

TASK 1 REPORT (R1)

**IDENTIFICATION OF
CHEMICALS AND RADIONUCLIDES
USED AT ROCKY FLATS**

MARCH 1991

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SUMMARY

This first task in the Rocky Flats Toxicological Review and Dose Reconstruction (TR/DR) project involves the preparation of a listing of the radionuclides and chemicals that have been used or produced at Rocky Flats since operations began in 1952. This document details the information repositories utilized, the documents reviewed, and the individuals interviewed in the generation of the radionuclide and chemical lists.

The list of radionuclides identifying over 50 substances believed to have been used at the facility since operations began is presented in the body of the report. The listing of chemicals is found in four appendices. Together the four appendices identify more than 8,000 chemicals or products that have been used at the Rocky Flats Plant. The appendices represent four major groupings of compounds: 1) chemicals that should be subjected to further evaluation to identify the compounds of concern (Priority 1, Appendix A); 2) tradename products (Priority 2, Appendix B); 3) tradename products and chemicals that are believed to have little or no potential for posing an off-site health hazard (Priority 3, Appendix C); and 4) gases and miscellaneous chemicals (Appendix D).

This report also identifies various categories of compounds used by the plant such as carcinogens, herbicides, chemicals identified as major use or of principal concern, and additional substances found through document searches.

Through the review of a considerable number of documents and inventories ChemRisk was able to determine that the Rocky Flats Plant maintained a fairly complete and consistent record of radionuclide use. However, plant records of chemical use are generally limited to the time period after 1970.

1.0 INTRODUCTION

This first task in the Rocky Flats Toxicologic Review and Dose Reconstruction (TR/DR) project involves the preparation of a list of the radionuclides and chemicals that have been used or produced at Rocky Flats since operations began in 1952. The initial version of the list, presented in this Task 1 report, encompasses more than 50 radionuclides and more than 8000 chemicals and product names.

The Task 1 scope was developed to permit the identification of chemicals and radionuclides that have been present at the Rocky Flats Plant and warrant study for their potential historical impact on off-site individuals. To accomplish this objective an effort was made to survey the major repositories of information related to Rocky Flats. Much of this report provides details on the nature and extent of the information available from these repositories and from persons with knowledge of the plant's historic operations. The documents contained in these various repositories number in the thousands, and clearly could not all be reviewed. However, efforts were directed at the identification of those documents that would contribute to the production of the most comprehensive list possible with an emphasis on the identification of those compounds that have been present in substantial quantities at the site.

The list generated by this task will serve as the basis for the selection in Task 2 of those radionuclides and chemicals representing the greatest concerns from a community exposure standpoint and which will be further studied in detail during the remainder of the TR/DR project. The total number of compounds that will be investigated in detail was anticipated to be 15 when the study was designed.

2.0 BACKGROUND

Several repositories of Rocky Flats Plant documentation have been identified that will be of use to the TR/DR Project. The majority of them are not open to the general public because various levels of security clearance are required to access them. With the exception of the Building 881 archives at the plant, ChemRisk team members have accessed the contents of each of the limited-access repositories listed below:

- The Environmental Master File
- The Plant Library
- Integrated Research File
- The Legal/Environmental File
- The Classified Archives (Building 881)
- The Federal Records and Archives Center
- The DOE Technical Library
- U.S. DOE Effluent Information System
- U.S. DOE On Site Discharge Information System

In addition, ChemRisk team members have reviewed documents contained in the following public repositories:

- The Rocky Flats Public Reading Room (at the Front Range Community College)
- The Rocky Flats Environmental Monitoring Council Library (in Golden, CO)
- The Colorado Department of Health (CDH) Air Division Files
- The CDH Hazardous Materials and Waste Management Division Files

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- The CDH Water Quality Division Files
- The CDH Radiation Control Division Files

The nature and content of these repositories are discussed in the following sections.

The Environmental Master File (EMF):

The EMF consists of powered horizontal file machines in Trailer 130 C at the plant site. According to one of the current caretakers, about 75% of the contents have been catalogued and arranged according to a numbering system. The main file machine has 16, 6-foot-long shelves. Two of the shelves have locked fronts, which may contain documents related to the Church litigation.

The card catalogue to the EMF consists of approximately 5 linear feet of 3 x 5 cards, arranged alphabetically by topic. Each card contains up to 12 entries, and a single document may be listed under several topics, appearing more than once in the catalogue. A scan of the cards revealed that the majority of the documents were authored between 1970 and 1980. The documents include Rocky Flats-specific memos, letter reports, and studies; copies of state and federal regulations; and DOE reports. The plant librarian indicated that the EMF was originally set up around 1975, primarily to address the every-day administrative and informational needs of the Environmental group. Approximately 90 documents from the EMF were reviewed prior to preparation of this report.

The Plant Library:

The library is located in Building 706 in the Plutonium Security Zone (PSZ), which requires a Q-clearance and additional authorization (demonstrable need) to gain access. The Library is physically

made up of the hard-copy collections of 1) the Integrated Research File, 2) various journals and scientific magazines, 3) reference materials such as textbooks, handbooks, manuals, monographs, and reports generated by outside institutions/individuals, and 4) indexes and abstracting tools. The Legal/Environmental File was located here at one time, but was moved to Las Vegas for copying. The two files of interest to the TR/DR Project that are in the library are described below.

Integrated Research File: This database was started around 1975 and contains only technical reports - no letters, memos, etc. This file has two separate holdings - classified and unclassified. The classified holdings also have levels of secrecy for various types of documents, known as sigma levels. The sigma level assigned to a document generally indicates how much information the document contains regarding design/theory of nuclear weapons. Sigma-level One is the highest security level. Access to Sigma-level documents is on a need-to-know basis. The document titles and summaries of the classified holdings (accessed through the VAX) may be classified information themselves.

The RF Legal/Environmental Index (LEI): This is an index only. The actual files (sometimes loosely referred to as the Church Litigation Files) were at one time located in the plant library, but are now in Las Vegas undergoing copying for preservation and will be returned to the plant. None of the information in the files is classified. However, the index of the files is Attorney-Client privileged, as it includes comments on the pertinence of each document to the attorney's strategy. The files were established in approximately 1975 by attorneys as a result of a lawsuit brought by a neighboring landowner. Apparently, the attorneys canvassed the plant for any and all documents that dealt with environmental issues and compiled them. Memos, letters, reports, etc. were included. Classified documents were not included. The plant librarian indicated that the files consist of an estimated 20,000 documents (five 4-drawer filing cabinets) dating from 1952 to approximately 1975.

There are four indexes of materials in the library that can be accessed through the plant's VAX computer system: the Integrated Research File Index, the Legal/Environmental Index, the Rocky Flats Journal Holdings Catalogue, and an Environmental Regulations (Federal and State) database.

Classified Archives, Building 881:

Inactive classified documents are kept in the archives in Building 881. However, there may be inactive classified documents in the various areas throughout the plant (active classified documents would probably be in the area of the generating/user group). These files were not reviewed for the purposes of this report. It is reported that there are approximately 1500 boxes of classified documents in the 881 Archives which have been catalogued to some degree. The nature of the information that is being sought for the purposes of this study (i.e., identity of chemicals and radionuclides and their release rates) is not considered to be classified information by itself. As a general rule, only information specifically related to the design of a weapon or production rates is considered classified. Therefore, classified repositories may not provide much useful information for the purposes of this study. However, information relevant to this study may be present in reports that also contain classified information, and, for this reason, future project efforts will be directed at reviewing the classified repositories.

Federal Records and Archives Center, Denver Federal Center:

The Federal Records and Archive Center is where inactive, unclassified documents are stored until their specified retention period expires. The retention time for each of the various types of documents is specified under a protocol established by the National Archives and Records Administration. For the Rocky Flats plant documents, the General Records Schedule and the DOE Records Schedule govern the record retention times. No classified documents are sent here, as they must remain on the plant site.

The Rocky Flats documents on file here cover the periods when the nuclear weapons complex (nuclear policy) was governed by the AEC (Atomic Energy Commission), the ERDA (Energy Research and Development Agency), and the DOE. Documents are segregated into groups, according to the governing agency at the time of the document's creation. Specifically, documents in group 326 are from the AEC era, and groups 430 and 434 represent the ERDA and DOE eras, respectively. Rocky Flats began submitting records to the Federal Records Center in the '60's, although some of the documents are from earlier dates.

A listing called an "Accession Number Master List" contains the type and amount (in cubic feet or number of boxes) of documents on file for each group. The entries on the list indicate the general type of documents the boxes contain, but do not provide the titles of the documents. From the Accession Number Master List, one turns to the "Standard Form 135" of an accession number to find out more specifically what is contained in the boxes; although the information even on these forms is rather generic. Access to these listings is uncontrolled, but access to the files themselves requires approval from the plant records group and possibly from the department that generated the documents. Some of the files at the Federal Records Center have been "frozen" by court order and can not be accessed at this time.

