human populations and animal studies are used to establish radiation exposure limits, the data collected in these observations include much more radiation with low specific ionization than would result from these alpha-emitting radionuclides. These radiations may contribute a very small amount to the cell injury but no large synergistic effects are ever observed.

The maximum permissible lung burden for occupational workers to plutonium-239 in lung tissue is 16 nCi in the total lung. This amount of activity would result in about 15 rem of exposure to the lung each year. The electron and photon components of the dose are less than 15 mrem/yr. Natural background radiations result in about 250 mrem of radiation to lung tissue. Therefore, the electron and photon radiations of lung tissue from plutonium-239 and americium-241 add little to the constant radiations fields which normally exist in the lung even if the lung contains 16 nCi of plutonium-239.

References

NAS, National Academy of Science, Report of the National Research Council on the Biological Effects of Ionizing Radiation, Washington, D.C., 1972.

NCRP, National Council on Radiation Protection, "Medical Radiation Exposure of Pregnant and Potentially Pregnant Women," Report No. 55, Washington, D.C., 1977.

Petkau, A., "Effect of $^{22}Na^{+}$ on a Phospholipid Membrane," Health Phys., 22, 239-244, 1972.

Enclosures to Letter from C. J. Johnson

The several enclosures included do not directly address the DEIS. Because of this, no response will be provided to the enclosures, even though the DOE is not necessarily in agreement with them.

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December 21, 1977

Mr. W. H. Pennington, Director
Office of NEPA Coordination
U.S. Department of Energy
Washington, D.C. 20545

Re: ERDA-1545-D, Rocky Flats Plant Site
<u>Draft Environmental Impact Statement</u>

Dear Mr. Pennington:

Enclosed are the comments of the Natural Resources Defense Council in the above matter.

Sincerely,

Arthur R. Tamplin

Arthur R. Tamplin
Staff Scientist

Enclosure

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December 21, 1977

Natural Resources Defense Council
COMMENTS ON ERDA-1545-D
Draft Environmental Impact Statement
Rocky Flats Plant Site
Golden, Colorado

Arthur R. Tamplin
Thomas B. Cochran

Introductory Remarks

The DOE proposes to modify the Rocky Flats facility and to continue its operation for the production of nuclear weapons. The draft EIS assumes that this proposed action is beneficial and asserts that an analysis of the alleged benefits of the proposal is beyond the scope of the environmental analysis. This position is clearly erroneous, conflicts with established legal precedents, and is indefensible as a matter of policy.

The mandate of NEPA is clear -- in evaluating any proposed major federal action, the agency must thoroughly explore the alleged benefits of the proposed action and alternatives which will equally or better achieve the legitimate benefits sought. Absent preparation of a programmatic impact statement on the United States nuclear weapons program, DOE is obligated to explore in this EIS the clearly relevant issues related to United States national defense and the role, if any, which Rocky Flats can play in that defense. Kleppe v. Sierra Club, 427 U.S. 390 (1976); Natural Resources Defense Council v. Nuclear Regulatory Commission, 547 F.2d 633 (D.C. Cir. 1976), cert granted 45 U.S.L.W. 3554 (Feb. 22, 1977). In addition, the existence of significant and authoritative criticism of the defense policy which is used as the unexplored premise of this draft EIS must be fully disclosed and addressed in the EIS. Committee for Nuclear Responsibility, Inc. v. Seaborg, 463 F.2d 783 (D.C. Cir. 1971); Save Our Ten Acres v. Kreger, 472 F.2d 463 (5th Cir. 1973); Environmental Defense Fund v. Corps of Engineers, 325 F.Supp. 728 (E.D. Ark. 1971). Finally, despite the fact that major commitments have already been made based upon the assumed validity of our present national defense policy, the present proposed action cannot be authorized without analysis of the programmatic issues involved. Scientists' Institute for Public Information v. A.E.C., 481 F.2d 1079 (D.C. Cir. 1973).

In the past the individuals preparing the various parts of an impact statement have done so in an atmosphere of anonymity. This, we feel, has materially contributed to the poor quality of the statements. The U.S. Code at 18 U.S.C. § 1001 states:

> Whoever, in any matter within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals or covers up by any trick, scheme, or device

> a material fact, or makes any false, fictitious or fraudulent statements or representations, or makes or uses any false writing or document knowing the same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than five years, or both.

We therefore request that this state of anonymity be ended and that those who prepare the various parts of the FEIS be fully identified.

General Comments

We find this DEIS is seriously inadequate in a number of respects related to safeguards and health and safety. We shall comment on these subsequently. At this point, we shall comment on a major deficiency that makes the DEIS totally inadequate. It is a deficiency that again demonstrates the crabbed interpretation of NEPA by ERDA and it must be corrected in the FEIS or in a separate Environmental Impact Statement. This deficiency relates to the benefits of the Rocky Flats Plant and hence to the cost/benefit or risk/benefit analysis.

On page 1-4 of the DEIS it is stated, "The principal benefit from the Rocky Flats Plant is its contribution to national defense." On page 1-18, it is stated, "A complete benefit-risk analysis of the national defense program is beyond the scope of this Statement." The apparent basis for these statements appears on p. iv:

> The United States' current defense posture dictates the need for nuclear weapons. As a result, weapon production is a mandate of the Administration, Congress, and the Department of Defense. The production of nuclear weapons, in which the Rocky Flats Plant maintains a vital role, will probably continue for as long as the world situation suggests that this

country must have a strong defense. The present and future operation of the Rocky Flats Plant therefore cannot be divorced from America's defense needs.

The approach taken and arguments presented in this DEIS are quite similar to those taken by the AEC in the case of the Clinch River Breeder Reactor and the LMFBR Program. The courts have asserted that this approach was wrong (Scientists' Institute for Public Information v. A.E.C., supra). By accepting the doctrine that the U.S. national security dictates the need for any and all nuclear weapons and that the Rocky Flats Plant must maintain a vital role in their production, is simply an unacceptable crabbed interpretation of NEPA -- an interpretation that the courts have disallowed.

This crabbed interpretation, among other things:

- fails to consider the opinion of opposing competent authority;
- fails to consider whether continual production of nuclear weapons at Rocky Flats or elsewhere adversely affects our national security;
- fails to consider the alternative of operating Rocky Flats or elsewhere at a reduced throughput;
- fails to consider alternative approaches to national security, such as nuclear disarmament;
- fails to consider the impacts of the use of nuclear weapons;
- fails to consider the impact of our nuclear weapons program on the development and expansion of similar programs world-wide;
- fails to consider the impact of unilateral actions on our part with respect to reducing the nuclear weapons arsenal elsewhere;
- fails to consider the command and control problems associated with nuclear weapons -- problems that could result in unauthorized detonations and even

trigger a massive nuclear war;

- fails to consider the problems associated with the deployment and possible use of tactical nuclear weapons;

- fails to consider the sociological effects associated with the "balance of terror" philosophy;

- fails to consider the problems associated with safeguards, including the invasion of privacy and the erosion of civil liberties.

These represent some of the issues raised by competent authorities. As representative, we offer Dr. Herbert York who was chief scientist for the Department of Defense throughout the Eisenhower Administration and into the Kennedy Administration. In his book, Race to Oblivion (Simon and Schuster, New York, 1970), Dr. York states on page 21:

> In January, 1961, I had the opportunity to discuss these matters with John J. McCloy, who was President-elect Kennedy's personal and principal adviser on matters of arms control and disarmament. I communicated to Mr. McCloy the substance of what I stated publicly before the Senate Foreign Relations Committee in 1963:
>
>> Ever since shortly after World War II, the military power of the United States has been steadily increasing; over the same period the national security of the United States has been rapidly and inexorably diminishing. . . . It is my view that the problem posed to both sides by this dilemma of steadily increasing military power and steadily decreasing national security has no technical solution. If we continue to look for solutions in the area of military science and technology only, the result will be a steady and inexorable worsening of this situation. I am optimistic that there is a solution to this dilemma; I am pessimistic only insofar as I believe there is absolutely no solution to be found within the areas of science and technology.

On page 23 Dr. York indicates that other DOD officials share his views and notes comments made by the present-day Secretary of DOD:

> By no means am I the only Department of Defense official who has come to realize the dilemma of an ever-increasing military power accompanied by an ever-decreasing national security. Nor am I the only defense official to realize that the dilemma cannot be resolved by the development and deployment of ever more complex and more costly machines. Harold Brown said after serving more than four years as DDRE and nearly four years as Secretary of the Air Force:
>
>> Those who have served as civilian officials in the Department of Defense at the level of Presidential appointment . . . have recognized the severely limited utility of military power, and the great risks in its use, as well as the sad necessity of its possession . . . [The] higher their position and, hence, their responsibility, the more they have come to the conclusion that we must seek national security through other than strictly military means . . . and urgently.

On page 91 Dr. York, drawing upon his long experience at DOD, states:

> Thus, the real reason that this year's defense budget is so and so many billion dollars is simply that last year's defense budget was so and so many billion, give or take about five percent. The same thing, of course, applies to last year's budget and the budget of the year before that. Thus the defense budget is not what it is for any absolute reason or because in any absolute sense the total cost of everything that is supposedly truly needed comes out to be precisely that amount, but rather it is the sum total of all the political influences that have been applied to it over a history of many years, and that have caused it to grow in the way that it has grown.

On page 103 Dr. York points out a serious consequence of this budget process:

> From the point of view of arms control and the arms race, these excesses in dollars and people also had serious consequences. The extra organizations and the extra people resulted in a larger constituency favoring weapons development. This larger constituency in turn strengthened those forces in the Congress "which hear the farthest drum before the cry of a hungry child," and consequently the whole arms race spiraled faster than before.

Concerning parity in the arms race, Dr. York states on page 169:

> Thus a balance of terror had been created such that neither side could conceivably survive a nuclear exchange no matter who struck first, and even fairly large deviations from strict numerical parity could not seriously upset the balance.

On page 228 Dr. York states the absurdity of our actions and processes:

> The actions and processes described in this book have led to two absurd situations.
>
> The first of these absurdities has been with us for some time, and has come to be widely recognized for what it is. It lies in the fact that ever since World War II the military power of the United States has been steadily increasing, while at the same time our national security has been rapidly and inexorably decreasing. The same thing is happening to the Soviet Union.
>
> The second of these absurdities is still in an early stage and, for reasons of secrecy, is not yet so widely recognized as the first. It lies in the fact that in the United States the power to decide whether or not doomsday has arrived is in the process of passing from statesmen and politicians to lower-level officers and technicians and, eventually, to machines. Presumably, the same thing is happening in the Soviet Union.

On page 233 Dr. York discusses the problems of command and control and how our actions obtain reactions:

> Can we rely on the Soviets to invent and institute the same kind of controls? What will happen as advances in our weapons technology require them to put more and more emphasis on the readiness and the quick responsiveness of their weapons? Do they have the necessary level of sophistication to solve the contradiction inherent in the need for a "hair trigger" (so that their systems will respond in time) and a "stiff trigger" (so that they won't fire accidentally)? How good are their computers at recognizing false alarms? How good is the command and control system for the Polaris-type submarine fleet now being rapidly, if belatedly, deployed by the Soviets? Is it fail-safe?

Finally, on page 239 Dr. York discusses unilateral actions by the United States:

> Just as our unilateral actions were in large part responsible for the current dangerous state of affairs, we must expect that unilateral moves on our part will be necessary if we are ever to get the whole process reversed.
>
> It may be beyond our power to control or eliminate the underlying causes of the arms race by unilateral actions on our part. Our unilateral actions certainly have determined its rate and scale to a very large degree. Very probably our unilateral actions can determine whether we move in the direction of further escalation or in the direction of arms control and, in the long run, nuclear disarmament.
>
> Conventional good sense urges us to keep quiet, to leave these matters to the experts and the technicians. My father, troubled by my repeated trips East to testify against the ABM, asked me, "Why are you fighting City Hall?" His metaphor is sound; the defense establishment is indeed our City Hall, and it can be depended upon to care for its own interests, whether or not these are the interests of the entire nation. If we are to avoid oblivion, if we are to reject the ultimate absurdity, then all of us, not just the current "in" group of experts and technicians, must involve ourselves in creating the policies and making the decisions necessary to do so.

The final paragraph of the above quotation corresponds to the mandate of NEPA. The preparation of impact statements only on selected parts of the nuclear weapons program is not adequate. NEPA requires an impact statement on the overall program. Unless this is done, the FEIS on the Rocky Flats Plant will be totally inadequate and unacceptable.

Specific Comments

The headings in this section will refer to the chapter headings in the DEIS.

2.11 Emergency Plans

This chapter is quite misleading. It discusses plans, radiological assistance groups, medical treatment and other items without in any way defining the value of these groups and plans in mitigating the consequences of a major release from the RFP.

It is essential that the statement discuss:

- The response time of such groups as IRAP;
- The actual function of the groups in terms of preventing or reducing exposure or contamination and the time scale involved;
- The nature of the possible medical treatment and its value in reducing effects;
- The number of victims that could be given treatment;
- In short, it is essential to justify the assertion that these plans have a significant value in reducing contamination, reducing exposure and mitigating effects.

2.12 Safeguards

This section is totally inadequate. It does not discuss:

- The threat size (internal and external) against which the system is designed;
- The severe limitations of material accounting which makes this an almost useless safeguard tool;
- The opinions of competent authorities who state that existing safeguards are inadequate;

- The social costs associated with the civil liberties implications of safeguards;
- The GAO reports critical of ERDA safeguards.

A detailed discussion of these factors is contained in the attached testimony of Thomas B. Cochran, "Nuclear Weapons Proliferation and Safeguards." This is intended as an integral part of our comments.

3.1.2 Radiological Impacts

This chapter seriously underestimates both the dose and effects from operational and accidental releases.

1. It presents only the annual dose when the important dose is the dose commitment over life time of the radionuclides in the biosphere.

2. The dose conversion factors used for Pu-239 in bone underestimate the bone dose by at least a factor of 10.

3. A non-conservative approach is used for determining the dose to man via the soil-plant route.

4. Recent evidence indicates that the BEIR Report estimate of the somatic and genetic effects of radiation were too low by at least a factor of 10. Hence the risk estimates used in the DEIS underestimate by a larger factor.

These factors are discussed in detail in the attached "Testimony of Natural Resources Defense Council, Re: Chapter IV." This is intended to be an integral part of our comments.

Appendix G

On page G-23 mention is made of the "hot particle" problem. It is mentioned that several organizations have concluded that our proposal was without merit. No mention is made of our critiques of the NAS Report or of the NRC denial. In these critiques we show that its rejection of our proposal is without merit. This section of the FEIS must address these critiques. These critiques are attached as an integral part of our testimony.

In this report, as we point out in the critiques, the most significant observations are the hot particle lesions - lesions showing a suspect prognosis because of their precancerous nature. Unless the DOE can set aside the hazardous nature of these lesions, DOE must accept the "hot particle" hypothesis as valid.

Conclusion

The draft EIS is seriously deficient. The most serious deficiency is the failure to examine critically the alleged benefits of the proposed action. This deficiency alone requires preparation and recirculation of a new draft EIS. Unless a new draft is prepared, it will be impossible for other federal agencies, state agencies or members of the public to meaningfully comment on this most crucial aspect of the impact statement. We therefore request that the draft EIS be withdrawn, that a new draft be prepared which thoroughly addresses all of the issues we have raised here, and that the new draft be circulated in compliance with the requirements of NEPA.

REMOVED ENCLOSURES

NUCLEAR WEAPON PROLIFERATION AND SAFEGUARDS

36 PAGES

TESTIMONY OF NATURAL RESOURCES DEFENSE COUNCIL

28 PAGES

The above enclosures were omitted from this section because they do not address the DEIS. They are on file with DOE.

DOE STAFF RESPONSES TO THE NATURAL RESOURCE DEFENSE COUNCIL COMMENTS ON THE ROCKY FLATS PLANT DRAFT ENVIRONMENTAL IMPACT STATEMENT (ERDA-1545-D)

The DEIS addresses safeguards, health, and safety of the Plant. Specific comments on these issues have resulted in many revisions in the FEIS. The cost benefit and risk benefits treated in Chapter 9 deal with the Plant specifically and the issues directly involving the Plant. Chapter 9 has been revised with respect to specifics in several places. The EIS for the Rocky Flats Plant is specific to the operation of that site. The environmental and health effects and the financial costs to citizens and government of detonating nuclear weapons has not been addressed because these are not activities in which the Plant is engaged. These issues have been addressed in several references such as the following:

1. National Research Council, Committee to Study the Long-term Worldwide Effects of Multiple Nuclear Weapons Detonations, Assembly of Mathematical and Physical Sciences, LONG-TERM WORLDWIDE EFFECTS OF MULTIPLE NUCLEAR WEAPONS DETONATIONS, National Academy of Sciences, Washington, D.C. (1975).
2. Samual Glasstone and Philip J. Dolan, THE EFFECTS OF NUCLEAR WEAPONS, Third Edition, USDOD and USDOE 1977.

Those aspects of the question which pertain directly to Rocky Flats have been included in the FEIS. Information that is not directly related to Rocky Flats, but rather to the nuclear weapons program as a whole, is not covered in the EIS. As explained in the Foreword, the EIS is a site-specific document and is not intended to cover the entire nuclear weapons program for this country or for other nations.

2.11 Emergency Plans

For many years, the Rocky Flats Plant operating contractors and the responsible Federal agency (now DOE) have had available tested emergency plans for directing on-site activities during emergency situations. There has also existed a plan which interfaces with State agencies in the event that off-site actions by State agencies should become necessary. This State plan is being revised, and is now receiving public comment. It is expected to be tested in the near future. The interface of the State Plan with the Rocky Flats Emergency plan is described in the FEIS (Section 2.11.4).

2.12 Safeguards

Matters concerning safeguards are discussed in Section 2.12 of the FEIS. The DOE has an effective organization and procedure for responding to nuclear backmail threats, sabotage and/or terrorist actions. The organization includes both DOE personnel and representatives from many DOE contractors. The procedure provides for rapid evaluation of the threat, investigation of the terrorists, and searching for and rendering safe the threatened hazard.

The plan has been tested and continues to be developed. The specific means and effects of possible sabotage, nuclear blackmail, or other terrorist activities and the many factors which are or would be used to preclude such occurrences or to mitigate the effects thereof are not appropriate for discussion in an EIS.

The safeguards and security sytems have undergone several changes to improve their effectiveness since the DEIS was written. The Section 2.12 of the FEIS includes an updated general discussion of the adequacy of these systems.

3.1.2 Radiological Impacts

The risk estimates used in the Draft Environmental Impact Statement are derived from the National Academy of Sciences-National Research Council Report on the Effects on Populations of Exposure to Low Levels of Ionizing Radiation as detailed in Appendix G. Both the "absolute" and "relative" risk models were used in the Draft EIS to estimate the health risks associated with operation of the Rocky Flats Facility. These risk models differ in their predicted risks by a factor of 10. The Draft EIS gives no preference to either estimate of risks but does suggest that they are based upon conservative assumptions. The most accepted conservatism lies in the linear extrapolation from studies of effects in high dose ranges to low dose ranges.

As described in Appendix G-1, these risk estimators are the most widely accepted values for use in evaluating the potential risks related to releases of radioactive materials to the environment. We should stress, however, that these questions are continuing to be reviewed by the National Council on Radiation Protection, the U.S. Environmental Protection Agency, the National Academy of Sciences-National Research Council and the U.S. Nuclear Regulatory Commission. Should changes in the recommendations of these agencies occur with respect to risk evaluations, these will be reflected in the future operating policies at the Rocky Flats Facility.

While the scientific community continues to reflect upon the uncertainties associated with the linear low dose extrapolations of radiation risk estimators, additional research is being performed. Studies of large human populations exposed to low levels of radiation are being supported by the Department of Energy including:

1. Radiation Effects Research Foundation (Japan) - continued studies of health and mortality data on the Hiroshima and Nagasaki survivors and of genetic characteristics of children born of A-bomb-exposed parents.

2. Brookhaven National Laboratory, Marshall Island Studies - continued surveillance of populations exposed to high levels of weapons fallout to detect late effects, thyroid abnormalities, cancers, and hematologic disorders.

3. U.S. Transuranium Registry - continued studies of transuranium elements deposited in nuclear industry workers and associated health effects.

4. Los Alamos Scientific Laboratory - analysis of plutonium in tissues and epidemiologic studies of plutonium workers.

5. Oak Ridge Associated Universities - mortality studies of workers in nuclear industries.

6. Argonne National Laboratory - collection and analysis of health and mortality data on former radium dial painters and former thorium workers.

7. National Academy of Sciences - studies of participants in the Nevada nuclear tests including mortality and health records of troops present at the nuclear test "Smokey".

8. John Hopkins University - detecting and characterizing dose and effects from low-dose radiation exposure in shipyard workers.

The Department of Energy is also supporting a large research program utilizing studies with laboratory animals to define the mechanisms of radiation injury and to extend the human exposure studies to specific exposure patterns where no human data is available. These studies in total will eventually result in a better definition of the dose response relationship at low radiation levels. However, in the meantime, a linear extrapolation of risks from high dose levels to low dose levels will continue to be used for industry impact evaluation as discussed in Appendix G of the Draft Environmental Impact Statement.

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Dec. 23rd, 1977

Mr. W. H. Pennington
N.E.P.A. Coordination
Energy R & D Admin.
Washington, D.C.
20545

Dear Sir

Thank you for excepting my Recommendation.
After giving most serious study, to the information sent me in Sept.; I feel the Rocky Flats plant, is needed; But operating in grave danger.
My designs of B-2-A.E.C-1, of 1973, I'm sure would offer, clear proof, of what I just stated.
Also, some astronomical cost, could be eliminated.
Any further interest you may have, in my opinions, and, designs, I will give you my full corporation.
Thank you

Respectfully yours
Homer L. Buseer
P.O. Box 255
Commerce City, Colo.

DOE STAFF RESPONSE TO THE LETTER FROM HOMER L. BUSEER, COMMERCE CITY, COLORADO

There is no record of the design mentioned in the letter, and since there has been no response to the request of May 22, 1978, to provide further details, no further action in this matter is planned.

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

ER 77/896

DEC 22 1977

Mr. W. H. Pennington
Director, Office of NEPA
Coordination
Department of Energy
Washington, D. C. 20545

Dear Mr. Pennington:

Thank you for your letter of September 23, 1977, transmitting copies of the Energy Research and Development Administration's draft environmental statement for the Rocky Flats Plant Site, Jefferson County, Colorado. [ERDA-1545-D].

Our comments are presented according to the format of the statement or by subject.

General

We believe that the draft statement adequately describes existing recreation and fish and wildlife resources and the project's impacts on those resources. In addition, we find that public lands or programs administered by the Bureau of Land Management will not be affected by the proposed action.

Cultural Resources

The draft statement indicates on page 2-10 that two archeological sites are known to exist within the Rocky Flats Plant Site. However, it is not indicated whether or not a comprehensive survey in accordance with Executive Order 11593, Section 2(a), has been made of all lands under jurisdiction of the Department of Energy. The final statement should either provide the results of such a survey or outline measures to be implemented to complete such an investigation. Until such a survey has been completed, any new construction should be guided by the precautions dictated by Section 2(b), Executive Order 11593.

In consultation with the State Historic Preservation Officer and the State Archeologist, the DOE should assess the significance of all archeological and historic resources on the plant site and nominate those properties which appear to qualify for inclusion in the National Register of Historic Places (36 CFR 800). We recommend that documentation of these evaluations and copies of relevant correspondence from the State Historic Preservation Officer and the State Archeologist should be included in the final statement. We suggest that future management decisions or operational actions should be assessed with respect to their possible impact on listed or eligible National Register properties in accordance with the Advisory Council on Historic Preservation "Procedures for the Protection of Historic and Cultural Properties" (36 CFR 800).

Mineral Resources

The draft statement gives no consideration to the mineral resources of the site nor to such resources and development in the immediate surrounding area, although the occurrence and/or extraction of mineral resources, however, is implied in a number of places throughout. For example: page 2-22, "Approximately 50 acres, including old gravel pits, were reclaimed . . . .;" page 2-74, ". . . because the microseismic activity is believed caused primarily by construction and mining activities in the region . . . .;" page C-1-8, "Overcapping these bedrock units is a veneer (10 to 70 ft.) of gravelly alluvial deposits, termed the Rocky Flats gravels . . . .;" page C-1-13, ". . . exposures show zones of iron-staining and occasional iron nodules . . . .;" pages B-1-6 and C-1-18, maps of the physical contour patterns in the area show four gravel pits and three clay pits on the plantsite.

We believe that the mineral activity off site, but in the immediate area, is noteworthy. Among these mineral activities are: a large aggregate quarry and processing plant just off the northwest corner of site which was operated by Ideal Basic Co. from about 1964 to 1976, a sand and gravel operation just across State Highway 72 south of RFP site, a large new sand and gravel operation begun in 1977 within 5 miles to the southwest; a number of clay mining operations along the hogbacks between the site and Golden; and one of the largest uranium mines in the country -- the Schwartzwalder mine in the foothills to the southwest of the site. Coal formerly was mined at Leyden, a few miles south of the plantsite, now the site of a large gas storage facility, and at other abandoned mines 10 miles north at Marshall. We recommend that final statement provide identification and quantification of the mineral resources on and adjacent to the plantsite to make the discussion of resources committed to the location and operation of the plant at this site complete.

Groundwater

The final statement should adequately evaluate the potential for impacts upon groundwater in the Arapahoe Formation. Recharge to the Arapahoe through the surficial Rocky Flats alluvium and by infiltration from the creeks north and south of the plant is recognized on pages 2-86 and 2-90 of the draft statement. Although as stated on page 2-86, permeable units of the lower part of the Arapahoe Formation may receive some recharge west of the plant, dips of the formation are generally low and permeable beds apparently underlie much of the alluvium of the plantsite (U.S. Geological Survey Open-file Report 76-268, pl. 1, app. D). Therefore, chances for infiltration of contaminants are appreciable. We recommend that the locations of the observation wells tapping the Arapahoe Formation should be specifically shown and designated on an appropriate map in the final statement. A description of the construction and completion of these wells should also be described in sufficient detail in the final statement to permit an assessment of possible pathways followed by the contamination that resulted in anomalously high concentrations of plutonium, as noted on page 2-105. Offsite wells tapping the Arapahoe should also be sampled for plutonium, inasmuch as the Arapahoe aquifers are hydrologically distinct from the aquifers of the Laramie-Fox Hills for which baseline data were reported on page 2-106. Also, the key for figure 2.4-17 should be corrected, because it omits the Arapahoe Formation which is included in the unit mapped as "Kdl."

Impoundment Failure

It is stated in the first paragraph on page 3-47 that the sediments in the B-series ponds are stated to contain several curies of plutonium. However, in the same paragraph, it is stated that even if the entire contents (including sediments) were released, the total would be less than 500 microcuries of plutonium. This apparent discrepancy should be clarified in the final statement.

The probability of a pond rupture is assumed to be "much less than 10^{-3} per year." We believe that this appears to be rather low considering that the planned surface runoff system is designed to contain only a 100-year storm, an event having a 10^{-2} probability. We recommend that the final statement substantiate this conclusion on probability of pond failure.

On pages 3-46 and 3-47, the draft statement discusses the possibility of accidental release from solar evaporation ponds as a result of landslide or other mechanism of release. It states that any release from these ponds will be entrapped on the site by the A-series holding ponds and that plans call for a surface runoff system which will have the capacity to hold the complete runoff from a 100-year flood. The final statement should, however, evaluate the potential for infiltration into both the shallow aquifers and the Arapahoe of contaminants accidentally released from the evaporation ponds and the impacts of their subsequent movement out of the area via subsurface flow. Since the evaporation ponds will be in use until 1985, we believe that a more careful consideration of potential impacts on groundwater resources should be provided in the final statement.

Indian Lands

We have determined that no Indian lands are impacted by this project for which the Secretary of the Interior has trust responsibility.

Specific Comments

Page 9-5, last paragraph: The comparison of "earnings per employee" versus the regional "personal income per capita" is invalid in that the latter involves some considerations not included in the former. We suggest that the impact of earnings per employee upon personal income per capita be calculated and provided in the final statement.

Page 9-15, first paragraph: Additional supporting data should be provided for the $5,000/acre figure for value of land near the Rocky Flats plantsite.

We hope these comments will be helpful to you in preparing the final statement.

Sincerely,

David Usher

Acting
Deputy Assistant SECRETARY

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

ER 77/896

JAN 3 0 1978

Mr. W. H. Pennington
Director, Office of NEPA
Coordination
Department of Energy
Washington, D. C. 20545

Dear Mr. Pennington:

It has come to our attention that we have supplementary comments to those provided in our letter of December 22, 1977, on the Energy Research and Development Administration's draft environmental statement for Rocky Flats Plant Site, Golden, Jefferson County, Colorado [ERDA 1545-D].

