

SEC Petition Evaluation Report Petition SEC-00167

Report Rev #: 0

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Site Expert(s):	N/A

Petitioner Administrative Summary

Petition Under Evaluation

Petition #	Petition Type	Petition A Receipt Date	DOE/AWE Facility Name
SEC-00167	83.14	March 10, 2010	Downey Facility

NIOSH-Proposed Class Definition

All employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at the Downey Facility in Los Angeles County, California, from January 1, 1948 through December 31, 1955, for a number of work days aggregating at least 250 work days, occurring either solely under this employment or in combination with work days within the parameters established for one or more other classes of employees included in the Special Exposure Cohort.

Related Petition Summary Information

SEC Petition Tracking #(s)	Petition Type	DOE/AWE Facility Name	Petition Status
SEC-00093	83.13	Area IV of the Santa Susana Field Laboratory	Class included in the SEC for 1955-1958
SEC-00151	83.13	Canoga Avenue Facility	Class proposed by NIOSH (1955-1960)
SEC-00156	83.14	Area IV of the Santa Susana Field Laboratory	Class proposed by NIOSH and ABRWH (1959-1964)
SEC-00168	83.14	De Soto Facility	Class proposed by NIOSH (1959-1964)

Related Evaluation Report Information

Report Title	DOE/AWE Facility Name
SEC Petition Evaluation Report for Petition SEC-00093	Area IV of the Santa Susana Field Laboratory
SEC Petition Evaluation Report for Petition SEC-00151	Canoga Avenue Facility
SEC Petition Evaluation Report for Petition SEC-00156	Area IV of the Santa Susana Field Laboratory
SEC Petition Evaluation Report for Petition SEC-00168	De Soto Facility

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SEC Evaluation Approved By:	_____ [Signature on file] <i>Stuart L. Himelfeld</i>	_____ 3/25/2010 <i>Date</i>

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Evaluation Report Summary: SEC-00167, Downey Facility

This evaluation report by the National Institute for Occupational Safety and Health (NIOSH) addresses a class of employees proposed for addition to the Special Exposure Cohort (SEC) per the *Energy Employees Occupational Illness Compensation Program Act of 2000*, as amended, 42 U.S.C. § 7384 *et seq.* (EEOICPA) and 42 C.F.R. pt. 83, *Procedures for Designating Classes of Employees as Members of the Special Exposure Cohort Under the Energy Employees Occupational Illness Compensation Program Act of 2000*.

NIOSH-Proposed Class Definition

All employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at the Downey Facility in Los Angeles County, California, from January 1, 1948 through December 31, 1955, for a number of work days aggregating at least 250 work days, occurring either solely under this employment or in combination with work days within the parameters established for one or more other classes of employees included in the Special Exposure Cohort.

Feasibility of Dose Reconstruction Findings

NIOSH lacks sufficient information, which includes biological monitoring data, sufficient air monitoring information, or sufficient process and radiological source information, to allow it to estimate with sufficient accuracy the potential internal exposures to various radionuclides to which the proposed class may have been subjected. NIOSH finds that it is likely feasible to reconstruct external dose, including occupational medical dose, for the Downey Facility workers with sufficient accuracy.

The NIOSH dose reconstruction feasibility findings are based on the following:

- Principal sources of both internal and external radiation doses for members of the NIOSH-proposed class included exposures to fission product and transuranic radionuclides associated with reactor, accelerator, and laboratory operations. Such sources of exposure were also present at Area IV of the Santa Susana Field Laboratory (SSFL) and the Canoga Avenue Facility when Downey Facility operations were transferred to the two sites in 1955. Downey, SSFL-Area IV, and Canoga were related facilities operated by North American Aviation.
- NIOSH previously determined in its evaluations of petitions SEC-00093 and SEC-00156 that some SSFL-Area IV workers could have received intakes of radioactive materials that went unmonitored from the beginning of the covered period for SSFL-Area IV operations in 1955 through the end of 1964. NIOSH similarly determined in its evaluation of petition SEC-00151 that the Canoga Avenue Facility also lacked an adequate routine bioassay monitoring program during its entire period of operations from 1955 through 1960. For both sites, limitations in the available data did not allow NIOSH to estimate radiation doses with sufficient accuracy. NIOSH therefore recommended SEC classes for SSFL-Area IV workers to include the time period from January 1, 1955 through December 31, 1964, and for Canoga Avenue Facility workers for the period from January 1, 1955 through December 31, 1960.

- NIOSH has determined that the Downey Facility was the predecessor site for the nuclear operations and health physics practices of North American Aviation that were subsequently moved to Canoga and SSFL in 1955. This move resulted in a continuation of the Downey health physics practices. NIOSH has observed this continuation in the radiological records reviewed during its evaluations of petitions SEC-00093, SEC-00151, and SEC-00156 for the SSFL-Area IV and Canoga Avenue facilities.
- NIOSH has determined that limitations in the available Downey Facility data are consistent with the data limitations found for the SSFL-Area IV and Canoga Avenue facilities, and such limitations preclude NIOSH from estimating Downey Facility radiation doses with sufficient accuracy.
- Pursuant to 42 C.F.R. § 83.13(c)(1), NIOSH determined that there is insufficient information to either: (1) estimate the maximum radiation dose, for every type of cancer for which radiation doses are reconstructed, that could have been incurred under plausible circumstances by any member of the class; or (2) estimate the radiation doses of members of the class more precisely than a maximum dose estimate.
- Although NIOSH found that it is not possible to completely reconstruct radiation doses for the proposed class, NIOSH intends to use any internal and external monitoring data that may become available for an individual claim (and that can be interpreted using existing NIOSH dose reconstruction processes or procedures). Therefore, dose reconstructions for individuals employed at the Downey Facility during the period from January 1, 1948 through December 31, 1955, but who do not qualify for inclusion in the SEC, may be performed using these data as appropriate.

Health Endangerment Determination

The NIOSH evaluation did not identify any evidence supplied by the petitioners or from other resources that would establish that the class was exposed to radiation during a discrete incident likely to have involved exceptionally high-level exposures, such as nuclear criticality incidents or other events involving similarly high levels of exposures. However, the evidence reviewed in this evaluation indicates that some workers in the class may have accumulated chronic radiation exposures through intakes of fission products and other radionuclides and from direct exposure to radioactive materials. Therefore, 42 C.F.R. § 83.13(c)(3)(ii) requires NIOSH to specify that health may have been endangered for those workers covered by this evaluation who were employed for a number of work days aggregating at least 250 work days within the parameters established for this class or in combination with work days within the parameters established for one or more other classes of employees in the SEC.

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SEC Petition Evaluation Report for SEC-00167

ATTRIBUTION AND ANNOTATION: This is a single-author document. All conclusions drawn from the data presented in this evaluation were made by the ORAU Team Lead Technical Evaluator: Michael Domal, MJW Technical Services. The rationales for all conclusions in this document are explained in the associated text.

1.0 Purpose and Scope

This report evaluates the feasibility of reconstructing doses for employees who worked at a specific facility during a specified time. It provides information and analysis germane to considering a petition for adding a class of employees to the Congressionally-created SEC.