The October printout of the Accession Master Number List indicated 622 cubic feet (boxes) of documents from the AEC era, 277 cubic feet from the ERDA era, and 2338 cubic feet from the DOE time period. The number of documents at the Federal Records Center fluctuates as a result of the various retention times for the documents on-hand and the submission of additional documents from the Plant. Twenty-five boxes of documents from the AEC era were reviewed for the purposes of this report.

At the Plant there is a cargo container of records (164 boxes) with the Health, Safety and Environment group that is to be processed and sent to the Federal Records Center. The index of the boxes, five pages long and not very detailed, is much like the Standard Form 135. The processing and transferring of these records to the Federal Records Center is on hold until funding is available.

DOE's Germantown, Maryland Library:

The DOE technical library is supposed to receive all unclassified technical reports from DOE facilities. Literature searches performed at the library for the purposes of this task suggest that at least some of the Rocky Flats reports, such as the Annual Environmental Monitoring Reports, are missing. Data summary reports can generally be found in this library, rather than detailed monitoring reports. The library may also be useful for obtaining technical reports addressing specific accidents or incidents at the Rocky Flats Plant.

U.S. DOE Effluent Information System & U.S. DOE On Site Discharge Information System:

These are databases maintained by EG&G in Idaho Falls, Idaho for DOE that contain data on radionuclide releases for all DOE facilities on an individual release point basis. The content of these databases were briefly reviewed for the purposes of this task.

Rocky Flats Public Reading Room at the Front Range Community College:

The reading room contains a variety of regulatory compliance documents and plant reports that the plant has released to the public after removing sections containing classified information. A listing

of the contents of the reading room is updated regularly. Many of the documents in this repository were reviewed for the purposes of this task.

Rocky Flats Environmental Monitoring Council Library:

Documents in this library duplicate many of those found at the Front Range Community College. No index is currently available for the information contained in this library. Numerous documents in this repository were reviewed for this task.

CDH Air Division Files:

These files are located on the third floor of the Ptarmigan Building in Denver, and consist of information on chemical emissions from the Plant. The total volume of records are contained in three horizontal file drawers. Most of the information is relatively recent, with an estimated 85% of the documents dating back only to 1989.

The Air Division has recently established an inventory of emission points at the Plant, and has compiled the information in a database in order to produce a quarterly status report. Only two editions of the quarterly report had been prepared at the time of this review. There are two versions of the report; the full-length version, and the condensed version which contains only those emission points that are of concern to the Division or warrant further investigation. The documentation includes building-by-building files (approximately 230 individual files) that were set up in anticipation of future information to be placed there. Most of these files contain only a single page of a summary form for each of the buildings. Several documents were retrieved from this repository for Task 1.

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CDH Hazardous Materials and Waste Management Files:

There are two sets of files that have been identified at the Department of Health offices at 4210 E. 11th in Denver that contain Rocky Flats documents: RCRA files in the Waste Management Division; and SARA Title III, Underground Storage Tank, and Solid Waste files in the Hazardous Materials Division.

The Waste Management Division's files are located on the third floor. Many of the documents in this repository have also been found in other repositories. The volume of Rocky Flats-related files is roughly equal to six, 4-drawer file cabinets. A cataloging/indexing scheme was recently established for these files.

The Hazardous Materials Division's files are in the basement of 4210 E. 11th. The Division's files basically include documentation concerning SARA Title III, Underground Storage Tank, and Solid Waste regulations. Rocky Flats has submitted documents under SARA Title III reporting requirements that include MSDSs for Section 313 and 302 materials (>10,000 lbs, or Extremely Hazardous Materials in excess of 500 lbs), and Tier 2 documentation. Several of these documents were reviewed for Task 1. Documents have been submitted by Rocky Flats authorities in compliance with the underground storage tank regulations, but these files are confidential at the request of Rocky Flats. The files date back to the enactment of the UST regulations (1986).

Solid waste reports have also been provided to CDH by Rocky Flats, but the files have been removed, presumably to CDH's Rocky Flats Program Unit or the Waste Management Division's files.

CDH Water Quality Division Files:

These files have not yet been reviewed as their relevance to Task 1 is limited. They address only surface water information, and are almost exclusively limited to the Monthly Data Exchange Reports. These files are in the CDH offices in the 1st National Bank Building at 400 S. Colorado Blvd in Denver. There is another set of files located with the Drinking Water Section, but they are focused on the reservoirs only.

CDH Radiation Control Division Files:

Division records reviewed for the purposes of Task 1 covered the period from approximately 1970 through 1987. These records are located in the Waste Management Library on the third floor of the West Tower of the Ptarmigan Building in Denver. These files consist of approximately four shelves of documents made up primarily of monthly plant reports, information exchange meeting notes, and CDH monthly monitoring reports. More specifically the reports include:

- Daily weather summaries covering various periods during the years 1970 to 1974.
- Monthly weather summary for the years 1969 to 1975 (when data reporting was automated).
- Environmental Survey Reports, including minutes and handouts from the information exchange meetings including:
 - Plant Calendar Year Summary - 1969
 - Facility Monthly Reports of monitoring data on; integrated stack releases, monthly average stack concentrations, ambient air on and off-site, high volume air samples (continuous and grab), fallout trays, holding pond water, soils, vegetation, well waters, and waste treatment facility effluent.

- CDH Monthly Monitoring Reports for the years 1975 through 1987 including:
 - Ambient air on and off-site,
 - Surface and tap water, and
 - Well water.

Division records for more recent years are kept at the Division's offices at 4210 E. 11th in Denver.

3.0 LIST DEVELOPMENT

Periodic reports and inventories containing information about radionuclide and chemical use have been generated since about the mid-1970's by the plant. In the case of radionuclides, the inventories were routinely generated and were intended to be comprehensive. Chemical reporting was not routine and, until recently, was generally not comprehensive. These inventories represent the best source of information identified to-date regarding radionuclide and chemical use and are the primary sources for the lists of compounds presented in this Task 1 report. The continuity of the nature of the operations at Rocky Flats and the comprehensiveness of some of the post-1970 information sources suggest that the lists presented in this report encompass the vast majority of radionuclides and chemicals that have been present at the site.

Reliable information on radionuclide and chemical use at Rocky Flats prior to the 1970's has been difficult to find because data are very limited and the records are scattered. If significant use of additional radionuclides or chemicals not identified by this initial project task is identified during subsequent tasks they will be considered for further study at that time.

The lists of radionuclides and chemicals present at the site have been developed using a variety of sources of information. An initial list was rapidly compiled from a few key documents that provided a relatively comprehensive inventory of radionuclides and chemicals. Subsequent efforts

focused on identification, retrieval and review of other documents from the numerous repositories to supplement the listing and on efforts to find more information regarding operations during the 1950's and 1960's. The following sections describe the process used and the sources that were consulted in the development of the lists.

3.1 Radionuclides

The presence of radionuclides at the Rocky Flats plant has been documented throughout the plant's operational history. The quality of the record is relatively poor prior to 1964, since before that time many people had the authority to order non-production radionuclides (presumably small quantities). Starting in 1964, a formal program was created whereby a Health Services Radioactive Source Registry was established for non-production radionuclides. This registry is maintained in a computer data base for registered sources and non-accountable sources and contains comprehensive information on each radionuclide source. Radionuclide inventories, containing general source information, have been published on a quarterly basis by the Department of Operational Health Physics since 1978. The first few of these reports, which included both production and non-production radionuclides, were created by searching laboratory and production records.

The primary sources of information for the listing presented in this report were the Health Physics Reports and a periodic report titled, "Radioactive Materials Associated With Rocky Flats Plant," which contain lists of all production and non-production radionuclides used at the Rocky Flats Plant. Reports from 1978 through 1981, 1983, and 1989 were reviewed. The completeness of the listing generated from these reports was evaluated by reviewing other plant reports and environmental monitoring reports. The documents in this review included:

- The Rocky Flats Plant Annual Environmental Monitoring Reports for 1976 through 1981, 1984 through 1986, and 1988,
- The Rocky Flats SAR, Chapter 10, Environmental Monitoring Program, 1981,
- The Radioactive Effluent/On Site Discharges/Unplanned Releases Report for 1988 (DOE Form F-5821.1),
- The Rocky Flats Plant Monthly Environmental Monitoring Reports (January 1984 through April 1990),
- The Environmental Measurements Laboratory Annual Report of the Surface Air Sampling Program, 1985 (EML-440),
- The History of Rocky Flats Waste Streams, 1982,
- History and Evaluation of Regional Radionuclide Water Monitoring and Analysis at the Rocky Flats Installation, February 1981 (RFP-3186),
- Investigation of Tritium Release Occurrence at the Rocky Flats Plant, November 1973 (TID-27810),
- Colorado Department of Health, USAEC Rocky Flats Plant Surveillance; August 1970 through March 1975.
- U.S. DOE Effluent Information System, Nuclide Database Master List for Calendar Years 1953 to 1989.
- U.S. DOE On Site Discharge Information System, Nuclide Database Master List for Calendar Years 1953 to 1989.