Seismicity

We suggest that the final statement should provide the basis for determining the latest age of movement of the Eggleston fault. In addition, the basis for determining the epicentral area for the 1882 earthquake described on page 2-76 of the draft statement should also be provided. We note that this earthquake was used in the calculations for design of this site. However, we believe that the Golden fault or others nearer the project site should be used in the design equation. There are few well determined epicenters in Colorado because of the lack of an installed network of instruments. Therefore, we believe that it is infeasible either to associate seismic events with geologic structure or to state that such an association is lacking. The final statement should indicate whether some short-term microseismic instrument networks had sufficient control to locate events of lower magnitude than those discussed in Section 2 of the draft statement.

On pages 2-70-74, the reference to the Dotsero Volcanics seems to be inappropriate as the discussion refers to trench/arc volcanics.

Sincerely,

Larry E. Meierotto
[illegible] Assistant SECRETARY

DOE STAFF RESPONSES TO THE UNITED STATES DEPARTMENT OF THE INTERIOR COMMENTS ON THE ROCKY FLATS PLANT DRAFT ENVIRONMENTAL IMPACT STATEMENT (ERDA-1545-D)

Cultural Resources

In response to the recommendation regarding a comprehensive survey of archeological sites in accordance with Executive Order 11593, Section 2(a), proposals have been solicited for additional studies to investigate possible additional cultural resources on Plant site. Should future studies identify any sites suitable for nomination to the National Register of Historic Places, appropriate action will be taken in consultation with the State Historic Preservation Office and the State Archeologist. Inasmuch as continued operation of the Plant does not require new construction or other actions which would jeopardize any possible cultural resources, the EIS has been finalized.

Mineral Resources

Comments concerning the mineral activity of the area have been included in a new section, Section 2.3.4.5.

Groundwater

In response to the comments regarding location of the test wells sampling the Arapahoe Formation, these are now shown on the map, Figure 2.10.2-1. Section 2.3.5.3 of the EIS has been revised to describe the pathways of movement and the construction of the test wells. There are no local wells offsite in the Arapahoe Formation. Inasmuch as test well monitoring data indicate that the aquifiers sampled through 35 on-site wells are not contaminated, there is no plan to increase the sampling. Figure 2.4-17 has been redrawn and now appears in the EIS as Figure 2.3.4-7. The recommended correction has been made.

Impoundment Failure

This question has been addressed in Section 3.2.2.3. Comment regarding the probability of impoundment failure is a logical one and the EIS has been revised accordingly. With regard to groundwater contamination by flooding of the solar evaporation ponds, this concern is covered in the FEIS, Section 2.3.5.3. The source term is conservatively based on 100% use of the ponds for waste storage. This is no longer the case.

Earnings Per Employee

The EIS has been revised to delete the objectionable comparison.

Cost Per Acre

The cost of land in the area varies widely as a function of time and location. The price used is typical.

Seismicity

There is some question as to whether or not the Eggleston fault exists and if it does exist, how far south it extends. There are presently insufficient data to determine the age of latest movement on the fault.

The basis for determining the epicentral area for the 1882 earthquake is presented on pages 31-35 of the Blume report. The location is based primarily on the work by Hadsell (1968) who compiled felt reports. Also the accuracy and sensitivity of the earlier microseismic networks is not known. Therefore the total subject of seismology in and around Rocky Flats is to be studied and reevaluated in a project planned for calendar year 1979. An off-site contractor will be retained to: (1) investigate any faults or possible faults in the vicinity of Rocky Flats (including the Eggleston fault) and evaluate the activity of the faults; (2) a review of the 1882 earthquake including a field investigation aimed at providing data to relate the earthquake to a specific fault. The results of these investigations will be published at a later date within Plant Safety and Analysis Review; (3) study the Golden fault to evaluate whether or not it could generate an earthquake in excess of the one presently considered for the Rocky Flats Plant design; and (4) a microseismic survey of the northern end of the Golden fault and in the vicinity of Rocky Flats.

Reference to the Dostero volcanics has been deleted from the final impact statement, since it is quite inappropriate to a discussion on trench-arc volcanics.

References

Blume, J.A. Seismic and Geologic Investigations and Design Criteria for Rocky Flats Plutonium Recovery and Waste Treatment Facility. JABE-CFB-01. John A. Blume & Associates, Engineers, San Francisco, California. September 1972.

Blume, J.A. Seismic and Geologic Investigations and Design Criteria for Rocky Flats Plutonium Recovery and Waste Treatment Facility. JABE-CFB-01. John A. Blume & Associates, Engineers, San Frnacisco, California. September 1972; revised June 1974.

COLORADO OPEN SPACE COUNCIL 1325 DELAWARE ST. DENVER, COLO. 80204 303/573-9241

December 21, 1977

Mr. W. H. Pennington
Office of NEPA Coordination
Department of Energy
Mail Station E-201
Washington, D.C. 20545

Dear Mr. Pennington:

The Colorado Open Space Council (COSC) has had a long-standing interest in the existence and operation of the Rocky Flats Plant. We have reviewed the Draft Environmental Impact Statement (DEIS) on Rocky Flats (ERDA - 1546 - D) and respectfully submit the following comments.

1. We are displeased with the way the draft EIS has been handled. The delay in publishing the Rocky Flats DEIS has been a serious concern to the environmental community in the Denver metropolitan area and particularly to the citizens living in the vicinity of the plant.

It seems inexcusable to us that it has been 2½ years since ERDA published the Omnibus Environmental Assessment in May 1975 (a precursor to this DEIS).

Furthermore, COSC believes the DEIS should be a decision and planning document. The DEIS should focus on the alternative options for the plant's future.

For example, if the complete decommissioning and decontamination alternatives (4-B and 5-A(1)) discussed in Chapter 5 were accomplished, the total pro-rated annual income to the metropolitan area to the year 2000 would be approximately the same amount as what the current plant operation provides to this same community, i.e. $114.8 million. This is not adequately reflected in the discussion of alternatives. Likewise, plant benefits have not been compared to the costs generated by ill health due to radiation exposure. Such comparison might reduce the $114.8 million annual economic benefit.

2. The location of the plant is of concern, particularly in light of the health questions which are inadequately addressed. The plant is located upwind and inappropriately close to a heavily populated metropolitan area. We question whether the present Nuclear Regulatory Commission guidelines would have permitted the siting of a power

a state-wide environmental coordinating council

plant at the Rocky Flats site with its geologic hazards. Frank J. Rozich, Director, Colorado Water Quality Control Division, wrote in his comments on the DEIS of November 28, 1977, that "if this DEIS were for a proposed nuclear weapons facility at the Rocky Flats site, we would recommend strenuously against it."

This DEIS grossly misleads the public on the potential health effects of low-level radiation, accumulated dosages, and their biological concentration (e.g., on page 1-6 it is stated that routine releases have no significant environmental impact). While we recognize there is not agreement among scientists on the health issues, we feel the potential health hazards should be recognized in the DEIS.

3. The Department of Energy (DOE) does not assume or assign clear responsibility for the potential liability associated with managing and operating the plant.

All transportation of nuclear material, especially air transport in unapproved containers, remains a serious and unaddressed concern. COSC would like DOE to take firm responsibility for low-level radiation along transportation corridors and detoxification in case of accidental spills.

The DEIS does not address the liability of the Department of Energy for any past or future off-site contamination, or for the removal of existing contaminatible soil at the plant site. COSC urges DOE to commit to a firm responsibility for potential future accidents on-site.

Finally, terrorist activity unfortunately seems to be occurring more frequently on a global scale. It is possible that plutonium storage and handling facilities at the plant could be heavily damaged by explosives delivered by air or ground, or simply accidentally by an air crash, with concomitant release of radioactive material. Such a possibility is not recognized by discussion of maximum credible accidents. The air space above the plant (including a safe perimeter) should be declared "prohibited" to avoid accidental aircraft incidents and facilitate surveillance of aircraft.

In conclusion, and consistent with our stated policy of December, 1975, COSC believes that the Federal Government should phase-out, as rapidly as possible, the handling of hazardous radioactive materials at the Rocky Flats Plant.

Until the accomplishment of such a phase-out (decommissioning), COSC urges the establishment of:

a. a prohibited airspace above and around the plant;

b. a moratorium on any expansion of radioactive material-handling operation or facilities at the plant;

c. a major increase in perimeter fence patrols, preferably of a highly visible nature, to deter terrorist intervention; and

d. an adequate Emergency Response Plan for those living in the area, with complete public knowledge of individual responsibilities in implementing such a plan. This needs to include an aggressive public awareness campaign and education process.

Very truly yours,

Terry Stuart

Terry Stuart
President

LSIII/ej

DOE STAFF RESPONSES TO THE COLORADO OPEN SPACE COUNCIL COMMENTS ON THE ROCKY FLATS PLANT DRAFT ENVIRONMENTAL IMPACT STATEMENT (ERDA-1545-D)

Item 1 The many concerns of the Denver metro community have prompted elaborate analyses and discussions on a variety of subjects in the EIS. The results of these complex analyses are presented in the DEIS and with additional revisions and clarification in the FEIS. The timeliness of the presentation of this material is of the utmost concern to all parties involved; however, any conscientious effort to write a document of this magnitude and technical sophistication is time-consuming.

The EIS contains information which will be used in decision making with regard to the Plant's continuing operation. There are a number of alternatives which are mentioned in Chapter 5 of the EIS. The exact and specific nature of the decisions which will need to be made is not clear at this time. Therefore, the EIS is a comprehensive document with the intent that the information would be pertinent to the various alternatives.

The comment is in error about the completion of Alternatives 4-B and 5-A(1) in Table 5-1 of Section 5, and the annual income pro-rated to the year 2000 equaling the $114.8 million that Rocky Flats provides to the community. The cost of completing Alternatives 4-B and 5-A(1) totals $2.1 billion and pro-rated over a period of 24 years (1976 to 2000) is $87.5 million per year as compared to the $114.8 million that Rocky Flats provides to the community each year in the form of annual disposable income, goods, services, and utilities for the Plant (DEIS pp. 2-9, 5-14). In addition, the community would lose the annual $800,000 of Federal Impact Funds if the Rocky Flats Plant were completely shut down. Also, if the employees were forced to move from the area, revenue from property taxes and sales taxes, as well as state income taxes, if they leave the state, would be lost (DEIS, pp. 9-6).

Item 2 The location of the Plant, in light of the health questions, is a concern which is addressed in the FEIS and the DEIS, Chapter 3. The analysis of the health impacts of the operation of the Plant on the community is made in great detail and objectivity. The EIS has been revised and clarification has been given on pathways, methodology, and the specific population involved. The wisdom of locating the Plant at its present site should be based on factual considerations. The Nuclear Regulatory Commission guidelines present standards for siting with which the DOE concurs. The hazards of the Plant with respect to the seismology of the site are discussed with appropriate updates for research which has been reported in the interim between the release of the DEIS and the FEIS. Additional studies are being conducted to more thoroughly define the aspects of the Plant with respect to seismology.

The methods used in the Rocky Flats Plant DEIS and FEIS to estimate the potential health effects of releases of radioactive materials from the Plant are based on the assumption that there is a human health risk associated with any level of exposure to ionizing radiation. These risks are reflected in the analysis of the health impact of the routine and accidental releases of radioactive material from the Rocky Flats Plant (Chapter 3 and Appendix G-1). This analysis does not "greatly mislead the public." The dose-risk estimators used are in agreement with the scientifically recognized, published, and reviewed reports on radiation risks to man: (1) U.S. National Academy of Sciences - National Research Council, The Effects on Populations of Exposure to Low Levels of Ionizing Radiations, Report of the Advisory Committee on the Biological Effects of Ionizing Radiations, Washington, DC, 1972; (2) U.N. Scientific Committee on the Effects of Atomic Radiations, Ionizing Radiation: Levels and Effects, Vols. I and II, United Nations, NY, 1972; (3) British Medical Research Council, The Toxicity of Plutonium, Her Majesty's Stationary Office, London, 1975; (4) U.S. National Academy of Sciences - National Research Council - National Academy of Engineering, Radiation Exposure of Uranium Miners, Report of an Advisory Committee from the Division of Medical Sciences, Washington, DC, 1968; (5) National Council on Radiation Protection and Measurements Report No. 43. Review of the Current State of Radiation Protection Philosophy; and (6) U.S. Nuclear Regulatory Commission, "Natural Resources Defense Council Denial of Petition for Rule Making", Federal Register, Vol. 41, (1976).

The significance of the environmental impact of the releases of radioactive material from the Rocky Flats Plant can be assessed by comparing the concentration of these materials in the Denver area with the concentration of similar materials from other sources. Such a comparison is made in the DEIS and in the FEIS, Appendix G-3. Since Rocky Flats' releases add very little to the organ radiation exposures of the Denver population, the impact of these releases would be very small.

Item 3 An adequate discussion of potential liability pertaining to the Plant's operations would necessitate a lengthy and involved treatise on the relevant portions of both Federal and State common law, the Federal Tort Claims Act, and the Price-Anderson (Nuclear Hazards Indemnity) Act, and is not considered to be within the intended scope of an environmental impact statement. Even if such a discussion were appropriate for inclusion in an EIS, these same issues are currently being litigated in Federal District Court concerning the alleged damage to values of lands adjacent to the Plant. Department of Justice regulations prohibit any out-of-court discussions of such issues until all possible litigation on the matter has been completed.

Item 3a Air shipments of plutonium to and from Rocky Flats were terminated in April 1977. In the future, all shipments of plutonium to or from the Rocky Flats Plant would be expected to resume only if made in containers certified as meeting aircraft crash, accident safety criteria.

Restricted air space was requested and air traffic studies have been conducted. The FAA has concluded that there is insufficient justification for restricted air space over the Plant. No further action to obtain restricted air space over Rocky Flats is planned. This subject is discussed in the FEIS in Section 3.2.2.7.

Item 3b Regarding a moratorium on the expansion of radioactive material handling operations at the Plant, it should be noted that no Plant expansion to accommodate greater amounts of radioactive material is presently planned. Modifications presently in progress are aimed at providing safer and more efficient handling of current material levels.

Item 3c Plant security undergoes continuing update and reinforcement, as discussed in Section 2.12.1.1, security at the perimeter fence is being strengthened.

In addition, numerous measures have been taken to ensure that systems and checks are in place to preclude deliberate sabotage. All employees must have a background investigation prior to receiving a security clearance. Use of picture badges for employees and other identification and escorts for non-employees are required. Special monitoring systems and searches of packages, briefcases, and purses are performed to preclude the introduction of dangerous materials into critical Plant areas. Special lock systems and access control are also maintained to limit access to only authorized individuals. Details of actions taken to prevent sabotage are not made public because the effectiveness of such control actions would be decreased.

The DOE has an elaborately structured organization and procedure for responding to nuclear blackmail threats, sabotage, and/or terrorist actions. The organization includes both DOE personnel and representatives from many DOE contractors. The procedure provides for rapid evaluation of the threat, investigation of the terrorists, and searching for and rendering safe the threatened hazard.

The plan has been tested and continues to be developed. The specific means and effects of possible sabotage, nuclear blackmail, or other terrorist activities and the many factors which are or would be used to preclude such occurrences or to mitigate the effects thereof are not appropriate for discussion in an EIS.

The safeguards and security systems have undergone several changes to improve their effectiveness since the DEIS was written. The FEIS includes an updated general discussion of the adequacy of these systems (Sections 2.11 and 2.12).

Item 3d For many years, the Rocky Flats Plant operating contractors and the responsible Federal agency (now DOE) have had available to the State and local governments emergency plans for directing on-site activities during emergency situations. There has also existed a plan which interfaces with State agencies in the event that off-site communities might be involved. This State plan is being revised, and is now receiving public comment. It is expected to be tested in the near future. The interface between the State Plan and the Rocky Flats Emergency Plan is described in greater detail in the FEIS (Section 2.11.4).

DECEMBER 23, 1977

W.H. PENNINGTON,
DIRECTOR,
OFFICE OF NEPA COORDINATION,
MAIL STATION E-201, DOE,
WASHINGTON, D.C. 20545

DEAR MR. PENNINGTON,

ENCLOSED IS MY TESTIMONY CONCERNING THE DRAFT EIS OF THE ROCKY FLATS PLANT.

I HOPE THAT IT IS NOT TOO LATE.

THANK YOU.

SINCERELY,

Stephen Kosmicki, O.P.

STEPHEN KOSMICKI, O.P.

TESTIMONY CONCERNING THE DRAFT ENVIRONMENTAL IMPACT STATEMENT OF THE ROCKY FLATS PLANT (VOLUMES 1 AND 2), SEPTEMBER 1977:

BY WAY OF INTRODUCTION, MY NAME IS STEPHEN KOSMICKI. I AM A MEMBER OF A RELIGIOUS ORDER IN THE ROMAN CATHOLIC CHURCH KNOWN AS THE DOMINICAN ORDER (PROVINCE OF ST. ALBERT THE GREAT). I WILL BE ORDAINED TO THE PRIESTHOOD IN THE FALL OF 1978.

I AM JUST NOW FINISHING UP A YEAR'S INTERNSHIP WITH THE AMERICAN FRIENDS SERVICE COMMITTEE (AFSC) AS PART OF MY DEGREE PROGRAM. I AM A STUDENT OF THEOLOGY AT AQUINAS INSTITUTE OF THEOLOGY IN DUBUQUE, IOWA. I HAVE WORKED FULL TIME FOR THE PAST YEAR WITH THE AFSC AND THE ROCKY FLATS ACTION GROUP ON THE ISSUE OF NUCLEAR WEAPONS AND DISARMAMENT--ESPECIALLY AS THIS ISSUE APPLIES TO THE ROCKY FLATS NUCLEAR WEAPONS FACILITY. I WORKED IN CLOSE CONJUNCTION WITH A SMALL SUBCOMMITTEE OF THE ROCKY FLAT ACTION GROUP WHICH WROTE AND PUBLISHED THE 20 PAGE BOOKLET ENTITLED, "ROCKY FLATS NUCLEAR WEAPONS PLANT: LOCAL HAZARD, GLOBAL THREAT". IN ADDITON I HAVE GIVEN A NUMBER OF TALKS ON THE ISSUE OF NUCLEAR WEAPONS AND DISARMAMENT TO DIVERSE ORGANIZATIONS. NEEDLESS TO SAY, OVER THE PAST YEAR I HAVE, OF NECESSITY, HAD TO STUDY THE SITUATION AT ROCKY FLATS IN SOME DETAIL IN ORDER TO BE ABLE TO SPEAK WITH ANY DEGREE OF AUTHORITY ON THE SUBJECT.

I HAVE PREPARED THE FOLLOWING TESTIMONY NOT BECAUSE I THINK THAT THE FEDERAL GOVERNMENT WILL LISTEN. QUITE TO THE CONTRARY--I FULLY EXPECT THE EXACT OPPOSITE. THE HISTORY OF ROCKY FLATS IS REPLETE WITH THE TESTIMONY OF STATE OFFICIALS AND PRIVATE CITIZENS WHOSE SUGGESTIONS HAVE LARGELY BEEN IGNORED OR CASUALLY DISMISSED AS EITHER IRREVALENT OR UNREALISTIC. HERE I CALL ATTENTION TO THE RECOMMENDATIONS OFFERED BY THE LAMM-WIRTH TASK FORCE ON DECEMBER 18, 1974. ERDA REJECTED ALL THE MAJOR RECOMMENDATIONS OF THAT HAND-PICKED COMMITTEE. ONE ALSO FINDS AMPLE EVIDENCE OF THE FEDERAL GOVERNMENT'S INTRASIGENCY IN THE EIS UNDER CONSIDERATION (SEE SECTION 10, VOLUME 2).

I HAVE PREPARED THIS TESTIMONY BECAUSE I FEEL THAT IT IS IMPORTANT FOR PEOPLE IN THIS COUNTRY TO EXERCISE THEIR FREEDOM OF SPEECH IRREGARDLESS OF HOW THE FEDERAL GOVERNMENT CHOOSES TO DEAL WITH THAT REALITY. I ALSO FEEL THAT IT IS IMPORTANT THAT THERE BE SOME OFFICIAL RECORD--HOWEVER SMALL-- OF RESISTANCE TO THE ATTEMPTS BY THE DEPARTMENT OF ENERGY (DOE) AND ROCKWELL INTERNATIONAL TO WHITEWASH THEIR INVLOVEMENT IN THE CONTAMINATION OF THE ENVIRONMENT AS WELL AS THEIR KEY ROLE IN THE CONSTRUCTION OF NUCLEAR WEAPONS OF MASS DESTRUCTION. THE HIGH-LEVEL CORPORATE EXECUTIVES OF DOE AND ROCKWELL ARE ESPECIALLY RESPONSIBLE FOR THE GRAVE PUBLIC RISKS POSED BY THE PLANT.

IN THIS REGARD I CALL ATTENTION TO THE RESPONSE TO COMMENT 27 (10-29). WHY IS IT SO DIFFICULT FOR THE PEOPLE WHO MAKE UP THE FEDERAL ESTABLISHMENT TO EVEN CONSIDER THEIR MORAL RESPONSIBILITY IN THE IRREVERSIBLE CONTAMINATION OF THE ENVIRONMENT AND THE CONSTRUCTION OF NUCLEAR WEAPONS?

IS IT IRREVALENT TO ASK THIS QUESTION OR TO EXPECT THAT ROCKWELL AND DOE EMPLOYEES BEGIN TO ANSWER IT? IF THE ANSWER TO THIS QUESTION IS, "YES", THEN WE HAVE PASSED THE PROVERBIAL POINT OF NO RETURN. WORLD WAR III IS NOT ONLY POSSIBLE IN THAT INSTANCE BUT MOST PROBABLE. AND ITS MIDWIVES WILL BE THE HUMAN ROBOTS OF DOE AND ROCKWELL. THE WAR CRIMES OF AUSCHWITZ AND OTHER NAZI DEATH CAMPS WILL PALE IN COMPARISON TO THE HOLOCAUST WROUGHT BY THESE RESPECTABLE, WELL-ADAPTED, INTELLIGENT, AND QUITE LITERALLY--MAD--BOMBERS.

IT IS MY SINCERE CHRISTIAN HOPE THAT THESE BUREAUCRATS WILL WAKE UP TO THEIR HUMAN RESPONSIBILITY IN THE CREATION, MULTIPLICATION, AND REFINEMENT OF NUCLEAR WEAPONS AS WELL AS THE CONCOMITANT AND IMMINENT DANGER THAT THEIR ESTABLISHMENT POSES TO THE ENVIRONMENT AND THE PEOPLE OF DENVER AND BOULDER.

IN GENERAL THE DRAFT EIS MAKES SEVERAL DANGEROUS ASSUMPTIONS.

FIRST, THE ROCKY FLATS COMPLEX ACCEPTS THE PREMISE THAT THERE IS "AN ACCEPTABLE LEVEL" OF PLUTONIUM CONTAMINATION. THIS ENABLES THE AUTHORS OF THE EIS TO PROPOSE THAT THE PLANT WILL CONTAMINATE THE ENVIRONMENT AND THE PEOPLE OF COLORADO WITH RADIOACTIVE ELEMENTS AT THE "LOWEST PRACTICAL LEVELS" (E.G., 1.2.1; 1.3.1; 1.3.3.). THIS PREMISE IS DANGEROUS BECAUSE IT IS FOUNDED UPON THE NOTION THAT LOW-LEVEL RADIATION IS HARMLESS.

THERE IS GOOD REASON TO BELIEVE THAT THIS NOTION IN ITSELF IS FALSE.[1]

THERE IS ADDITIONAL EVIDENCE THAT THE FEDERAL GOVERNMENT HAS SUPPRESSED A NUMBER OF REPORTS ON THE SUBJECT WHICH CAME UP WITH CONCLUSIONS THAT WERE AT VARIANCE WITH THE PREDOMINANT ASSUMPTIONS OF THE FEDERAL GOVERNMENT.[2]

DR. LINUS PAULING, TWO-TIME NOBEL LAUREATE, HAS APPROPRIATELY NOTED THAT, "THERE IS NO SAFE AMOUNT OF RADIATION. EVEN SMALL AMOUNTS DO HARM."[3]

PLUTONIUM--AS YOU MAY RECAL--IS A MAN-MADE SUBSTANCE WITH A HALF-LIFE OF 25,000 YEARS. PLUTONIUM HAS ONLY EXISTED FOR ROUGHLY 35 YEARS. THE EFFECTS OF LOW-LEVEL PLUTONIUM CONTAMINATION DO NOT IMMEDIATELY MANIFEST THEMSELVES. IT MAY TAKE YEARS FOR LOW-LEVEL CONTAMINATION BY PLUTONIUM TO WORK OUT ITS DREADED EFFECTS UPON THE HUMAN BIOLOGICAL SYSTEM. FURTHERMORE, NO ADEQUATE RECORDS HAVE BEEN KEPT HERETOFORE WHICH WOULD HELP TO ESTABLISH THE RISKS TO WORKERS AND THE GENERAL PUBLIC OF LOW-LEVEL RADIATION. FOR THESE AND OTHER REASONS IT IS NEXT TO IMPOSSIBLE TO DETERMINE IF A GIVEN DISEASE (E.G., LUNG CANCER) IS PLUTONIUM CAUSED. THE SUBJECT OF LOW-LEVEL RADIATION IS IN ITS

INFANCY IN TERMS OF WHAT THE POTENTIAL HARM TO MAN AND HIS ENVIRONMENT WILL BE. GIVEN THESE UNKNOWN VARIABLES PLUS THE GENERAL BIAS OF DOE IN FAVOR OR CONTINUED WEAPONS PRODUCTION AND ESCALATED DEVELOPMENT OF NUCLEAR POWER, WE MAY NEVER KNOW THE EXTENT TO WHICH CURRENTLY "ACCEPTABLE LEVELS" OF PLUTONIUM CONTAMINATION WILL AVERSELY AFFECT OUR BODIES, OUR ENVIRONMENT, AND THE GENETIC WELL-BEING OF FUTURE GENERATIONS. WHEN WE ARE DEALING WITH SO MANY UNKNOWN VARIABLES WE CANNOT RIGHTLY JUSTIFY THE CONTINUED OPERATION OF THE ROCKY FLATS PLANT. TO DO SO WOULD CONSTITUTE AN UNNECESSARY, UNWARRENTED, AND FOOLISH RISK THAT WE CANNOT AFFORD TO TAKE.

SECONDLY, THE AUTHORS OF THE EIS TEND TO PLACE A DISPROPORTIONATE EMPHASIS UPON THE SO-CALLED SOCIO-ECONOMIC BENEFITS (E.G., 1.4; 1.5.3; 1.5.4; 1.9; 4.3; 9.2.2; 9.4.2) OF THE PLANT TO THE DENVER-METRO AREA. THE BENEFITS ARE FAR OUTWEIGHED BY THE FOLLOWING:

1. THE IRREVERSIBLE PLUTONIUM CONTAMINATION OF 11,000 ACRES OF LAND AROUND THE PLANT;

2. THE CONTINUED LOW-LEVEL CONTAMINATION OF THE ENVIRONMENT BY (A) NORMAL PLANT OPERATIONS (E.G., 1.4; 3.1.2) AND (B) THE TRANSPORATION OF SPECIAL NUCLEAR MATERIALS TO AND FROM ROCKY FLATS (E.G., 1.3.3; 3.3FF.).

3. THE POTENTIAL FOR MAJOR NEW ACCIDENTS IN THE FUTURE DUE TO HUMAN ERROR.

4. THE PRINCIPAL PRODUCT OF THE PLANT (PLUTONIUM TRIGGERS FOR NUCLEAR WARHEADS) WHICH MUST BE VIEWED AS UTTERLY DESTRUCTIVE AND CAN IN NO WAY BE CONSTRUED AS SOCIALLY BENEFICIAL OR CONSTRUCTIVE. IN THIS REGARD THE CATHOLIC BISHOPS OF VATICAN COUNCIL II SOUNDLY AND UNEQUIVOCALLY CONDEMNED NUCLEAR WEAPONS WHEN THEY STATED,

> "ANY ACT OF WAR AIMED INDESCRIMINATELY AT THE DESTRUCTION OF ENTIRE CITIES OR OF ESTENSIVE AREAS ALONG WITH THEIR POPULATIONS IS A CRIME AGAINST GOD AND MAN HIMSELF. IT MERITS UNEQUIVOCAL AND UNHESITATING CONDEMNATION."[4]

POPE PAUL VI ECHOES THE SENTIMENT OF THE BISHOPS OF VATICAN II IN A RECENT TATEMENT ON DISARMAMENT. HE NOTES,

> "THE EVIDENT CONTRADICTION BETWEEN WASTE INVOLVED IN THE OVERPRODUCTION OF TEH MACHINERY OF WAR AND THE VAST NUMBER OF UNSATISFIED VITAL NEEDS IS ALREADY AN ACT OF AGGRESSION AGAINST THOSE WHO ARE VICTIMS OF THE CONTRADICTION. THIS ACT OF AGGRESSION IS CRIMINAL: THESE WEAPONS, EVEN IF NEVER USED, ARE, BY THEIR HIGH COST STARVING THE POOR TO DEATH."[5]

5. ROCKY FLATS (AND THE NORAD COMMAND CENTER NEAR COLORADO SPRINGS) IS UNDOUBTEDLY A HIGH PRIORITY TARGET FOR THE SOVIET UNION. IN THE EVENT OF NUCLEAR WAR ROCKY FLATS WOULD BE GROUND ZERO FOR SOVIET MISSILES.