This report does not make any determinations concerning the feasibility of dose reconstruction that necessarily apply to any individual energy employee who might require a dose reconstruction from NIOSH, with the exception of the employee whose dose reconstruction could not be completed, and whose claim consequently led to this petition evaluation. The finding in this report is not the final determination as to whether or not the proposed class will be added to the SEC. This report will be considered by the Advisory Board on Radiation and Worker Health (the Board) and by the Secretary of Health and Human Services (HHS). The Secretary of HHS will make final decisions concerning whether or not to add one or more classes to the SEC in response to the petition addressed by this report.

This evaluation, in which NIOSH provides its findings both on the feasibility of estimating radiation doses of members of this class with sufficient accuracy and on health endangerment, was conducted in accordance with the requirements of EEOICPA and 42 C.F.R. § 83.14.

2.0 Introduction

Both EEOICPA and 42 C.F.R. pt. 83 require NIOSH to evaluate qualified petitions requesting that the Department of Health and Human Services add a class of employees to the SEC. The evaluation is intended to provide a fair, science-based determination of whether it is feasible to estimate, with sufficient accuracy, the radiation doses of the proposed class of employees through NIOSH dose reconstructions.¹

NIOSH is required to document its evaluation in a report, and to do so, relies upon both its own dose reconstruction expertise as well as technical support from its contractor, Oak Ridge Associated Universities (ORAU). Once completed, NIOSH provides the report to both the petitioners and the Advisory Board on Radiation and Worker Health. The Board will consider the NIOSH evaluation report, together with the petition, comments of the petitioner(s) and such other information as the Board considers appropriate, to make recommendations to the Secretary of HHS on whether or not to add one or more classes of employees to the SEC. Once NIOSH has received and considered the advice of the Board, the Director of NIOSH will propose a decision on behalf of HHS. The Secretary

¹ NIOSH dose reconstructions under EEOICPA are performed using the methods promulgated under 42 C.F.R. pt. 82 and the detailed implementation guidelines available at <http://www.cdc.gov/niosh/ocas>.

of HHS will make the final decision, taking into account the NIOSH evaluation, the advice of the Board, and the proposed decision issued by NIOSH. As part of this final decision process, the petitioner(s) may seek a review of certain types of final decisions issued by the Secretary of HHS.²

3.0 NIOSH-Proposed Class Definition and Petition Basis

The NIOSH-proposed class includes all employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at the Downey Facility in Los Angeles, California, from January 1, 1948 through December 31, 1955, for a number of work days aggregating at least 250 work days, occurring either solely under this employment or in combination with work days within the parameters established for one or more other classes of employees included in the Special Exposure Cohort. During this period, employees at this facility were involved with the operation of various types of nuclear reactors and particle accelerators.

The evaluation responds to Petition SEC-00167 which was submitted by an EEOICPA claimant whose dose reconstruction could not be completed by NIOSH due to a lack of sufficient dosimetry-related information. NIOSH's determination that it is unable to complete a dose reconstruction for an EEOICPA claimant is a qualified basis for submitting an SEC petition pursuant to 42 C.F.R. § 83.9(b).

NIOSH has determined that the Downey Facility, operated by North American Aviation (NAA), was the origin of many of the radiological control and monitoring practices, as well as radiological monitoring records programs, subsequently employed at multiple sites related to the Energy Technology Engineering Center (ETEC) operations at Area IV of the Santa Susana Field Laboratory (SSFL). The related sites included the Downey Facility, the De Soto Avenue Facility, the Canoga Avenue Facility, and Area IV of the SSFL (ORAUT-TKBS-0038-2). In 1955, NAA transferred its Downey Facility operations to its SSFL-Area IV and Canoga Avenue facilities. NIOSH has found dose reconstruction infeasibilities associated with these two successor facilities beginning in 1955.

There is currently one class of SSFL-Area IV workers associated with the NIOSH evaluation of SEC petition SEC-00093, for which the Secretary of Health and Human Services (HHS) has designated inclusion in the Special Exposure Cohort:

Class added to the SEC effective July 18, 2009: Employees of the Department of Energy (DOE), its predecessor agencies, and DOE contractors and subcontractors who worked in any area of Area IV of the Santa Susana Field Laboratory for a number of work days aggregating at least 250 work days from January 1, 1955 through December 31, 1958, or in combination with work days within the parameters established for one or more other classes of employees in the SEC (HHS, 2009).

Detailed information associated with the SEC-00093 worker class added to the SEC can be found in the NIOSH evaluation report, *SEC Petition Evaluation Report, Petition SEC-00093* (NIOSH, 2009). The basis for this 1955-1958 SEC class was the determination that NIOSH does not have access to sufficient personnel monitoring, workplace monitoring, or source term data to bound potential internal

² See 42 C.F.R. pt. 83 for a full description of the procedures summarized here. Additional internal procedures are available at <http://www.cdc.gov/niosh/ocas>.

exposures from the various radionuclides for the evaluated worker class at Area IV of SSFL during the period from January 1, 1955 through December 31, 1958 (HHS, 2009).

Through the course of ongoing dose reconstruction, continued data capture efforts, and investigations associated with SEC-00093, NIOSH subsequently determined that there were insufficient access controls employed at SSFL-Area IV; as a result, there were some workers who should have been monitored who were not, and who could have received unmonitored intakes of radioactive materials after 1958. During this subsequent investigation, NIOSH determined that the available bioassay data have limitations through the end of 1964 that preclude the development of adequate co-worker dose distribution models for the years prior to 1965. These NIOSH findings were presented in a second NIOSH evaluation report for Area IV of the SSFL, *SEC Petition Evaluation Report, Petition SEC-00156* (NIOSH, 2010b), that resulted in NIOSH proposing a second SEC class to include DOE employees who worked at Area IV of the SSFL from January 1, 1959 through December 31, 1964.

NIOSH similarly determined in its evaluation of petition SEC-00151 that the Canoga Avenue Facility also lacked an adequate routine bioassay monitoring program during its entire period of operations from 1955 through 1960. These NIOSH findings were presented in a NIOSH evaluation report for the Canoga Avenue Facility, *SEC Petition Evaluation Report, Petition SEC-00151* (NIOSH, 2010a), that resulted in NIOSH proposing an SEC class to include DOE employees who worked at the Canoga Avenue Facility from January 1, 1955 through December 31, 1960.

The Downey Facility originated many of the radiological practices and record-keeping programs subsequently employed at the SSFL-Area IV and Canoga Avenue facilities when operations ceased at the Downey Facility in 1955. The collective health physics records, including the ones for the Downey Facility are now stored at SSFL. NIOSH has determined that (as with SSFL-Area IV and the Canoga Avenue Facility) it also does not have access to sufficient personnel monitoring, workplace monitoring, or source term data to bound potential unmonitored internal exposures that may have occurred at the Downey Facility during its covered DOE operational period (1948 through 1955).