Additional information was gathered from interviews with current Rocky Flats Plant employees.

The reporting of radionuclides present at the plant site is typically broken down into three groups defined by the gross quantity of material handled. The first group includes radioactive materials handled in kilogram quantities and used in production activities. The second group includes

radioactive materials handled in gram quantities, primarily for research and analytical activities. The final group includes other radionuclides (e.g., sealed solid sources, plated sources, liquid sources, and analytical stock solutions) used for research, analytical, and calibration activities. This last grouping contains two categories of sources. The first are the registered sources which require semi-annual leak tests and physical audits and include sealed solid sources greater than ten microcuries, plated sources greater than one microcurie, and liquid sources greater than one microcurie. The other category is the accountable sources which require annual accountability and include sealed solid sources less than ten microcuries, plated sources less than one microcurie, liquid sources less than one microcurie, and analytical stock solutions.

The list of all radionuclides, identified to date, that have been used or stored at the Rocky Flats Plant is presented below. Each radionuclide is listed only in the quantity category representing the highest quantity present at any time at the plant. Tritium is normally present in quantities of much less than one gram. However, there was an incident in 1973 that resulted in an off site release of tritium from scrap material contamination. An AEC investigation committee concluded that the maximum contamination of the scrap material with tritium was 2000 Curies as reported in a document titled, "Investigation of the Tritium Occurrence at the Rocky Flats Plant ". Consequently, tritium has been included with the radionuclides on the gram quantity list.

Radioactive Materials at the Rocky Flats Plant

Radioactive Material Handled in Kilogram Quantities

Americium-241

Plutonium

Pu-238

Pu-239

Pu-240
Pu-241
Pu-242

Thorium-232

Uranium
U-233
U-234
U-235
U-238

Radioactive Material Handled in Gram Quantities (<1 Kg)

Curium-244

Hydrogen-3 (Tritium)

Neptunium-237

Thorium-228

Other Sources

Includes sealed solid sources, plated sources, liquid sources, and analytical stock solutions.

Actinium	Ac-228	Sodium	Na-22, 24
Aluminum	Al-26	Strontium	Sr-85, 89, 90
Americium	Am-243	Technetium	Tc-99, 99m
Antimony	Sb-124, 125	Thallium	Tl-204
Argon	Ar-39	Thorium	Th-230, 231, 234
Barium	Ba-133	Tin	Sn-113
Beryllium	Be-7	Uranium	U-232, 236
Bismuth	Bi-207, 210	Ytterbium	Yb-169
Cadmium	Cd-109	Yttrium	Y-88, 90
Californium	Cf-250, 251, 252	Zinc	Zn-65
Carbon	C-14		
Cerium	Ce-139, 144		
Cesium	Cs-134, 137		
Chlorine	Cl-36		
Cobalt	Co-57, 60		
Curium	Cm-245, 246		
Europium	Eu-152, 154, 155		
Holmium	Ho-166m		
Iodine	I-129, 131		
Iridium	Ir-192		
Iron	Fe-55		
Krypton	Kr-85		
Lead	Pb-210		
Manganese	Mn-54		
Mercury	Hg-203		
Nickel	Ni-63		
Plutonium	Pu-236, 244		
Polonium	Po-210		
Potassium	K-40		
Promethium	Pm-147		
Protactinium	Pa-231, 234		
Radium	Ra-226		
Ruthenium	Ru-106		
Selenium	Se-75		
Silver	Ag-110, 110m		

Interviews with a plant employee and review of the Rocky Flats Legal/Environmental File and Environmental Master File documents have suggested that Thorium-233 and Thorium 227 may also have been present at one time at the site. However, ChemRisk has been unable to establish the accuracy of these reports. Further investigation will be necessary to confirm the presence and quantity of these radioisotopes at the plant site.

3.2 Chemicals

The starting point for preparing the list of chemicals used or produced at Rocky Flats was a computer database containing one of the latest Rocky Flats Chemical Inventory Lists which was obtained from the Environmental Restoration and Waste Management Group at Rocky Flats. This list is an updated version of the 1988-1989 Chemical Inventory List on file in the Rocky Flats Public Reading Room. The inventory is the result of a survey of the chemicals present and respective quantities in every building on the plant site, supplemented with information from purchasing records. The individuals preparing the resulting listing submitted it to the area managers at the plant for verification.

The only other major inventory of chemicals identified by our investigations is one prepared by Dow Chemical Company in January of 1974. The Dow inventory represents a compilation of separate inventories conducted in all the plant areas and is titled "Harmful and Potentially Harmful Materials Inventory, January 25, 1974". The inventory was to include materials considered to be directly harmful to people found in amounts greater than 3 grams, and materials considered to be harmful only when grossly mis-handled or potentially harmful in the environment if found in amounts greater than 4 kilograms. The inventory states that all areas were physically inspected and

estimates (within $\pm 30\%$ of the amount) were permitted. The inventory excluded "special and source" materials, inert gases, air and potable waters.

The chemicals and their quantities as presented in the 1974 and 1988/89 inventories are presented in Appendices A, B and C. The plant inventories presented quantity information in many different forms (e.g. gallons, pounds, milligrams, kilograms). In order to facilitate the comparison of these various quantities, they were all converted to kilograms using the following conversion approximations:

- 0.264 gallons per kilogram,
- 1.0 liter per kilogram,
- 2.2 pounds per kilogram,
- 1,000 milliliters per kilogram,
- 33.3 ounces per kilogram,
- 2.1 pints per kilogram, and
- 1.057 quarts per kilogram.

Appendix D contains a listing of materials found on the 1988/89 inventory that are either gases or items for which no quantitative information was available.

The chemical list has been divided into three major groupings in anticipation of the first screening step required by Task 2 which addresses the selection of the compounds of concern. The assignment of compounds to these listings will be finalized as part of Task 2. The first major grouping (Appendix A) represents those chemicals that should be subjected to further evaluation to identify the compounds of concern (Priority 1). The Appendix A list is composed of two alphabetical listings. The first list is those chemicals found on the 1988/89 inventory. This first list

also identifies quantities for those chemicals that were also on the 1974 inventory. The second list identifies those chemicals that are unique to the 1974 inventory. The second grouping (Appendix B, Priority 2) is comprised of trade name products placed into two listings as was done in Appendix A. These products have been listed in order of the quantity reported (when available) in the inventories. Identification of the chemical makeup of products used in large quantities is one objective of the Task 2 efforts. The third list (Appendix C, Priority 3) identifies tradename products and chemicals that are believed to have little or no potential for posing an off-site health hazard and is organized in the same fashion as the Appendix A and B listings. Materials were placed on the Appendix C listing if they fell in one of the following categories:

- Common household or commercial products,
- Chemicals likely to be used as laboratory standards or analytic testing materials (typically listed in very small quantity), or
- Considered to be generally non-toxic or of very low toxicity.

4.0 SUBSIDIARY LISTS

Appendices A, B, C and D together provide a comprehensive list of the chemicals and brand name products that have been reported as being present at Rocky Flats. Because the comprehensive list is so extensive, several categories of substances are discussed separately in this section to provide an overview of the types of compounds represented on the comprehensive list.

4.1 Listed Carcinogens Present at Rocky Flats

Tables 4-1 and 4-2 identify those chemicals on the 1988/89 and 1974 inventories respectively that are listed as carcinogens on the Health Effects Summary Table B: Carcinogenicity (updated 3rd quarter 1990) of the U.S. EPA "Health Effects Summary Tables and User's Guide". The inventories include over 80 chemicals and elements that have been identified by the EPA as possible, probable or known human carcinogens. Of these compounds 23 were reported in inventory quantities that exceeded one kilogram and 15 were reported in quantities exceeding ten kilograms. It should be noted that beryllium and possibly a few other metals have special status as production materials at the plant, and that more recent inventories do not include complete quantitative information for these elements.

4.2 Herbicides Used at Rocky Flats

Investigations led to the identification of documents addressing herbicide use at the plant. A document in the Rocky Flats Reading Room titled "List of Herbicides Used at the Rocky Flats Plant August, 1989", and two documents from the Environmental Master File; Pesticides Control Program Report (EMF # 60-12240-RR-001) and Weed Spraying Operations (EMF# 60-12240-CO-002) listed a number of compounds not found in the inventories. Neither of these documents or the inventories identified atrazine, which was the subject of concerns as the result of a fairly recent release. The herbicides and pesticides identified by these documents are listed in Table 4-3. No information on the quantity of the pesticides and herbicides was provided in these documents.