FINALLY, ONE MIGHT RIGHTLY CONCLUDE--CONTRARY TO THE AUTHORS OF THE EIS--THAT THERE IS NO LONG-TERM BENEFIT TO BE DERIVED FROM THE CONTINUED EXISTENCE OF ROCKY FLATS--THAT INDEED ROCKY FLATS IS A LOCAL HAZARD AND A GLOBAL THREAT. THEREFORE, ALL PLANT OPERATIONS SHOULD BE TERMINATED. ROCKY FLATS SHOULD BE SHUTDOWN COMPLETELY, DECOMMISSIONED, AND TOTALLY DEMOLISHED. WORKERS AT THE PLANT SHOULD BE TRANSFERRED OR RELOCATED IN OTHER SECTORS OF THE ROCKWELL OR DOE COMPLEX.

THANK YOU.

SUBMITTED DECEMBER 23, 1977

STEPHEN KOSMICKI, O.P.
DOMINICAN COMMUNITY
2859 MEADE ST.
DENVER, COLORADO 80211
(303)433-0627

NOTES

1. SEE DR. ERNEST STERNGLASS, LOW-LEVEL RADIATION (LONDON, ENGLAND, 1973); DR. JOHN C. COBB, "SURPRISING FINDINGS ABOUT PLUTONIUM DANGER TO MAN REPORTED AT THE INTERNATIONAL ACTOMIC ENERGY MEETING," (SAN FRANCISCO, CALIF., 1975), PRIVATE PAPER; DR. THEODORE T. PUCK, "WHY LOW-LEVEL HUMAN RADIATION DAMAGE IS DIFFICULT TO ACCESS, BUT DANGEROUS TO IGNORE," (NO DATE), PRIVATE PAPER OF UNIVERSITY OF COLORADO MEDICAL CENTER; PHILIP KREY, "REMOTE PLUTONIUM CONTAMINATION AND TOTAL INVENTORIES FROM ROCKY FLATS," HEALTH PHYSICS (NORTHERN IRELEAND, 1976) 30, PP. 209-214; DR. CARL J. JOHNSON, "LEUKEMIA DEATH RATES OF RESIDENTS OF AREAS CONTAMINATED WITH PLUTONIUM," (PARIS, 1977), PRIVATE PAPER PRESENTED TO IVTH INTERNATIONAL CONGRESS OF THE INTERNATIONAL RADIATION PROTECTION ASSOCIATION; AND DR. CARL JOHNSON, ET AL., "PLUTONIUM HAZARD IN RESPIRABLE DUST ON THE SURFACE OF THE SOIL," SCIENCE (AUGUST 6, 1976) 193, PP. 488-490.

2. JACK ANDERSON, "GOVERNMENT SUPPRESSES NEWS ABOUT RADIATION DANGERS," ROCKY MOUNTAIN NEWS (DECEMBER, 3, 1977), P. 61.

3. NO MORE WAR. (N.Y., 1958), P. 82.

4. WALTER ABBOTT, THE DOCUMENTS OF VATICAN II (N.Y., 1965), P. 294.

5. "THE HOLY SEE AND DISARMAMENT" IN THE POPE SPEAKS (NOV-DEC, 1977).

DOE STAFF RESPONSES TO STEPHEN KOSMICKI'S COMMENTS ON THE ROCKY FLATS PLANT DRAFT ENVIRONMENTAL IMPACT STATEMENT (ERDA-1545-D)

Paragraph 4

The Environmental Impact Statement of the Rocky Flats Plant site is a detailed and accurate description of the impacts of the Plant on its environment and community. The role of DOE in the construction of nuclear weapons is not discussed in the FEIS, as stated in the Foreword and Section 1.1. This is because the Environmental Impact Statement contains only a discussion of Plant operations and not the policies of Congress and the President to maintain a nuclear defense program.

Paragraph 10, 11, and 12

1) The quotation from Linus Pauling implies rather than defines a problem, and taken out of context, inspires images of doom. The fact that most of the radiation to which we are exposed is from natural sources is forgotten. Likewise, it is forgotten that some radiation damage to cells can be repaired by the body without any permanent damage.

Plutonium inhalation has been the subject of extensive research, especially to determine the effects relative to lung cancer. Some of this research and the references related to it are discussed below. The continued operation of the Plant is based on a solid body of well-researched information which validates the knowledge that the Plant can operate in safety without unnecessary risk to the environment, the community, or the employees. The health effects from radiation exposure long have been the subject of considerable investigative effort.

Studies of survivors of the atomic bombings in Japan have disclosed definite relationships between their exposures to radiation and the incidence of certain diseases such as leukemia. Likewise, studies of radiologists and other workers exposed to substantial radiation doses have added information about radiation-related health effects. On the other hand, investigations to establish similar relationships between extremely low-level chronic radiation exposure and health effects have not been as productive.

At this time, epidemiological studies of low-level radiation exposure effects are being expanded to cover all populations of past and present radiation workers over which DOE and its predecessor agencies have had cognizance. In examining the records of these population groups, there will be a review of radiation exposure information and of certain other activities or conditions that also might contribute to adverse health effects. It will take many years before the current studies can be expected to produce reportable results.

With regard to the specific populations at and around the Rocky Flats Plant, DOE is not aware of any cases of ill health having resulted from radiation exposures due to Rocky Flats Plant operations. Chapter 3 shows that imperceptibly few cases of ill health would be expected due to those radiation exposures. The Los Alamos Scientific Laboratory is conducting a study of plutonium workers in a number of facilities, including the Rocky Flats Plant, to evaluate what effect, if any, this material has upon human health and to analyze the causes and rates of cancer mortality in the facilities' population groups. It will extend through the lifetime of the workers, and will assess any long-term consequences of occupational exposures.

Radioactive elements are a normal part of our environment; hence, low level radiation exposures of people can never be prevented. Agencies responsible for controlling radiation exposures recognize this and also recognize the need to limit increases in radiation exposures of people to the "lowest practical levels." They do not assume that a threshold level of radiation exists below which there is no probability of producing radiation health effects. However, a practical threshold may exist because the latent period before the development of major radiation-induced diseases is very long at low radiation doses. Thus, below certain dose levels the estimated health effects would not be expected to occur during a person's lifetime.

In estimating the health effects related to a specific nuclear industry activity, we apply a linear extrapolation of radiation risk probabilities from high radiation dose levels, where the effects can be measured, down to zero dose. At near zero dose levels, we cannot study the probabilities for producing radiation effects since they are vanishingly small. However, we can estimate the magnitude of the possible increases in risk based upon extensive research both in previously exposed human populations and in laboratory animals as outlined in Appendix G of this Environmental Impact Statement.

The exposures of Denver area residents to radioactivity is only one of their many exposures to known carcinogens in their environment. Others include hydrocarbons, pesticides, herbicides, metal compounds, and noxious gases. It is generally recognized that the hazards of long-term exposures to radiation are better known than any of the others. The total radiation doses to area residents from Rocky Flats effluents are very small. For example, we estimate lung doses in the range of 0.0005 to 1.2 mrem/yr for persons living within 50 miles of the Rocky Flats Plant. This can be compared to the natural background radiation doses to lungs which are 250 mrem/yr. Thus, the estimated probability of the Rocky Flats effluents causing increased health effects is small.

The premise that there is an acceptable level of plutonium contamination is founded upon the notion that the very small predicted effects from this level of plutonium cannot be measured by any usual sampling program.

Studies on the effects of low levels of radiation on man are receiving support from government agencies at the present time. Studies supported by the Department of Energy include.

1. Radiation Effects Research Foundation (Japan) - continued studies of health and mortality data on the Hiroshima and Nagasaki survivors and of genetic characteristics of children born of A-bomb-exposed parents.

2. Brookhaven National Laboratory, Marshall Islands Studies - continued surveillance of populations exposed to high levels of weapons fallout to detect late effects, thyroid abnormalities, cancers, and hematologic disorders.

3. U.S. Transuranium Registry - continued studies of transuranium elements deposited in nuclear industry workers and associated health effects.

4. Los Alamos Scientific Laboratory - analysis of plutonium in tissues and epidemiologic studies of plutonium workers.

5. Oak Ridge Associated Universities - mortality studies of workers in nuclear industries.

6. Argonne National Laboratory - collection and analysis of health and mortality data on former radium dial painters and former thorium workers.

Paragraph 13, Items 1 through 5

1. It is not acknowledged or recognized that there is "irreversible plutonium contamination of 11,000 acres of land around the Plant." There are plutonium concentrations in the soil east of the Plant greater than can be attributed to fallout from worldwide weapons testing. The EIS documents that there are about 1000 acres that may contain plutonium concentrations greater than the State guideline value of 2 d/m/g, as determined by the latest measurements, which had not been completed at the time the DEIS was written.

2. With regard to your comments on low level contamination and the transportation of special nuclear materials, these topics have been discussed in both the DEIS and the FEIS in great detail. See Sections 2.4.9 and 2.6.10.

3. The effects of human error in predicting accidents have been addressed in the accident analyses. See Appendix I-3. In some cases quantification of human error was very difficult but wherever applicable, the effects of human error were considered in development of the accident scenario. See Chapter 3.

4. The Rocky Flats Plant is used to assist in fulfilling U.S. nuclear weapons production requirements that are entrusted to DOE by the Congress and the President as a part of the overall national defense policy. The EIS is not intended to assess the environmental impacts of that policy or the moral issues associated with it.

5. The facts related to the issue raised regarding Rocky Flats as a local hazard are discussed in great detail in the FEIS. Revisions have been added for purposes of clarification. The conclusion presented regarding the demolition of the Plant is not supported by the facts, which are presented in the FEIS. Decisions regarding future operations of the Plant will be made using the information presented in the FEIS. Specific comments regarding defined issues have been welcomed for purposes of clarification in revision of this EIS.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JAN 27 1978

Mr. W. H. Pennington, Director
Office of NEPA Coordination (E-201)
Department of Energy
Washington, D.C. 20545

Dear Mr. Pennington:

Enclosed are the EPA review comments on the Draft Environmental Statement, ERDA-1545-D, entitled, "Rocky Flats Plant Site, Golden, Colorado".

While there are many areas covered by our comments, there are four to be emphasized. First, we are concerned with the heavy emphasis placed on whole body dose equivalent from Rocky Flats Plant (RFP) operation. EPA believes that this approach does not adequately assess the major hazard involved with the materials handled at RFP. These materials are mainly alpha emitters, which add very little to the whole body dose but can cause significant internal exposures. Second, in order to allow a more accurate impact analysis, there is a definite need for the various involved parties to reach an agreement on the soil sampling depth to be employed in the RFP 1 area. Third, we believe that ERDA has been overly conservative in its interpretation of the requirements of the Colorado Department of Health standard regarding plutonium soil contamination. Because of this, the land area that would be necessary to decontaminate to achieve contamination levels corresponding to the CDH standard has been greatly overestimated and, therefore, so has the cost for remedial actions. Finally, EPA believes that ERDA has not placed sufficient emphasis on impacts near the RFP site. The discussions of public health impacts are centered on the metropolitan Denver population with little mention of the local population.

In accordance with EPA procedure and in light of this review, this Environmental Statement is rated 2 (Insufficient Information) and the proposed action is rated ER (Environmental Reservations). If you or your staff have any questions regarding our classification or comments, please do not hesitate to call on us.

Sincerely yours,

Peter L. Cook
Acting Director
Office of Federal Activities (A-104)

Enclosure

The U.S. Environmental Protection Agency's
Comments On ERDA-1545-D,
The Draft Environmental Impact Statement on
The Rocky Flats Plant Site
Golden, Colorado

Chapter 1

General Comment

1. The use of total body dose equivalent, versus lung and bone doses, in the environmental impact statement (EIS) (except in section 3.1) is misleading. The primary radiologic hazard from plutonium is generally noted to be to the lung and bone. Thus, in this case, the calculated total body dose equivalent does not properly assess the major hazard.

2. There is not sufficient emphasis placed on the impacts to the environment near the Rocky Flats Plant (RFP) site. The public health impact comparisons given in the EIS are centered on the metropolitan Denver population with little mention of the local population. EPA believes that this is an important aspect which needs to be discussed more thoroughly.

3. EPA believes that simply comparing doses from various activities with the background dose, finding that in comparison they are small and therewith justifying their inconsequential nature is a misuse of facts. Any dose to man from man-made radioactive sources is to be considered unnecessary and harmful to mankind without the existence of sufficient benefit from the activity to outweigh the dose incurred. EPA would prefer to see no such comparisons in the EIS until all doses resulting from RFP activities are summed, and then only to establish a point of perspective, not to justify ignoring the problem. Further, particularly in the RFP case, such comparisons must include internal doses since the radionuclides of concern at RFP present a greater hazard than is shown by an external, whole body dose value.

Specific Comments

1. Page 1-3, third paragraph

"...The U.S. Environmental Protection Agency provides additional monitoring through its studies of liquid and solid effluent accumulations in various media."

To prevent misunderstanding on the level of EPA effort, it should be noted that EPA has been and continues to be involved in special project-type monitoring activities, but not ambient trend monitoring of the plant environs. The only routine monitoring is the NPDES sampling activity. This involves annual or semi-annual sampling of the main plant effluent to South Walnut Creek to establish compliance status with the permit limitations.

2. Page 1-7, top:

The use of Radioactivity Concentration Guide (RCG) in context with a mixture of alpha-emitting radionuclides is not accurate unless the sum of ratios of the observed concentration of each radionuclide to the RCG values are compared to one. Further, the RCG values quoted did not come from EPA. This should be clarified and the sources of the RCG values unambigously identified.

3. Page 1-8, first and second paragraphs:

It would seem appropriate to consider the environmental effects of toxic materials, such as beryllium, as well as the effects of radioactive materials in postulated plant accidents.

4. Page 1-8, last paragraph:

EPA's current protective action guidance does not apply to particulate releases of radioactive material which remains in a given area as would occur if plutonium oxide escaped the RFP. Also, in this paragraph, another comparison with whole body exposure from natural background radiation is made with what would essentially involve the inhalation and ingestion of transuranic elements which affect specific organs like bone, lung, liver and gonads. Transuranics in these organs can then cause related somatic or genetic effects. When dealing with transuranics, dose commitments to the critical organs are a far more meaningful measure of risk than the whole body dose.

5. Page 1-11, second paragraph:

Why is the metropolitan Denver population growth not extrapolated through the 50 years on which the dose commitment calculations are based (see page 3-29, second paragraph)?

6. Page 1-12, top:

The term "reasonable growth" needs to be quantified, and further, the meaning of the phrase "general Plant Waste" should be specified.

7. Page 1-12 and 1-13:

Radiation dose to the entire body from a gamma flux field of radiation is only a small portion of the dose that can be received from transuranic radioisotopes. Gamma exposures from transuranic radioisotopes like plutonium-239 and americium-241 are limited to low energy, low abundance, weakly penetrating, gamma radiation. However, these same elements emit relatively high-energy alpha particles which, when translocated through the gut wall, can create serious long term effects. Therefore, mention needs to be made of other pertinent organ doses.

8. Page 1-13:

To say that overall environmental benefits from relocation would not be significant because emissions would only be transferred to another area is not necessarily true; the potential impact on humans could be greatly lessened in an area more removed from Colorado's greatest population concentration.

9. Page 1-15 (last paragraph) and Page 1-16 (first paragraph):

What is the basis for choosing to design the surface-water control project to the "worst postulated" 100-year storm? It would be more prudent to design for a less likely storm, for examaple, a 1000-year storm. Please document the value used in the draft EIS.

10. Page 1-17, first paragraph:

We question the accuracy of the statement which indicates plant compatibility with current land-use plans.

> "There is no conflict between current plant activities and current land-use plans; however, there is a controversy about acceptable guidelines for putonium levels in soil and the required remedial actions when such levels are exceeded..."

11. Page 1-16 and 1-17, Section 1.7:

The use of the terms "vicinity of Rocky Flats" and immediate vicinity of the Plant" are vague at best and should be eliminated from the DEIS in favor of using compass points along with discrete distance measurements to describe land-use plans around the RFP. Ideally, land-use plans should be designed in keeping with the Colorado Department of Military Affairs' Radiation Emergency Response Plan (RERP) for the RFP wherein given protective action requirements are predicated on radial distances from the Plant's radioactive material handling facilities. For example, there are now home site developments within five miles southeast of the Plant site whose residents, according to the State RERP, would be required to observe certain protective actions in the event of an unlikely, but possible plant accident involving the release of radioactive material. In terms of prudent land use, it would be far more desirable to develop, easily evacuated, parks and golf courses or industrial parks on the acreage where protective actions must be implemented.

12. Page 1-18, fourth paragraph:

Comments appearing for Page 1-15 and 1-16 are equally applicable here. It would be more meaningful for the Final EIS on the Rocky Flats Plant Site to adopt EPA's philosophy on transuranium element radiation dose characterization to the general public as is reflected in the Agency's "Proposed Guidance on Dose Limits for Persons Exposed to Transuranium Elements in the General Environment," now in its 90-day comment period. Instead of using whole body exposure, EPA focuses its guidance on the pulmonary lung and bone exposure from transuranium elements in the general environment. Since these include plutonium, americium and curium, the radioactive elements of major concern at the RFP operation, it would seem logical for the Department of Energy to follow suit. Since alpha radiation accounts for essentially the entire dose from these elements, EPA has adopted the use of the "rad" as a unit of absorbed alpha radiation dose instead of rem to avoid frequent guidance changes as the quality factors for alpha radiation are changed with further research. A further point in this regard would be the desirablility of having the Final EIS use the same unit of dose that appears in EPA's Proposed Federal Guidance which, along with the Clean Air Act Amendments of 1977, which will be pertinent to RFP transuranic emissions. Similarity between radiation dose units in the Proposed Federal Guidance and the Final EIS will increase the level of understanding and acceptance of the general public to which the EIS is addressed.

13. Page 1-19, third paragraph:

It is important to discuss the potential benefits of the alternatives cited in this paragraph in terms of pulmonary lung and bone dose reduction for an individual living in the immediate plant environs as well as the "Denver area population."

Chapter 2

General Comments

1. The potential hazard from the inundation of the plant site could be large; and a quantitative analysis is needed of the impacts, both on-site and in the downstream reaches. This analysis should include the possible backwater effect and the impact from local inundation due to insufficient drainage system capacity.

2. The final EIS for RFP should provide the following information about all fossil fuel-fired equipment at the site:

(a) type of unit
(b) quantity in BTU's per hour heat input
(c) type of fuel, fuel use rate and analysis
(d) stack or vent height and internal diameter
(e) exit gas temperature and velocity.

3. The report, NERC-LV-539-36, "Actinide Concentrations in Tissues from Cattle Grazing Near the Rocky Flats Plant," by Smith, et al., should be referenced and included in Chapter 2. This was a project requested and funded by ERDA.

4. There is currently an on-going EPA-funded study, "Determination of Plutonium Levels in Humans Residing in the Vicinity of the Rocky Flats Nuclear Facility", being done by Erich Bretthauer of the EPA's Environmental Monitoring and Support Laboratory in Las Vegas, Nevada. ERDA might be interested in this study and incorporating any available, pertinent information from it.

5. To further understanding and to reduce possible confusion, it is necessary for ERDA to coalesce the various and dispersed references concerning waste disposal to form a clear, concise statement on the waste disposal philosophy and criteria, and on pertinent monitoring.

Specific Comments

1. Page 2-12:

In section 2.4.3, "Demography," what is the justification for using an average annual population growth rate 2.5% when the previous ten years saw an annual average population growth rate of 4.5% ? Continuing a growth rate of 4.5% annually would result in a Denver-area population of approximately 4.2 million people, a significant increase over the estimate on p. 2-14. This would significantly increase the population dose estimate.

2. Page 2-21:

According to Figure 2.4-6, the process wastes normally go to pond B-2, yet on p. 2-97, Table 2.4-19 clearly shows that pond B-1 has the greatest plutonium inventory. What is the reason for this?

3. Page 2-66, last two paragraphs:

In discussing the remote-sensing study conducted by EG&G Inc., during the period of July 1974 through December 1975, the following conclusion is reached:

> "This work is preliminary and no firm conclusion can be drawn from the observations and evaluations made to date. Additional investigation will be required to satisfactorily complete the program and resolve suspect indications..."

Is there a definite plan for the conduct of the additional investigation? If so, what is the anticipated time schedule (Starting date, completion date, etc.)?

4. Page 2-92:

According to Colorado's permissible level of radioactive material in uncontrolled areas (0.01 microcurie plutonium per square meter), the contour map on page 2-93 indicates that Rocky Flats should acquire property out to East of Standley Lake and South of 80th Avenue (tripling the present area of Rocky Flats property).

In order for these contours to be meaningful, one should know to what depth Krey took his soil samples. (4" as per HASL, 1/8" as established by Colorado Department of Health, 2" as presently taken by Rocky Flats, or 1 cm as indicated by Colorado 1971 regulations?)

5. Page 2-95:

Since the Colorado Department of Health used a 1/8" sampling depth to establish background plutonium in soil, why does Rocky Flats sample at 2" depth? Since the HASL (Krey) estimates are used in this report, we need to know if his sampling depth was 4" as indicated in paragraph #1, or 8" as indicated in paragraph #2. It appears that, prerequisite to making meaningful conclusions about the amount of plutonium in Rocky Flats soils, there should be a resolution, among Rocky Flats, HASL, and the Colorado Department of Health, as to what constitutes the proper soil sampling depth. This depth should then be used by all parties doing sampling at the site. The HASL objective was to obtain an inventory of the total amount of plutonium released to the environment from the Rocky Flats Plant, while the Colorado standard is concerned with surface contamination which may be resuspended and become available for transport to people. Only a fraction of the total inventory is contained in the surface layer and results obtained by the different sampling techniques must be related to the fraction of the total depth and distribution with depth

6. Page 2-96, third paragraph:

"In addition to the measured plutonium levels in the environment, there is some americium-241, which is also an alpha emitter. This americium-241 comes from direct releases from the Plant in addition to coming from the decay of plutonium-241, which is a beta emitter."

If this paragraph is intended to list the radionuclides which are detectable in environmental media as the result of releases from the Rocky Flats Plant, it should be expanded to include mention of uranium and tritium.

7. Page 2-96, fifth paragraph:

Reference is made that Rocky Flats plutonium has only about 0.44 percent plutonium-241 by weight. A question arises on whether or not this has been a constant isotopic ratio for Rocky Flats plutonium for as long as the plant has been operating (since 1950). For example, what was the plutonium-241 by weight in the contamination resulting from the drum storage leakage incident? If the plutonium-241 percentage was higher due to separation technology in use during the 1950's, as opposed to the technology now available, it would be inaccurate to use the 0.44 percent number in Table 2.7-2 for characterizing the environmental impact of americium-241 in the environs of Rocky Flats as is done in the DEIS. A small difference on the higher side would significantly change anticipated effects over the next millennium that are due to Rocky Flats' americium-241 contamination. The Final EIS should contain a revised Table 2.7-2, page 2-180, which provides isotopic ratios for Rocky Flats plutonium by year or timeframes in which ratios changed due to improvements in separation technology. It would also be desirable to maintain a continuing check on the ratios of Am-241 to Pu-239/240 in environmental samples collected in the environs of the Rocky Flats Plant, particularly since the beta decay of plutonium-241 occurs with a 15 year half-life which makes the generation of Am-241 quite significant and worthwhile monitoring. Also of importance is the fact that Am-241 will reach its peak concentration in the existing contamination in about 50 years and will account for about a third of the related total alpha activity.

8. Page 2-97:

How will plutonium trapped in bottom sediments of "B" ponds be handled (disposed of)? Even if there is zero liquid discharge by 1978, will not these levels continue to build up in the ponds because of water runoff from contaminated land and upstream sediments?

9. Page 2-101, third paragraph:

We disagree with the conclusion that the uranium concentration of the Plant's liquid effluent is almost totally attributable to natural sources.

> "...The difference between the total activity and the plutonium activity is due primarily to alpha activity from uranium and its daughters. This activity is due almost entirely to the natural uranium content of the water taken into the Rocky Flats Plants..."

The data used to reach this conclusion should be included in the statement.

10. Page 2-101, last paragraph and Page 2-103, last paragraph:

The analysis by ERDA of EPA sediment data (1973 study) (4) and the resulting conclusion(s) are invalid.

> "...The 1.4 pCi/g level of concentration in Great Western Reservoir sediment is about equal to that of the soil in the area; thus a significant fraction of the plutonium in the Reservoir may in fact be from the transfer of surface plutonium and deposition of airborne plutonium into Great Western Reservoir rather than from the water discharges..."

(a) Averaging the results of the sediment samples to obtain a single value for comparison with soil data is not a meaningful procedure since the samples were collected from two distinct zones of contamination. The areas of Great Western Reservoir considered to be of minimum impact in terms of plutonium contamination (concentrations less than 1.0 pCi/gram) were the South arm (bay), the shallow-water, shoreline area between the South arm and the dam, and the North arm (bay). The zone of area of highest contamination was the central section of the reservoir (inlet to dam). In this zone, plutonium concentrations showed a range of 1.0 to 4.0 pCi/gram.

Contrary to the ERDA interpretation of EPA data, EPA concluded that bottom sediment contamination in Great Western Reservoir was attributable to the plant effluent (page 17 of the EPA report) (4,5):

> "(3) Plutonium contaminated sediment attributable to the routine discharge of plutonium-bearing liquid wastes from the Rocky Flats Plant occurred throughout Great Western Reservoir. Maximum concentrations in the top layer of sediment (2.54 cm. - compacted) were approximately 40 times the baseline concentration; i.e. approximately 4.0 pCi/gram (dry weight). The thickness of the layer of plutonium-contaminated sediment was 5 cm or more at most sampling stations."

The conclusion that the liquid effluent from the plant has been the major source of bottom sediment contamination in Great Western Reservoir is supported by a comparison of results obtained from the EPA studies in 1970 and 1973 (3,4). Over the three-year period between the sediment studies, the plutonium-239 concentrations in the upper sediment layer increased significantly. Whereas the maximum concentration observed in 1970 was 0.9 pCi/gram, the October 1973 study showed eleven stations characterized by plutonium-239 concentrations greater than 1.0 pCi/gram. The 1973 study also showed maximum concentrations in the inlet area (adjacent to the mouth of Walnut Creek). As noted in Table 2.4-20, Radioactive Releases from Pond B-4, this time interval (1970-1973) was characterized by a large increase in the effluent release of plutonium to the Walnut Creek--Great Western Reservoir system. Plutonium releases jumped to 4900 and 4000 μCi in 1970 and 860 μCi in 1971. Hence, there is a strong correlation between the increased contamination of bottom sediment in the reservoir and the annual releases of plutonium to Walnut Creek.

Summarizing, the transfer of surface plutonium and deposition of airborne plutonium does contribute to the contamination of bottom sediment in the reservoir--the effect of these transport mechanisms probably would be greatest in areas such as the South arm and the shallow, shoreline area between the South arm and the dam. However, the significant fraction of plutonium contamination in the Reservoir is attributable to the liquid effluent.

(b) The implication that the plutonium level in the bottom sediment of reservoirs in the environs of the Plant, but not connected hydrologically to the Plant is greater than the plutonium level in soils in the general Denver vicinity (from fallout contamination) is not correct. Based on the October 1973 sediment study of Standley Lake and the April 1974 sediment study of Cherry Creek Reservoir, Marston Lake, and Ralston Reservoir, EPA reached the following conclusion (page 17 of the EPA report) (4):

"(1) In the environs of the Rocky Flats Plant, the baseline level of plutonium-239 in the bed sediment of impoundments is equal to or less than 0.10 pCi/gram (dry weight)."

As stated in the EIS, samples collected in October 1973 from the East end of Standley Lake (just offshore of the dam in the deep-water area) were found to apparently contain plutonium in concentrations on the order of two to three times the baseline value. However, the more rigorous and comprehensive study conducted in 1973 did not substantiate the existence of detectable sediment contamination in Standley Lake. The slightly elevated results obtained for the 1970 Standley Lake samples must be attributed to analytical error. (Note: EPA has not sampled Baseline Reservoir; 1970 sampling of Calkins Lake and Autrey Reservoir by EPA showed plutonium sediment concentrations of 0.04 and 0.07 pCi/gram, respectively).

11. Page 2-104, second paragraph:

(a) As mentioned previously, monitoring data should be presented to support the conclusion that the uranium alpha content in the waters of Great Western Reservoir is due primarily to natural sources, not to the liquid discharges from the plant.