4.0 Radiological Operations Relevant to the Proposed Class

The following subsections summarize the radiological operations at the Downey Facility from January 1, 1948 through December 31, 1955, and the information available to NIOSH to characterize particular processes and radioactive source materials. Using available sources, NIOSH has attempted to gather process and source descriptions, information regarding the identity and quantities of radionuclides of concern, and information describing processes through which the radiation exposures of concern may have occurred and the physical environment in which they may have occurred. The information included within this evaluation report is meant only to be a summary of the available information.

4.1 Operations Description

The operating company for the Downey Facility in the 1940s was North American Aviation (NAA). The main operation during that era was airplane manufacturing. A small section of the facility was used for atomic research. Operations were conducted at the Atomic Energy Research Department (AERD), which later became the Atomics International Division when operations were moved to the Canoga Avenue Facility in 1955. AERD was involved in the research and development of atomic energy for the production of electric power, which was sponsored by the AEC (Downey, 2009).

The Downey Facility operations that were relevant to the NIOSH-proposed SEC class for all workers from 1948 through 1955 included nuclear research and development, bench-top nuclear experimentation and engineering studies. These activities involved the use of a 2-MeV Van de Graaff accelerator, a radiochemistry laboratory, and a neutron counting room. Activities also involved operations associated with the use of two small reactors, a 0.5-W teaching reactor and a 4-W water reactor known as a water boiler neutron source (WBNS) (ORAUT-TKBS-0038-2). The WBNS was used as a neutron source for an exponential pile. The exponential pile was a system designed to model different fuel/moderator lattice configurations. The neutron flux in these lattices could be measured. The WBNS was in operation from 1952 through 1955. The majority of radioactive material present at Downey while the WBNS was in operation was due to canned normal and depleted uranium metal used in the exponential pile (ORAUT-TKBS-0038-2).

The radioactive materials used for the exponential piles and the WBNS were supplied by the AEC and government contractors. After use, the radioactive materials were either returned to the source or transferred to SSFL (ORAUT-TKBS-0038-2).

The research activities involved the handling, preparing, transferring, analyzing and storing of radioactive material.

4.2 Radiation Exposure Potential from Operations

The Downey Facility had a 2-MeV Van de Graaff accelerator, a radiochemistry laboratory, a neutron counting room, and two small reactors. Radioactive materials were handled, prepared, transferred, and analyzed in these areas (ORAUT-TKBS-0038-2). These activities resulted in potential internal and external radiation exposures for Downey Facility workers during the DOE operations period from 1948 through 1955. Because NIOSH has found indications that not all potentially-exposed workers were included in the personnel radiation monitoring program, an individual worker's potential for radiation exposure at the Downey Facility cannot be determined based solely on the existence or non-existence of individual monitoring records.

4.3 Time Period Associated with Radiological Operations

Per the DOE Office of Health, Safety and Security, the time period associated with DOE operations at the Downey Facility is 1948-1955 (DOE, 2010). NIOSH has discovered no additional data to support more specific dates for the start and stop of DOE operations at the Downey Facility. Therefore, DOE work at the Downey Facility is assumed to have started on January 1, 1948 and continued through December 31, 1955.

4.4 Site Locations Associated with Radiological Operations

Through the course of ongoing dose reconstruction and continued research for the Downey Facility and the other ETEC-related sites, NIOSH has determined that the site-specific and claimant-specific data available for the Downey Facility for the time period of this evaluation (1948-1955) are insufficient to allow NIOSH to characterize worker movements throughout the site. NIOSH is therefore unable to define individual worker exposure scenarios based on specific work locations at the Downey Facility.

4.5 Job Descriptions Affected by Radiological Operations

Through the course of ongoing dose reconstruction and continued research for the Downey Facility and the other ETEC-related sites, NIOSH has determined that the site-specific and claimant-specific data available for the Downey Facility for the time period of this evaluation (1948-1955) are insufficient to allow NIOSH to determine that any specific work group was not potentially exposed to radioactive material releases or possible subsequent contamination. NIOSH has insufficient information associating job titles and/or job assignments with specific radiological operations or conditions and is, therefore, unable to define potential radiation exposure conditions based on worker job descriptions.

5.0 Summary of Available Monitoring Data for the Proposed Class

The primary data used for determining internal exposures are derived from personal monitoring data, such as urinalyses, fecal samples, and whole-body counting results. If these are unavailable, the air monitoring data from breathing zone and general area monitoring are used to estimate the potential internal exposure. If personal monitoring and breathing zone area monitoring are unavailable, internal exposures can sometimes be estimated using more general area monitoring, process information, and information characterizing and quantifying the source term.

This same hierarchy is used for determining the external exposures to the cancer site. Personal monitoring data from film badges or thermoluminescent dosimeters (TLDs) are the primary data used to determine such external exposures. If there are no personal monitoring data, exposure rate surveys, process knowledge, and source term modeling can sometimes be used to reconstruct the potential exposure.

A more detailed discussion of the information required for dose reconstruction can be found in OCAS-IG-001, *External Dose Reconstruction Implementation Guideline*, and OCAS-IG-002, *Internal Dose Reconstruction Implementation Guideline*. These documents are available at: <http://www.cdc.gov/niosh/ocas/ocasdose.html>.

5.1 Data Capture Efforts and Sources Reviewed

In addition to examining its Site Research Database (SRDB) to locate documents supporting the evaluation of the proposed class, NIOSH completed an extensive database and Internet search for information regarding the Downey Facility. The database search included the DOE Legacy Management Considered Sites database, the DOE Office of Scientific and Technical Information (OSTI) database, the Energy Citations database, the Atomic Energy Technical Report database, and the Hanford Declassified Document Retrieval System. In addition to general Internet searches, the NIOSH Internet search included OSTI OpenNet Advanced searches, OSTI Information Bridge fielded searches, Nuclear Regulatory Commission (NRC) Agency-wide Documents Access and Management (ADAMS) web searches, the DOE Office of Human Radiation Experiments website, and DOE-National Nuclear Security Administration-Nevada Site Office searches.

NIOSH's data capture efforts include visits to the SSFL site in September and November 2009, and one visit to the San Bruno Federal Records Center in September 2009. NIOSH has worked with representatives from DOE Legacy Management and the SSFL site in an attempt to gather documents and data relevant to dose reconstruction of claims for the Downey Facility and the other ETEC-related sites. NIOSH's SRDB currently contains over 1500 documents associated with the ETEC-related sites, including over 100 documents associated specifically with the Downey Facility. Attachment 1 contains a summary of Downey-related documents. The summary identifies data capture details for each document retrieved.

5.2 Worker Interviews

To obtain additional information for related Santa Susana sites (i.e., Area IV of the Santa Susana Field Laboratory, Canoga Avenue Facility, De Soto Avenue Facility, and Downey Facility) NIOSH interviewed ten former Santa Susana employees. All ten interviews were reviewed for this Downey Facility evaluation and the following three interviews were deemed relevant to the Downey effort.