Table 4-1

Table 4-2

insert table 4-3

4.3 Chemicals Identified from Document Searches

The list of chemicals prepared from the 1974 and 1988/89 inventories was checked by reviewing a large number of documents and interviewing a number of individuals. A partial listing of the documents reviewed and persons contacted is provided in Appendices E and F. As an indication of the completeness of the inventories of 1974 and 1988/89, the search of documents resulted in the identification of few chemicals not named on the inventories and a number of commonly used brand name products. The chemical and product names cited in a document but not found on the inventories are identified in Table 4-4. The chemicals identified on Table 4-4 are generally closely related to chemicals found on the chemical inventories. No quantitative data comparable to that provided in the inventories was available for these additional compounds.

4.4 Chemicals Identified as Major Use or of Principal Concern in Past Reports

A wide variety of reports have been prepared that deal with concerns related to chemical releases or contamination from Rocky Flats. A number of these reports are discussed here in the interest of establishing whether the chemical inventories that are the basis for the chemical listings generated for this task include the compounds that have been historically identified as of potential concern.

Two reports were identified which provided a listing of the important radionuclides and chemicals at the plant. The first is from the Governor's Scientific Panel and the second is the 1980 Environmental Impact Statement for the plant.

INSERT TABLE 4-4

- Governor's Rocky Flats Scientific Panel on Monitoring Systems (October 1990). The Radiation and Air Committee reports identified important radionuclides and chemicals at the plant site. The Radiation Committee report suggested that primarily those radionuclides reported to be present in gram quantities or greater be the focus of monitoring efforts. The Radiation Committee relied primarily on the same plant inventories used to construct the listing for this task, therefore no additional radionuclides were reported. The Air Committee of the Governor's Panel relied on SARA Title III reports for 1988 from the plant to identify the top 19 hazardous materials and to make recommendations regarding monitoring systems for these chemicals. Each of these 19 materials were found on the chemical inventory presented in the Appendices of this report with the exception of methylene bis(phenyl isocyanate) - MDI (Diphenylmethane-4,4'-diisocyanate), a resin or epoxy component which may be reported under a product name in the inventory (Appendix B). The panel estimated that there are no air emissions of MDI from the plant. The annual usage quantities for the 19 materials presented in the panel's report (based on the SARA Title III reporting) are generally about ten times higher than the quantities reported in the 1988/89 inventory, suggesting that the inventory quantities identified in the Appendices of this report may represent about one month's supply of the material.
- Final Environmental Impact Statement for the Rocky Flats Plant Site (April, 1980), This report identified 42 major chemicals and the typical annual consumption rates of each in 1977. All 42 of the chemicals were present on the lists presented in the Appendices.

A variety of reports address the identification and clean-up of chemicals released to the environment by the plant. These reports present an opportunity to evaluate whether chemicals detected in the environment are consistent with those found on the plant inventories. The following three reports were reviewed for the purposes of establishing whether the contaminants of concern for remediation have been included in the plant chemical inventories:

- Remedial Investigation Report for High Priority Sites (881 Hillside), Volume 1, 3/1/88
- Solar Evaporation Ponds, Closure Plan, Volume 1, 7/1/88

- Remedial Investigation Report for 903 Pad, Mound and East Trenches Area, Volume 1, 12/31/87

Table 4-5 lists the contaminants of concern identified by these reports for various areas of the plant site.

Each of the chemical contaminants identified in the table is listed on the chemical inventory presented in the appendices (metals are included as a constituent of a number of compounds on the inventory).

4.5 Summary

The primary objective of this Task 1 effort has been the identification of the radionuclides and chemicals that have been used at Rocky Flats over the past 40 years. As part of the investigation, additional information regarding inventory quantities and the nature of some of the materials was identified and presented as part of this report.

A fairly complete and consistent record of radionuclide use has been maintained by the plant, and in conjunction with environmental monitoring data suggests a relatively complete picture of the radionuclides historically present at the plant.

Comprehensive records regarding historic chemical use are limited to inventories prepared in the mid-1970s and the late 1980s. A considerable number of documents were reviewed to determine whether there was evidence of substantial use or presence of chemicals not

insert table 4-5

found on these inventories, and to identify any documentation of significant process changes that may have marked dramatic changes in chemical usage at the plant. The document review did not result in the identification of any information suggesting major process changes that were linked to significant changes in the chemicals used over time. Interviewees suggested that there is constant change and adjustment in various processes, and also indicated that process changes apparently affected the accuracy of the waste stream characterization reports over a short period of time. However, nothing that was reviewed for the purposes of this task suggested that any changes could be identified that alone have dramatically altered general chemical usage at the facility with two exceptions. The first dramatic change involved the introduction of machining methods employing lubricants in the late 1950s to what had previously been a dry process. The second change, also in the 1950's involved changes in the form (liquid, powder, solid) of the plutonium used by the plant. The source of the differences in the inventory quantities between 1974 and 1988/89 for some chemicals may, in many cases, be linked to the general trends in industry to reduce the usage of some specific carcinogenic compounds in favor of less toxic substitutes.

The document review performed for this task suggested that the inventories included the majority of the chemicals cited in other documents, but also indicated that commercial product names not listed in the inventory are likely to be continually encountered in documents. Also, references to chemicals not on the inventories are also likely to be found with no reference to their potential importance or use at the plant site. In many cases references to chemicals that on first look were not on the inventory, were found after further investigation under a synonym for the chemical. In other cases there were many closely related compounds, each representing distinct chemicals, but potentially used interchangeably, behaving similarly in the environment and having similar toxic properties. These observations suggest that while chemical changes may appear to have taken

place, many times such changes have no practical impact on the nature of a potential chemical release and its ultimate impact on the environment.

Therefore, while the picture of chemical use at the facility in many ways appears to be extremely complex, overall the general nature and type of compounds used in quantity at the facility have been relatively stable. A key objective of future investigations for this project will be to further detail the historic use of selected chemicals at the site to refine our understanding and to evaluate the nature of potential releases.

0320ALR1

APPENDIX A

PRIORITY 1 CHEMICALS

APPENDIX B

PRIORITY 2 CHEMICALS

APPENDIX C

PRIORITY 3 CHEMICALS

APPENDIX D

GASES AND MISCELLANEOUS CHEMICALS

APPENDIX E

LISTING OF DOCUMENTS REVIEWED

This listing identifies many of the documents reviewed for the purposes of Task 1. While a number of additional documents may have been reviewed, the following list identifies those which received particular attention for the purposes of this task.

ROCKY FLATS ENVIRONMENTAL MONITORING COUNCIL LIBRARY

Agreement in Principle/Interagency Agreement - Draft, signed 12/8/89, Hazardous Material List.

Omnibus Environmental Assessment for the Rocky Flats Plant of the USERDA, May 1975.

Preliminary Safety Analysis Report, (Proposed) Plutonium Recovery and Waste Treatment Facility. Rockwell International, February 2, 1976.

Fact Sheets and MSDS for radionuclides, metals, acids, bases, solvents, fuels and oils supplied in response to a request by Howard Brown of the Rocky Flats Environmental Monitoring Council to EG&G on 5/31/90.

Waste Minimization and Assessment Report, NFT and Stoller, 12/18/89.

RFP Low-Level Mixed Waste Plan, Wastren and Rockwell, 11/29/89.

ROCKY FLATS READING ROOM, FRONT RANGE COMMUNITY COLLEGE

Final Environmental Impact Statement (EIS), Rocky Flats Plant Site. Department of Energy DOE/EIS-0064, April 1980.

Resource Conservation Recovery Act (RCRA) Part B applications, 11-1-85, 11-8-85, 11-26-86, 12-15-87, 3-30-90.

Federal Bureau of Investigation (FBI) Search Warrant, June 6, 1989.

Comprehensive Environmental Assessment Response Program (CEARP), Phase 1 Installation Assessment. Department of Energy Albuquerque Operations Office, Environment, Safety and Health Division. April, 1986.

Waste Stream Identification and Characterization (WSI). Volumes 1-26, April 6, 1987.

Resource Conservation Recovery Act (RCRA), Part B Operating Permit Application for Hazardous and Radioactive Mixed Wastes. Volumes 1,2 and 6-9, December 15, 1987.

Colorado Department of Health 1989 Hazardous Waste report, 5/1/90,

Rocky Flats Plant Low-Level Mixed Waste Plan, November 29, 1989.

Remedial Investigation Report for High Priority Sites (881 Hillside Area). Volumes 1-10, March 1, 1988.

Remedial Investigation Report for 903 Pad, Mound and East Trench Area. Volumes 1-11, December 31, 1987.

"Tiger Team" Assessment of Environmental Conditions at Rocky Flats Plant, August 1989.

Environmental Statement, Plutonium Recovery Facility (WASH - 1507), 1/72.

Technical Safety Appraisal of the Rocky Flats Plant, USDOE, 1/89.

Production Building Ventilation report, 8/4/89.

Rocky Flats Sewer Plant report, 8/4/89.

Compositional Summary of Major Constituents in Rocky Flats Duct Samples, 5/90.

Waste Isolation Pilot Plant Environmental Impact Statement Executive Summary, 10/80.