(b) We question the accuracy of the statement:

"...In fact, the uranium alpha content in Ralston Reservoir upstream from Rocky Flats, from which most Rocky Flats water comes, averages about 20 pCi/l (Dow, 1972)..."

Water samples collected from Ralston Reservoir on September 27, 1972--over the length of the reservoir and at surface and near bottom locations--contained dissolved uranium at concentrations less than 2.5μg/l. The corresponding total alpha concentrations were less than 2 pCi/l.

It is a fact that Ralston Creek upstream from Ralston Reservoir is characterized by elevated total alpha, uranium, and radium-226 concentrations. However, these high concentrations are attributable to the liquid effluent from the Schwartzwalder uranium mine. Since Ralston Creek is not the sole supply source for Ralston Reservoir, the radiological water quality of the reservoir has not been significantly impacted by liquid wastes from the Schwartzwalder mine.

The baseline concentrations of radionuclides in Ralston Reservoir and the conclusions based on these data require reevaluation in the EIS.

12. Page 2-105, third paragraph:

It is stated that the conclusion of no significant contamination of groundwater is based on the rejection of some sample results greater than 1 pCi/l of plutonium alpha activity.

> "...In general, most of these samples show plutonium content below 1 pCi/l of plutonium alpha activity. Some "measurements, however, show levels going up to 2 or 3 pCi/l. These levels do not tend to repeat in the same well at different sampling times. It is thought that most readings above 1 pCi/l are caused by contamination of the water samples rather than actual general contamination of the groundwater..."

What measures are being taken to eliminate sample contamination such that the data generated provide the basis for an unqualified assessment of groundwater contamination or the lack thereof?

13. Page 2-106, first paragraph:

> "...The measured plutonium levels were only on the order of 0.02 pCi/l and apparently resulted entirely from background plutonium..."

It is assumed that background plutonium refers to that attributable to worldwide fallout. Do groundwater aquifers in other areas of Colorado and the adjacent states contain comparable concentrations of plutonium?

14. Page 2-106, first and second paragraph:

In DEIS discussions on plutonium-in-soil related to the Rocky Flats Plant, one gets the feeling that existing soil contamination, its movement and consequences, are well understood and under control. In any case, this contrasts sharply with a conclusion reached by John H. Harley, Director of DOE's Health and Safety Laboratory who said that, "Our basic knowledge of the behavior of these materials (transuranium elements) in soil is much more limited and our predictions of possible effects are therefore quite restricted."--as presented at the American Nuclear Society Winter Meeting, Washington, D.C., October 30, 1974. Such limitations should be clearly stated in the EIS.

15. Page 2-106:

We question the statement:

> "Because of the slow movement of plutonium in soil and the low resuspension of plutonium in air, the on-site plutonium-contaminated soil poses no threat to off-site personnel."

According to the contours of plutonium contamination shown on page 2-93, plutonium from contaminated soil (or some other source) is resuspended and subsequently deposited up to five miles distant from the plant site. (A line drawn from the plant, due East to the 0.01 $\mu Ci/m^2$ contour is five miles in length.) Also, is americium more or less subject to resuspension than plutonium?

16. Page 2-106, third paragraph:

The DEIS states that:

> "...the total of all increases in background radiation resulting from Plant operation has not increased the exposure of any member of the general population by more than a fraction of one percent of the natural background radiation level of 200 mrem/yr." (underscore added)

The DEIS admits to dispersing 2.6 curies (see other comments on release estimates) of plutonium off-site before reaching the quoted conclusion above. As pointed out previously in the other comments, existing and future plutonium contamination in soil has the potential of inflicting primarily alpha particle irradiation to internal organs like the pulmonary lung, bone, liver and gonads via the following mechanisms which are described in the Rocky Flats Facility/Technical Assessment Document, September 1977, and issued by EPA on November 24, 1977 to accompany EPA's Proposed Guidance on Dose Limits for Persons Exposed to Transuranium Elements in the General Environment".

I. Inhalation Pathway (pulmonary lung dose)

1. Ambient Air Concentrations due to on-site, off-site contamination.

a. Wind resuspension of soil

b. Resuspension of soil by mechanical disturbances

c. Resuspension of dust within the house

d. Resuspension of dust from contaminated clothing

II. Ingestion Pathway (bone dose)

1. Concentrations in water, foodstuffs and soil due to on-site, off-site contamination.

a. Food plant ingestion

b. Cow milk ingestion

c. Beef ingestion

d. Drinking water consumption

e. Soil ingestion

Noteworthy is the fact that the dose sources outlined above are not functions related to natural background radiation that the DEIS purports to be 200 mrem/year but are related to existing or future transuranium contamination in soil.

Therefore, the question remains on how the inhalation or ingestion of plutonium, americium or curium, the radionuclides of interest at the Rocky Flats Plant, can be evaluated as potential public health threat in terms of natural background whole body irradiation due to penetrating radiation of an entirely different form. For example, EPA does not make the same comparison in its proposed Guidance and neither do recognized experts (3) in the field of environmental aspects of transuranium element contamination. How then is the DEIS justified in considering the impact of the Rocky Flats Plant in terms of some incremental percentage of natural background radiation?

17. Page 2-114, first paragraph:

The statement is made that the health effects caused by depleted uranium are not related to radiation. This is not strictly true; class Y uranium results in approximately the same lung dose as would plutonium, i.e., a picocurie of uranium-238 results in about the same lung dose as a picocurie of plutonium-239.

18. Page 2-116, last paragraph and Page 2-117, last paragraph:

At the bottom of page 2-116, it is stated that the Recycle Recovery Ion Exchange operation is used for solutions containing less than 10^{-3}g/l of plutonium in order to reduce the plutonium level to

10^{-5}g/l or less. This seems to be inconsistent with the statement at the bottom of page 2-117 which indicates that in most instances the side streams of waste liquids generated during the recovery operations and having plutonium content below 5 x 10^{-3}g/l are treated in the process waste treatment plant.

19. Page 2-152:

The final sentence on p. 2-152 concerning the shipment of radioactive material to and from the RFP states, "Future amounts and number of shipments are expected to decrease." Such a statement implies that the numbers used in the analysis are conservative compared to the activity expected in the future; however, there is no support given for this statement. Please provide documentaton to support the accuracy of this statement.

20. Page 2-176:

The subject of tritium control equipment needs to be discussed more fully than it is on p. 2-176. The statement in the first paragaph of that page implies that a cost-benefit analysis has been completed concerning this equipment. This analysis should be presented to substantiate the conclusion reached on p. 2-176.

21. Page 2-180, Table 2.7-3, "Airborne Releases of Uranium and Tritium from Rocky Flats Plant":

Do the tritium releases listed in this table include evaporative emissions from the solar evaporation ponds or only emissions from various plant stacks?

22. Page 2-181:

On page 2-181, either the text or Table 2.7-4 is in error since uranium-234 is not shown in the table but is discussed in the text. This information should be made consistent.

23. Page 2-182 and 2-183, tritium emissions:

It is estimated that the future yearly release of tritium into the atmosphere may be as high as 100 curies. Despite the fact that the estimated exposures to individuals and population groups attributable to such releases do not exceed accepted limits, this level of release is quite large and should not be accepted without additional strong justification.

Apparently, the estimated tritium release is based on new operating procedures and the acceptance of tritium-contaminated materials that would have been considered unacceptable under past operating procedures.

"...In addition to the above mentioned limit on stack gas concentrations, the Rocky Flats Plant contractor has set an interim limit of 0.1 curies per month on the total amount of tritium contamination that may be received at the facility..."

What are the critical requirements which would allow a change in this policy such that the monthly limit could be increased by one or more orders of magnitude?

24. Page 2-184, second paragraph:

In discussing the process liquid waste collection system in section 2.7.3.1, the statement is made that the "majority of the plant's process-waste holding tanks are connected by pipeline to the waste treatment facility." This pipeline system would seem to possess the potential of causing a major contamination incident should a pipe rupture occur, yet this possibility was not discussed. EPA requests that such an analysis be included in the EIS.

25. Page 184, last paragraph:

In section 2.7.3.1, one of the standards for releasing wastes to the unlined ponds is cited as 720 pCi/l. What is the source of this value?

26. Page 2-186:

Is water balance information available for the "evaporation ponds"? That is, what is the significance of seepage? It is suggested that water balances should be maintained for all of the "closed" ponds.

27. Page 2-200, third paragraph:

We disagree with the statement that a concentration of 40 pCi/l total alpha acitivity is due almost entirely to natural uranium alpha activity. We doubt that the natural contribution is excess of 10 pCi/l. We are not aware of any data to support the statement that natural uranium alpha activity of Colorado surface waters often approaches and even exceeds 40 pCi/l. Two rivers which show elevated concentrations of naturally-occurring uranium are the Arkansas River and the South Platte River downstream of Denver. However, in most of the other cases of elevated concentrations, the sources usually are uranium mines and/or mills.

28. Page 2-206:

Table 2.9-4, p. 2-206, indicates that the metal and oxide forms of uranium are soluble in water. This is not correct and should be changed.

29. <u>Page 2-207, second paragraph</u>:

"...The U.S. Environmental Protection Agency provides additional monitoring through its studies of liquid and solid effluent accumulation in various media."

This statement tends to imply a greater monitoring involvement on behalf of EPA than is the actual situation. With the exception of routine liquid effluent monitoring to determine compliance with NPDES permit limits and several studies, EPA is not involved in long-term monitoring of the plant environs.

30. <u>Page 2-211</u>:

While it is not due to plant operations, there are data to indicate that the measured off-site concentration of Pu-239 is normally 10-100 times that measured elsewhere in the Northern and Southern hemispheres. These data are published quarterly by HASL. This high concentration could be the result of the orographic influence of the Rocky Mountains, and may not necessarily be the result of RFP operations. There has been considerable research into this unique phenomenon at both the University of Colorado and Colorado State University. We believe it is of sufficient impact to be discussed in the EIS.

31. <u>Page 2-219 and 2-220, Table 2.10-3, "Water Monitoring Program"</u>:

Uranium analysis should be added to the analytical protocols for treated water and sewage treatment plant influent samples.

32. <u>Page 2-228</u>:

It is indicated that the Radioactivity Concentration Guides (RCG) for tritium in public waters is $3x10^{-3}\mu Ci/ml$. This is incorrect if that water serves as a supply of water to a community. Both Standley Lake and the Great Western Reservoir serve community water systems. In the <u>National Interim Primary Drinking Water Regulations</u> (EPA-570/9-76-003) the maximum contaminant level (MCL) for tritium is $0.02x10^{-3}\mu Ci/ml$. The EPA Drinking Water Regulations should be cited as the authority governing radioactivity concentrations in public drinking water supplies.

33. <u>Pages 2-230 and 2-231</u>:

At the appropriate place on one of these two pages, the intent or plan of the State to annually monitor the plutonium content of bottom sediment in Great Western Reservoir should be noted as should concentrations of transuranics in these waters be compared to the MCL for alpha particle emitters in the abovementioned National Regulations.

There should also be a commitment on the part of the plant contractor to include sediment sampling in the comprehensive monitoring program.

Chapter 3

General Comments

1. An important aspect of radiation impact is occupational exposure. There should be discussion of the radiation hazard for RFP employees from on-site plutonium and any other radionuclides present.

2. There should be a section on the expected additional on-site impact caused by the liquid recycle system once it is in operation.

Specific Comments

1. Page 3-6, first paragraph:

What, if any, changes might be anticipated in the comprehensive radiological monitoring program on-site and off-site after implementation of the total water-recycle plan?

2. Page 3-27:

The statement that materials released by Rocky Flats are not "in general" concentrated in the food chain, is rendered open to question by statements of Price:

(a) "..radionuclides with very long half lives will increase in relative importance with time particularly where they are uncontained within the biosphere."

(b) "There is some indication that plutonium uptake by plants may be enchanced with successive cropping and the passage of time...due to either more perennial roots coming into contact with plutonium particles as the plants aged or that natural organic materials resulting from root tissue decay complexed with the plutonium and resulted in increased uptake."

Also, "americium is even more toxic than plutonium, with demonstrable greater uptake by plants as compared to plutonium."

Ingestion of even low levels of plutonium over a long period of time (which may also be accumulated in the food chain) point to the possibility of harmful effects to resident animal populations, such as the blood cell depressions observed at the Nevada Test Site. Such damage may be a necessary and tolerable impact on animals in the near vicinity of the plant, but if the area of impact grows larger and levels of activity in soils and surface waters increase with time, damage to certain animal (and human) populations may become intolerable. The EIS should indicate that ERDA has considered such impacts.

3. Page 3-29:

While ERDA is apparently proceeding to calculate environmental dose commitment in general agreement with EPA philosophy, there is a shortcoming. The environmental impact over fifty years from one year's releases does not and cannot adequately assess the total future impact of RFP releases. There needs to be an analysis completed similar to the one already completed but spanning the number of years the plant is expected to operate. This includes buildup of long-lived radionuclides in the environment through the years of operation and then the exposure for fifty years following the end of RFP operations.

4. Page 3-45:

There is some confusion in the first paragraph of section 3.2.1.3, "Impoundment Failure". It is not logical that only 500 microcuries of plutonium would be released from the B-series ponds, including sediments, when earlier it was stated that there are several curies trapped in the sediment alone. Please clarify this apparent contradiction and revise the impact estimates if necessary.

5. Page 3-57:

EPA realizes that to estimate the releases from a glove box fire, it was necessary to make several assumptions. As such, we ask that such assumptions be documented or developed in the statement. For example, what is the justification for assuming that 2.1 percent of the plutonium chips and massive plutonium become airborne in three minutes?

6. Page 3-75:

In discussing accident dose commitments, ERDA gives a Denver area population "yearly dose commitment" of 18.2 man-rem. Later, on p. 9-6, the "general Denver area population dose" is given as 72,000 man-rem. First, how are these estimates related to each other? Second, what is the definition of yearly dose commitment in terms of the radionuclides of concern at the Rocky Flats Plant?

7. Page 3-81:

Please document the statement on p.3-81 that Rocky Flats shipments never cause dose rate levels higher than 1 mrem/hour at six feet outside the transport vehicle.

Later in the same section, ERDA should document the dose rates assumed for onlookers. They do not appear to follow from the earlier assumption of 1 mrem/hour.

8. Page 3-83:

EPA requests that an impact analysis be performed on shipments of plutonium oxide. Considering the material involved and the public's interest in that material it is important to include such an analysis in this document whether or not it is shipped only in "gram amounts". It would appear likely, given an accident scenario which involved winds and/or a fire, or both, that the plutonium oxide in its powdery form could pose a greater hazard than the solid plutonium metal.

9. Page 3-90:

We have two comments concerning section 3.3.2.4, "Expected Releases in Accidents." First, in considering shipments to be "gram amount" shipments one knows not whether there is 1 gram or 999 grams. The consequences of accidents within this range will vary proportionately. There needs to be a stricter definition of "gram amounts."

Second, it is generally recognized that accidents involving small amounts of material occur more frequently than those involving large amounts. It is conceded, given an accident, that one involving a large amount of material will dominate the impacts incurred; however within a given time span, the accumulated impacts of several smaller releases may surpass the impact of one large release. Therefore, EPA does not feel that is is appropriate to dismiss "gram amount" accidents without demonstrating their purported inconsequential nature compared to "kilogram amount" accidents.

Chapter 5

ERDA appears to have overestimated the land area that would be necessary to decontaminate to levels corresponding to the Colorado Department of Health (CDH) standard. To meet the standard, 2 dpm/gram ($0.01 \mu Ci/m^2$), ERDA estimated that 11,000 acres would need to be decontaminated. This estimate is based upon the published Health and Safety Laboratory's (HASL) soil contours for the Rocky Flats area. However, because the HASL results calculate the total inventory for the top 20 cm, one may not use these contours to take action concerning the CDH standard. The CDH standard is effective to a depth of only 1/8 inches. Using the HASL contours directly therefore leads to overestimation of the radioactivity in the top 1/8 inch of soil. This is why the CDH estimated that, at most, only 1,000 acres need to be decontaminated rather than 11,000 acres. The result is a large overestimation of the cost of decontamination.

Appendix F

1. Page F-1:

Equation 1 in Appendix F, which calculates resuspension concentrations, is confusing. The text needs to provide more discussion on it and also needs to define all of the symbols used.

2. Page F-3:

On page F-3 it is stated that the concentration of radionuclides in the reservoir is the RFP's yearly output divided by the total reservoir volume. First, if this is all that is done, then the radionuclides existing in the water prior to that year's release are ignored and would result in underestimation of the calculated doses. This factor should be taken into account. Second, apparently there is no consideration of variations in the volume of the reservoir. It seems that a prolonged dry period could reduce the reservoir's volume thereby increasing the concentration of the radionuclides present. This should be mentioned in the EIS along with a determination of its relative importance.

In calculating the ingestion doses, as shown in Appendix F, a distinction should be made between radioactive material biologically incorporated into the plant, and radioactive material which settled onto the plant's surface. The difference should indicate that there is a greater transfer across the gut of the biologically incorporated material because of its higher solubility. This then influences the later dose equivalent calculations.

Further, the soil to plant uptake factors for plutonium and americium are assumed to be equivalent. However, recent studies, e.g., An Appraisal of Available Information on Uptake by Plants of Transplutonium Elements and Neptunium (LA-640-MS) by R.L. Thomas and J.W. Healy, and Concentration of Actinides in the Food Chain by R.A. Bulman (NRPB-R44), have shown americium uptake to be as much as 50 times greater.

3. Page F-4:

Section F-4 implies that the milk and meat pathways are the only pathways considered for tritium. However, in general, the critical pathway for atmospheric tritium is through skin and lung absorption. Whether or not this is true at RFP, it should be evaluated.

4. Page F-6:

On page F-6, in the text just above equation 3, the soil density should be 1.5×10^6 g/m^3 not 1.5 g/m^3.

5. Page F-16:

Data for use in calculating doses to the standard man should now be obtained from ICRP 23 rather than ICRP 2.

Appendix I

1. Page I-1-32:

From the results of the analysis (Fig. A-1, A-2, page I-1-32, I-1-33), it appears that the distribution of the maximum wind speeds fit closer to type I distribution than to type II distribution. Consequently, using the results obtained from Type I distribution would be more reliable than that of using type II distribution.

The factors between the predicted wind speeds based on Type II and Type I distribution are approximately 1.6 for a 1000-yr event and 1.3 for a 100-yr event. These differences may be within an acceptable limit. However, using 5 year records to extrapolate a 1000-yr event could result in significant error. A correlation approach, using the records observed in Denver, Colorado may also be used to substantiate the analyses.

REFERENCES

1. Oakley, D.T., Natural Radiation Exposure in the United States, ORP/SID 72-1:39, June, 1972.

2. See papers given by Nathaniel F. Barr, J. Newall Stannard, John H. Harley and others at ANS Winter Meeting Session, October 30, 1974, titled: "Environmental Levels of the Transuranium Elements".

3. "Radioactivity Levels in the Environs of the Rocky Flats Plant," EPA Office of Water Quality, Cincinnati, Ohio, April, 1971.

4. "Radioactivity Levels in the Environs of the Rocky Flats Plant, Colorado, Part 2," SA/TIB-26, EPA Region VIII Office, December, 1973.

5. "Plutonium Levels in the Sediments of Area Impoundments Environs of the Rocky Flats Plant," SA/TIB-29, EPA Region VIII Office, February, 1975.

DOE STAFF RESPONSES TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE ROCKY FLATS PLANT DRAFT ENVIRONMENTAL IMPACT STATEMENT (ERDA-1545-D)

Letter of Transmittal of P. L. Cook

Area 1

In accordance with the suggestion concerning the comparison of Rocky Flats dose with whole body background dose, this comparison has been de-emphasized in the EIS, and comparisons with organ doses have been added.

Area 2

Soil sampling techniques are discussed in the FEIS, Section 2.3.9. The differences between most methods are complementary, i.e., useful for differing purposes, and are not inconsistent or irreconcilable. The measurement of radioactivity in the so-called respirable dust method propounded by Dr. Johnson is an exception to this generalization.

Area 3

Recent data show that the land area on which radioactivity exceeds the State guidelines has been overestimated. The EIS has been revised accordingly (Chapter 5).

Area 4

In response to the recommendation, the EIS has been revised to place greater emphasis on the local population (e.g., Table 3.1.2-3).

EPA Comments on ERDA 1545-D

Chapter 1, General Comment

1. The lung and bone doses are given in the DEIS; e.g., Tables 3.1.2-6 and 3.1.2-8. A revised calculation of dose was made for the FEIS. The revised dose calculation methodology is summarized in Section 3.1.2.3 of Volume I and given in detail in Appendix F of Volume II.

2. The demography (Section 2.3.3) has been reevaluated using planning data from the Denver Regional Council of Governments and is shown to 50 miles in Tables 2.3.3.1 through 3.2.3-4. Organ doses are calculated to 2, 3, 4, 5, 10, 20, 30, and 40 mile radii and the subsequent values conservatively applied to the total distance of the interval between calculated values (see Table 3.1.2-3). Dose effects in the immediate area for continued Plant operation are considered in evaluation of the maximum reference man, Section 3.1.2.4, Table 3.1.2-5, and a hypothetical high density population approaching the Plant from the east. A similar procedure is used for Plant accident analysis considering reference man and a population in the southeast sector during a maximum credible release (see Tables 3.2.4-5 through 3.2.4-7).

3. As noted in response to Comment 1, the emphasis in the FEIS is on organ doses resulting from Plant radionuclide releases. These doses are summed over the several

radionuclides involved and the possible pathways to man. Included are contributions from past releases, present and future operations, and estimated Plant accidents. Comparison to natural background organ doses are made, not to justify the release of activity, but to provide a frame of reference for the computed doses of Plant origin. These results are summarized in Sections 1.3.1, 1.3.2, and 1.3.3 of Volume I.

Chapter 1, Specific Comments

Page 1-3, 3rd paragraph

Sections 1.2.10 and 2.10 have been modified in the FEIS to more correctly reflect EPA's role in Plant monitoring and special studies.

Page 1-7, top

The FEIS has been amended in Section 2.10 to reflect the applicability of the regulation requiring summation of RCG fractions for mixtures of radionuclides.

Page 1-8, 1st and 2nd paragraphs

In addition to the transportation accident involving beryllium being already considered (Section 3.3.2.1, Volume I), an analysis of a Plant accident involving beryllium has been added in Section 3.2.1, Volume I of the FEIS.

Page 1-8, last paragraph

Section 1.3.2 of Volume I of the FEIS has been rewritten to delete reference to the EPA's proposed protective action guidance and to give the impact of radionuclide releases in terms of organ dose.

Page 1-11, 2nd paragraph

The length of dose commitment (taken as 70 years in the FEIS) was not extended to cover the period over which population growth is estimated because extending these estimates past the year 2000 is too speculative to be useful.

Page 1-12, top

The term "reasonable growth" was intended to imply only a capacity for possible increased need at a future date. In the FEIS (Section 1.5.2, Volume I), the phrase is changed to read "a reasonable margin for growth." With respect to the phrase "general Plant waste", it was intended to refer to liquid process waste from Plant operations. Revisions have been made to avoid the misunderstanding (Section 1.5.2, Volume I).

Page 1-12 and 1-13

As noted in the response to General Question 1 on Chapter 1, the consequences of radionuclide releases from the Plant are assessed in the FEIS in terms of organ doses (cf. Sections 1.3.2, 1.3.3, 3.2, and 3.3 of the FEIS).

Page 1-13

In Section 5.3 of Volume I of the FEIS, a more complete discussion on relocation (giving the maximum possible man-rem reduction in radiation exposure) is given, emphasizing the fact that overall benefits cannot be fully evaluated without specific site selection.

Page 1-15 (last paragraph) and Page 1-16 (1st paragraph)

The surface water control project design considerations were to contain a 100-year flood and to maintain structural integrity during a maximum probable precipitation event. This was based on both the area topography and the funds which could reasonably be made available for such a project. It was also felt that a storm such as a 1000-year event would dilute activity concentration enough that little environmental consequence from this cause would ensue. Further discussion of the surface water control project appears in Section 2.10.2.1.

Page 1-17, 1st paragraph

Plant influence on land use is discussed in Section 7.2 (Volume I of the FEIS). Summary Section 1.7 has been clarified to distinguish where the conflict lies. The only area of potential land use conflict is east of the Plant where an "Area of Concern" has been defined by the Colorado Department of Health within which special construction techniques may be required, prior to development, for soil containing plutonium in excess of 2 dpm/g. Both the action level and measurement techniques are subjects of controversy. A related development is the filing of three lawsuits by landowners alleging that Plant operations have damaged land near the Rocky Flats site. The owners want to use the land for residential development, but the land has not been rezoned for residential use partly because it allegedly contains plutonium above the State's guideline. Resolution of this litigation may determine whether any changes in existing land use plans will be required.

Page 1-16 and 1-17, Section 1.7

To make terminology such as "vicinity of Rocky Flats" more meaningful, the areas covered by the various land use plans are shown on the composite map in Section 7.1 (Volume I of the FEIS). Also, the State Emergency Response Plan and the associated Protective Action Guides are discussed in Section 2.11.4. These plans are developed by various local agencies and are not the responsibility of the Department of Energy. The EIS can only reflect the information available from these agencies.

Page 1-18, 4th paragraph

As noted earlier, the FEIS focus has been modified to emphasize body organ radiation dose commitments in addition to whole body exposures. The rem unit of absorbed dose has, however, been maintained, as it is the most widely accepted basis for comparison of radiation effects.

Page 1-19, 3rd paragraph

The FEIS (Volume I, Section 1.9) has been modified to give percentage reductions in all radiation doses associated with the several options for Plant operations. This includes dose reductions to site boundary residents as well as those residing in each sector of the Denver area as shown in Figures 2.3.3-1 and 2.3.3-2 in Volume I of this EIS.

Chapter 2, General Comment

1. All of the major Plant buildings at Rocky Flats are included within the perimeter security fence. This area is drained by Woman Creek, located south of the security fence, North Walnut Creek, which is located near the north security fence, and South Walnut Creek, which runs through the area within the fence. These three creeks all flow west to east.

On the Surface Water Control Project, which is currently under construction, the existing McKay Bypass Ditch and an interceptor ditch west of the security fence are being modified to divert all water up to the volume of a 100-year, 3-day storm to the north of North Walnut Creek into the bypass ditch. When this project is completed, North and South Walnut Creeks will drain only relatively small areas within or to the east of the Plant security-fenced area. Only a small portion at the south edge of the area within the security fence drains into Woman Creek.

The spillways on the three dams being constructed as part of the Surface Water Control Project are sized for the flows which would result from a "Probable Maximum Precipitation" (PMP) as required by State law. These flows, which would result from a 23.1-inch rainfall, are 6603 CFS, 2892 CFS, and 19,079 CFS for North Walnut, South Walnut, and Woman Creek, respectively. These flows are as high as would result from a 500-year storm. Although the McKay Bypass Ditch and the west interceptor ditch would overflow during a PMP storm, North Walnut Creek can easily carry the volume of the PMP without inundating any Plant buildings. The same is true for Woman Creek. The flows from either a 100-year or a PMP storm on South Walnut Creek could not be carried by the existing culverts under the east perimeter road. However, the water would overflow the perimeter road without reaching the Building 991, which is the most susceptible to flooding.

The PMP or 100-year storms would cause problems such as road washouts, overflowing drainage ditches, etc., but there would be no flooding hazard to the Plant production or process buildings.

Since Plant processing and production buildings would not be destroyed by the PMP, there would be no contribution from them downstream of the Plant. In fact, the retention volume provided by the Plant dams on Woman and Walnut Creeks would help to minimize the effect of flooding in the downstream reaches.

2. The FEIS contains the suggested information regarding fossil fuel-fired equipment at the site. It is included in Table 2.6.9.1 of Volume I.

3. The reference to Smith and Black's work on actinide uptake in cattle grazing near Rocky Flats has been included in FEIS Section 2.10.4.2 (Volume I) on Ecological Monitoring in which these studies are described.

4. The subject study is incomplete at this time and no conclusions can be reached from the data; therefore, it would be inappropriate to include any information in the FEIS.

5. Waste disposal for the Rocky Flats Plant is covered in Section 2.7, 2.8, and 2.9 (FEIS, Volume I). References are given within these Sections to documents which form the statements of DOE with respect to waste disposal philosophy and criteria. The Rocky Flats Plant adheres and complies with all regulations and guidelines which have been developed by the various agencies for control of waste handling. Monitoring of the various kinds of wastes is discussed in the Sections mentioned above. It is dependent on the media and on the nature of the pollutants. Monitoring is also discussed in Section 2.10. In this section, more details on monitoring frequency and locations are presented. Many revisions are included in the FEIS with the intent that clarification will be useful to the readers.

Chapter 2, Specific Comments

Page 2-12

The demographic data in Section 2.3.3 (Volume I) of the FEIS have been revised upward according to the most current projections available from regional county planning departments and from the Denver Regional Council of Governments.