- Personal Communication, 2005, *Personal Communication with ETEC Medical Staff Member*; Telephone Interview by ORAU Team; December 1, 2005; 12:00 PM EST; SRDB Ref ID: 20534
- Personal Communication, 2007a, *Personal Communication with Health Physicist*; Telephone Interview by ORAU Team; November 20, 2007 11:00 AM PST; SRDB Ref ID: 37534
- Personal Communication, 2007b, *Personal Communication with Health and Safety Manager*; Telephone Interview by ORAU Team; November 30, 2007 9:00AM PST; SRDB Ref ID: 37538

5.3 Internal Personnel Monitoring Data

Radionuclides of concern for the facilities and processes at Downey Facility were primarily fission products. Exposure to fissionable material, transuranics, and activation products was also possible (NIOSH, 2009).

Through the course of ongoing dose reconstruction, continued data capture efforts, and investigations associated with SEC-00093, NIOSH has identified only limited amounts of internal personnel monitoring data for pre-1959 exposures at the ETEC-related sites; this is consistent with NIOSH

findings that a routine bioassay program was not initiated until August 1958 at SSFL-Area IV (NIOSH, 2009).

The NOCTS database was reviewed for claimants whose work history included the Downey Facility during part or all of the covered period (1948 through 1955). A total of 33 claimants were identified. The files for all 33 claimants were thoroughly reviewed and no internal monitoring data were found. This is consistent with the above determination that insufficient monitoring existed and that only very limited internal monitoring data are available to NIOSH until after 1958.

5.4 External Personnel Monitoring Data

NIOSH has access to limited photon, beta, and neutron external dosimetry results, as well as other supporting data, for the entire period evaluated in this report (available for all years of site operation). The policy at SSFL-Area IV was to assign the applicable dosimetry to anyone with the potential for photon, beta, or neutron exposure; it was assigned based on job assignments that required exposure to radioactive materials (NIOSH, 2009; ORAUT-TKBS-0038-6). AERD operations comprised only a small portion of the overall activities at the Downey Facility during this time period; therefore, the majority of personnel were not radiation workers. Summaries of the available external monitoring data can be found in the NIOSH evaluation report for Area IV of the Santa Susanna Field Laboratory, *SEC Petition Evaluation Report, Petition SEC-00093* (NIOSH, 2009). Details regarding the various analyses used, and the associated minimum detectable activities, are presented in *Atomics International – Occupational External Dose* (ORAUT-TKBS-0038-6).

5.5 Workplace Monitoring Data

NIOSH only has access to limited workplace air, surface, and environmental monitoring data for the entire Downey Facility operations period (Monitoring, 1952; Monitoring, 1954-1955). The data available are inadequate for sufficiently accurate dose reconstructions in the absence of personnel monitoring data.

5.6 Radiological Source Term Data

The diverse reactor, accelerator, and support operations at the Downey Facility resulted in potential exposures to fission products and transuranics. The source term and activity data available to NIOSH for the years of DOE operation (1948 through 1955) are inadequate for sufficiently accurate dose reconstructions in the absence of personnel or workplace monitoring data.

6.0 Feasibility of Dose Reconstruction for the Proposed Class

42 C.F.R. § 83.14(b) states that HHS will consider a NIOSH determination that there was insufficient information to complete a dose reconstruction, as indicated in this present case, to be sufficient, without further consideration, to conclude that it is not feasible to estimate the levels of radiation doses of individual members of the class with sufficient accuracy.

In the case of a petition submitted to NIOSH under 42 C.F.R. § 83.9(b), NIOSH has already determined that a dose reconstruction cannot be completed for an employee at the DOE or AWE facility. This determination by NIOSH provides the basis for the petition by the affected claimant. Per § 83.14(a), the NIOSH-proposed class defines those employees who, based on completed research, are similarly affected and for whom, as a class, dose reconstruction is similarly not feasible.

In accordance with § 83.14(a), NIOSH may establish a second class of co-workers at the facility for whom NIOSH believes that dose reconstruction is similarly infeasible, but for whom additional research and analysis is required. If so identified, NIOSH would address this second class in a separate SEC evaluation rather than delay consideration of the claim currently under evaluation (see Section 10). This would allow NIOSH, the Board, and HHS to complete, without delay, their consideration of the class that includes a claimant for whom NIOSH has already determined a dose reconstruction cannot be completed, and whose only possible remedy under EEOICPA is the addition of a class of employees to the SEC.

This section of the report summarizes research findings by which NIOSH determined that it lacked sufficient information to complete the relevant dose reconstruction and on which basis it has defined the class of employees for which dose reconstruction is not feasible. NIOSH's determination relies on the same statutory and regulatory criteria that govern consideration of all SEC petitions.

6.1 Feasibility of Estimating Internal Exposures

NIOSH has evaluated the available personnel and workplace monitoring data and source term information and has determined that there are insufficient data for estimating internal exposures, as described below.

As presented in Section 3.0 of this report, HHS has designated an SEC class for SSFL-Area IV workers for the period from January 1, 1955 through December 31, 1958 (HHS, 2009). In the associated evaluation report, *SEC Petition Evaluation Report, Petition SEC-00093* (NIOSH, 2009), NIOSH determined that inadequate routine bioassay monitoring program existed for SSFL-Area IV through 1958. NIOSH similarly determined in its evaluation of petition SEC-00151 (NIOSH, 2010a) that the Canoga Avenue Facility also lacked an adequate routine bioassay monitoring program during its entire period of operations from 1955 through 1960, resulting in a NIOSH-proposed SEC class that includes DOE employees who worked at the Canoga Avenue Facility from January 1, 1955 through December 31, 1960.

The Downey Facility originated many of the radiological practices and record-keeping programs subsequently employed at the SSFL-Area IV and Canoga Avenue sites when operations were transferred from the Downey Facility in 1955. This resulted in a continuity of the program limitations (e.g., no bioassay monitoring done before 1958) that are evident in the collective health physics records for the ETEC-related sites. Despite extensive research into each of the ETEC-related sites, NIOSH has found no evidence of an adequate bioassay monitoring program during DOE operational years at the Downey Facility (1948 through 1955). This NIOSH finding is consistent with the dose reconstruction infeasibility findings beginning in 1955 for the SSFL-Area IV and Canoga Avenue facilities (NIOSH, 2009; NIOSH, 2010a).

NIOSH does not have access to sufficient personnel monitoring, workplace monitoring, or source term data to estimate potential internal exposures to fission products and other radionuclides at the Downey Facility during the period from January 1, 1948 through December 31, 1955. Consequently, NIOSH finds that it is not feasible to estimate, with sufficient accuracy, internal exposures to fission products and other radionuclides and resulting doses for the class of employees covered by this evaluation.

Although NIOSH found that it is not possible to completely reconstruct internal radiation doses for the period from January 1, 1948 through December 31, 1955, NIOSH intends to use any internal monitoring data that may become available for an individual claim (and that can be interpreted using existing NIOSH dose reconstruction processes or procedures). Dose reconstructions for individuals employed at the Downey Facility during the period from January 1, 1948 through December 31, 1955, but who do not qualify for inclusion in the SEC, may be performed using these data as appropriate.