Solar Evaporation Ponds - Closure Plan 8/86.

Rocky Flats Materials datasheets, 12/71.

Plutonium-Gallium Alloys: Annotated Bibliography 1/17/75.

History and Evaluation of Regional Radionuclide Water Monitoring and Analysis at the Rocky Flats Installation, 2/21/81.

ROCKY FLATS ENVIRONMENTAL MASTER FILE DOCUMENTS

Potentially Relevant to Task 1:

20-13700-CO-007, Hazardous Materials Inventory - Supplemental Information, E. Vejvoda, 12/80.

60-12180-CO-010, Harmful Material Inventory, C.W Barrick, 1/74 (printout of an inventory that specifically excludes "Special and Source" materials and has other limitations, but the lengthiest list found for the time period).

60-12180-CO-008, More on Carcinogens, G. J. Werkema, 11/73 (two lists: one of epoxies used, and the other of carcinogen-containing commercial epoxy products used).

60-13370-RR-005, Radioactive Materials Associated With Rocky Flats, Author Not Listed (Quarterly Reports - included in this file are reports from 4/77 [revised 3/78], 4/79, 2/80, 6/80, 5/81, 12/81, 1/83, 3/83, & 7/83).

60-10112-RR-008, Lithium Hydride and Lithium Deuteride Disposal, Hobbs, 3/72 (a brief statement of the disposal, by water-reaction, of Lithium compounds onsite).

60-12180-CO-011, Chemicals Causing Genetic Alterations, C.W. Barrick, 1/30/74 (a listing of those chemicals in the 1972 edition of NIOSH's "Toxic Substances List" which were noted as carcinogenic, mutagenic, neoplastic, or teratogenic. Of those, the ones present at the plant site were noted as to what amount, based upon a 1974 inventory).

60-12180-CO-013, CuO/Al Thermite Mixture, Hornbacher, D. 4/7/77 (letter concurring with proposal for disposal of 10 pounds of this mixture by remote electrical activation).

60-12240-RR-001, Pesticides Control Program Report, Willging, 11/73 (a listing of pesticides on a standard form, with little additional or supporting information).

60-13800-RR-012, Environmental Inventory: A Historical Summation of Environmental Incidents Affecting Soil At or Near the USAEC Rocky Flats Plant, Owen and Steward, 1/74 (a very useful document for history of areas of the plant that may have "infiltration" of contaminants as a result

of routine operations or accidental releases; document is identified by Information Security as "Not for public release.").

60-13333-RR-009, Algecides at Rocky Flats, Allen, 3/72 (listing of those algecides used on the plant site at the time of the document).

60-12240-CO-002, Weed Spraying Operations, Illsley, 6/76 (letter regarding substitution of Tordon with a mixture of 2,4- D and Banvel).

60-12240-CO-003, Pesticides, Henry, 2/77 (a listing of those pesticides "no longer used" at the plant site, and those that were found in the storage area).

Not Relevant to Task 1 List:

10-13200-CO-011, Emissions and Halogenated Solvents, Hobbs, 1973 (record of discussion concerning proposed clean air laws).

20-10200-CO-035, Records Storage Receipts, Howerton, 1981 (receipts for obtaining EIS documents).

20-17000-CO-001, USAEC Rocky Flats Plant Effluent, Woodruff, 1966 (sketch of retention ponds on-site).

40-50300-RR-039, Accidental Offsite Releases Other Than Fire, Yoder, 1971 (summary discussion of Plutonium release from the 903 Pad).

60-10113-CO-004, Chemicals Inventory and Control Committee, Yoder, 4/76 (letter recommending an inventory committee and an on-going program).

60-10113-CO-001, Disposal of Building 91 Chemical Wastes, Voight/Ryan, 8/10/66 (a letter providing a guideline for disposal of general types of Building 91 wastes).

60-12051-RR-007, Release of Radioactive Effluents From Rocky Flats, Lee, 3/71 (summary report of Beryllium and alpha monitoring from various buildings - no additional constituents found).

60-13250-RR-004, Hydrocarbon Emissions, Author and Date Not Listed (single sheet of emissions calculations with no additional information provided).

80-20101-OR-003, Radiochemical Analysis of Ground and Surface Water, Scott and Voegeli of USGS, 1961 (sampling locations/parameters in Colorado, 1954-1961).

70-45100-CO-014, On-Plant Inventory, P.W. Krey, 3/75 (discussed additional Plutonium and responsibilities from land acquisition).

60-10112-RR-013, Updated Information on Burial Sites at Rocky Flats, Illsley, 1/83 (update of 1973 Environmental Inventory Report of burials or infiltrated soil onsite. Information includes trenches, scrapes, & drilling. Some amounts and items buried noted. All chemicals or radioisotopes listed were on existing inventories).

60-12180-CO-002, Hazardous Materials, Hobbs, 4/72 (document is a proposal for disposal guidelines).

20-53000-CO-001, Report to Governor Love on Hazardous Substances, P. Smith, 4/72 (document is a letter regarding a report to Governor Love, not the report itself. No useful information for Task 1).

20-10610-CO-015, Form 789 Radioactive Effluent/On-site Discharge Data, Biles, 3/76 (standard reporting form that provides breakdown on emissions by building and/or plenum for CY 74-75; all chemicals or radioisotopes listed were on existing inventories).

20-10610-CO-012, CY 71-72 Radioactive Effluent Data Compilation, Roeder, 7/73 (all chemicals or radioisotopes listed were on existing inventories).

20-10610-CO-013, Form 789, Radioactive Effluent/On-site Discharge Data, Werkema, 3/77 (all chemicals or radioisotopes listed were on existing inventories).

60-10200-RR-001, Atmospheric and Demographic Impact, M. Boss, 1/74 (very general summary of the emissions controls on the plant site and a conclusion derived by the Health and Safety Laboratory of the USAEC based upon comparison data, plus a summary of area demographics and plant population history).

60-10100-CO-004, Operational Safety Survey Report, Seed, 4/72.

80-06005-OR-005, Health and Safety Labs, Environmental Report, USAEC, 1/75 (report of World-wide Fallout).

80-06005-OR-050, Health and Safety Labs, Environmental Report, USAEC, 1980 (report of world-wide fallout).

80-06005-OR-051, Health and Safety Labs, Environmental Report, USAEC, 1981 (report of world-wide fallout).

60-13211-RR-009, Product and Health Physics Research Service Report, Hammond, 1/72 (locations of Monitoring Stations).

60-13280-RR-002, Product and Health Physics Research Service Report, Bokowski, 11/72 (6 page report of analyses of effluent from stack of Bldg. 771 incinerator by gas chromatography. No additions to existing inventories).

60-22010-RR-001, Toxic Gas Building 371, Handschy, 12/72 (a postulated accident scenario with anticipated results).

60-13210-RR-015, Hydrocarbon Emissions Booster #1 - Bldg 776-777, C. Johnson, et al, 8/74 (Results of testing an in-plenum method of analyzing emissions by gas chromatography; parameters limited to TCE, carbon tetrachloride, methane, carbon monoxide, and total hydrocarbons).

60-12115-CO-011, Accomplishments and Information, Thompson, 12/75 (includes comparisons of emissions; all listed were on existing inventories).

60-13250-CO-001, Hydrocarbon Emissions, Hobbs, 11/73 (Letter discussing proposed hydrocarbon emission regulations and their potential problems.)

10-13200-CO-007 to -018, Hydrocarbon Emissions to Degreasing Operations, various authors, 11/73 to 3/74 (concerning reduction of these emissions).

60-22000-CO-008, Average Hourly Winds During '69 Fire, Cuddihy/Thompson, 1969 (title is self-explanatory).

60-13280-CO-004, Building 71 Stack Releases, Epp, 5/63 (good history of releases from this building, all chemicals or radioisotopes listed were on existing inventories).

60-20100-RR-002, Unusual Occurrence Report, Yoder, 5/83 (incident involving overflow of process water; all chemicals or radioisotopes listed were on existing inventories).

10-15000-OR-005, Carcinogens, No Author, 7/73 (blank OSHA compliance inspection form).

10-15000-RR-001, OSHA Inspection of Rocky Flats, 9/72 (citations, primarily for exits and electrical code infractions).

60-10115-CO-017, Shipments of Non-Routine or Non-SS Materials, Bowman, 10/74 (policy/procedure).

60-10115-CO-022, Shipments of Non-Routine or Non-SS Materials, Young, 10/73 (policy/procedure).

60-13320-RR-001, Waste Shipment Data, Author Not Listed, 1975 (no specific constituents listed; overall monthly totals of general types of rad waste shipped offsite for the period of 7/74 to 6/75).

60-12180-CO-005, Rocky Flats Cyanide Waste, Author Not Listed, 8/73 (letter discussing possibility of School of Mines purchasing cyanide wastes).

60-13880-RR-004 to -007, Log Books, Author Not Listed, 1964-67 (almost exclusively sample date, sample numbers, and their respective alpha counts).