Page 2-21

Decontaminated laundry and process wastes were routed to Pond B-2 beginning in 1973. From the startup of Plant operations in 1952 until December 21, 1973, water containing these wastes was released into Pond B-1 and passed through the other three B-series ponds before being released to Walnut Creek.

Page 2-66, last 2 paragraphs

The EG&G study was terminated without release of a final report. A related study is reported in Section 2.3.4.7.

Page 2-92

Methods of soil sampling are discussed in the EIS, Section 2.3.9, in accordance with your suggestion. The State of Colorado adopted a radiation control regulation that states if the plutonium activity in soil concentration (sampled to a depth of 0.3 cm) exceeds 2 d/m/g (0.01 $\mu Ci/m^2$), special techniques of construction are required. It does not mention a permissible level of radioactive material in uncontrolled areas.

The 0.01 $\mu Ci/m^2$ contour on Figure 2.4-24 of the DEIS (from HASL 235) includes an original "area of concern" defined by the State, but does rely on data obtained from samples taken to a 20 cm depth. As a result of more recent soil analyses by the State and by private land developers, the "area of concern" has been reduced to include only that land lying west of Simms Street, north of 80th Avenue and Colorado Highway 72, east of Colorado Highway 93 and south of Colorado Highway 128.

Page 2-95

It is acknowledged that soil samples taken to different depths are not directly comparable in units of activity per unit area. Rocky Flats samples soil to a depth of approximately 2 inches because of recommendations in NRC Guide 4.5, HASL (now EML) procedures for routine sampling, and Nevada Applied Ecology Group procedures reported in NVO 171. It is believed by many soil scientists that a representative and reproducible soil sample can be collected only by penetration to at least 2 inches. The data used to prepare the plutonium isopleths shown in Report HASL-235 were obtained from samples collected to a depth of 8 inches. A joint soil sampling program between Rocky Flats, the Environmental Protection Agency, the Colorado Department of Health, and the Jefferson County Health Department has been underway for over a year. Soil samples were collected by the four groups using their own different techniques. The results will be evaluated as soon as radiochemical analyses are complete.

Page 2-96, 3rd paragraph

This paragraph was not intended to be a list of all radionuclides in environmental media but only a discussion of the americium-241 normally associated with elemental plutonium. Other elements such as tritium and uranium in environmental systems were discussed elsewhere in the section. In the FEIS, this paragraph is placed in Section 2.3.9.1, where its meaning in context is more clear.

Page 2-96, 5th paragraph

The available data regarding plutonium-241 concentration in Rocky Flats plutonium were reviewed. The data that follows are the average values for calendar years 1959 through 1977.

TABLE I

WEIGHT PERCENT Plutonium-241 IN ROCKY FLATS PLUTONIUM

Years	1959 1960	1960 1961	1963 1944	1965 1966	1967 1968	1969	1970
Pu-241 (wt%)	0.59	0.60	0.65	0.56	0.57	0.48	0.49

Years	1971	1972	1973	1974	1975	1976	1977
Pu-241 (wt%)	0.44	0.45	0.43	0.47	0.39	0.35	0.37

Mean = 0.49

Standard Deviation = 0.09

Variance = 0.008

The highest value listed is 0.65 for 1963-1964. The percentage of the total activity due to in-growing americium-241 was calculated (ignoring concurrent americium-241 decay) using the mean and maximum values. The results are listed in Table II.

TABLE II

MAXIMUM PERCENT OF TOTAL ALPHA ACTIVITY DUE TO Americium-241

	Weight Percent Pu-241	Percentage of Total α Activity Due to Am-241
Average Last 2 Years	0.36	<15.1
Average Last 19 Years	0.49	<20.3
Maximum Value	0.65	<25.2

In view of this information, a value of 0.36 wt% (the average plutonium-241 isotopic content) is assumed in Table 2.7.2-2 of the FEIS (Volume I). However, as noted in Section 3.1.2.1 of the FEIS, 50% of the total alpha activity source term is assumed to be due to americium-241.

Page 2-97

A specific plan for sediment removal has not yet been defined. Plutonium concentrations will not continue to build up in the ponds because of surface water runoff from contaminated land and upstream sediments. All contaminated upstream sediments were removed during pond reconstruction in 1972 and subsequent sediment excavation has not revealed the presence of additional plutonium. Also, there are no areas of contaminated land upstream from Pond B-1. Drainage from existing contaminated land flows into Pond C-1 on Woman Creek but no identification of plutonium contamination from surface runoff has been evident from Pond C-1 monitoring data.

Page 2-101, 3rd paragraph

Data to support the quoted statement are included in Section 2.3.9.4 of the FEIS (Volume I).

Page 2-101, last paragraph and Page 2-103, last paragraph

The concerns regarding the source of plutonium in the sediment of Great Western Reservoir has resulted in modifications to the EIS. With regard to averaging the sediment activity levels from your 1973 monitoring report, there is no statistical reason not to average these numbers provided a statistical description of the numbers is provided. A stratified analysis of the data would reduce the variance but not change the mean value. The question as to whether the plutonium activity in the Great Western Reservoir sediment results from waterborne discharges, airborne deposition, or surface runoff appears to be debatable. We have sediment core data from 12 areas taken by Battelle Northwest Laboratories in 1974 which do not show any significant change in activity from 1972 (the period of pond reconstruction) to 1974. Hence, while we acknowledge the EPA data showing increased sediment activity levels from 1970 to 1973, we feel that the extent to which Great Western Reservoir sediments have been affected remains in doubt. Finally, concerning the plutonium levels in impoundments not connected hydrologically to the Plant, we agreed that the conclusions on the top of p. 2-103 of the DEIS is not supportable by existent soil activity level data; hence, we have deleted this paragraph.

Page 2-104, 2nd paragraph

The answer to Part (a) of this question is incorporated into the answer for Specific Comment 9. Section 2.3.9.4 of the FEIS (Volume I) has been changed to show uranium-in-water data collected during March to June, 1978, from Rocky Flats raw water which was received from Ralston Reservoir. These data indicate that the uranium concentration in Ralston Reservoir and subsequently in Rocky Flats raw water and effluent water varies considerably.

During this period, both Rockwell and the Colorado Department of Health (CDH) noted dramatic increases in total long-lived alpha activity in Rocky Flats waterborne effluents. It was determined that this increase was due to elevated concentrations of uranium in the incoming raw water from Ralston Reservoir. For example, in March 1978, two samples averaged 61 pCi/l; in April 1978, four samples averaged 17 pCi/l, and in May, the uranium concentration had dropped to an average of 2 pCi/l.

Page 2-105, 3rd paragraph

As noted in the statement in question, subsequent water sample analyses do not show these high concentrations of plutonium (see Report RFP-ENV-76) with plutonium activity levels for 1976 all being below 0.5 pCi/l. Wells are now pumped before sampling and are allowed to refill to ensure that the sample obtained represents formation water. Well covers are now sealed to prevent contamination from surface materials such as soil with abnormal plutonium concentrations. This material is discussed in Section 2.3.5.3.

Page 2-106, 1st paragraph

Environmental Protection Agency Reports 3 and 4 (Office of Radiation Programs, Montgomery, Alabama) indicate regional plutonium activity levels in water are 0.012.

Page 2-106, 1st and 2nd paragraphs

Numerous measurements of the plutonium concentrations in environmental materials from the Rocky Flats Plant site have been made; and many of these are referenced in the EIS. We cannot attempt to analyze Dr. Harley's intent.

Page 2-106

The section in which the statement appeared is revised in the FEIS and the statement is not used, however Chapter 3 and, especially, Table 3.1.2-11 demonstrate its validity.

Regarding the question of relative mobility of americium-241 and plutonium-239, there is some evidence in Report HASL-318 that americium-241 moves downward in soil more readily, possibly due to increased solubility of weathered americium-241. In this case, the americium-241 may adhere to the clay soil fraction and be more resuspendable from this viewpoint but may for the same reason penetrate more deeply into the soil and thus be less accessible to resuspending disturbances.

Page 2-106, 3rd paragraph

As indicated in the answers to previous questions (e.g., Chapter 1, General Question 3), the FEIS has emphasized radionuclide release evaluations in terms of specific organ doses (cf Sections 3.2.4 and 3.3.2.2 of Volume I and Appendix F of Volume II). Also by comparison with Appendix F, it can be seen that all the pathways (with the exception of resuspended dust from contaminated clothing or house interiors) mentioned in your question have all been considered. Plutonium, americium, and curium sources are included for routine operation and accident purposes. Background radiation doses to specific organs are stated, not as justification for any Plant-originated radiation effects but as numbers which provide a frame of reference.

Page 2-114, 1st paragraph

The statement in question has been deleted. It was intended to imply only that the principal hazard is from chemical toxicity. The radiation effect of depleted uranium is, however, considered in the dose calculations (cf Table 3.1.2-1 in Volume I of the FEIS).

Page 2-116, last paragraph and Page 2-117, last paragraph

The FEIS is corrected in Section 2.5.6.1 of Volume I to clarify the plutonium recovery process.

Page 2-152

The information in Section 2.6.10.1 is modified to make it apparent that the material shipment information is historical only (current to April 1978) and has no relationship to the expected future rate of shipments.

Page 2-176

Section 2.7.1 of the FEIS (Volume I) is clarified to emphasize the fact that, consistent with DOE's ALARA (As Low As Reasonably Achievable) policy for effluent control, no tritium control system other than the HEPA filter banks are considered necessary.

Page 2-180, Table 2.7-3

The tritium releases listed in Table 2.7.2-3 are those measured in stack effluents. Some tritium does enter the atmosphere from the solar evaporation ponds. However, ambient air sampling for tritium in water vapor at three on-site locations near these ponds has shown concentrations of tritium that are indistinguishable from off-site measurements made at a location west and a location east of the Rocky Flats Plant.

Page 2-181

Table 2.7.2-4 has been corrected in that "Th-234" is replaced by "U-234." Also, the U-236 activity should be 2.5 x 10^{-7} Ci/g and "Pa-234" in both table locations should read "Th-234."

Page 2-182 and 2-183, tritium emissions

The limit of 100 Ci per year tritium release (cf Section 2.7.2, Volume I of the FEIS) has been replaced by a requirement that no Plant-building tritium-stack effluent concentration may exceed the DOE RCG for exposure of the general public (0.2 $\mu Ci/m^3$). The administrative limit of no more than 0.1 Ci per month of tritium in materials processed at the Plant will also be met. The limit will be reviewed whenever production requires.

Page 2-184, 2nd paragraph

This comment has been addressed in Section 2.7.3.1 (Volume I) where it is noted that all process waste lines containing radioactivity be doubly contained and equipped with leak detectors.

Page 184, last paragraph

The DOE limit (ERDA Manual Chapter 0524, Annex I) of 1667 pCi/l for soluble plutonium in water accessible to the general public is the limit which is applied to the water released to the unlined ponds. This change has been made in Section 2.7.3.1 of the FEIS (Volume I).

Page 2-186

The volume of liquid transferred into the solar evaporation ponds is recorded on a monthly basis. A distinction between losses from evaporation and losses from seepage is not available.

Page 2-200, 3rd paragraph

The answer to this question is covered by the response to Specific Question 11 (part b) on Chapter 2. Briefly, it is felt that evidence exists to support the statements made concerning the preponderance of total alpha activity in water samples having its origin in natural uranium concentrations. However, in this case (cf Section 2.9.1, Volume I of the FEIS) the statements in question have been deleted as they were not particularly relevant to the topic being discussed.

Page 2-206

Table 2.9.3-2 is changed to show that uranium in metal form decomposes, and in oxide form it is insoluble.

Page 2-207, 2nd paragraph

Section 2.10, Volume I of the FEIS has been modified to more correctly reflect the degree of EPA involvement in Plant-related monitoring efforts.

Page 2-211

Dr. E. P. Hardy of EML (formerly HASL) was contacted to obtain information regarding the HASL data mentioned in this comment. Dr. Hardy indicated that to his knowledge, HASL data does not show an orographic influence which would yield plutonium-239 concentrations 10 to 100 times that measured elsewhere in the northern hemisphere. It is therefore felt that it would not be appropriate to discuss the possibility of such a phenomenon in this EIS.

Page 2-219 and 2-220, Table 2.10-3

Uranium is monitored in Rocky Flats treated drinking water when it is necessary to do so, as required by the EPA drinking water standards. However, as uranium is measured in all Plant discharges, we feel that there is no useful purpose in measuring the uranium content of sewage plant influent samples. Table 2.10.2-1 (Volume I of the FEIS) has been modified to list the 1978 monitoring program which includes the uranium measurement in Rocky Flats raw and drinking water.

Page 2-228

The National Interim Primary Drinking Water Regulations are applicable to finished waters after treatment, rather than raw water reservoirs. However, since tritium is not expected to be removed by typical water treatment processes, the FEIS (Volume I) will include in Section 2.10.2.3 a reference to the EPA tritium standard of 0.02×10^{-3} μCi/ml.

Pages 2-230 and 2-231

In reply to your comment on sediment sampling, the FEIS will not include programs still in planning stages. With respect to the Plant's own monitoring programs, an annual review is made, and sediment sampling will be considered in the planning of upcoming programs. Also, special studies on sediments are discussed in Section 2.3.9.4 (Volume I) of the FEIS. Extensive water data show that the Broomfield municipal water is well within the limits of applicable regulations.

Chapter 3, General Comments

1. The radiation monitoring and safety programs, as they pertain to the occupational exposures of Plant employees, are described in FEIS (Volume I) Sections 2.5.1.2, 2.5.3.2, 2.5.6.3, and 2.6.2.6. Radiation exposure histories are given in Volume II, Appendix H.

2. At this time, no on-site impact associated with operation of the liquid recycle system is anticipated; hence, it is not appropriate to include a section on this topic. A general description of this system appears in Section 5.2.3 (Volume I) of the FEIS.

Chapter 3, Specific Comments

Page 3-6, 1st paragraph

There will be no change in the Plant water monitoring program with the exception that the monitoring frequency of the B-series ponds (cf Section 2.3.5.1, Volume I of the FEIS) may be reduced as no downstream discharge through this pond system will then be required. There is no attempt to assess events associated with future projects in the FEIS.

Page 3-27

The statement in question has been deleted from Section 3.1.2 of the FEIS (Volume I). It is debatable and serves no useful purpose in that section or in the subsequent dose analysis.

As described in revised Appendix F (Volume II of the FEIS) the radiation dose to off-site persons by all radionuclides handled at the Plant, via the food chain pathway, is considered. The best available data on concentration factors and ratios are employed. Discussion of impacts on plant and animal populations is contained in a report by the Colorado State University which appears as Appendix A-2, in Volume II of this FEIS.

Page 3-29

The requested analysis is included in the FEIS (cf Section 3.1.2.3 of Volume I) where it is noted that doses are computed (including effects from past Plant releases) for 70 years of Plant operation for a person living for 70 years in the Plant vicinity.

Page 3-45

There was an error in the DEIS. The FEIS (Section 3.2.2.3, Volume I) has been amended to read: "Further, the pond capacities are small, and even if the entire contents (excluding the sediments) of the B-series ponds were to be released...."

Page 3-57

The assumptions associated with the postulated fire accident (cf Section 3.2.2.4, Volume I of the FEIS) are as follows:

1. A glove box contains 3 kg of massive form plutonium metal, 1 kg of plutonium metal chips, and 5 to 6 gallons of coolant oil.

2. A cooling oil leak occurs outside the box, the leaking oil ignites, and the resultant fire breaches the box and burns the oil and plutonium therein contained.

3. Two and one-tenth percent of the burning plutonium is airborne.

4. Half of the airborne plutonium deposits on walls, ceiling, ductwork, and other surfaces.

5. The other half of the airborne plutonium is incident on the two-stage room filters.

6. The first-stage filter has a 99.9% filtration efficiency for the incident airborne plutonium, and the second-stage filter has a 99.8% filtration efficiency for the plutonium which penetrates the first-stage filter.

The first assumption is based on criticality limitations routinely imposed on the contents of production glove boxes. A modification of the wording in Section 3.2.2.4 has been made to clarify this. The second assumption is arbitrary and does not need justification. The third is very conservative and is adequately covered by the original DEIS wording. The fourth assumption is realistic and consistent with the assumed deposition velocity of 0.001 m/sec (cf Appendix F, Volume II) for plume depletion and the deposition area available in typical production buildings. These facts are also noted in FEIS Section 3.2.2.4.

The fifth assumption is arbitrary but conservative, as any plutonium exhausted through the glove box would see four-stage filtration. The last is realistic and consistent with the measured HEPA filter penetration efficiencies of 0.03% for 0.3-μm DOP particulate (cf FEIS, Section 2.7.1.2). An appropriate reference to this section is made in the FEIS.

Page 3-75

As noted in the answers to earlier questions (e.g., General Comment 1, Chapter 1), the FEIS emphasizes organ dose commitments and avoids direct comparisons for the purpose of Plant location justification. The number quoted here (18.2 man-rem and 72,000 man-rem) are not quoted in the FEIS as organ doses are given. The numbers in question here are (1) 50-year whole body dose commitments to the Denver area population associated with accident risks from one year of Plant operation, and (2) the 50-year whole body dose commitment to the Denver area population if the postulated maximum credible accident should actually occur. The 50-year dose commitment is defined as the integrated radiation dose a person will receive over 50 years from a given exposure (either chronic or acute).

Page 3-81

The statement that dose rates at 6 feet from outside surfaces of transport vehicles never exceed 1 mrem/hour is not documented. The dose rate measurements taken are on the outside surfaces of the tractor-trailers and ATMX railcars transporting waste. Those readings have not exceeded 1.0 mrem/hour. Dose rate measurements are not taken at 6 feet from other vehicles. However, the argument can be made that since the Plant internal limit for packages is 10.0 mrem/hour at 3 feet from the surface of the package, distance and vehicles walls would decrease the dose rate at 6 feet from the vehicle to less than 1.0 mrem/hour.

For conservatism, 10.0 mrem/hour at 6 feet from the transporting vehicle is used in the FEIS for all external radiation exposure calculations, including onlookers.

Page 3-83

The transportation accident analysis (Section 3.3.2.2, Volume I, and Appendix F, Volume II of the FEIS) rely on NRC (Nuclear Regulatory Commission) transportation accident assessments in which the principal parameters are containers or package-type and accident severity. The release fractions (Table F-47 of Appendix F) are independent of material form but are based on experimental observations on powdered magnesium oxide, and hence should be representative of plutonium oxide release fractions.

Page 3-90

Gram amounts and kilogram amounts of plutonium will differ by at least an order of magnitude and as the same shipping precautions are taken with any quantity that is shipped, neglecting "gram amounts" accidents will always mean neglecting at most a second-order effect.

Chapter 5

The most recent soil data from CDH and Rocky Flats indicates that about 1000 acres of off-site land may contain plutonium greater than 2 d/m/g in the top 1/8-inch of soil. The same data indicate that about 3000 acres of on-site land may contain greater than 2 d/m/g of plutonium in the top 1/8-inch of soil. The data are in the Colorado Department of Health Annual Reports on Rocky Flats and in unpublished reports connected with the land litigation in Federal District Court.

Appendix F

Page F-1

In the revised Appendix F (Volume II of the FEIS), this equation and the associated terms are clarified and revised.

Page F-3

For routine releases from normal Plant operations, finished water samples from the water treatment plant for the reservoir are used to estimate dose; consequently, the results of all past releases are considered, and also the level of water in the reservoir would not be a factor. For accidental releases (e.g., the postulated impoundment failure) the dose calculations are based on plutonium activity concentrations in the reservoir water computed by the accidental input of plutonium activity divided by the mean reservoir volume. As the accidental activity input (87,000 μCi) is considerably greater than the estimated plutonium content of the reservoir, and as the reservoir water turns over annually, the neglect of past releases in this calculation is unimportant. Also, no credit is taken for removal of plutonium by the water treatment system or for the protective actions which would be taken in the event of such an accident (cf Section 2.11.4, Volume I of the FEIS).

In regard to the difference in solubility and gut uptake fraction of surficially deposited as opposed to systematically incorporated material in plants, the EPA recommended factor of 10^{-4} is assumed in both cases. As well over 99% of the activity associated with plants is surficial, and as organ doses due to the food ingestion pathway are at least an order of magnitude less (cf Table 3.1.2-5, Volume I of the FEIS) than the inhalation pathway, any nonconservatism arising from this approximation would be a fourth order effect at most.

In regard to the plant uptake factors for americium versus plutonium, the same value (2.5×10^{-4}) is used for both elements. These values are those incorporated in the FOOD code data base (cf Section 3.1.2.3, Volume I of the FEIS) and include the best data presently available on soil-plant concentration ratios.

Page F-4

As noted in revised Appendix F (Section F.1.1.1, Volume II of the FEIS), the dose factors used to determine tritium doses are those recommended in Report NUREG-0172, which includes skin and lung absorption.

Page F-6

The soil density units error noted is corrected in revised Appendix F (Volume II of the FEIS).

Page F-16

The doses to reference man are computed in revised Appendix F (Volume II of the FEIS) using data from ICRP-23.

Appendix I

Page I-1-32

Both Type I and II distributions appear to fit the data reasonably well. Justification for using the Type II distribution is given in Appendix E-2 (Volume II of the FEIS) as "a commonly made assumption" and more definitively as "has been used more often with wind data, and since it also gives larger probability values, the conservative assumption that the Type II model is the better one will be made in this study."

As noted, five years of data is minimal since winds, like temperature, may be cyclic with a long period. However, the uncertainty of extrapolation to the stated extremes exceeds the effect of the particular model used. Unfortunately, the suggestion of using Denver data to enhance the analysis is not helpful as studies indicate there is no correlation between winds in Denver and those at the Rocky Flats Plant.

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION EIGHT
BUILDING 40, DENVER FEDERAL CENTER
DENVER, COLORADO 80225

February 27, 1978

IN REPLY REFER TO:
HED-08

Mr. W. H. Pennington
Director, Office of NEPA Coordination
Department of Energy
Washington, D.C. 20545

Dear Mr. Pennington:

Thank you for the opportunity to review the draft environmental impact statement for the Rocky Flats Plant Site at Golden, Colorado.

The alternatives presented (termination, relocation, no change, and completion of modifications currently underway) will have little or no impact upon the need for highway improvements in the vicinity of the Rocky Flats Plant. In addition, the transport of hazardous materials appears to have been adequately addressed, and therefore, we have no substantive comments to add.

Sincerely yours,

F. A. Allison

for Daniel Watt
Regional Federal Highway Administrator

DOE STAFF RESPONSE TO THE LETTER FROM DANIEL WATT, FEDERAL HIGHWAY ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

This letter requires no staff response.

We wish to thank Mr. Watt and the Federal Highway Administration for their interest in the DOE activities at the Rocky Flats Plant.

PERTINENT ITEMS
RELATIVE TO THE
PUBLIC HEARING
HELD IN
DENVER, COLORADO
ON MAY 24 AND 25, 1978

ACTIONS RELATIVE TO PROVIDING A PUBLIC HEARING ON THE ROCKY FLATS PLANT SITE DRAFT ENVIRONMENTAL IMPACT STATEMENT, ERDA-1545-D

A number of those who submitted comments on the Rocky Flats draft Environmental Impact Statement recommended that there be a public hearing to discuss the primary issues surrounding that document. Accordingly, it was decided in early 1978 that a hearing would be held. A Federal Register Notice was published on April 24, 1978, announcing that a public hearing would be held and provide information about that impending hearing. This notice was sent to all who had received copies of the DEIS prior to that date.

Preliminary to the public hearing a staff statement was prepared which summarized comments received and contained the proposed treatment of the comments. This staff statement was made available prior to the hearing and sent to all commentators on the DEIS and to those who had indicated an interest in the public hearing. This staff statement, taken from the public hearing record, is included herein, starting on page 395.

The hearing was held on May 24 and 25, 1978, at Denver, Colorado, and there was contributions at that hearing by 47 non-DOE participants who presented statements and/or materials for the record. For the purpose of this hearing, the services of a Presiding Board were arranged with a Presiding Officer, John B. Farmakides to be assisted by McDonald E. Wrenn and L. Trowbridge Grose. A complete hearing record was prepared and published and placed for public inspection in DOE reading rooms at various locations. The transmittal letter and statement of the Presiding Board taken from the public hearing record are included herein, starting on page 434.

Staff responses to the recommendations of the Hearing Board are included starting on page 459.

STAFF STATEMENT IN RESPONSE TO COMMENTS RECEIVED

on the

DRAFT ENVIRONMENTAL IMPACT STATEMENT

ROCKY FLATS PLANT SITE

Golden, Colorado

(ERDA-1545-D, September 1977)

April 1978

U.S. Department of Energy

TABLE OF CONTENTS

1. Introduction

The Draft Environmental Impact Statement (DEIS) on the Rocky Flats Plant Site (ERDA-1545-D) was issued for review and comment by the Energy Research and Development Administration (ERDA) on September 23, 1977, The Department of Energy (DOE) assumed the responsibilities of ERDA on October 1, 1977, including the operation of the Rocky Flats Plant.

The Rocky Flats Plant is operated by the DOE as a part of its National Defense program. The Plant's objective in this program is to produce nuclear weapons components in a safe, environmentally acceptable manner. Certain limited energy related activities are also conducted at the site. The environmental impact statement evaluates the environmental impacts of continued operation of the Plant and of various alternatives to such a continuation and will provide environmental input to decisions on the continuation of ongoing and proposed future activities at the Rocky Flats site.

The Rocky Flats Plant, facilities and site, are described in the DEIS in detail with regard to natural and manmade features including its operations, environmental monitoring, emergency plans, safeguards, transportation, and the impacts of each of these on the environment. Potential accidents are described and actions which mitigate adverse impacts are discussed.

The evaluations of environmental impacts in this statement are based upon extensive environmental monitoring and special studies which have been conducted over the past 25 years. The cutoff date selected for inclusion of fully evaluated factual data in the Final Environmental Impact Statement (FEIS) is December 31, 1977.

A notice of intent to prepare this statement was placed in the Federal Register June 5, 1975, and comments and suggestions solicited for consideration in the preparation of the draft statement. Comments from 36 individuals, agencies, and organizations were received and considered in preparing the DEIS.

After the issue of the DEIS, a total of 29 formal comment letters were received as a result of public review. The DOE staff has reviewed the comments which were received, and has prepared this statement, to identify outstanding issues and discuss how the staff proposes to address these issues. The comments received were placed into ten general categories. These issues and the proposed DOE responses are discussed in the following sections. Those detailed editorial-type comments such as technical accuracy of data, spelling, grammar, etc., will be corrected where appropriate in the FEIS, which is expected to be distributed in early 1979. Reports and documents which were included as appendices in the DEIS and which are available to the public will be deleted from the FEIS to reduce its overall size.

2. Mission and Location of the Rocky Flats Plant

Comment:
There were several comments requesting that the EIS evaluate the environmental effects of nuclear war, the building and utilization of nuclear weapons, alternatives to nuclear weapons, and that the EIS be expanded in general so as to constitute an environmental impact statement for the United States nuclear weapons program.

Response:
This environmental impact statement on the Rocky Flats Plant Site is designed to serve as input for decisions on the continued operation of the Rocky Flats Plant site. The site is used primarily to assist in fulfilling U.S. nuclear weapons production requirements that are imposed on DOE by the Congress and the President as a part of the overall national defense policy. The statement does not assess the environmental impacts of the U.S. policy to produce nuclear weapons but rather focuses on the site specific environmental impacts of conducting nuclear weapons production activities at the Rocky Flats Plant and reasonable alternatives for the conduct of such activities.

U.S. defense policy and nuclear weapons requirements in support of that policy restrict alternatives as to DOE's weapons production activities. However, the converse is not true. DOE's production of nuclear weapons does not foreclose options with respect to the overall U.S. national defense program. Consequently, it is the DOE staff view that meaningful decisionmaking on the continued operation of the Rocky Flats Plant site does not require a consideration of the issues associated with maintenance of a nuclear weapons stockpile or the possible environmental effects that might result in the event of a nuclear war.

Whether a separate NEPA review of the broad issues associated with U.S. nuclear weapons policy and alternatives thereto would be a useful decisionmaking tool currently is under consideration.

Commenters desiring more information on the subject of effects of nuclear weapon detonations are referred to two recent publications: (1) National Research Council, Committee to Study the Long-Term Worldwide Effects of Multiple Nuclear Weapons Detonations, Assembly of Mathematical and Physical Sciences, "Long-Term Worldwide Effects of Multiple Nuclear Weapons Detonation," National Academy of Sciences, Washington, DC (1975), and (2) Samuel Glasstone and Philip J. Dolan, "The Effects of Nuclear Weapons," Third Edition, USDOD and USDOE, 1977.

Comment:

There was a request that the EIS be expanded to assess the possible effects the Rocky Flats Plant might have on the use of adjacent lands for commercial and/or industrial purposes.