6.2 Feasibility of Estimating External Exposures

This evaluation responds to a petition based on NIOSH determining that internal radiation exposures to fission products and other radionuclides could not be reconstructed for a dose reconstruction referred to NIOSH by the Department of Labor (DOL). As noted above, HHS will consider this determination to be sufficient without further consideration to determine that it is not feasible to estimate the levels of radiation doses of individual members of the class with sufficient accuracy. Consequently, it is not necessary for NIOSH to fully evaluate the feasibility of reconstructing external radiation exposures for the class of workers covered by this report.

NIOSH has determined that it has access to sufficient personnel monitoring and workplace monitoring data to either: (1) estimate the maximum external radiation dose for every type of cancer for which radiation doses are reconstructed that could have been incurred under plausible circumstances by any member of the class; or (2) estimate the external radiation doses to members of the class more precisely than a maximum dose estimate.

Adequate reconstruction of medical dose is likely to be feasible by using claimant-favorable assumptions in the technical information bulletin, *Dose Reconstruction from Occupationally Related Diagnostic X-Ray Procedures* (ORAUT-OTIB-0006), and site profile documents associated with the ETEC-related sites (ORAUT-TKBS-0038).

6.3 Class Parameters Associated with Infeasibility

Consistent with the NIOSH findings for the SSFL-Area IV site (NIOSH, 2009) and the Canoga Avenue Facility (NIOSH, 2010a), NIOSH has found no evidence of an adequate bioassay monitoring program during DOE operational years at the Downey Facility (1948 through 1955). NIOSH has therefore recommended that the proposed SEC class for the Downey Facility include the entire DOE operations period from January 1, 1948 through December 31, 1955.

As discussed in Section 4.4, NIOSH is unable to define individual worker exposure scenarios based on specific work locations at the Downey Facility. Therefore, NIOSH recommends that the class definition include the entire Downey Facility during the specified time period.

NIOSH has found insufficient documentation associating job titles and/or job assignments with specific radiological operations or conditions. Without such information, NIOSH is unable to define the proposed SEC class based on worker job descriptions or the availability of individual monitoring data. NIOSH therefore recommends that the proposed class definition include all employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at the Downey Facility during the specified time period, regardless of whether a worker was monitored for radiation exposure.

7.0 Summary of Feasibility Findings for Petition SEC-00167

This report evaluates the feasibility for completing dose reconstructions for employees at the Downey Facility from January 1, 1948 through December 31, 1955. NIOSH determined that members of this class may have received radiation exposures from intakes of fission products and other radionuclides. NIOSH lacks sufficient information, which includes biological monitoring data, sufficient air monitoring information, or sufficient process and radiological source information that would allow it to estimate the potential internal exposures to which the proposed class may have been exposed.

NIOSH has documented herein that it cannot complete the dose reconstructions related to this petition. The basis of this finding demonstrates that NIOSH does not have access to sufficient information to estimate either the maximum radiation dose incurred by any member of the class or to estimate such radiation doses more precisely than a maximum dose estimate.

Although NIOSH found that it is not possible to completely reconstruct radiation doses for the period from January 1, 1948 through December 31, 1955, NIOSH intends to use any internal or external monitoring data that may become available for an individual claim (and that can be interpreted using existing NIOSH dose reconstruction processes or procedures). Dose reconstructions for individuals employed at the Downey Facility during the period from January 1, 1948 through December 31, 1955, but who do not qualify for inclusion in the SEC, may be performed using these data as appropriate.

8.0 Evaluation of Health Endangerment for Petition SEC-00167

The health endangerment determination for the class of employees covered by this evaluation report is governed by EEOICPA and 42 C.F.R. § 83.14(b) and § 83.13(c)(3). Pursuant to these requirements, if it is not feasible to estimate with sufficient accuracy radiation doses for members of the class, NIOSH must determine that there is a reasonable likelihood that such radiation doses may have endangered the health of members of the class. The regulations require NIOSH to assume that any duration of unprotected exposure may have endangered the health of members of a class when it has been established that the class may have been exposed to radiation during a discrete incident likely to have involved levels of exposure similarly high to those occurring during nuclear criticality incidents. If the occurrence of such an exceptionally high-level exposure has not been established, then NIOSH is required to specify that health was endangered for those workers who were employed for a number of work days aggregating at least 250 work days within the parameters established for the class or in combination with work days within the parameters established for one or more other classes of employees in the SEC.

NIOSH has determined that members of the class were not exposed to radiation during a discrete incident likely to have involved levels of exposure similarly high to those occurring during nuclear criticality incidents. However, the evidence reviewed in this evaluation indicates that some workers in the class may have accumulated chronic radiation exposures through intakes of fission products and other radionuclides and from direct exposure to radioactive materials. Consequently, NIOSH is specifying that health was endangered for those workers covered by this evaluation who were employed for a number of work days aggregating at least 250 work days within the parameters established for this class or in combination with work days within the parameters established for one or more other classes of employees in the SEC.

9.0 NIOSH-Proposed Class for Petition SEC-00167

The evaluation defines a single class of employees for which NIOSH cannot estimate radiation doses with sufficient accuracy. This class includes all employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at the Downey Facility in Los Angeles County, California, from January 1, 1948 through December 31, 1955, for a number of work days aggregating at least 250 work days, occurring either solely under this employment or in combination with work days within the parameters established for one or more other classes of employees included in the Special Exposure Cohort.

10.0 Evaluation of Second Similar Class

In accordance with § 83.14(a), NIOSH may establish a second class of co-workers at the facility, similar to the class defined in Section 9.0, for whom NIOSH believes that dose reconstruction may not be feasible, and for whom additional research and analyses are required. If a second class is identified, it would require additional research and analyses. Such a class would be addressed in a separate SEC evaluation rather than delay consideration of the current claim. At this time, NIOSH has not identified a second similar class of employees at the Downey Facility for whom dose reconstruction may not be feasible.

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11.0 References

42 C.F.R. pt. 81, *Guidelines for Determining the Probability of Causation Under the Energy Employees Occupational Illness Compensation Program Act of 2000*; Final Rule, Federal Register/Vol. 67, No. 85/Thursday, p 22,296; May 2, 2002; SRDB Ref ID: 19391

42 C.F.R. pt. 82, *Methods for Radiation Dose Reconstruction Under the Energy Employees Occupational Illness Compensation Program Act of 2000*; Final Rule; May 2, 2002; SRDB Ref ID: 19392

42 C.F.R. pt. 83, *Procedures for Designating Classes of Employees as Members of the Special Exposure Cohort Under the Energy Employees Occupational Illness Compensation Program Act of 2000*; Final Rule; May 28, 2004; SRDB Ref ID: 22001

42 U.S.C. §§ 7384-7385 [EEOICPA], *Energy Employees Occupational Illness Compensation Program Act of 2000*; as amended; OCAS website

DOE, 2010, U.S. Department of Energy, Office of Health, Safety, and Security; Energy Employees Occupational Illness Compensation Program; Facilities List:
<http://www.hss.energy.gov/healthsafety/fwsp/advocacy/faclist/findfacility.cfm>

Downey, 2009, *ETEC – The Downey Facility*, Energy Technology Engineering Center (ETEC) historical website; <http://www.etc.energy.gov/Reading-Room/Downey.html>; accessed November 9, 2009; SRDB Ref ID: 76539