60-13880-RR-009 to -013, Site Survey Monthly Progress Reports, Kittinger/Hammond, 1952-57 (on- and off-site sampling summaries, analytical parameters limited to alpha and beta activity, all chemicals or radioisotopes listed were on existing inventories).

20-10115-CO-001 to -007, Dissemination to the Public of Data on Environmental Levels of Radiation, T.S. Chapman, et al, dates vary (concerning guidelines for such).

10-10703-CO-001, Reporting Radiation Accidents, Hertford, 4/60 (guidelines).

60-12230-CO-001, Lithium Disposal at Rocky Flats Plant, Willging, 10/73 (1 page summary of how lithium was disposed at plant site on occasion).

70-00100-CO-002, Refute of Article, "Secrecy and Safety at Rocky Flats" in West Magazine, Joshel, 9/69 (editorial comment).

40-50300-NR-014, Feedback at Rocky Flats Plant - Critics Renew Charges, Author Not Listed, No Date Listed (editorial).

40-00550-NR-001, Dow Denies Look Allegations, Author Not Listed, 12/70 (editorial).

40-00100-RR-002, History of Rocky Flats Plant, Author Not Listed, Date Not Listed (the text for a public relations slide show from a presentation that was not referenced).

60-10101-RR-012, Possible Areas of Concern and Research at Rocky Flats Plant, Matheson, 10/69 (internal report of those areas of concern that had been highlighted by persons outside the plant with additional areas that were identified by the author).

40-02200-CO-008, Visit with Ed Martell, Matheson, 3/70 (discussion notes).

40-02200-CO-009, Discussions with Ed Martell, Matheson, 6/70 (discussion notes).

60-12230-RR-002, Lithium, Author Not Listed, Date Not Listed (history of Lithium use and results of monthly water samples for '57 to '60; cites an instance of converting the lithium to lithium butyrate prior to disposal).

60-13280-RR-002, Investigation of Airborne Pollutants from 771 Incinerator by Gas Chromatography, Author Not Listed, 10/72 (information contained no chemicals or radionuclides that weren't already on ChemRisk listing).

60-13250-CO-002, Styrene Emissions During Fiberglassing Operations in Bldg 334, Hobbs, 9/74 (all chemicals listed were on existing inventories).

60-12238-CO-033, Inventory of Radioactive PCB's, Wickland, 4/83 (includes listing of amount of PCB transformers and power capacitors in service).

60-20100-RR-003, Unusual Occurrence Report, Yoder, 5/83 (nitric acid spill; all chemicals or radioisotopes listed were on existing inventories).

60-13271-RR-016, Summary of Air and Waterborne Radioactive and Non-Radioactive Releases for CY 1971, Boss, 1/72 (all chemicals or radioisotopes listed were on existing inventories).

60-13271-RR-018, Summary of Airborne Releases from R & E Buildings, Boss, 1/72 (all chemicals or radioisotopes listed were on existing inventories).

60-13271-CO-020, Non-Radioactive Air Emissions, Piltingsrud, 2/72 (concerns upcoming regulations- mentions 'lanthanide series' of exotic metals as one of the types of RFP emissions).

60-13271-CO-023, History of Stack Sampling at Rocky Flats, Author Not Listed, Date Not Listed (short, general history overview with some unexplained tables of emissions numbers).

60-13271-CO-015, Releases of Materials to Environment, Werkema, 7/73 (a notification letter regarding an upcoming meeting to discuss recent incidents).

60-11000-CO-002, Chronology of Rocky Flats Plant, No Author Listed, 2/72 (project Apple selection criteria and a chronology of legal wranglings with landowner Church).

60-12120-RR-001 through -004, Summary: Rocky Flats Effluent and Environmental Monitoring Results, Boss, 10/71 - 1/72 (all chemicals or radioisotopes listed were on existing inventories).

60-13271-RR-003, Plutonium in Stack Effluent, Hobbs et al, 7/73 (concerns the wide range in accuracy/quality of Pu analyses).

60-13271-RR-024, Plutonium and Beryllium Plenum Filter Loading Estimates for Accidental Stack Release Calculations, Langer, 11/79 (good document for future tasks, but all chemicals or radioisotopes listed were on existing inventories).

60-12238-CO-035, PCB Move, Langheim, 10/80 (concerns PCBs transported to RFP from offsite sources).

60-13880-RR-002, Site Survey Results, Author Not Listed, 1952-71 (Graphs of monthly emissions. Useful for tasks 3-5, but no information to add to Task 1).

Documents Listed in the EMF Card Catalogue, but not found in the File:

60-10000-RR-012, Rocky Flats Environmental Monitoring Program and Associated Materials Inventory, Yoder, 1977.

60-12110-RR-004, Summary of Air and Waterborne Radioactive and Non-Radioactive Releases for CY 1971, Author Unknown, 1/71.

80-06005-OR-059, Environmental Report, Environmental Monitoring Lab, 5/81.

60-12110-RR-028, Source Report, Author Not Listed, 1975.

60-13277-CO-003, 4/19/83 Incident Mod J, Building 707, Yoder, 5/83 (This entry was seen listed under a number of topics on several different cards, and in every case had been crossed-out).

40-00500-NC-001, Secrecy and Safety at Rocky Flats Plant, Rappaport, No Date Listed.

60-12122-RR-001 through -090, Rocky Flats Environmental Monitoring Reports, 4/60 to 8/75.

60-12110-RR-040, Environmental Sciences Progress Report for 1978, No Author Listed, 8/80.

60-12110-RR-049, Environmental Sciences Semi-Annual Progress Report for 7-12/81, No Author Listed, 4/83.

60-12122-RR-158, Rocky Flats Monthly Environmental Report, No Author Listed, 3/81.

60-12122-RR-108 through -119, Rocky Flats Monthly Environmental Reports for 1977.

ROCKY FLATS LEGAL/ENVIRONMENTAL FILE (CHURCH LITIGATION)

Accession Number: 10515

Document Number: J-003498

Bates Number: 061359 - 061362

Title: Radioactive Materials Associated with Rocky Flats

Date: 78/03/28

(Summary: Quarterly Report originally generated 4/14/77, lists the radionuclides on site; same document as one of those in the EMF, #60-13370-RR-005.)

Accession Number: 10516

Document Number: J-003499

Bates Number: 061288

Author: No Author on Document

Title: No Title on Document

Date: No Date on Document (but notation indicates that it encompasses at least until 3/78)

(Summary: Hand-written table showing where information is located concerning quantities of material received, processed, released, and dispatched for 26 radioisotopes since 1951; only that information which is unclassified is provided. Table mentions some nuclides that were not on inventories, but these are all reported as "None" in quantities columns.)

Accession Number: 12301

Document Number: N-000127

Bates Number: 051551 - 051553

Title: Nuclide Inventory Data

Author: Willging

Date: 73/11/07

(Summary: Tabulation of quantities of radioactivity released, disposed, or deposited at the plant; nuclides basically involve Ur, Pu, Am, all radioisotopes listed were on existing inventories.)

Accession Number: 14262

Document Number: N-002213

Bates Number: 082618 - 082621

Title: Schedule I - Types of Pollutants Generated at Rocky Flats

Date: 70/07/10

(Summary: Listings of the general types of emissions that could/do occur at the plant, for the purpose of providing information on the FY 1972 Capital Equipment items and General Plant Project budget items. All chemicals or radioisotopes listed were on existing inventories.)

Accession Number: 12328

Document Number: N-000155

Bates Number: 051612 - 051617

Title: History of Incineration and Landfill Operations at the Rocky Flats Plant

Date: 73/10/10

(Summary: A general history of said items, with some information on quantities and location of materials landfilled onsite. Report references figures but none are attached. All chemicals or radioisotopes listed were on existing inventories.)

Accession Number: 12303

Document Number: N-00129

Bates Number: 051555 - 051559

Title: Letter Report on Reference Materials and Reply to Summary of Known Incidents at Rocky Flats.

Date: 1/11/73

(Summary: All chemicals or radioisotopes listed were on existing inventories. Had references for where to obtain more information on the 23 incidents noted.)

Accession Number: 13556

Document Number: N-001402

Bates Number: 080393

Title: Preliminary Harmful Material Inventory

Author: C. Barrick

Date: 10-30-73

(Summary: One page cover letter for an unattached preliminary inventory. Provides the limitations/qualifiers of the inventory. All chemicals or radioisotopes listed were on existing inventories.)

Accession Number: 1336

Document Number: C-000453

Bates Number: 016908-016911

Document Type: Notes

Names: Roeder, J. R.; Flagstead, A. P.

(Summary: Document of indeterminate origin/application. Outline of what appears to be an approach to reduction of risks, waste, and exposures.)

Accession Number: 1353

Document Number: C-000471

Bates Number: 016956-017199

Author: Bean, E. W.

Date: 11-6-75

(Summary: List of chemicals that may be present at the Plant site [as of 11-75].)