Response:

When the Plant site was selected in 1951, it and the surrounding lands were used for grazing. In the 1972-1976 period, an additional belt of land around the original site was acquired as a buffer zone. In the meantime, there has been substantial residential development several miles east of the Plant and some commercial development to the northwest. Immediately south of the Plant, the land is still used for grazing although about a mile further south of the Plant boundary there have been a few commercial developments. As is noted in pages 1-16, 1-17, and 7-1 thru 7-5 of the DEIS, the lands immediately adjacent to the Plant are zoned for commercial and agricultural use. The operation of the Plant does not limit the usefulness of the adjacent lands for these purposes. However, because of the Plant's distance from other commercial and industrial areas in the surrounding communities, it is expected that only limited industrial or commercial development will occur in the immediate vicinity of Rocky Flats Plant in the near future, whether or not the Plant is in operation.

Comment:
There was a request that additional information be furnished on the prospective loss of state and local tax revenues for the Plant site and the surrounding vicinity which may be expected as a result of Rocky Flats' existence.

Response:
This subject is discussed in Section 4.3 of the DEIS. To develop this issue further would involve such a degree of speculation as to the types and values of businesses and/or residential developments which might locate in the area in the absence of the Rocky Flats Plant, as well as with respect to whether such developments would not otherwise still locate in the same governmental areas, that any conclusions resulting therefrom would be of questionable merit.

Comment:
It was requested that consideration be given to moving the plutonium-related activities from Rocky Flats Plant. Another comment questioned the intended use for the Rocky Flats Plant site after weapons production use is ended. This comment also requested that a commitment be made with respect to final decontamination of the site and facilities. It was asked that it be acknowledged that there would be a lessening of environmental effects if the Plant were to be relocated to a less populated area. It was also suggested that relocation of the Plant totally underground be considered as a possible alternative.

Response:
The questions of relocation of the Plant and termination of operations are addressed in Section 9.4 and 9.5 of the DEIS. A change of mission which would not involve the handling of plutonium or a similar radioactive material, would require the same actions to make the plutonium-handling facilities safe in a condition of disuse that would be required for termination of operations.

If a decision were made to cease weapons production at Rocky Flats, proposed future uses of the Plant site would be subject to NEPA review at that time. Included within that review would be a detailed discussion of decontamination of the Plant site and facilities. Any attempt to discuss these issues in detail at this time would be too speculative to be meaningful.

Underground relocation of the Plant is but a variation of Plant relocation and, in that sense, is already discussed in the DEIS. In the FEIS, mention will be made of underground relocation in that context. Placing the Plant underground would decrease the potential risk from aircraft accidents, high winds, tornadoes, etc. Other risks, however, would not be reduced and the cost would be substantial.

3. Health Effects and Dose Calculations

Comment:

There were several comments requesting that a more comprehensive discussion of health questions be included in the EIS. These included requests for discussion of the cancer incidence and of ill health among past and present workers and their families, of long-term health and genetic effects from exposure to radioactive materials, of the synergistic carcinogenic effects of smoking and exposure to inhalable radioactive materials, and of data from the EPA's current study regarding plutonium uptake by residents in the vicinity of Rocky Flats Plant.

Response:

The health effects from radiation exposure long have been the subject of considerable investigative effort.

Studies of survivors of the atomic bombings in Japan have disclosed definite relationships between their exposures to radiation and the incidence of certain diseases such as leukemia. Likewise, studies of radiologists and other workers exposed to substantial radiation doses have added information about radiation-related health effects. On the other hand, investigations to establish similar relationships between extremely low-level chronic radiation exposure and health effects have not been as productive.

At this time, epidemiological studies of low-level radiation exposure effects are being expanded to cover all populations of past and present radiation workers over which DOE and its predecessor agencies have had cognizance. In examining the records of these population groups there will be review of radiation exposure information and of certain other activities or conditions that also might contribute to adverse health effects. It will take many years before the current studies can be expected to produce reportable results.

With regard to the specific populations at and around the Rocky Flats Plant, to date DOE is not aware of any cases of ill health having resulted from radiation exposures due to Rocky Flats Plant operations. Colorado Department of Health has estimated that imperceptibly few cases of ill health would be expected due to those radiation exposures. The Los Alamos Scientific Laboratory is conducting a study of plutonium workers in a number of facilities including Rocky Flats Plant to evaluate what effect, if any, this material has upon their health and to analyze the causes and rates of cancer mortality in their population groups. It will extend through the lifetime of the workers, and will assess any long-term consequences of occupational exposures.

Genetic effects of exposure to transuranics are discussed in Appendix G and in the body of the DEIS, pages 3-40 through 3-43, 3-78, Section 3. The information presented is the most current available.

Possible synergism between inhaled alpha emitting radionuclides and other materials (e.g., cigarette smoke) is currently under experimental investigation. The most complete epidemiological study to date which considered exposure both to alpha emitting radionuclides and cigarette smoke was reported by Lindin, Wagoner, and Archer.[1] Smoking history also will be one of variables considered in the Los Alamos study of plutonium workers referred to above. The suggestions of Martell and of Gofman were discussed on pages 23 and 24, respectively, of Appendix G of the DEIS. In addition, several publications[2,3,4,5] have addressed the views of Gofman. These comments will be included in the FEIS.

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[1]Lindin, F. E.; Wagoner, J. K.; and Archer, V. E., "Radon Daughter Exposure and Respiratory Cancer Quantitative and Temporal Aspects," Joint Monograph No. 1, National Institute for Occupational Safety and Health and National Institute of Environmental Health Sciences, Public Health Service, U.S. Department of Health, Education, and Welfare, 1971.

[2]Bair, W. J., "Review of Reports by J. W. Gofman on Inhaled Plutonium," BNWL-2067, Battelle Pacific Northwest Laboratories, Richland, Washington, October 1975.

(Continued)

Another study is underway to investigate the uptake of plutonium among residents in the Rocky Flats Plant vicinity. An investigator with the University of Colorado Medical School is conducting this research for EPA. Any published data from these studies will be referenced in the FEIS.

Comment:
There should be consideration of the assertion that risk estimates were under-estimated by a factor of 10.

Response:
The basis of the risk estimates is given in Section 3 and Appendix G, and includes the report of the Advisory Committee on Biological Effects of Ionizing Radiation to the National Academy of Sciences - National Resource Council. While there may be differences of opinion on specific issues and on parti.. lar data or its interpretation, the above reference is considered by the gene· scientific community to be the most authoritative statement which, togethe. with other information discussed in Section 3 and Appendix G, provides a reasonable basis for the estimation of risk.

(Continued)

[3]Healy, J. W.; Anderson, E. C.; McInroy, J. F.; Thomas, R. G.; and Thomas, R. L, "A Brief Review of the Plutonium Lung Cancer Estimates by John W. Gofman," LA-UR-75-1779, Los Alamos Scientific Laboratory, Los Alamos, New Mexico, October 1975.

[4]Richmond, C. R., "Review of John W. Gofman's Reports on Health Hazards from Inhaled Plutonium," ORNL/TM-5257, Oak Ridge National Laboratory, Oak Ridge, Tennessee, February 1976.

[5]Snipes, M. B.; Brooks, A. L.; Cuddihy, R. G.; and McClellan, R. O., "Review of John Gofman's Papers on Lung Cancer Hazard from Inhaled Plutonium," LF-51, Inhalation Toxicological Research Institute, Lovelace Foundation for Medical Education and Research, Albuquerque, New Mexico, September 1975.

Comment:
There should be discussion of the hot particle thesis promoted by the Natural Resources Defense Council.

Response:
The hot particle theory was considered (DEIS, ERDA-1545-D, pages 3-40, G-23) in the preparation of the DEIS. The hot particle thesis has been discussed extensively in the open literature with the widespread conclusion that the hot particle hypothesis is without merit. The commenter is referred to DEIS, ERDA-1545-D, page G-33, and references 53, 54, and 55; and to a more recent publication, "Health Effects of Alpha-Emitting Particles in the Respiratory Tract," Report of Ad Hoc Committee on "Hot Particles" of the Advisory Committee on the Biological Effects of Ionizing Radiation, National Academy of Sciences - National Resource Council, October 1976, published by Office of Radiation Programs, U.S. Environmental Protection Agency, Washington, DC, EPA 520/4-76-013. Based upon these opinions, the spatial averaging of doses to the entire lung is considered appropriate. No further discussion of this issue will be included in the FEIS.

Comment:
One commenter requested that the FEIS discuss the alleged increased leukemia death rates around Rocky Flats.

Response:
An investigator from the Denver locality has suggested (no published papers) that the incidence of leukemias and lung cancers in the general public in the Rocky Flats vicinity of Jefferson County, Colorado, is greater than for other locations in Jefferson County.

Because this assertion had been made, an epidemiologist with the Colorado Department of Health randomly sampled health data on two Denver residential areas remote from the Rocky Flats Plant and compared the incidences of leukemias and lung cancers in those two areas with the leukemia and lung cancers for the area around the Plant. This comparison (unpublished) disclosed that the leukemia and lung cancer death rates for these other Denver residential areas actually were higher than for the nearer area, for which the increased leukemia and lung cancer rates had been alleged. Leukemia incidence in Colorado is 8.7 per 100,000 (average of white males and white females). In Jefferson County this average rate is 6.8. (Reference: U.S. Cancer Mortality by County, USDHEW, Washington, DC 1974.)

Demographic studies of populations near other nuclear facilities at various locations in the United States similarly have failed to establish adverse health effects such as various types of cancer, cataracts, central-nervous-system disorders, fertility impairment, congenital defects, gene mutations, and chromosomal aberrations that might be related to radiation exposure. ("Trends in Public Health in the Population Near Nuclear Facilities, C. H. Patrick, Nuclear Safety, Vol. 18, No. 5, September-October 1977.)

These local and national data do not appear to support the allegation of increased leukemia death rates around the Rocky Flats Plant site. The allegation of increased leukemia death rates around Rocky Flats will be discussed in the FEIS.

Comment:

There were comments objecting that the calculated whole body doses from Rocky Flats Plant emissions were being compared to natural whole body background doses for the area. Commenters asked, instead, that organ doses be used, rather than whole body doses, in assessing the impacts of the Rocky Flats Plant emissions on the population. There was also a question as to the accuracy and basis of the conclusion, stated in the DEIS, that no person in the surrounding area receives from Rocky Flats Plant operations more than a fraction of one percent of the natural background exposure levels.

Response:
Organ doses were calculated and discussed in several places in the DEIS, including Section 3.1.2. The commenters concern regarding the comparison of calculated organ dose from internal emitters to the background whole body dose is justified. A more meaningful basis of comparison will be used in the FEIS.

Comment:
It was requested that a better description of the postulated pathways be used to determine maximum individual dose commitments, and clarifications of how radiological impacts were calculated, especially the equations and computer models used in the calculations. Also, it was requested that ingestion as well as inhalation be included when calculating the dose effects (it was suggested that dose calculations and health effects should include exposures to men, women and children, and also to pregnant women). There was also a comment that whereas only annual doses were given in the DEIS that dose commitments over a lifetime should be discussed and that there be discussion of whether conversion factors for bone dose calculations were underestimated in the DEIS.

Response:
The calculation of dose presented in the DEIS is thought to be reliable; however, the documentation associated with the calculation was not complete. In the FEIS, the dose will be recalculated, the methods of analysis will be described, and pathways will be specified. All input data, including source terms, uptake and transfer coefficients will be re-examined. Although inhalation is the primary mode of body uptake, ingestion is considered in the calculations when it contributes to the dose (see Section F-2 and F-3).

Dose calculations will be based on the "standard man" (ICRP, Publication 23), and will show relationships of the dose to the "standard woman" and "standard child." The FEIS dose calculations will be based on a 70 year dose commitment.

The entire dose calculation will be repeated, taking care to document thoroughly the calculation of source terms, pathways, assumptions, and equations. The lifetime cumulative dose commitment will be reviewed and discussed in the FEIS.

Comment:
There was a request that skin and lung absorption of tritium be discussed as a contributing pathway in the dose estimate.

Response:
The EPA study of tritium at the Rocky Flats Plant (Reference: "Investigative Report of the 1973 Tritium Release at the Rocky Flats Plant in Golden, Colorado," USEPA, 1975) asserts that this source of dose is negligible. The DEIS used the air as the pathway of assimilation (Table 3.1.2-1). Tritium contribution from both airborne and waterborne pathways will be included in the FEIS.

Comment:
It was suggested that dose calculations should include the expected population growth for the next 50 year and that dose affects for 50 years beyond the end of Rocky Flats Plant operations should be assessed.

Response:
Expected population growth to the year 2000 was used as a basis for the calculations in the DEIS. During the 25 years in which the Plant has been in operation, the demographic patterns of the area have changed substantially. The estimates for the growth in the next 25 years were based on data from the U.S. Census Bureau, but projections are very speculative. It is questionable whether growth data for a 25-year period beyond that given would provide meaningful decision-making information. Also, the dose per person is a more well-defined number that may be applied to whatever estimate of population is appropriate for any given year.

Comment:

It was requested that dose effects be assessed to a radius of 50 miles. Also, it was requested that more attention be directed to the impacts affecting the immediate area of Rocky Flats Plant rather than those affecting the metropolitan Denver population.

Response:

As described in Section 3 of the DEIS the maximum potential dose to residents would be at the Plant boundary, and the potential dose would decrease rapidly as the distance from the Plant increases. This concern for dose impacts over a range of distances from the Plant will be considered when the doses are recalculated.

Comment:

There were comments requesting that a summary of Rocky Flats employees' occupational exposures to all potentially hazardous materials (especially beryllium and the radioactive materials) be included in the FEIS.

Response:

In the specific instance of radiation exposure to Rocky Flats' employees, these data are included in Appendix H of the DEIS. With regard to nonradioactive potentially hazardous materials, especially beryllium, Rockwell International, the contractor operating Rocky Flats, monitors the work areas. The Plant is in compliance with all prescribed occupational health standards or limits (see Section 2.5.3). Information reflecting the Plant's programs with respect to employee exposures to potentially hazardous nonradioactive materials will be included in the FEIS.

4. Seismology

Comment:

Comments were received suggesting the possiblity that the Golden Fault may be active, and that this possibility should be discussed in the FEIS; suggesting that seismic design criteria for all buildings be included; and suggesting that additional information be included in the FEIS concerning the Rocky Mountain Arsenal deep well pumping operations.

Response:

Recent studies of the Colorado Geologic Survey (CGS) suggest that the Golden Fault, located in Golden south of the Plant site, is active. Evidence cited in the DEIS (Section 2.4.7.4) suggests that the Fault is inactive. The information presented by the CGS had not been published at the time the DEIS was being written. The FEIS will be updated to include these more recent studies. Also, an investigation by an independent contractor-consultant, an expert in the field of geology and seismology, is underway. This consultant will gather and evaluate all recent seismologic and geologic information that is pertinent to the Rocky Flats area. This information will be studied and evaluated for its relevance to the facilities at Rocky Flats. Since there are differences regarding the interpretation of the seismic and geologic information, efforts will be made to gather the opinions of all sectors of the technical community for inclusion in the seismic discussions. The purpose of the discussions will be to review current information, clarify terminology, such as "active" faults and "capable" faults as defined in 10 CFR Part 100, and to reach a consensus of opinion concerning the earthquake potential at Rocky Flats. This information will be included in the FEIS.

On the issue of seismic design criteria, Rocky Flats process facilities were built to codes and criteria in effect at the time of design and construction. A full review of older process facilities is underway and safety analysis reports (SAR) for them are in preparation to provide analyses of the facilities.

The information on the deep well pumping operations of the Rocky Mountain Arsenal is available in the open literature. (Reference: D. M. Evans, "Denver Area Earthquakes and the Rocky Mountain Arsenal Disposal Well," Mountain Geologist, Vol. 3, Number 1, pp. 23-36, 1966.) Additional information on the Rocky Mountain Arsenal wells, which are several miles away from the Rocky Flats Plant, will be included in the FEIS to the extent relevant to an evaluation of the impacts of the Rocky Flats Plant.

5. Emergency Plans and Safeguards

Comment:
There were comments questioning the adequacy of existing emergency plans to respond to catastrophic situations.

Response:
For many years, the Rocky Flats Plant operating contractors and the responsible Federal agency (now DOE) have had available to the State and local governments an excellent emergency plan for directing onsite activities during emergency situations. There has also existed a plan which interfaces with State agencies in the event that offsite communities might be involved. However, the plan for offsite actions by State agencies is the responsibility of the State of Colorado. This State plan is being revised, and is now receiving public comment. It is expected to be tested in the near future. The plan will be described in greater detail in the FEIS.

Comment:
There were several requests for a discussion of the possible threat and consequences of nuclear blackmail, sabotage, terrorist actions, and especially intentional aircraft crashes into the Plant's plutonium handling facilities.

Response:
Matters concerning safeguards are discussed in Section 2.12 of the DEIS. The DOE has an elaborately structured organization and procedure for responding to nuclear blackmail threats, sabotage and/or terrorist actions. The organization includes both DOE personnel and representatives from many DOE contractors. The procedure provides for rapid evaluation of the threat, investigation of the terrorists, and searching for and rendering safe the threatened hazard.

The plan has been tested and continues to be developed. The specific means and effects of possible sabotage, nuclear blackmail, or other terrorist activities and the many factors which are or would be used to preclude such occurrences or to mitigate the effects thereof are not appropriate for discussion in an EIS.

Comment:
There were several requests that a discussion of the adequacy of the safeguards and security systems be included in the FEIS.

Response:
The safeguards and security systems have undergone several changes to improve their effectiveness since the DEIS was written. The FEIS will include an updated general discussion of the adequacy of these systems.

Comment:
There was one suggestion that the accuracy of the nuclear materials inventory system be discussed.

Response:
A discussion of the accuracy and timeliness of the nuclear materials inventory system will be included in the FEIS.

6. Environmental Monitoring, Analysis, and Standards

Comment:

There were several comments requesting more detailed information and clarification on the monitoring of soil, air, and water.

Response:

Section 2.10 provides an exhaustive statement on the monitoring program. The FEIS will be updated to include data from these programs collected through the end of calendar year 1977. Tables listing the radionuclides measured and the appropriate laboratory minimum detectable amounts will be updated to reflect the most current monitoring and measuring conditions at the Rocky Flats Plant.

Comment:

There were two requests for a clarification of the various soil sampling methods and a comparison of the results which can be expected from each. These requests also called for a discussion of background levels of plutonium in soil and the use of these levels in evaluating the sampling data. There was also a request that acknowledgment be made of the limits of our understanding of the behavior of transuranics in soil.

Response:

Different methods of sampling are used for different purposes. A more detailed statement of soil sampling techniques and the results derived from them will be included in the FEIS. It also will include a discussion on the scientific community's present understanding of the behavior of transuranics in soil.

7. Accident Analysis and Control Systems

Comment:

There was a question about the efficiency of the Plant's filtration systems in collecting particles smaller than 0.3 microns.

Response:

The efficiency of the HEPA filter system (as used at Rocky Flats Plant) has been evaluated by researchers at Los Alamos Scientific Laboratory and by independent researchers. (Reference: Harry Ettinger, J. C. Elder, M. Gonzales, M. Tillery, "Performance of Multiple HEPA Filters Against Plutonium Aerosols," LA-5784-PR, Los Alamos Scientific Laboratory, Nov. 1974, and B. Schuster, T. Kyle, D. Osetek, "Multiple HEPA Filter Test Methods," LA-6852-PR, Los Alamos Scientific Laboratory, June 1977.)

The researchers whose publications are referenced below have reported that the efficiency of the filters increases for particle sizes less than 0.3 microns. This size is a minimum efficiency point in the curve denoting efficiency versus particle size. The research usually done on these matters uses particles ranging in size down to a minimum of 0.03 microns. (Reference: N. A. Fuchs, Mechanics of Aerosols, Pergammon Press; S. K. Friedlander, Smoke, Dust, and Haze, Wiley and Sons, New York, 1977; R. D. Cadle, The Measurement of Airborne Particles, Wiley and Sons, New York, 1975.)

Comment:

There was also a question as to the adequacy of the Plant's ambient air monitoring system to detect accidental releases.

Response:
The ambient air monitoring system, as generally described at Section 2.10.1 in the DEIS, is not intended to give early warning of accidental releases, but rather to confirm that the controls are effective. However, the stack alarm system and the constant air monitors located throughout all work areas where radioactive materials are handled, are highly adequate for alerting the Plant to accidental releases. (See DEIS, Section 2.10.1.1)

Comment:
There was a question about the size of the maximum credible accidents that were analyzed.

Response:
The analysis conducted to identify and evaluate maximum credible accident scenarios represents the use of the best available data and techniques. However, a reexamination of operational accidents will be performed to assure accuracy of the maximum credible accidents.

Comment:
There was a request for more detailed information with regard to process liquid waste discharge limits.

Response:
The attention of the commenter is directed to Section 2.7.3 of the DEIS. There are two waste water systems at Rocky Flats, the sanitary and the process liquid waste. The discharge limits used for the sanitary waste system are those established by NPDES Discharge Permit. In a totally separate system, process liquid wastes containing alpha emitters are treated to precipitate the radioactivity, and subsequently the liquid is evaporated. The discussion of the handling of process liquid wastes will be clarified in the FEIS.

Comment:

There was a request that the effects of spills of nonradioactive toxic materials be evaluated.

Response:

Potential accidents involving spills of nonradioactive materials will be discussed in the FEIS. The commenter is referred to Section 4.4.2.2.

Comment:

There were requests that greater detail be given on the process waste water piping system, with which to better evaluate the potential for contamination of the ground water.

Response:

The commenters' concern in avoiding possible ground water contamination is shared by DOE Staff. That concern resulted in the requirement that all process waste water piping systems be doubly contained. The outer containment guides any leakage from the primary pipe to a collection reservoir. Water sensing devices in these reservoirs alert personnel to the presence of a leak, so that it can be repaired and the leakage collected and sent to process waste water treatment. All process waste water pipes not already double contained are being replaced to provide double containment. This information will be included in the FEIS.

Comment:

The question arose as to whether the possibility of floods at Rocky Flats Plant and the postulated probabilities for ruptures occurring to the holding ponds or solar evaporation ponds had been discussed adequately.

Response:

Mention is made in two different sections of the DEIS that a surface water runoff control system is being planned for Rocky Flats Plant; the system would hold the total site runoff in a design 100-year storm. A storm which might compromise building containment is not credible. The surface water control project will be further defined in the FEIS. It is also noted that failure of the solar evaporation ponds would not lead to offsite release of hazardous materials, because the largest of the A series ponds has sufficient capacity to contain the material from all solar ponds. This also will be reviewed for technical accuracy of the potential release quantities.

Comment:

One commenter requested that the rationale for the lack of tritium control equipment on Plant exhaust systems be discussed in greater detail.

Response:

In one instance tritium was brought into the Plant inadvertently; however, there is no tritium in process at the Rocky Flats Plant. While there is no tritium control equipment on the Plant exhaust systems, the monitoring of the stack emissions has provided information confirming that there is no tritium in excess of normal background levels.

Comment:

One commenter asked for clarification on the assumptions used in postulating the accidental glovebox fire.

Response:

The postulated glovebox fire is based upon experience from plutonium fires that have been investigated by several researchers.

(Reference: Burning and Extinguishing Characterestics of Plutonium Metal Fires, R. E. Felt, Isochem Inc., August 1967. (ISO-756) A Review of Research on Plutonium Releases During Overheating and Fires, J. Mishima, Hanford Atomics Products Operation, August, 1964. (HW-38668) Probable Volatilization of Plutonium During a Fire, R. K. Hilliard, Hanford Laboratories Operation, General Electric Company, December 1, 1961. (HW-71743) Characteristics of Burning Plutonium, R. K. Hilliard, Hanford Laboratories Operation, General Electric Company, April 23, 1963. (HW-77531).)

Possible ambiguities in the assumptions made in the DEIS will be clarified.

8. Transport of Radioactive Materials in the Environment

Comment:
Two comments were received requesting that the effects of wind erosion be addressed.

Response:
These commenters seem to be concerned primarily with the effects on soil quality and topographic features as well as the movement of radioactivity from the Plant site. Pertinent information on wind erosion has been published in the open literature and will be discussed in the FEIS (F.W. Whicker, Radioecology of Natural Systems; Three-Year Summary Report for the Period May 1, 1974, to July 1, 1977, COO-1156-90, USERDA, August, 1977).

Comment:
One reader took issue with the atmospheric diffusion analysis, saying it does not present the worst case situation with respect to the possible spread of a radioactive release. A Pasquill E Category diffusion had been used, whereas the commenter considered the Pasquill F Category diffusion as posing the worst case situation.

Response:
Although the condition used (Pasquill E Category) would not be the worst case situation for a flat terrain, it is the worst case situation that could be reasonably postulated for the sloping terrain which exists at the Rocky Flats Plant. The discussion in the FEIS will be revised to clarify the foregoing.

Comment:

There was a request for more detailed information regarding milk animals, meat animals, and crops from within five and fifty miles of Rocky Flats.

Response:

Additional information on farm produce from within five miles of the Rocky Flats Plant and the related estimates of potential exposures to plutonium as a result of the ingestion pathway will be included in the FEIS. However, since the possible contribution of areas beyond five miles from Rocky Flats on this pathway would be insignificantly small, the collection of additional information would not be justified for the five- to fifty-mile zone.

Comment:

There was a request for a review of the estimate of offsite soil which would have to be removed to reduce contamination to acceptable levels.

Response:

Under the proposed EPA guidance for transuranic elements, there would be no requirement to remove or treat soil offsite. All of the present offsite soil levels of transuranics are acceptable under those proposed guides.

Comment:

There was a request that the status of accomplishment on removal of radioactive materials under the asphalt pad be discussed.

Response:

A project authorization has been supported in the DOE budget which will involve the construction of a facility to remove the contaminated soil from under the pad, concentrate the radioactive materials from the soil and prepare them for disposal. This intended project will be discussed in the FEIS.

Comment:

One commenter questioned the methods used to remove and dispose of sludge from the solar evaporation ponds.

Response:

The solar evaporation ponds are cleaned by draining the ponds, partially drying the sludge or mixing it with moisture absorbers, depositing it in appropriate shipping containers and sending it to a radioactive waste repository. After cleaning, the solar ponds will be used subsequently only for storing water which has been treated through the sanitary sewage treatment plant until it can be further processed through the reverse osmosis plant. After such treatment, it will be sent to another cleaned solar pond for subsequent use in the cooling towers. This will be reflected in the FEIS.

Comment:

There was a request that the FEIS include a discussion of the reclamation of the sediments in the onsite ponds which contain radioactive materials.

Response:

It should be made clear that neither the holding pond sediments nor the contaminated soils contain plutonium at levels sufficiently high to be reclaimed. However, the onsite holding ponds will be cleaned if it is deemed necessary to do so. In the event the sediments are removed, they will be collected in an efficient manner, using the best available control methods to prevent dispersal of the radioactive materials which are contained in some of them. The method of collection and disposal of the sediments would be aimed at controlling dispersal of radioactive materials to the lowest practicable level and would be similar to that used for soils containing radioactive materials and for the solar pond sludges. This will be discussed in the FEIS.

Comment:

There were questions as to the possibility of seepage from the solar evaporation ponds into the ground waters, seepage from the unlined holding ponds to ground waters, and seepage from the landfill into the ground water. One commenter requested that data on plutonium in ground water be included in the DEIS, especially from other areas in Colorado and surrounding states. One commenter alleged that the aquifer has been contaminated as a result of Rocky Flats Plant operations, and that more information is needed on the subsurface flow of the ground water through the Arapahoe Formation.

Response:

The seepage from the solar evaporation ponds surfaces on the slopes to the north of the solar ponds and is collected in ditches along the hillside. From there, it is pumped back to the solar ponds.

Seepage from the unlined holding ponds does occur. However, the soil under the ponds contains clay which acts to filter the undissolved particles of transuranic radionuclides. The clay also acts as an ion exchange medium which inhibits the movement of dissolved plutonium. This information is adequately covered in the DEIS in Sections 2.4.8.3 and 2.10.2.2.

The landfill contains several test holes which are sampled periodically. The data indicate that seepage contains tritium (which appears as a form of water) to a level of concentration slightly higher than observed in surface water in background locations. The landfill is lined with an impermeable clay liner over the bed rock Arapahoe Formation. Seepage from the landfill is collected in the drainage ditches along the base of the landfill and flows to a holding pond to the east of the landfill. The water evaporates by natural processes from this pond. No radioactivity has been observed in the pond water except for naturally occurring radium. This information will be provided in the FEIS. No tritium levels above ambient background have been measured by air monitoring equipment in the vicinity of the holding ponds.

Ground water is periodically monitored by means of 35 hydrologic test wells on site and the information from the program is reported annually in the environmental monitoring report. A summary of this data will be included in the FEIS. Similar data from remote areas of Colorado and surrounding states have not been obtained because the results from testing the onsite wells have not indicated a need to extend the monitoring program to these remote areas. The levels of transuranic radionuclides in the ground water in general have indicated no concentrations which are higher than the expected amounts present from worldwide fallout. Investigation of ground water quality will continue and a review of the locations of the test holes will be made.