HHS, 2009, *HHS Designation of Additional Members of the Special Exposure Cohort under the Energy Employees Occupational Illness Compensation Program Act of 2000, Designating a Class of Employees from Santa Susana Field Laboratory – Area IV Santa Susana, California*; Department of Health and Human Services (HHS); July 23, 2009; OSA Ref ID: 109364

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NIOSH, 2009, *SEC Petition Evaluation Report for Petition SEC-00093, Santa Susana Field Laboratory-Area IV*; National Institute for Occupational Safety and Health; April 28, 2009; available on OCAS website at: <http://www.cdc.gov/niosh/ocas/pdfs/sec/area4/ssfler-r1.pdf>; SRDB Ref ID: 76961

NIOSH, 2010a, *SEC Petition Evaluation Report, Petition SEC-00151, Canoga Avenue Facility*, National Institute for Occupational Safety and Health (NIOSH); January 25, 2010; SRDB Ref ID: 79902

NIOSH, 2010b, *SEC Petition Evaluation Report, Petition SEC-00156*, Area IV of the Santa Susana Field Laboratory, National Institute for Occupational Safety and Health (NIOSH); January 12, 2010; SRDB Ref ID: 79567

ORAUT-OTIB-0006, *Dose Reconstruction from Occupationally Related Diagnostic X-Ray Procedures*, Rev. 03 PC-1; Oak Ridge Associated Universities (ORAU); Oak Ridge, Tennessee; December 21, 2005; SRDB Ref ID: 20220

ORAUT-OTIB-0077, *External Coworker Dosimetry Data for Area IV of the Santa Susana Field Laboratory, the Canoga Avenue Facility (Vanowen Building), and the De Soto Avenue Facility (sometimes referred to as Energy Technology Engineering Center [ETEC] or Atomics International)*, Rev. 00; Oak Ridge Associated Universities (ORAU); Oak Ridge, Tennessee; August 3, 2009; SRDB Ref ID: 72162

ORAUT-TKBS-0038-1, *Atomics International – Introduction*, Rev. 01; Oak Ridge Associated Universities (ORAU); Oak Ridge, Tennessee; August 30, 2006; SRDB Ref ID: 30080

ORAUT-TKBS-0038-2, *Energy Technology Engineering Center – Site Description*, Rev. 00; Oak Ridge Associated Universities (ORAU); Oak Ridge, Tennessee; February 2, 2006; SRDB Ref ID: 22140

ORAUT-TKBS-0038-3, *Atomics International – Occupational Medical Dose*, Rev. 01; Oak Ridge Associated Universities (ORAU); Oak Ridge, Tennessee; September 8, 2006; SRDB Ref ID: 30081

ORAUT-TKBS-0038-4, *Area IV of the Santa Susana Field Laboratory, the Canoga Avenue Facility (Vanowen Building), the Downey Facility, and the De Soto Avenue Facility (sometimes referred to as Energy Technology Engineering Center [ETEC] or Atomics International) – Occupational Environmental Dose*, Rev. 01; Oak Ridge Associated Universities (ORAU); Oak Ridge, Tennessee; March 8, 2007; SRDB Ref ID: 30622

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ORAUT-TKBS-0038-6, *Atomics International – Occupational External Dose*, Rev. 01; Oak Ridge Associated Universities (ORAU); Oak Ridge, Tennessee; November 16, 2006; SRDB Ref ID: 30082

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Personal Communication, 2007b, *Personal Communication with Health and Safety Manager*; Telephone Interview by ORAU Team; November 30, 2007 9:00AM PST; SRDB Ref ID: 37538

Attachment 1: Data Capture Synopsis

Table A1-1: Data Capture Synopsis for Canoga Ave., De Soto Ave., and Downey Facilities			
Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded
<u>Primary Site/Company Name:</u> Canoga Avenue Facility; DOE 1955-1960 De Soto Avenue Facility; DOE 1959-1995; DOE Remediation 1998 Downey Facility; DOE 1948-1955 <u>Other Site Names:</u> Rocketdyne Atomics International North American Aviation North American Rockwell Rockwell International Boeing	Boeing has possession of the company-maintained records for the Canoga Avenue Facility, De Soto Avenue Facility, and Downey Facility at the Santa Susana Field Laboratory (SSFL). Data Captures have been conducted at SSFL in December 2007, November 2008, September 2009, and November 2009. 21 documents from the September and November 2009 data captures are still undergoing sensitivity and legal reviews. The summary for documents received from SSFL is under SSFL below.	Ongoing	See SSFL below.
<u>State Contacted:</u> Gonzalo Perez, California Department of Public Health, Radiologic Health Branch Judy Hardy, California Department of Public Health, Public Records Coordinator	The state has copied and forwarded California Radioactive Material License 0015, including the original issue and all subsequent amendments. The document package, which includes ancillary information such as Boeing financial reports, is undergoing review for relevant data.	Ongoing	0
Cincinnati Operations Center Library	The design and operational characteristics of a portable instrument calibrator containing 3 mCi of Sr-90 and environmental monitoring following waste disposal at sea.	09/11/2009	2
Cincinnati Public Library	North American Aviation research reports and articles including the disposal of organic moderated reactor wastes by burning, plutonium recycling, processing uranium and thorium fuels, a discussion regarding potential reactor scram techniques, a method for U-238 activation analysis, reports on the L-88 reactor, thorium-uranium fuel for the Sodium Reactor Experiment, the low decontamination method for processing metallic reactor fuels containing thorium, and a review of three cohort studies of cancer mortality among Rocketdyne workers.	10/28/2009	13
DOE Legacy Management - Grand Junction Office	Correspondence regarding 6% enriched uranium sent to Atomics International in 1958 and a 1987 update on FUSRAP actions.	11/15/2008	3

Table A1-1: Data Capture Synopsis for Canoga Ave., De Soto Ave., and Downey Facilities			
Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded
DOE Legacy Management - MoundView (Fernald Holdings, includes Fernald Legal Database)	DOE correspondence regarding potential mixed waste shipments to the Nevada Test Site, operating procedure for a Fernald production run of slugs for North American Aviation, the nationwide survey of normal uranium scrap, and a New Brunswick Laboratory proposed work program for 1953-1954 which includes analyzing the boron concentration in heavy water for North American Aviation.	05/21/2008	7
DOE Office of Scientific and Technical Information (OSTI)	A 1961 survey of irradiation facilities. The results of the OSTI search of their non-publicly available holdings for the Downey Facility has been forwarded to Objective 4. The OSTI search did not turn up documents for the Canoga Avenue and De Soto Avenue Facilities.	Ongoing	1
Federal Records Center, San Bruno	A 1984 environmental report, appraisals of the occupational medical program, a report of radiation exposures during chest x-rays, and a 1969 appraisal of the industrial hygiene program.	09/15/2009	9
Internet - DOE Comprehensive Epidemiologic Data Resource (CEDR)	The executive summary from and appendices to the Rocketdyne worker health study, a brief publication explaining the study, and an article from <u>Radiation Research</u> which presented the Boice study.	11/10/2009	3
Internet - DOE Hanford Declassified Document Retrieval System (DDRS)	A 1956 report which indicates that Hanford was testing sodium for the Sodium Reactor Experiment.	11/10/2009	1 Added through site association review.
Internet - DOE OpenNet	AEC reports to Congress.	11/10/2009	2 Added through site association review.
Internet - DOE OSTI Energy Citations	A test of NTA film to fast neutrons, gamma and neutron streaming from the Sodium Reactor Experiment, 1960 environmental report, 1992 hot lab decommissioning report, pathway analysis for soil remediation, and testing of the Hallam reactor core components for releases during maintenance.	11/10/2009	7