Accession Number: 8437

Document Number: J-001410

Bates Number: 053367-053369

Author: Young, E.R.

Date: 10-21-76

Title: Inventory of Chemical Operations

(Summary: Letter requesting a delay in the scheduled semi-annual inventory to allow for processing of waste backlog. Includes a chart on the kilograms of plutonium in drums stored on site for reprocessing.)

Accession Number: 7497

Document Number: J-000464

Bates Number: 048914-048926

Author: Hicks

Date: 12-21-65

Title: Compilation of Incidents Excerpted from the Executive Safety Council Minutes by the Hazardous Materials Committee.

(Summary: Good listing of 99 significant incidents; showing the date of incident, the building, nature of injury, materials involved, and a one-line summary of the incident.)

Accession Number: 5025

Document Number: H-001586

Bates Number: 008469-008475

Title: Report on Unusual hazardous Substances at Federal Installations in Colorado.

Author: USEPA

Date: 72/04/18

(Summary: A summary report of the materials reported by various installations to be at their facilities, including Rocky Flats. The items listed in this document for Rocky Flats only included Plutonium, Uranium, and Beryllium. Document is incomplete, missing appendices.)

Accession Number: 6810

Document Number: I-001761

Bates Number: 072389-072402

Title: Status of Liquid and Solid Waste at Rocky Flats Division

Author: White, G.E.

Date: 64/05/21

(Summary: Five tables of totals of various waste types and their disposition. Partly illegible.)

Accession Number: 13555

Document Number: N-001401

Bates Number: 080388-080392

Title: History of Incineration and Landfill Operations, Rocky Flats Plant.

Author: Seastone, J.A.

Date: 73/10/09

(Summary: Describes the cause for replacement of the incinerator in Facility 219 in 1968 with a landfill on the northeast section of the property; and the construction, contents, and controls of the landfill. Missing two diagrams referenced in document.)

OTHER DOCUMENTS

SARA Title III Community Right-To-Know Emergency and Hazardous Chemical Inventory, Tier II, For Calendar Year 1989. (supplied by CDH)

RCRA Contingency Plan Implementation Reports ("Spill Reports"), June 1988 to October 1990; 35, in number. (Summary: Documents are spill reports of incidents, per RCRA regulations. In general, "Name and Quantity of Material Involved" section did not always contain detailed information (e.g. - "process wastes containing sodium and potassium compounds," and, "dissolved nitrate salts").

Listing of carcinogens from the Rocky Flats Carcinogen Control Program. (Summary: Contains two lists; one which is a complete listing of all carcinogens as regulated by OSHA or recognized by ACGIH regardless of their presence at the plant, and a second list which includes those areas which have carcinogens in quantities to warrant a concern and are under a control program. These two lists do not identify small-quantity carcinogens in use at the Plant.)

A copy of an August 2, 1990 printout from the Registered Sources Program database at the plant site. (Summary: Lists the registered sources currently on plant site, their registry number, activity, and type of source.)

A copy of a December 6, 1990 printout from the Registered Sources Program database at the plant site. (Summary: Lists the registered sources currently on plant site, their registry number, activity,

and type of source. Some of the listed sources do not appear on existing inventories, but may be typos [e.g.- CA 252 is listed, which may actually be CF 252].)

A copy of an August 14, 1990 printout from the 881 Chemical Standards Lab's Physical Inventory of Radionuclides database. (Summary: Lists the accountable sources currently on plant site, their identification number, isotope, activity, volume, and location.)

"Health Physics Report: Radioactive Materials Associated With Rocky Flats Plant," 10-30-90, by K.E. Cavin, Radiological Building Engineers Section Manager. (Summary: all radionuclides were on existing inventories.)

Material Safety Data Sheets for approximately 110 commercial products used on the Plant site, present in excess of 80 pounds.

Putzier's Memoirs, E.A. Putzier, 11/82 (UCNI (unclassified controlled nuclear information) document, good historical information).

Material Hazards Manual, Barrick, 1976 (appears to contain the same printout as in document #60-12180-CO-010, plus a listing of commercial products; all are contained in another listing in the Manual that provides the hazard rating assigned to each).

APPENDIX F
PERSONS INTERVIEWED/CONTACTED

ROCKY FLATS PERSONNEL INTERVIEWED

Interviewee	Yrs at RFP	Position/Area of Service
Dave Simonson	1989-1990	DOE, RF Asst Mgr Env Mgt
Dave Costain	1989-1990	Clean Air & Env Rprtng Div (CAERD)
Rod Hoffman	1963-1990	Classification Officer
Margaret Moomey	1981-1990	Librarian
Georgene Porter	1989-1990	CAERD - APENs
Farrell Hobbs	1969-1990	Water Quality
Dale Bukowski	1961-1990	Standards Labs
Mary Ann Paliani	1967-1990	Librarian
G.E. Loudenberg	1973-1990	Purchasing Department
Dr. Bob Bistline	1966-1990	Medical Director
Craig Armstrong	1990-1990	CAERD
Brent Lane	1988-1990	Records
Rocky Petrocci	1983-1990	IH/ Emerg Plnng & Prep
Larry Grocki	1989-1990	IH/ Constr'n Safety
Dick Link	1962-1990	Operation'l Hlth Physics
Otis Angell	1953-1965	Ind Hyg/ Safety
Chuck Barrick	1952-1990	Analytical Labs/Emerg Prep
Bob Cordova	1990-1990	Industrial Hygiene
Allen Schubert	1987-1990	Waste Management
Nancy Daugherty	1982-1990	CAERD
Debbie Poland	1986-1990	Records and Info Svcs
Don Baasco	1956-1990	Chem Technology/Spec Recov/Oper'ns Tech Sup.
George Setlock	1980-1990	Director, CAERD

Merlin Boss	1962-1990	Health Physics/ Env. Restoration/ Nucl. Safety
Reed Hodgkins	1982-1990	Emerg Assmt Systems Brch
Cheryl Snyder		Environmental Master File librarian
William (Bill) Moore	1990-1990	CAERD, Land Use/Demography
Robert Rogers	1988-1990	Acting Dir. - Tech Assessment
Sarah Buckie	1980-1990	Radiological Engineering
T.J. Wirth	1990-1990	Radiological Engineering
Barabara Karpen	1979-1990	H & S Records
Will-Ann Lamsens		RF Public Reading Room Librarian
Lee Ann Issaian	1988-1990	Industrial Hygiene
Ted Watanabe		Effluent Info Sys/ Onsite Dischg Info Sys (EG&G ID)

REGULATORY PERSONNEL INTERVIEWED

Interviewee	Agency/Area of Service
Al Hazle	CDH - Rad'n Control Div'n
Rob Terry	CDH - Radiation Control Division
Debbie Mauer	CDH - Rocky Flats Program Unit, Waste Mgt Liaison
Archie Crouse	CDH - Air Division
Judy Bruch	CDH - Water Quality Division
Caren Johannes	CDH - Waste Management Division
Pam Harley	CDH - Hazardous Materials Division
Judy Waddill	CDH - Hazardous Materials Division
Martin Hestmark	EPA - Region VIII

OTHER PERSONS CONTACTED

Interviewee	Affiliation
Howard Brown	Executive Dir RF Env Monitoring Council
Mark Ferguson	Denver Federal Records and Archives Center
Paula Elofson-Gardine	Citizens Against Radiotoxic Pollution
Dr. Ward Whicker	CSU Dept of Radiology/Radiation Biology
Bill Alldredge	CSU Fishery and Wildlife Biology Dept
Brian Rothman	IT Corporation
Jake Chavez	DOE Attorney, Legal/Env File Custodian
Denise Diggin	Head DOE Librarian, Germantown, MD
Tom Courtney	Former Plant Employee

POTENTIAL ADDITIONAL INTERVIEWEES/CONTACTS FOR FUTURE INVESTIGATIONS

Interviewee	Affiliation
Roger Falk	Rocky Flats Internal Dosimetry
Roger Cichorz	Rocky Flats Quality Labs
John Haydn	Former Rocky Flats Waste Ops & Disposal Employee
Wm. Mike Shannon	Rocky Flats Finance
Robert Nau	Rocky Flats Chemist
Todd Lewis	Rocky Flats IH Mgr
Joe Majestic	Rocky Flats Dir Health & Safety
Gary Potter	Rocky Flats Dir of Waste Programs
Joe Furman	Rocky Flats Occup Hlth Director
Scott Anderson	Rocky Flats Waste Management
Dolores Krieg	Rocky Flats Transportation