Comment:
A comment was made requesting information on radioactivity in the sanitary landfill.

Response:
There is no intentional deposit of radioactive materials in the landfill, and there is an increased effort to control and monitor the refuse being deposited therein to assure that no radioactive deposits are being made. Inadvertent deposits of low-level items have been made, however. Data showing evidence of the radioactivity in the landfill will be presented in the FEIS.

Comment:
There was one request that the isotopic ratios for plutonium and americium be discussed as a function of time.

Response:
In Rocky Flats plutonium (see the DEIS, Table 2.7-2), the concentration of americium increases monthly at the rate of approximately 20 ppm, depending on isotopic content and age of the material. The FEIS will be amended to include this information and will be clarified where appropriate.

Comment:

One commenter requested clarifying data to support the conclusion drawn in the DEIS that the uranium concentration of the Plant's liquid effluent is almost totally attributable to natural sources.

There was also the statement that the conclusion drawn in the DEIS, Section 2.4.9, p. 2-101, regarding the source of contamination in the sediment of Great Western Reservoir, is in error. The DEIS suggests that judging from the concentration of the plutonium oxide in the sediment, the contaminant may have come from airborne sources, rather than from water discharges.

Response:

The data concerning these items will be reexamined and discussed in the FEIS in more precise terms.

9. Transportation

Comment:
Two commenters questioned the practice of shipping plutonium by air. The possible use of containers which have not been certified safe for an accident crash was of particular concern to them.

Response:
Since the DEIS was prepared, the DOE's regulations and policies governing the air shipment of plutonium have changed significantly. In accordance with the new regulations, Rocky Flats Plant has had no shipments of plutonium by air since March 1977. The discussion of the subject of Transportation will be updated in the FEIS.

Comment:
There was the question as to whether radioactive materials had been release to the environment at other facilities in the process of receiving materials from Rocky Flats.

The impact of a transportation accident which permits the release of plutonium oxide was suggested for consideration in the accident analysis discussion.

Response:
Radioactive materials being shipped from Rocky Flats are monitored to assure that materials are not being released. While detectable radioactivity was seen several years ago on the outside of some shipped containers, there had not been substantial release of materials nor has there been a recurrence of this condition. This will be discussed in the FEIS.

The Nuclear Regulatory Commission has recently published an EIS, "Transportation of Radioactive Materials by Air and Other Modes," NUREG-0170 (Vol. 1,2), December 1977. That EIS addresses the issues of material releases and effects from transportation accidents. The Rocky Flats Plant Site FEIS will reflect the pertinent conclusions presented in the NRC Statement to the extent that they relate to Rocky Flats Plant operations.

10. Energy Usage and Conservation

Comment:
Questions were received requesting more information on the irregular rate of use of fuels at the Rocky Flats Plant.

Response:
Fuel oil is used as a backup fuel for natural gas, which is purchased on an interruptible basis. This means that during periods of high usage or need by the citizens served by the Public Service Company, the Plant's gas-burning equipment is switched to the alternate fuel-oil. The gas which we would otherwise consume is then available for noninterruptible purposes such as homes and hospitals. Most fluctuations in natural gas and fuel oil usage at the Rocky Flats Plant are the result of natural gas availability. This information as well as actual fuel usage will be included specifically in the FEIS. The reader is referred to Section 2.6.6 of the DEIS.

Comment:
One commenter requested that the possibility of conversion of the steam plant to coal be discussed.

Response:
A study is underway to review the possibility of converting the steam plant to burn coal. The environmental aspects of this alternative fuel source for the steam plant will be discussed in the FEIS.

11. Miscellaneous Comments

Comment:

One commenter requested a discussion be included in the FEIS of permanent waste disposal for the transuranic wastes being generated at Rocky Flats.

Response:

The Rocky Flats Plant does not dispose of its radioactive wastes onsite; they are packaged and shipped to the DOE's storage sites in Idaho, Washington, and Nevada. EIS's have already been issued on Idaho and Washington waste management operations (reference: Waste Management Operations, Idaho National Engineering Laboratory, ERDA 1536; and Long-Term Management of Defense High-Level Waste, Hanford Reservations, Richland, Washington, ERDA 1538). The practice of sending radioactive wastes to the Nevada Test Site for storage or burial is included in an EIS on that site (Final EIS Nevada Test Site, ERDA 1551). A subsequent EIS(s) will consider the permanent disposal of transuranic wastes including those from Rocky Flats.

Comment:

One commenter requested that all sites of archaeological interest be reviewed and a report of the survey be summarized in the FEIS.

Response:

Possible archaeological sites have been reported and appropriate registry has been made. Recognition of this will be included in the FEIS.

Comment:

One commenter requested that mineral resource activity in the area surrounding the Plant site be identified and quantified.

Response:
The presence of Rocky Flats does not impact adjacent mineral developments, and is, therefore, not included in the DEIS. A brief discussion of the mineral resource activity in the immediate vicinity of the Plant site, which was provided by the commenter, will be included in the FEIS.

Comment:
There were requests for discussion of liability that is now being litigated in Federal District Court (Denver) with respect to alleged damages caused to lands surrounding Rocky Flats. There also were suggestions that a cost benefit/analysis be made of further expanding the buffer zone versus defending land lawsuits.

Response:
The EIS discusses the impacts of past, current, and future operations of the Plant on the surrounding environment. Since the specific question of Government liability for alleged damage to values of lands adjacent to the Plant is currently being litigated, it would be inappropriate to discuss this issue in the FEIS.

Comment:
Another commenter requested that assurance be given that DOE will commit Rocky Flats to using the best available technology to protect the health of the residents of Colorado.

Response:
The DOE has promulgated a policy known as "as low as practicable" (ALAP). That policy is practiced by DOE in regard to the operation of the Rocky Flats Plant. The use of the ALAP policy indicates recognition of the possibility of reducing radiation exposures by limiting releases of all materials to all media by the amount which can practicably be achieved. It is certain that as scientific understanding improves and present research is completed, even further emission reductions will be achieved.

Comment:

There were comments requesting that the DEIS be withdrawn and that a new DEIS be prepared and recirculated for comments.

Response:

The DEIS contains substantive, relevant information, pertinent to evaluating the impacts of the Rocky Flats Plant. The modifications necessary to accommodate the many responsible comments will be made in the FEIS; there are no plans to recirculate the DEIS for comment.

Comment:

There were requests that the authors of the various parts of the DEIS be identified and their backgrounds and competence be described.

Response:

The DEIS represents the work of numerous people. It is an agency statement, and no individual could be meaningfully singled out for authorship.

12. Conclusion

It is the intent of the staff to recognize the merits of the many comments received and, wherever appropriate, to include the recommended changes in the FEIS. The Staff Statement indicates many of the changes which will be made as a result of the commenting process. It also indicates most of those changes which were recommended, but which will not be made in the FEIS for the reasons given in previous sections of the Staff Statement.

This statement carries no claims of being complete in its enumeration of every comment or every proposed change. It was intended to address the majority of comments, and to include those which seemed to the staff to be representative. If additional appropriate changes become apparent to the staff, especially as a result of the public hearings, or in the process of updating information presented in the DEIS, those changes will be made in the FEIS.

The staff expresses appreciation to the many commenters whose comments and suggestions will aid in the preparation of the FEIS on the Rocky Flats Plant site.

Department of Energy
Washington, D.C. 20545

July 11, 1978

Dr. James L. Liverman
Acting Assistant Secretary
for Environment
Department of Energy
Washington, D.C. 20545

Dear Dr. Liverman:

Consistent with the notice of hearing issued on Monday, April 24, 1978 (43 F.R. 17391) public hearings were held on the Draft Environmental Impact Statement "Rocky Flats Plant Site", (ERDA-1545-D) in Denver, Colorado, on May 24 and 25, 1978. The hearings were conducted by the undersigned Presiding Board in conformance with the procedures set forth in the notice.

Following review of the draft environmental impact statement and of the record compiled to date, the Board has identified a number of issues which may be critical to future decision making. The attached report sets forth these issues, as well as the Board's recommendations concerning their treatment in the final environmental statement.

In addition, the Board has compiled a record of the hearings, consisting of the transcripts, and the written statements, documents, and exhibits submitted by private persons, organizations and Government agencies, (including the written comments submitted after the close of the hearings in response to Board request). This record has been sent to the Department's public documents room.

In accordance with the notice of hearing and the mandate to this Board, we have limited our report to those unresolved issues relating to ERDA-1545-D which the Board determined to be critical to future decision making regarding the Rocky Flats Plant Site. The Board has neither undertaken to resolve the issues raised nor to render judgments concerning such issues, however, we trust that their identification and our recommendations on how they should be addressed in the final environmental impact statement will assist the decision-making process.

Respectfully,

THE PRESIDING BOARD

L. Trowbridge Grose

McDonald E. Wrenn

John B. Farmakides, Chairman

Enclosure:
As stated

STATEMENT

IDENTIFYING VIEWS AND ISSUES ON

THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

ROCKY FLATS PLANT SITE, ERDA 1545-D

by the

PRESIDING BOARD

July 11, 1978

I. Introduction

As provided by the notice of hearing issued Monday, April 24, 1978, 43 Fed. Reg. 17391, the public hearings announced in connection with the Draft Environmental Impact Statement - ERDA 1545-D (DEIS) on the Rocky Flats Plant Site, Jefferson County, Golden, Colorado, (hereafter RFP, or Plant) were held on May 24-25, 1978 at Denver, Colorado. The hearings were conducted by the Presiding Board (Board) established for this proceeding in accordance with the rules of procedure set forth in the notice.

Extensive comments on the DEIS were received from a number of federal, state and local government agencies, from private organizations, and from individual citizens.[1/] The Board has reviewed the impact statement in light of the comments made, including the staff responses to these comments.[2/] In accordance with the notice of hearing, the Board

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1/ Many of the written and oral comments raised identical or similar issues. In order to render this report in a timely manner, the Board did not reference all the participants who addressed a specific issue, nor did we cite every reference to an issue; instead, such references as are included are by way of example only. Participant's titles are omitted after first occurence.

2/ Staff Statement in response to comments received on the DEIS, dated April 1978. Therein the staff has indicated agreement with many of the comments raised and stated its intent to amend the FEIS accordingly. Obviously differences of opinion exist as to the issues raised and must be resolved.

has identified only those issues which it considered to be critical to future decision-making involving the Rocky Flats Plant Site (RFP). In identifying these issues, the Presiding Board does not presume to judge their merits and does not undertake to render judgment concerning the course of the operations. This report, along with copies of the transcripts, oral and written comments and questions submitted to the Board by members of the public, organizations and Government agencies, and the list of exhibits attached hereto (Appendix A) including the written responses of the staff to the questions raised in the hearings, constitute the record of this public hearing. Concurrent with the submission of this report and record to the Acting Assistant Secretary for Environment, Department of Energy (DOE) it is being sent to the Director, Office of NEPA Coordination for placement in the Department's public document rooms.

II. <u>Unresolved Issues</u>

A. Several issues were identified most frequently by the participants as critical to future decision-making on the Rocky Flats Plant Site. The first is in effect a challenge to the issuance of the DEIS because it does not analyze the activities of the RFP as one component of the national nuclear weapons program nor discuss and evaluate the assumptions for continued operation of RFP based on the needs of the national nuclear weapons program.

This issue was further defined as whether the National Environmental Policy Act (NEPA) requires an analysis and discussion of the entire nuclear weapons program within the DEIS because of, and as a part of, the assumptions stated in the DEIS to the effect that the production of nuclear weapons would continue indefinitely. As an alternative, the participants raising this issue[3/] would require the preparation and issuance of a separate environmental impact statement covering the entire nuclear weapons program. They were of the opinion that a NEPA impact statement as to the RFP can be meaningful only within the context of an environmental impact analysis of the national nuclear weapons program. They stated that such a broad general analysis could conceivably result in a decision to curtail or stop further nuclear weapons production and thus reduce or eliminate the need for the RFP.

On the other hand, the staff is of the opinion that the DEIS, as a site-specific environmental impact statement, meets the needs and requirements of the NEPA[4/]. The staff noted that the

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3/ For example, see Tr. 24,25, Dr. A. Robbins, Colo. Dept. of Health; Dr. D. Filley, COSC; Mr. A. Roisman, NRDC; Mr. C. Aron, SANE, Ms. F. Cohen, M.A.P.; Mr. P. Kiepe.

4/ Tr. 94,95,178, Mr. H. Roser.

mandate of DOE is to fulfill U.S. nuclear weapons production requirements as imposed by the Congress and the President, and that DOE has no role as to deployment and use of such weapons systems. However, the staff recognized the issue noted and pointed out that it is now under advisement.[5/]

A related issue, the need for discussion of the statutory and policy authority for the continued operation of the RFP, was voiced. As to this issue it would seem that the legal authority for the continued operation of the RFP should be addressed and more adequately discussed in the Final Environmental Impact Statement (FEIS).

B. Another general issue states that the DEIS is inadequate in its analysis and discussion of alternatives to RFP. This issue challenges the adequacy of the DEIS in its cost-benefit evaluation of two such alternatives: (a) the option of terminating all activities there,[6/] and (b), the option of converting the facility to other uses.[7/] The essence of this issue is that the cost-benefit balance for the RFP is "nonexistent" and has

5/ Tr. 102-107,179-181, H. Roser; Staff Statement, p.4

6/ Tr. 196-199, Dr. J. Cobb; Prof. P. Wehr; Mr. J. Pekarek; Ms. N. Hersh; Ms. E. Lui.

7/ Tr. 24-27, A. Robbins; Mr. R. Herrick-Stare; Mr. F. Anders; Mr. J. Jurie; Mr. R. Young never been evaluated since the "benefit" is an "assumption" which has not been evaluated, and the "cost" of removing the plant or reconverting the plant site does not include or adequately evaluate relevant factors such as:

(a) the proximity of RFP to downtown Denver (16 miles) and to some of its suburbs (5 miles); 8/

(b) the RFP is upwind and upstream from Denver; 9/

(c) it is in the path of rapid housing growth; 10/

(d) hazards of transportation accidents; 11/

(e) hazards of flooding; 12/

(f) the safety and integrity of transuranic storage facilities, including waste; 13/

8/ DEIS pp 1-5,2-10,2-22; Tr. 26,A. Robbins; D. Filley; J. Cobb;

9/ DEIS pp 2-22 to 2-42; 2-80 to 2-90; Dr. N. Helburn; J. Pekarek

10/ Tr. 26, A. Robbins; F. Anders; J. Pekarek; N. Helburn

11/ Tr. 28, A. Robbins; P. Wehr; F. Anders; A. Robbins; Ms. A. Parks

12/ Ltr. from P. Cook to W. Pennington, Jan 27, 1978; Ltr from F. Rozich to A. Robbins, Nov 28, 1977 as submitted by A. Robbins.

13/ Tr 456 A. Parks; Tr 479 N. Mullen; Tr 28 A. Robbins

(g) hazards of inplant accidents which may release radioactive materials;14/

(h) the economic burden on State human service agencies for monitoring soil, air, etc. - police, fire and health departments;15/

(i) an Emergency Response Plan;16/

(j) assessment of the benefits of uses for the plant other than for production of nuclear weapons, such as solar energy research facility, etc.17/

Accordingly, a number of participants concluded that, in their view, the DEIS does not justify the continued operation of RFP, and therefore it should be gradually phased out of its present mission and converted into a solar or other similar research use.

14/ Tr. 405-414, J Pekarek; Tr. 456, A. Parks; Tr. 68, Dr. C. Johnson; Tr. 355, P. Smith

15/ Tr. 30, A. Robbins; Tr. 240-247 Ms. E. DeChavendes; Tr. 407, J. Pekarek Tr. 421. K. Partridge.

16/ Tr. 27 A. Robbins; A. Filley; R. Young; J. Cobb

17/ Tr. 157-161, Dr. L. Dumas; Mr. D. Ford; C Aron; Mr. C. Lehrburger

C. Unresolved issues on health effects were frequently mentioned. For clarity the Board has grouped such issues, where possible, into a number of related categories.

1. Assessment and control of effluents (solid, liquid, and airborne) from the Plant, both for normal and accident conditions;

   (a) Routine releases from the operating plant. Although the DEIS indicates that the annual routine releases will be kept very low, (on the order of 6/µci/yr), the systems and methods for accomplishing this objective were not explained in detail and were considered inadequate by a number of participants.[18/] Therefore, a better description of the engineering aspects of effluent control (especially to the atmosphere) is needed in order to address the concerns expressed by many participants, including the Colorado State Department of Health. This would also apply to the justification in the DEIS for "any" exposure. Stating that steps have been taken far beyond those which might be considered adequate to minimize routine effluents is not sufficient. It is necessary that such steps be clearly documented.

18/ Tr. 456, A. Parks; Tr. 408-409, J. Pekarek; Ltr. from P. Cook to W. Pennington, Jan 27, 1978

In addition, in view of other similar concerns,it is suggested that the FEIS address not only the subject of HEPA filter performance, but also provide a more general background discussion of the effectiveness of filters for small particles, including those less than 0.3 microns (as referenced in the Staff Statement, pp. 20).

(b) Accidental releases. Although one of the appendices discusses the scenarios of a variety of accidents and gives calculations both of the probability and the size of the source terms which might be involved, there is limited discussion in the DEIS of the methodology employed for such analyses and of the strengths and shortcomings of the methodologies used. These short-comings were the subject of comments by several participants.[19/]

The degree to which given methodologies have been used, the advantages and disadvantages of the methods and the degree to which the results of the use of such methodology is factored into the prevention of

19/ Tr. 372-377 Dr. F. Martell; Tr 452 A. Parks; Tr. 356, Mr. P. Smith, EPA; Tr 483, Dr. M. Spector; Tr 412-415, J. PeKarek accidental releases should be discussed in the FEIS perhaps as an expansion of Appendix I of the DEIS.

A description of the risk of potential exposure from accidents is set forth in the DEIS through analyses of various scenarios without an adequate showing of the effort made to prevent such accidents. The FEIS should more fully discuss actions taken to encourage prevention of accidents (which could lead to release of radioactivity) including: the engineering measures adopted (such as multiple redundancy in filter banks); any administrative actions such as inspection schedules; procedures for filter bypass leakage testing; and fire prevention and mitigation programs.

(c) Emergency Response Plan. Concern was repeatedly expressed that the emergency response plan with the State of Colorado is not evaluated in the statement.[20/] It was noted that because such a plan may have the

20/ Tr. 163-168, R. Young; Tr. 309, Mr. J. Matis; A. Robbins; R. Herrick-Stare; Ms. K. Partridge; Comment Ltr. # 3, NRDC (Dr. Tamplin) effect of ameliorating the potential impact of accidents, it is therefore relevant to the continued operation of the plant and should be addressed. We recommend that the plan, even though it may be the responsibility of the Colorado State Department of Health, be described in the FEIS. The staff should also consider an assessment of the effectiveness of the plan on mitigating the consequences of accidents.

2. Evaluation of the environmental transport (air, food, soil, water) and health effects for man and animals.

   (a) The staff has agreed that the calculations of dose from plutonium emissions are not adequately documented and will be redone.[21/] The reliance on whole body doses to provide general perspective was frequently questioned, and as pointed out by a number of participants and agreed to by the staff, specific organ doses, primarily to lung, liver, and skeleton, are required in calculating for plutonium and other actinides.[22/] The assumptions under which these

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21/ Staff Statement, p. 7-14; Tr 26 A. Robbins; Ltr. from A. J. Hazle to R. Simsick, Nov. 28, 1977; Tr 362, Mr. R. Foulk; J. Cobb; C. Johnson

22/ Tr. 355, P. Smith; Comment letter A. Robbins #17, Tr. 359. To include a discussion of gonadal doses.

recalculations are performed should be clearly identified by the staff and should take into account the comments received.

(b) Many participants expressed concern that the DEIS did not adequately address the issue of potential doses to local populations within 10 miles of Rocky Flats Plant and especially within 5 miles.[23/] Since it would appear that the highest individual doses from normal or accidental releases would be delivered to these local populations, the FEIS should address such potential impacts in more detail, especially as to dosimetric calculations.[24/]

(c) Familiarity of the reader with the state of knowledge of the transport of plutonium from soil to man is assumed by the authors of the DEIS. While this subject has been addressed in several scientific reviews, nevertheless, it would be helpful to include an appendix discussing the state of knowledge of transport of plutonium from soil to man in the FEIS.

23/ Tr. 17, Mr. D. Ehrman; Tr. 57,61,72 C. Johnson.

24/ Tr. 57,61-62,71-74,362. The staff agreed to discuss this matter in greater detail.

Consideration should also be given to including transport by wind and by water in this particular appendix. Also in this regard, the subject of past releases and consequent accumulation in soil including future does commitments should be adequately addressed in the FEIS, especially for populations residing near the plant. 25/

3. Assessment and control of the health risks to man and biota.

(a) The DEIS was criticized by some participants because of its failure to place uncertainties with respect to potential health effects in persepctive.26/ In this regard, giving a range of doses, as well as an expected dose should be considered for the FEIS. In addition, while comparison to background from the point of view of putting possible or calculated exposure into perspective is a justifiable and proper technique, nevertheless, comparison to

25/ Tr. 17 D. Ehrman; Tr. 26 A. Robbins; Tr. 57-68, C. Johnson; The staff has agreed to address doses to local populations in greater detail. The presentation of complex technical issues inthe DEIS is sometimes too abbreviated and complex even for experts. An example of this is the question of the current state of knowledge on soil liits. Consideration should be given to treating such complex technical issues as may require detailed explanations in appendices to the main text. This would also improve the brevity and readability of the main text.

26/ Mr. A. Hazle, attachment to comment Ltr. #17; But see Appendix G, DEIS.

background alone is not sufficient justification for such exposure.27/

(b) The model used to estimate biological effects in man, given estimated exposures to radiation, was questioned several times during the hearings. The staff relied on professional evaluations in the literature such as the NAS Committee on Biological Effects of Ionizing Radiation (BEIR) for the basis of their risk estimates.28/ Apparently, many participants either did not understand, or agree with, the linear no-threshold dose response model used in the DEIS and therefore some adopted a non linear or threshold model for purposes of their evaluation. Accordingly, a more complete discussion of the linear hypothesis threshold and other forms of radiation dose response relationships should be included.

(c) For purposes of this report the Board notes that radiation protection standards may be described as "derived" and "basic." Derived standards relate to

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27/ This rationale, as found in the ICRP #26, (International Commission a Radiological Protection, Report #26) is that the justification process consists first of showing that a benefit is associated with the activity; there then needs to be an analysis of whether further expenditures of money would be efficient in terms of reducing potential harm.

28/ Tr. 372, E. Martell; Tr. 190, J. Cobb; Tr. 505 M. Spector Tr. 51, R. Herrick-Stare; Tr. 257, W. Evans. The staff agreed to discuss this subject.

concentrations in air, water, soil and food, whereas the basic standards define radiation doses (and risks) to man. A better description of the relationship of one to the other is needed to clarify this subject in the DEIS. To this end it should be noted that whereas standards for air, water and food exist nationally, internationally, and within DOE directives, soil is the most difficult media for which international and national standards do not exist.[29/] Accordingly, a separate discussion of the origin of soil limits is suggested.

(d) Concerns were expressed that occupational worker protection was not adequate.[30/] This issue should be clarified in the FEIS.

(e) Concerns were expressed with respect to biological concentration in grass, local biota, fish and cattle, and for potential effects in these biota.[31/] A supplementary statement or appendix should include these concerns and sufficient detailed results (in addition to the list of site specific studies found in

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29/ A. Hazle, attachment to comment Ltr #17.

30/ Tr. 59, C. Johnson.

31/ Tr. 168, R. Young; Tr. 260, N. Helburn; Tr. 286-8, L. Mehlhoff. The staff has agreed to address these concerns the DEIS 3-24) to demonstrate that site-specific aspects have been addrgssed. The work of F. W. Whicker in particular conducted on the site on the radio-ecological cycling of plutonium is germane and should be included as part of such appendix.32/ In addition, the results of measurements of plutonium content in cattle, locally and distant, should be included.

4. Another unresolved issue relates to the degree of seismic safety of the Rocky Flats Plant.

   (a) Recent information developed by the Colorado Geologic Survey suggests that the Golden fault located in the vicinity of Golden, Colorado, south of the plant site, is "active.", while the DEIS, on the other hand, indicates that this fault is inactive.33/ This issue, i.e., the capability of the Golden fault, or any other fault in the region, should be specifically addressed in the FEIS.

   (b) Concerns were expressed that the Rocky Flats Plant may be vulnerable to seismic shaking, and that it does not conform to seismic standards used for nuclear power plants. Whether or not the seismic standards to

32/ "Radioecology of Natural System", Dr. F. W. Whicker (enclosure to comment Ltr. #8

33/ Tr. 343-344. Mr. R. Kirkham; Letter from Wm. P. Rogers to P. H. Schmuck dated Nov. 16, 1977; see also DEIS pp.2.43 through 2.46; p. 2.78,2.78.

be used should be those applied to nuclear power plants is an unresolved issue which should be addressed in the FEIS.

(c) Some participants expressed concern that the earthquake potential of the RFP requires that the present facilities be backfitted to conform to seismic standards so as to preclude the release of any hazardous substance in case of earthquake.[34/] This issue should likewise be addressed in the FEIS.

The staff indicated that a contractor-consultant will investigate the earthquake potential at Rocky Flats Plant, and will prepare and issue a report thereon. While the plant has not been analyzed for seismic safety using modern techniques, such an effort is to be included within the investigation.[35/]

(d) The timing of the consultant's seismic related findings and report, relative to the preparation and issuance of the FEIS, was another issue.[36/] The concern expressed was that the seismic consultant's report and the staff comments based thereon should be made available for public comment before the FEIS is prepared on this point. Therefore, several

34/ Tr. 348; Rogers Letter supra, fn

35/ Tr. pp. 351-352, R. Kirkham.

36/ Tr. 350-352, R. Kirkham

suggestions were made that the effort to investigate the seismic issues posed be commenced at the earliest possible time.

5. Relative to the cost benefit of the various alternatives to the RFP, several participants commented on the failure of the DEIS to adequately treat the impact of the Rocky Flats Plant on current land use plans, including land devaluation, and siting of residential and commercial developments near the site.[37/] For example, the statements in the DEIS that there is no conflict between Rocky Flats Plant and current land use plans should be clarified.[38/]

The analyses and demographic projections for the area adjacent to the Rocky Flats Plant[39/] were challenged as unrealistic. Because of the extremely rapid development of the entire Denver area, it is recommended that this subject be amplified in the FEIS to include the staff's best estimates of prospective loss of state and local tax revenues as may be related to the presence and operation of Rocky Flats Plant.

37/ Tr. pp. 265-267; N. Helburn; Tr. 51-52 D. Filley; N. Hersh Tr. 135-141; E. DeChavendes Tr. pp. 239-248; J. Matis Tr. pp. 308-309.

38/ DEIS pp. 1-17

39/ Tr. 354-357, P. Smith

6. The effects of wind erosion on the Rocky Flats Plant is another unresolved issue. Some participants felt that the DEIS did not adequately address the entire wind meteorology subject, and expressed concern that the strong wind action in the Rocky Flats Plant area had been largely ignored.[40/] The staff noted that pertinent information on wind erosion has been previously published in the open literature, however, they agreed to clarify this issue in the FEIS.[41/]

7. A number of participants objected to the estimates of maximum credible accidents analyzed as being erroneously underestimated. The staff indicated its intent to reexamine this subject to assure accuracy. It is recommended that such reexamination, including the criteria used, be made as clear as possible to the public and incorporated in the FEIS.[42/]

8. Transportation of radioactive materials into and out of the Rocky Flats Plant is a major hazard in the view of a

40/ Tr. 261, N. Helburn; EPA comment Ltr. pp. 19-20.

41/ Staff Statement, p. 25;

42/ Tr. 27, A. Robbins; Tr. 52 R. Herrick-Stare; Tr. 74, C. Johnson; Tr. 291 F. Anders.

number of participants and has not been adequately evaluated.43/ The issue of planes flying over the site was repeatedly mentioned as a hazard with recommendations that such airspace be "controlled" and barred to all flights.44/ While the transportation of plutonium by air has been terminated,45/ a number of comments were directed to the need to fully evaluate the transportation of radioactive substances into and out of the Rocky Flats Plant, including the routes and types of transport involved, and the adequacy of the containers used.46/

9. Also of concern to a number of participants was the possibility of terrorist activities affecting the Plant.47/ They specifically criticized for example, the adequacy of perimeter patrols; adequacy of safeguards; and the failure to obtain "controlled air space" designation for the air space over the RFP.

One participant noted that while the security of the RFP had improved under the present contractor, the very nature

43/ Tr. 28, A. Robbins; Tr. 271 R. Young; Tr. 460, A. Parks.