Table A1-1: Data Capture Synopsis for Canoga Ave., De Soto Ave., and Downey Facilities			
Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded
Internet - DOE OSTI Information Bridge	The summary of FY 1964 AEC radioisotope shipments, hot lab decommissioning annual reports, the verification survey of Building 4059, reports on sodium-graphite reactor technology, sodium component test installation reports, Organic Moderated Reactor reports, Sodium-Graphite Reactor fuel test reports, uranium-molybdenum studies for the Hallam reactor, SNAP reactor studies, and shielding and coolant system maintenance studies for the Sodium Reactor Experiment.	11/14/2009	116
Internet - ETEC Website	A UCLA epidemiologic study and environmental reports.	09/03/2009	4
Internet - Google	An aerial radiological survey, a dose reconstruction methodology, histories of the Canoga Avenue, De Soto Avenue, and Downey Facilities, a survey of the De Soto gamma irradiation facility, environmental reports, federal facility review, incident reports, news articles, verification survey reports, progress reports, an NRC inspection report, depleted uranium waste disposal alternatives, a DOE press release summarizing the State of California epidemiologic study, and an article which describes and summarizes the UCLA epidemiologic study.	11/14/2009	90
Internet - National Academies Press (NAP)	No relevant data identified.	11/10/2009	0
Internet - National Nuclear Security Administration (NNSA) - Nevada Site Office	No relevant data identified.	11/10/2009	0
Internet - NRC Agencywide Document Access and Management (ADAMS)	Special Nuclear Materials Licenses SNM-21 and SNM-33 with correspondence, byproduct material licenses and applications, the list of documents provided in response to FOIA request FOIA/PA-207-0262, and the feasibility report for the manufacture of 164 19% enriched pins for the Sodium Reactor Experiment test program.	11/14/2009	23
Internet - Washington State University (U.S. Transuranium and Uranium Registries)	A poster session regarding the longevity of workers exposed to plutonium.	11/10/2009	1
NARA Atlanta	A 1952 request for one kilogram of UF ₄ from Oak Ridge National Laboratory.	05/20/2008	1

Table A1-1: Data Capture Synopsis for Canoga Ave., De Soto Ave., and Downey Facilities			
Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded
Santa Susana Field Laboratory (SSFL)	Environmental reports, annual reviews of radiation controls, radiation survey reports, effluent monitoring reports, radiation surveys of the Canoga diagnostic x-ray facility, routine room surveys, access controls for the x-ray cells, California Radioactive Material License 0273-59, the wound monitoring procedure, facility maps, urinalysis results, annual radiation exposure reports, waste operations procedures, radiological controls manual and procedures, some amendments from California Radioactive Material License 0015, Building 001 plan, radiation safety reviews, L-77 Reactor surveys, air sample data, and raw environmental data.	12/22/2009, pending the delivery of the remaining 21 documents undergoing review.	160
TOTAL			443

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
DOE CEDR http://cedr.lbl.gov/ COMPLETED 11/10/2009	"North American Aviation" Rocketdyne "Atoms International" "North American Rockwell" "Rockwell International" "United Technologies" Downey (Key Word) De Soto (Key Word)	13	3
DOE Hanford DDRS http://www2.hanford.gov/declass/ COMPLETED 11/10/2009	"North American Aviation" 01/01/1955 - 08/21/2009 "Rocketdyne" +Canoga 01/01/1955 - 08/21/2009 "Atoms International" "North American Rockwell" 01/01/1955 - 08/23/2009 "Rockwell International" 01/01/1955 - 08/28/2009 "United Technologies" 01/01/1955 - 08/28/2010 "Rocketdyne" + "Vanowen" 01/01/1955 - 08/28/2010 Downey or "De Soto" (Simple Search)	0	0

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities

Database/Source	Keywords / Phrases	Hits	Uploaded
DOE OpenNet http://www.osti.gov/opennet/advancedsearch.jsp COMPLETED 11/10/2009	"North American Aviation" +"Canoga" 01/01/1955 - 08/15/2009 "North American Aviation" +Vanowen 01/01/1955 - 08/21/2009 "Rocketdyne" +Canoga 01/01/1955 - 08/21/2009 "Rocketdyne" +Vanowen 01/01/1955 - 08/21/2009 "Atomics International" +Canoga 01/01/1955 - 08/23/2009 "Atomics International" +Vanowen 01/01/1955 - 08/23/2009 "North American Rockwell" +Canoga 01/01/1955 - 08/23/2009 "North American Rockwell" +Vanowen 01/01/1955 - 08/23/2009 "Rockwell International" +"Canoga" 01/01/1955 - 08/28/2009 "Rockwell International" +"Vanowen" 01/01/1955 - 08/28/2009 "United Technologies" +"Canoga" 01/01/1955 - 08/28/2010 "United Technologies" +"Vanowen" 01/01/1955 - 08/28/2010 Downey or "De Soto" (Full Text)	154	0
DOE OSTI Energy Citations http://www.osti.gov/energycitations/ COMPLETED 11/10/2009	"North American Aviation" +"Canoga" 01/01/1955 - 08/09/2009 "North American Aviation" +Vanowen 01/01/1955 - 08/21/2009 "Rocketdyne" +Canoga 01/01/1955 - 08/21/2009 "Rocketdyne" +Vanowen 01/01/1955 - 08/21/2009 "Atomics International" +Canoga 01/01/1955 - 08/22/2009 "Atomics International" +Vanowen 01/01/1955 - 08/23/2009 "North American Rockwell" +Canoga 01/01/1955 - 08/23/2009 "North American Rockwell" +Vanowen 01/01/1955 - 08/23/2009 "Rockwell International" +"Canoga" 01/01/1955 - 08/28/2009 "Rockwell International" +"Vanowen" 01/01/1955 - 08/28/2009 "United Technologies" +"Canoga" 01/01/1955 - 08/28/2010 "United Technologies" +"Vanowen" 01/01/1955 - 08/28/2010 Downey or "De Soto" (all fields)	10,442	7
DOE OSTI Information Bridge http://www.osti.gov/bridge/advancedsearch.jsp COMPLETED 11/14/2009	"North American Aviation" +"Canoga" 01/01/1955 - 08/09/2009 "North American Aviation" +Vanowen 01/01/1955 - 08/21/2009 "Rocketdyne" +Canoga 01/01/1955 - 08/21/2009 "Rocketdyne" +Vanowen 01/01/1955 - 08/21/2009 "Atomics International" +Canoga 01/01/1955 - 08/21/2009 "Atomics International" +Vanowen 01/01/1955 - 08/23/2009 "North American Rockwell" +Canoga 01/01/1955 - 08/23/2009 "North American Rockwell" +Vanowen 01/01/1955 - 08/23/2009 "Rockwell International" +"Canoga" 01/01/1955 - 08/28/2009 "Rockwell International" +"Vanowen" 01/01/1955 - 08/28/2009 "United Technologies" +"Canoga" 01/01/1955 - 08/28/2010	2,319	116