Duane Hunter	Rocky Flats QA Lab Dir
Mary Wickland	Rocky Flats H & S Records
Nick Roberts`	DOE Safeguards & Security
Ed Young	Rocky Flats Security
Bill Kirby	Rocky Flats Quality Assurance Labs
Janine Wilson	Rocky Flats Communications
Ed Putzier	Retired Director of Rad Prot'n Div
Ed Vejvoda	Retired Plutonium Scientist
John Hill	Retired Occup Hlth Mgr
Jean Reynolds	Rocky Flats Records
Chuck Ilsley	Rocky Flats Env Mgmt
Carol Barker	Rocky Flats H&S Support Services
Dr. Les Fraley	CSU Dept of Radiobiology
Dr. Jim Johnson	CSU Dept of Radiobiology
Doug Kissell	Rocky Flats Occurrence Notification Center
Margaret Hickey	Rocky Flats Occurrence Notification Center
E.A. Di Carlo	Rocky Flats Rad Operations Mgr
Richard Herbert	USGS
Richard Mueller	USGS
Dave Lystrom	USGS
Joe Rau	DOE Dir Constr & Eng
Tod Anderson	DOE Product QA/QC
Leon McGovern	Rocky Flats Facilities Engineering
Victor Terkun	Rocky Flats Facilities Engineering
Deward Walker	Hanford Study Panel Member
Duane Millet	Rocky Flats Nuclear Mat'l Control & Acctblty
Gary Carnival	Rocky Flats Director of Safeguards
Terry Foppe	Rocky Flats Safety Anal Reptng
Mark Van Der Puy	DOE Chief Env Monit'g Branch
Wanda Busby	Rocky Flats Env Monit'g & Assmt

R.G. Delpizzo	Rocky Flats Rad Ops Admin & Support
Chuck Bogart	Rocky Flats Facilities Engineering
Jack Quella	Rocky Flats Mgr Bldg 771
John Beacham	Rocky Flats Safeguards & Security
Steve Melick	Rocky Flats Warehouse Manager

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TABLE 4-1

**CARCINOGENS AT ROCKY FLATS
FROM 1988/1989 INVENTORY**

Chemical	Quantity (Kilograms)	Chemical	Quantity (Kilograms)
Acrolein	0.005	DDT	0.002
Acrylamide	0.010	Dibenzo Furan	0.010
Acrylonitrile	0.015	Dibromo Chloromethane	0.010
Aldrin	0.003	o-Dichlorobenzene	0.015
Allyl Chloride	0.010	p-Dichlorobenzene	0.010
Aniline	0.473	1,2-Dichloropropane	0.030
Aroclor	0.122	Dieldrin	0.003
Arsenic	3.06		
Asbestos	0.572		
Benzene	5.97		
Benzo-a-pyrene	0.002		
Benzyl Chloride	0.010		
Beryllium	1.26 ¹		
Bis Chloromethyl Ether	0.005		
Bis 2 Chloroethyl Ether	0.015		
Bis 2 Ethylhexyl Phthalate	0.010		
Bromoform	5.52		
Butyl Benzyl Phthalate	0.005		
Cadmium	29.1		
Carbazole	0.010		
Carbon Tetrachloride	7,059		
Chloranil	0.250		
Chlordane	0.003		
o-Chloroaniline	0.010		
p-Chloroaniline	0.010		
Chlorodibromomethane	0.005		
Chloroform	499		
Chromium VI	793		
Crotonaldehyde	0.010		
4,4 DDD	0.001		
DDE	0.001		

1,1 Dimethyl Hydrazine	0.010
Dioxane	31.5
Epichlorohydrin	0.010
Ethyl Acrylate	0.010
Ethylene Chloride	11.9
Flourene	0.015
Formaldehyde	146
Heptachlor	0.003
Heptachlor Epoxide	0.001
Hexachloro Benzene	1.02
Hexachloro Butadiene	0.469
Hexachloro Ethane	0.025
Hydrazine 95%	0.500
Hydrazine Sulfate	1.34
Isophorone	0.010
Lead	1,257
Lindane	0.002
Methylene Chloride	300
Nickel	129
2-Nitropropane	0.010
N-Nitroso Diphenylamine	0.005
N-Nitroso Di N Propylamine	0.001
o-Phenylene Diamine	0.010
Quinoline	1.08
Sodium Diethyldithiocarbamate	0.237
Styrene	0.128
Tetrachloroethane	0.025
Tetrachloroethylene	0.030
o-Toluidine	0.010
p-Toluidine	0.010
Toxaphene	0.003
1,1,2-Trichloroethane	0.016
Trichloroethene	140
2,4,6-Trichlorophenol	0.011
Vaponite 2 Insecticide	18.9
Vinyl Chloride	0.004
Vinylidene Chloride	0.005

1 Quantity information for production related beryllium is classified. This value does not represent the total quantity of beryllium on site.

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TABLE 4-2

**ADDITIONAL CARCINOGENS
AT ROCKY FLATS
FROM 1974 INVENTORY**

Chemical	Quantity (Kilograms)
Azobenzene	0.020
Benzidine	0.025
Butadiene	113
Chloromethyl Aniline	0.020
Ethylene Oxide	192,400
Nitrogen Trioxide	57
Propylene Oxide	1.5

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TABLE 4-3**PESTICIDES AND HERBICIDES USED AT ROCKY FLATS**

Arsenic	(likely an organic arsenical compound)
Banvel	(2-methoxy-3,6-dichlorobenzoic acid; Dicamba)
Dursban	(0,0-diethyl 0-(3,5,6 trichloro-2-pyridyl)-phosphorothioate; Chloropyrifos)
Karmex	(3-(3,4-dichlorophenyl)-1,1-dimethylurea; Diuron (80%))
Krovar 1/Hyvar X	(5-bromo-3-sec-butyl-6-methyluracil; Bromacil (40%)) (3-(3,4-dichlorophenyl)-1,1-dimethylurea)
Oust	(methyl 2 {{{{(4,6-dimethyl-2-pyrimidinyl) amino} carbonyl} amino} sulfonyl} benzoate; Sulfometuron Methyl)
Princep	(2-chloro-4,6-bis (ethyl amino)-s-triazine; Simazine)
Eerex	(3-(p-chlorophenyl)-1,1-dimethylurea trichloroacetate; Urox)
Surflan	(3,5-dinitro-N4,N4-dipropylsufanilamide; Oryzalin)
Tersan	(methyl-1(butylcarbonyl)-2-benzimidazole carbamate; Benomyl)
Tordon	(4-amino-3,5,6-trichloropicolinic acid; Picloram)
Ureabor	(sodium borate-66.5%; sodium chlorate-30%; bromacil-1.5%)
Velpar	(3-cyclohexyl-6-(dimethylamino)-1-methyl-1,3,5-triazine-2,4-(1H,3H)-dione; Hexazinone)
Warfarin	(3(a-acetonylbenzyl)-4-hydroxycoumarin)

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TABLE 4-5

CONTAMINANTS IDENTIFIED ON-SITE AT ROCKY FLATS

881 Hillside

Trichloroethylene (TCE)

Perchloroethylene (PCE)

Trichloroethane (TCA)

Dichloroethylene (DCE)

East Trenches

TCE

PCE

903 Pad

TCE

PCE

Carbon Tetrachloride (CCl₄)

DCE

Chloroform

Solar Ponds

nitrates

cyanide

beryllium

acetone

PCE

methylene chloride

chromium

calcium

magnesium

aluminum

copper

iron

potassium

sodium

nickel

tin

plutonium

americium

uranium

tritium

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TABLE 4-4**CHEMICALS IDENTIFIED FROM OTHER DOCUMENTS**

Compound	Document
Cadmium Cyanide	RCRA, Part B Operating Permit Application, 12/15/87
Bromine Trifluoride	RCRA, Part B Operating Permit Application, 12/15/87
Chlorine Trifluoride	RCRA, Part B Operating Permit Application, 12/15/87
Tungsten Pentafluoride	RCRA, Part B Operating Permit Application, 12/15/87
4-chloro-3-methyl phenol	Waste Stream Identification and Characterization April 1987
DHDECMP complexing agent	Waste Minimization and Assessment Report 12/19/90
Methyl Ethyl Ketone Peroxide	Fact Sheets and MSDS supplied by Howard Brown
Lithium Deuteride	Lithium Hydride and Lithium Deuteride Disposal EMF #60-10112-RR-008
Prestolite	SARA Title III Community Right to Know... 1989
Prestolite B	SARA Title III Community Right to Know... 1989
P-10	SARA Title III Community Right to Know... 1989
Medical Gas	SARA Title III Community Right to Know... 1989
Reillex HPQ	SARA Title III Community Right to Know... 1989
Lectra Clean	SARA Title III Community Right to Know... 1989
Polar Melt	SARA Title III Community Right to Know... 1989
Ice Melt	SARA Title III Community Right to Know... 1989

Salt Rock	SARA Title III Community Right to Know... 1989
Sand Squeegee	SARA Title III Community Right to Know... 1989
Conclude Fabric Softener	SARA Title III Community Right to Know... 1989
Premium Car Wash	SARA Title III Community Right to Know... 1989
Betz 2020	SARA Title III Community Right to Know... 1989
Betz 2040	SARA Title III Community Right to Know... 1989

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