44/ Tr. 43, 46. Apparently the FAA has ruled against "controlled air space" over RFP. See also Tr. 280, P. Wehr.

45/ Staff Statement p. 31; Tr. 20 A. Robbins

46/ Tr. 25, A. Robbins, Tr. 223, E. DeChavendes.

47/ Tr. 273-283 P. Wehr

of the facility makes security difficult.[48/] While the reluctance of the staff to describe security details is understandable, nevertheless it would be useful to amplify the discussion in the FEIS to reflect such information as provided by the staff during the hearings.

10. The treatment of fire hazards and fire safety precautions in the DEIS is considered inadequate by some participants.[49/] In view of the fire hazards of plutonium and the possibility of fire at the plant, it was their opinion that the DEIS should address this subject in greater detail, including a clarification of the assumptions made as to potential glovebox fire.[50/]

Perhaps, in discussing the current Plant program on safety - i.e. prevention of fire, accidents, accidental releases, and safety monitoring devices, the DEIS should be amplified along the lines noted by the staff in responding to one participant.[51/] The staff might also

48/ Tr. 273-284, P. Wehr

49/ Tr. 257, W. Evans; Tr. 404, J. Pekarek

50/ Tr. 257, 404; Staff Statement pp. 23-24.

51/ Tr. 307, J. Matis; Ltr. from H. Roser to J. Matis, June 15, 1978 by the notice of hearing was too short, and precluded the detailed review necessary, and (b) several other participants who wanted to speak during the May 24-25 hearing dates were unable to do so because of prior commitments elsewhere. Relative to this issue, however, it should be noted that the DEIS was published approximately eight (8) months earlier - in September, 1977. Moreover, as shown during the hearings, some of the subject matter commented on most frequently at the May 24-25 hearings had been the object of serious consideration in 1974, by the "Lamm-Wirth" Rocky Flats Task Force,[55/] and in 1975, by the Environmental Protection Agency.[56/] It also became evident at the May 24-25 hearings that much of the testimony offered by participants became more repetitive as the hearings continued.

On the other hand, it should also be noted that the staff has committed itself to undertake two significant actions: a review and recalculation of dose measurements, and an investigation and evaluation of the seismological aspects of the RFP.[57/] As requested by the representatives of the

55/ Tr. 54 R. Herrick-Stare; Tr. 24 A. Robbins; Tr. 189, J. Cobb; Tr. 258-259, D. Evans; Tr. 18 D. Ehrman; Tr. 462 A. Parks

56/ "Proceedings of Public Hearings: Plutonium and the Other Transuranium Elements." ORP/CSD-75-1 issued by the USEPA - Office of Radiation Programs.

57/ It is appropriate that the Board note for the record the cooperation and responsibility displayed by the staff in responding to questions raised by both the Board and the participants.

consider the suggestion[52/] made for the establishment of a committee to monitor internal plant safety programs to include outside experts from state or local agencies, such as A. J. Hazle, for example.

11. Several participants requested that the authors of the various sections of the DEIS be identified for purposes of completeness and public accountability.[53/] One suggestion noted is to present detailed scientific and technical material in appendices, with the authorship of those appendices available to the public on request provided it does not impinge on the objectivity of the author. The staff should consider this suggestion for the FEIS. Another participant noted that the public could better review the DEIS if an index were to be included. This suggestion also merits consideration for the FEIS.

12. A significant number of participants requested that the hearings be continued, and that a second opportunity be afforded for public comment during June or July, 1978.[54/] Their major reasons were: (a) the time period provided

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52/ Tr. 27-31. A. Robbins.

53/ Staff Statement, p. 36; Tr. 183-185, J. Cobb

54/ Tr. 23, A. Robbins; Tr. 210 E. DeChavendes; Tr. 273, R. Young Tr. 496, H. Raiburn; Tr. 313, P. Kiepe; Tr. 188, J. Cobb

State of Colorado, it would appear that serious consideration should be given to a reissue of those parts of the DEIS related to these two subjects, with opportunity for public comment limited to such reissued portions.

STAFF RESPONSE TO ISSUES RAISED

BY THE PUBLIC HEARING PRESIDING BOARD

Staff responses to the "Unresolved Issues" identified in the report of the Presiding Board are included in this section. Abstracted items from the "Statement of the Presiding Board" are included in quqtes; followed by a brief statement of how or where the corresponding subject is addressed in this final EIS. Page numbers shown at the start of each item are those of the public hearing record and are shown at the top of those pages; starting on preceeding page 436.

Page 4, Second Pargraph:

Issue

"... the legal authority for the continued operation of the RFP should be addressed and more adequately discussed in the Final Environmental Impact Statement (FEIS)."

Response

Information on the plant mission and authority to produce nuclear weapons is presented in Section 3.4.1, page 3-102.

Page 4, Item B

Issue

The basic question in the Hearing Board's statement requests further consideration be given to items (a) through (j) (page 5) in analysis and discussion of alternatives to the Rocky Flats Plant, with a related cost-benefit analysis, for plant conversion and termination.

Response

The basic question is addressed in Section 5. "Alternatives," under "Termination of Operations and Complete Shutdown, Total Decommissioning, and Partial Decontamination" (this condition is probably the closest to that which would exist under a plant conversion situation).

Items (a) through (j) are handled as listed below:

"(a) the proximity of RFP to downtown Denver (16 miles) and to some of its suburbs (5 miles);"

> The distance of population centers within 50 miles of the plant boundary is given in Table 2.3.3-1. Dose calculations are carried out to 50 miles. Effects on organ and whole body dose are related to complete and partial relocation of the plant in Sections 5.3.1 and 5.3.2 respectively and in Table 5-1. Related social and monitoring costs are discussed in Section 9 (see Table 9-1).

"(b) The RFP is upwind and upstream from Denver;"

The above item is recognized as to degree in Section 2.3.6.2 "Local Climatology" and is taken into account in the dose assessments in Section 3 (see paragraph 3, Section 3.1.2.3). A description of the procedures is presented in Appendix F (FEIS, Vol. II). A tabulation of resultant dispersion factors is given in Appendix B-2.

"(c) it is in the path of rapid housing growth;"

The growth pattern and regional projections are discussed in Section 2.3.3. The area around the plant at distances from 2-3, 3-4, 4-5, 5-10, 10-20, 20-30, 30-40, 40-50 miles are divided into 16 sectors. Dose effects in the area are considered for the maximum reference man (Section 3.1.2.4, Table 3.1.2-5, and a hypothetical high density population approaching the plant from the sectors in an easternly direction from the plant (see text immediately before and following Table 3.1.2-9). A similar procedure is used for plant accident analysis considering reference man and a population in the southeast sector during a maximum credible release (see Tables 3.2.4-5 through 3.2.4-7).

"(d) hazards of transportation accidents;"

Transportation accidents are discussed in Section "3.3 Environmental Impact of Transportation" (3.3.2.2 Radiological Effects). The evaluation is based on a fire involving a truckload of Rocky Flats plutonium (maximum credible accident), and uniform population densities, catagorized as high, medium, and low density. Though not called out in the analysis of alternatives (Section 5) as transportation routes are nationwide, the risk dose can only be transferred from one population group to another by moving the plant and consequently changing the route.

"(e) hazards of flooding;"

Though there is no narrative specifically addressing flooding in the accident analysis, the result of flooding with the greatest impact would be impoundment failure, which is discussed in the accident analysis (see Section 3.2.2.3). Section 2.10.2.1 "Plant Water Flow and Control" outlines the surface water control project which is sized to "... safely pass the PMP (probable maximum precipitation) flood via spillways and to retain the amount of water projected for the 100-year storm." The surface water control project is discussed in Section 5, "Alternatives" (Table 5-1 and Section 5.5.4) in terms of radiological impact and risk dose savings. The expected effect of a 100-year flood on process or storage facilities is not mentioned. A cost-benefit analysis relative to plant termination is dependent upon selection of an alternate site and would be expected to appear in an EIS on construction at an alternate location.

"(f) safety and integrity of transuranic storage facilities, including waste;"

There are numerous references to presentation of seismic design criteria for buildings in future plant SAR's. The primary commitment appears in Section 2.3.4 and 5.5.2. The SAR's will also contain information on integrity of facilities relative to other natural phenomenon. A cost-benefit analysis of remodeling to achieve ideal structural stabilities versus reconstruction at an alternate site is not possible at this time, if it is indeed relevant.

"(g) Hazards of in-plant accidents which may release radioactive materials;"

The in-plant accident scenarios have been reevaluated and updated. They are presented in Section 3.2.

"(h) the economic burden on State Human Service agencies for monitoring soil, air, etc., police, fire, and health departments;"

These items are not considered in a cost-benefit analysis, relative to conversion or decommissioning. If the State monitoring program appropriately considers stewardship of the taxpayers money, a comparable program plus an extensive preoperational study can be expected in any other State selected for relocation. Thus, this item would be nullified by appearing on both sides of the ledger. The requirement for emergency preparedness is a matter of perception and could not be assessed prior to selection of an alternate site. Information pertaining to area economic burdens is presented in Section 4.3.

"(i) an emergency response plan;"

The departments mentioned in "(h)" above are all elements in an emergency response plan. See the above response. Emergency response capabilities are discussed in Section 2.11.

"(j) assessment of the benefits of uses for the plant other than for production of Nuclear Weapons, such as solar energy research facility, etc.;"

Uses such as solar energy are not discussed but rather left to the Environmental Impact Statement which would be required when any proposal is seriously considered. An assessment of the cost of preparation of the plant site for any possible plant use may be inferred by considering a number of combinations of alternatives presented, with related dose savings (Section 5, Table 5-1) and related cost (Section 9, Table 9-1).

Page 7, Item C 1(a)

Issue

"... a better description of the engineering aspects of effluent control (especially to the atmosphere) is needed in order to address the concerns expressed by many participants;

Response

The information specifically requested pertaining to radioactive airborne effluent control systems is presented in Section 2.7.1.

Page 8, Item C 1(a)

Issue

"... It is suggested that the FEIS address not only the subject of HEPA filter performance, but also provide a more general background discussion of the effectiveness of filters for small particles, including those less than 0.3 microns."

Response

The FEIS has expanded discussion for the HEPA filter performance (Section 2.7.1 (page 2-160-167).

Page 8, Item C 1(b)

Issue

"The degree to which given methodologies have been used, the advantages and disadvantages of the methods and the degree to which the results of the use of such methodology is factored into the prevention of accidental releases should be discussed in the FEIS ...."

Response

A description of the methodology and the prevention of accidental releases has been included. The discussion includes multiple redundance in filter banks and independent review process.

Postulated plant accidents presented in Section 3.2 include spills, mechanical or administrative failure, impoundment failure, fire, criticality, aircraft impact, tornadoes, high winds, and earthquakes.

Accident prevention in general is discussed in Section 4.4.4. Means for prevention of accidental releases listed are provided as follows:

(1) Health protection and environmental controls are discussed in Section 2.6.2, Section 3.2.2.2, and Section 4.4.3.1 which depict Administrative and functional control efforts.

(2) Spill prevention is primarily a function of housekeeping in the production lines to maintain an uncluttered unobstructed work area. The FEIS does not go into housekeeping detail. Discussions on in-house controls in the event of a spill are presented in Section 3.2.2.1, Section 2.5.1.1, Section 2.7.1, and Section 2.7.3.

(3) Impoundment failure prevention is not specifically discussed. It could be pointed out in conjunction with Figure 2.9.3-1 that removal of the water from the drainage trenches below the solar ponds helps maintain the stability of the hillside by preventing saturation. Mitigating factors in the event of impoundment failure are inherent in Sections 1.5.2, Paragraph 3, and Section 5.5.4 "Surface Water Control" and Section 3.2.2.3.

(4) Unlike the other accident scenarios, fire prevention and control is given a very lengthy discussion (Section 3.2.2.4) before presentation of postulated fire accidents. The inerting system is described in Section 2.5.1.1.

(5) Criticality safety considerations are presented in Section 3.2.2.6, just prior to the postulated criticality accidents.

(6) Aircraft impact - efforts to obtain restricted air space are described in Section 3.2.2.7.

(7) Tornadoes, high winds, earthquakes - are mentioned relative to studies on structural stability and design criteria in Section 4.4.4, Section 3.2.2.8, and Section 3.2.2.10. Section 3.2.2.10 also notes that such information is to be incorporated in future safety analysis reports.

Page 10, Item C 1(a)

Issue

"We recommend that the plan, even though it may be the responsibility of the Colorado State Department of Health, be described in the FEIS. The staff should also consider an assessment of the effectiveness of the plan on mitigating the consequences of accidents."

Response

The Colorado draft, "Radiological Emergency Response Plan for Rocky Flats" is described in Section 2.11.4. An assessment of effectiveness as suggested is considered premature at this time as the plan has not received even preliminary testing or exercise

Page 10, Item 2(a)

Issue

"The staff has agreed that the calculations of dose from plutonium emissions are not adequately documented and will be redone ...."

"... The assumptions under which these recalculations are performed should be clearly identified by the staff and should take into account the comments received."

Response

The dose calculations considering environmental transport by air, food, soil, and water have been redone in Section 3. The methodology is discussed briefly in Section 3.1.2.3, and in detail in Appendix F (FEIS, Volume II).

Page 11, Item C 2(b)

Issue

"Since it would appear that the highest individual doses from normal or accidental releases would be rendered to these local populations, the FEIS should address such potential impacts in more detail, especially in dosimetric calculations."

Response

The FEIS discusses the potential doses to the local population within five miles of the plant in greater detail. The method of the dose calculations is presented.

Potential doses to the population within 5 miles and 10 miles of the plant are included in Table 3.1.2-3 for normal plant operation. A similar table (3.2.4-1) presents risk doses for postulated accidents. Table 3.2.4-2 projects a potential dose commitment assuming the postulated accidents happen without consideration for the probability of their happening. The method of calculation is presented in Appendix F (FEIS, Volume II).

Page 11, Item C 2(c)

Issue

"While this subject has been addressed in several scientific reviews, nevertheless, it would be helpful to include an appendix discussing the state of knowledge of transport of plutonium from soil to man in the FEIS."

Response

Appendix G-4 has been included which discusses the state of knowledge of transport of plutonium from soil to man. The effects of wind and water are considered. The effects of accumulation of plutonium in soil on future dose commitments are also included.

The state of knowledge on transport of plutonium is reflected by the use of widely accepted, well documented computer codes. Any variations from these codes are qualified. A limited discussion of behavior of transuranics in soil is presented in conjunction with Colorado State University studies in Section 2.10.4.2. Wind, water, and soil are all considered as factors in the source terms. The methodology is presented in Appendix F (FEIS, Volume II).

Page 12, Paragraph 3(a)

Issue

"The DEIS was criticized ... because of its failure to place uncertainties with respect to potential health effects in perspective. In this regard, giving a range doses, as well as an expected dose should be considered for the FEIS."

Response

The discussion of "a range of doses" is not feasible in the present time frame. It should be noted that the maximum dose to the individual is presented. Range might be interpreted to mean zero to the maximum.

Doses from normal plant operation are presented for the maximum reference man in Section 3.1.2.4, Table 3.1.2-5. Doses are also presented for a hypothetical high density population to the east of the plant. A similar procedure is used for plant accident analysis considering reference man and a population in the southeast sector assuming a maximum credible release (see Tables 3.2.4-5 through 3.2.4-7). Uncertainties related to potential health effects are not applied or related to dose computations. Encompassing and far outweighing the inherent range of doses, a discussion of the range of health effects is important and is presented in Section 3.1.2.4 following Table 3.1.2-9.

Page 13, Item C 3(b)

Issue

"... a more complete discussion of the linear hypothesis threshold and other forms of radiation dose response relationship should be included."

Response

A complete discussion of the linear hypothesis, threshold and other forms was included in the DEIS in Appendix G, pages G-21 and G-22. Discussion of the linear hypothesis in this FEIS appears in Appendix G-1 pages G-1-19 and G-1-20.

Page 14, Item C 3(c)

Issue

"... a separate discussion of the origin of the soil limits is suggested."

Response

A discussion of the relationship between basic and derived standards is included. The discussion of soil limits includes a summary of the proposed EPA standard. The Rocky Flats Facility Assessment Document is included as an Appendix G-4.

The relationship between basic and derived standards is described in Appendix G-3. Discussion of standards for plutonium in soil is presented in Section 2.3.9.2.

Page 14, Item C 3(d)

Issue

"Concerns were expressed that occupational worker protection was not adequate. This issue should be clarified in the FEIS."

Response

The discussion of occupational worker protection in the DEIS was intentionally brief. We believe that this material is not appropriate to an EIS, inasmuch as it does not affect the community.

Information related to occupational worker exposure was presented in Appendix H of the DEIS. Additional information reflecting the plant's personnel protection programs with respect to both radioactive and nonradioactive materials is included in Chapter 2, as follows:

2.5.1.2 Radiation and Safety Controls.
2.5.2.2 Health and Safety aspects of handling plutonium.
2.5.3.2 Health and Safety aspects of handling beryllium.
2.5.4.2 Health and Safety aspects of handling uranium.
2.5.5.2 Health and Safety aspects of handling other metals.
2.6.2.5 Radiation Monitoring.

In addition, safety aspects of handling carbon techtrachloride and trichloroethane are presented in Section 2.5.2.1 (see also the discussion on Health Sciences and Industrial Safety, Section 2.6.2.4).

Page 14, Item C 3(e)

Issue

"Concerns were expressed with respect to biological concentration in grass, local biota, fish and cattle, and for potential effects in these biota. A supplementary statement or appendix should include these concerns and sufficient detailed results ... to demonstrate that site-specific aspects have been addressed ....

... In addition, the results of measurements of plutonium content in cattle, locally and distant, should be included."

Response

The work of Ward Whicker is summarized in an appendix and additional discussion of plutonium in cattle is included.

A list of "Special Environmental Studies at Rocky Flats" which includes ecological studies is presented as Table 3.1.1-10. Ecological Research and Monitoring is discussed in Section 2.10.4. Colorado State University (CSU) studies (work of Ward Wicker) are described in Section 2.10.4.2. A 3-year CSU summary report is included as Appendix A-2 (FEIS, Volume II). A summary of the EPA Cattle Studies is also given in Section 2.10.4.2.

Page 15, Item C 4(a)

Issue

"This issue, i.e., the capability of the Golden Fault, or any other fault in the region, should be specifically addressed in the FEIS."

Response

Possible activity of the Golden Fault is discussed in Section 2.3.4.6 under the subheading "Golden Fault."

There are numerous references to presentation of seismic design criteria for buildings in future plant SAR's. The primary commitment appears in Sections 2.3.4 and 5.5.2.

The following are discussed under the subheading "Faults":

Idaho Springs - Ralston Shear Zone
Livingston Fault
Golden Fault
Faults in the Marshall, Superior, Louisville area
Eggleston Fault
Valmont Fault
Other possible faults

Page 15, Item C 4(b)

Issue

"Whether or not the seismic standards to be used should be those applied to nuclear power plants is an unresolved issue which should be addressed in the FEIS."

Response

The information addressing the question of "seismic standards" appears in Section 2.3.4.

Page 16, Item C 4(c)

Issue

"The timing of the consultant's seismic-related findings and report, relative to the preparation and issuance of the FEIS, was another issue."

Response

An associated risk assessment program and a process for determination of need for backfitting facilities is described in Section 2.3.4, paragraph 3. Structural integrity of buildings and safety analysis reports (SAR's) are also discussed in Section 5.5.2.

The investigation of earthquake potentials at Rocky Flats, noted in this item of the Hearing Board's Statement, to be conducted is described briefly in the last paragraph of Section 2.3.4.

Description of the function of the SAR's is in response to this issue.

Page 17, Item C 5

Issue

(a) "...The statements in the DEIS that there is no conflict between Rocky Flats Plant and current land use plans should be clarified."

Response

(a) Zoning and area land use planning is summarized in Section 1.7.1 and presented in greater detail in Section 7.2.

Issue

(b) ...Because of the extremely rapid development of the entire Denver area, it is recommended that this subject be amplified in the FEIS to include the staff's best estimate of prospective loss of state and local tax revenues as may be related to the presence and operation of Rocky Flats Plant.

Response

(b) DOE legal staff has advised against the highly speculative exercise that would be involved is a discussion of tax revenues. Therefore, tax revenues are not discussed in greater detail. The information provided in the DEIS is restated in Section 4.3, paragraph 3 of the FEIS.

Area demography (Section 2.3.3) has been reevaluated using planning data from the Denver Regional Council of Governments and is shown in 16 sectors to a radius of 50 miles in Figures 2.3.3.1 and 2.3.3-2.

Page 18, Item C 6

Issue

"The effects of wind erosion on the Rocky Flats Plant is another unresolved issue .... The staff ... agreed to clarify this issue in the FEIS.

Response

Material movement and wind erosion are addressed in Section 2.3.7. Wind meterology is discussed under "Regional Climatology and Local Climatology", Sections 2.3.6.1 and 2.3.6.2 respectively. Area climatological data summaries are given in Tables 2.3.6-1 through 2.3.6-4. The highest recorded winds in the area are called out in the paragraph immediately following these tables.

Page 18, Item C 7

Issue

"It is recommended that such reexamination (estimates of maximum credible accidents analyses), including the criteria used, be made as clear as possible to the public and incorporated in the FEIS."

Response

The maximum credible accidents were reexamined and additional discussion is given in the FEIS.

The commentators questioned the size of the maximum credible accidents with regard to being undersized (not adequately conservative). As promised in the staff response, the accident scenario has been reexamined. This reexamination has resulted in a reduction of various source terms and postulated releases rather than the increase expected by the commentators. Some of the basic differences in the accident scenario are listed below:

(1) The source term for tritium under the heading 3.2.2.2, "Mechanical or Administrative Failure," has been reduced from 100 Ci/year to 5 Ci/year.

The potential release of plutonium and uranium from the solar ponds has been increased by approximately three percent. The source term for americium was also raised by three percent (Section 3.2.2.3).

(2) Backed by extensive evaluation of the literature, the source term for the postulated fire accident has been reduced from 42.5 grams of plutonium to 4.8 grams, with a resultant projected release to the atmosphere reduced from 6.2 μCi to 0.70 μCi (Section 3.2.2.4) with a reduction in the yearly expected release from 6.2×10^{-4} μCi.

(3) The criticality analysis was reevaluted. A dry criticality of 1×10^{18} fissions was again assumed, however, this analysis also assumed the excursion was not terminated by disassembly and that all fission energy was used to vaporize metal (500 grams of plutonium). Breaching of a glovebox was assumed with a 5 minute release time and a transfer factor through two stages of HEPA filters of 2×10^{-6} (as compared to 10^{-11} in the DEIS), resulting in a release of 0.001 grams of plutonium. Plutonium was not considered a part of the criticality source term in the DEIS (see DEIS footnote to Table 3.2.2-1). Fission products included 25 percent of the halogens and 100 percent of the noble gasses. Fifty and 100 percent respectively were used in the DEIS. Solid fission products were assumed vaporized at the same ratio as plutonium metal, with a transfer factor through the HEPA filters of 2×10^{-6}. Nuclides in amounts less than one

microcurie were not included in the source term. Total activity in the maximum credible dry criticality presented in the FEIS and DEIS are 4.12×10^3 Ci fission products plus 73.2 μCi plutonium, and 2.64×10^1 fission products plus 0 μCi plutonium respectively. The probability of the maximum credible dry criticality used in both documents was 8×10^{-4} occurrences per year.

For solution criticality, 2.2×10^{20} fissions was used rather than 8×10^{18}, as was used in the DEIS. 2200 liters of solution from the largest rasching ring tank were assumed vaporized. The same assumptions for a dry criticality were used except for the use of a thermal neutron spectrum. Additional fission product nuclides considered increased the total curies from 2.96×10^5 to 9.43×10^5. This analysis included a 1.6 μCi plutonium release. Plutonium was not considered to be released in the DEIS analysis. The probability of a wet criticality was reassessed and raised from 1×10^{-7} occurrences per year to 8×10^{-3}.

Page 18, Item C 8

Issue

"The issue of planes flying over the site was repeatedly mentioned as a hazard with recommendations that such air space be 'controlled' and barred to all flights. While transportation of plutonium by air has been terminated, a number of comments were directed to the need to fully evaluate the transportation of radioactive substances into and out of the Rocky Flats Plant ...."

Response

Efforts to obtain controlled air space are discussed in Section 3.2.2.7.

A summary of materials, their forms, relative quantities, form of transportation and miles in transit per year is given in Table 2.6.10-1 and 2.6.10-2. Modes of transportation are discussed further in the pages immediately following the tables.

Section 2.6.10.2 discusses transportation safety, regulations, package testing, radiation exposure limits, and certificate of compliance containers (DOT 6M Specification). DOT Regulations for surface contamination are summarized and a survey implied. The DOT Regulations are not reprinted in the FEIS as they were in the DEIS.

The potential impact of transportation accidents is discussed in Section 3.3.2.2, based on the Nuclear Regulatory Commission's document NUREG-0170, Volumes 1 and 2, "Transportation of Radioactive Materials by Air and Other Modes."

In Section 3.3.2.3, under Transportation Accidents, the following statement is made in the second paragraph: "Although there have never been any radioactive releases from transportation associated with Rocky Flats, a risk dose can be calculated." It is also noted that "The Probabilities of Accidents" (Appendix F) are such that shipment of radioactive materials by truck instead of air results in an increase in the risk dose to the U.S. population.

Page 19, Item C 9

Issue

"While the reluctance of the staff to describe security details is understandable, nevertheless, it would be useful to amplify the discussion in the FEIS to reflect such information as provided by the staff during the hearings."

Response

A more comprehensive updated general discussion of the safeguards and security systems is presented in Section 2.12.

Page 20, Item C 10

Issue

(a) "The treatment of fire hazards and fire safety precautions in the DEIS is considered inadequate by some participants ..., it was their opinion that the DEIS should address this subject in greater detail, ..."

Response

(a) The assumptions made as to potential glovebox fire, "cannot be clarified." The information present in the DEIS was complete to the best of our knowledge.

The assumptions used in the postulated accidental glovebox fire are located in Section 3.2.2.4 under the subheading "Postulated Fire Accidents" beginning with paragraph 5. The data have been revised but little new information could be provided.

Issue

(b) "Perhaps, in discussing the current plant program on safety; i.e., prevention of fire, accidents, accidental releases, and safety monitoring devices, the DEIS should be amplified along the lines noted by the staff in responding to one participant."

Response

(b) The discussion of the current plant safety program was amplified as requested.

The Health, Safety, and Environmental program is discussed in Section 2.6.2, Filter Certification - Section 2.6.4.2, Transportation Safety - Section 2.6.10.2, Radiation Safety Controls - Section 2.5.1.2. Safety Aspects of Handling Various Materials are reflected in Sections 2.5.2.1, 2.5.2.2, 2.5.3.2, 2.5.4.2, and 2.5.5.2. Radiation Monitoring is discussed in Section 2.6.2.5.

In addition to the above, measures taken toward prevention of accidents and accidental releases are also reflected in the descriptions of Radioactive and Chemical Waste Handling Systems (Sections 2.7 through 2.9), and Environmental Monitoring Programs are described in Section 2.10. For information on Accident Prevention, refer to the staff response to the issue presented in Item C, 1, (b), on page 8 of the statement by the Hearing Board.

Issue

(c) "The staff might also consider the suggestion made for the establishment of a committee to monitor internal plant safety programs ...."

Response

(c) An external committee to monitor plant safety programs presently exists that is felt to be adequate; therefore, the subject is not addressed in the FEIS. The suggestion was from the Director of the Colorado Department of Health (CDH). The response to CDH (Volume III, page 184) indicates that we recognize the Rocky Flats Monitoring Committee and would encourage appointment of persons to the Committee with technical expertise in areas of interest to the Committee.

Page 21, Item C 11

Issue

(a) "Several participants requested that the authors of various sections of the DEIS be identified ...."

Response

(a) In accordance with the Council on Environmental Quality Regulations, 40 CFR 1502.17, the list of preparers is presented in Appendix J of Volume II of the FEIS. The authors of the appendices, in most cases, were given in the DEIS. The FEIS also identifies the authors, including those responsible for the preparation of the new Appendix F.

Issue

(b) "Another participant noted that the public could better review the DEIS if an index were to be included. This suggestion also merits consideration in the FEIS."

Response

(b) An index has been included in the FEIS.

Page 21, Item C 12

Issue

"A significant number of participants requested that the hearings be continued, and that a second opportunity be afforded for public comment during June or July 1978."

Response

DOE felt that additional hearings would not surface any additional issues, and the testimony would be repetitive; DOE concluded that no further substantial information would be obtained to warrant these additional hearings. Therefore, none were held. However, DOE held two meetings with CDH to clarify their concerns regarding the dose calculations so that DOE could be responsive to these concerns.

With regards to reissuance of certain revised portions of the EIS for public review and comment, DOE felt that this would be inadvisable since many of the portions are interrelated so that meaningful comment would be difficult.