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities

Database/Source	Keywords / Phrases	Hits	Uploaded
	"United Technologies" +"Vanowen" 01/01/1955 - 08/28/2010 Downey or "De Soto" (all fields)		
Google http://www.google.com COMPLETED 11/14/2009	<p>"North American Aviation" "Canoga" OR "Vanowen" "americium OR Am241 OR Am-241 OR Am 241 OR 241Am OR 241-Am OR "241 Am" OR ionium OR Th230 OR Th-230 OR "Th 230" OR 230Th OR 230-Th OR "230 Th"</p> <p>"North American Aviation" "Canoga" OR "Vanowen" "neptunium OR Np237 OR Np-237 OR "Np 237" OR 237Np OR 237-Np OR "237 Np" OR palm OR palmolive OR polonium OR Po210 OR Po-210 OR "Po 210" OR 210Po OR 210-Po OR "210 Po"</p> <p>"North American Aviation" "Canoga" OR "Vanowen" "thorium OR thoria OR Th232 OR Th-232 OR "Th 232" OR 232Th OR 232-Th OR "232 Th" OR "Z metal" OR Z-metal OR myrnalloy OR "chemical 10-66" OR "chemical 1066" OR "chemical 10 66"</p> <p>"North American Aviation" "Canoga" OR "Vanowen" "chemical 18-12" OR "chemical 1812" OR "chemical 18 12" OR "chemical 10-12" OR "chemical 1012" OR "chemical 10 12" OR UX1 OR UX2"</p> <p>"North American Aviation" "Canoga" OR "Vanowen" "Th-234 OR Th234 OR "Th 234" OR 234-Th OR 234Th OR "234 Th" OR tritium OR H3 OR H-3 OR mint OR HTO"</p> <p>"North American Aviation" "Canoga" OR "Vanowen" "uranium OR U233 OR U-233 OR "U 233" OR 233U OR 233-U OR "233 U" OR U234 OR "U 234" OR U-234 OR 234U OR 234-U OR "234 U" OR U235 OR "U 235" OR U-235 OR 235-U OR 235U OR "235 U"</p> <p>"North American Aviation" "Canoga" OR "Vanowen" "U238 OR "U 238" OR U-238 OR 238-U OR 238U OR "238 U" OR U308 OR "U 308" OR U-308 OR 308-U OR 308U OR "308 U" OR "black oxide" OR "brown oxide" OR "green salt" OR "orange oxide" OR "yellow cake"</p>	2,183,873	90

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities

Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>"North American Aviation" "Canoga" OR "Vanowen" "UO2 OR UO3 OR UF4 OR UF6 OR C-216 OR C-616 OR C-65 OR C-211 OR U3O8 OR "uranium extraction" OR "uranium dioxide" OR "uranium hexafluoride" OR "uranium tetrafluoride" OR "uranium trioxide"</p> <p>"North American Aviation" "Canoga" OR "Vanowen" "plutonium OR Pu-238 OR Pu238 OR "Pu 238" OR 238Pu OR 238-Pu OR "238 Pu" OR Pu-239 OR Pu239 OR "Pu 239" OR 239Pu OR 239-Pu"</p> <p>"North American Aviation" "Canoga" OR "Vanowen" "239 Pu" OR Pu-240 OR Pu240 OR "Pu 240" OR 240Pu OR 240-Pu OR "240 Pu" OR Pu-241 OR Pu241 OR "Pu 241" OR 241Pu OR 241-Pu OR "241 Pu"</p> <p>"North American Aviation" "Canoga" OR "Vanowen" "radium OR Ra-226 OR Ra226 OR "Ra 226" OR 226-Ra OR 226Ra OR "226 Ra" OR Ra-228 OR Ra228 OR "Ra 228" OR 228Ra OR 228-Ra OR "228 Ra" OR radon OR Rn-222 OR Rn222 OR "Rn 222" OR 222Rn OR 222-Rn"</p> <p>"North American Aviation" "Canoga" OR "Vanowen" "222 Rn" OR thoron OR Rn-220 OR Rn220 OR "Rn 220" OR 220Rn OR 220-Rn OR "220 Rn" OR protactinium OR Pa-234m OR Pa234m OR "Pa 234m" OR 234mPa OR 234m-Pa OR "234m Pa"</p> <p>"North American Aviation" "Canoga" OR "Vanowen" strontium OR Sr-90 OR Sr90 OR "Sr 90" OR 90-Sr OR 90Sr OR "90 Sr" OR oralloys OR postum OR tuballoy OR "uranyl nitrate hexahydrate" OR UNH OR K-65 OR "sump cake"</p> <p>"North American Aviation" "Canoga" OR "Vanowen" accident OR "air count" OR "air dust" OR "air filter" OR "airborne test" OR alpha OR "belgian congo ore" OR beta OR bioassay OR bio-assay OR breath OR "breathing zone" OR BZ</p> <p>"North American Aviation" "Canoga" OR "Vanowen" "body burden" OR calibration OR "chest count" OR columnation OR contamination OR curie OR denitration OR "denitration pot" OR derby OR regulus OR "derived air concentration" OR DAC OR dose OR dosimeter</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>"North American Aviation" "Canoga" OR "Vanowen" dosimetric OR dosimetry OR electron OR environment OR "Ether-Water Project" OR exposure OR "exposure investigation" OR "radiation exposure" OR external OR "F machine" OR fecal OR "feed material"</p> <p>"North American Aviation" "Canoga" OR "Vanowen" femptocurie OR film OR fission OR fluoroscopy OR "Formerly Utilized Sites Remedial Action Program" OR FUSRAP OR gamma-ray OR "gamma ray" OR "gas proportional" OR "gaseous diffusion" OR health</p> <p>"North American Aviation" "Canoga" OR "Vanowen" "health instrument" OR "health physics" OR H.I. OR HI OR HP OR "highly enriched uranium" OR HEU OR hydrofluorination OR "in vitro" OR "in vivo"</p> <p>"North American Aviation" "Canoga" OR "Vanowen" incident OR ingestion OR inhalation OR internal OR investigation OR isotope OR isotopic OR "isotopic enrichment" OR "JS Project" OR Landauer OR "liquid scintillation"</p> <p>"North American Aviation" "Canoga" OR "Vanowen" log OR "log sheet" OR "log book" OR "low enriched uranium" OR LEU OR "lung count" OR "maximum permissible concentration" OR MPC OR metallurgy OR microcurie OR millicurie</p> <p>"North American Aviation" "Canoga" OR "Vanowen" "mixed fission product" OR MFP OR monitor OR "air monitoring" OR nanocurie OR "nasal wipe" OR neutron OR "nose wipe" OR nuclear OR Chicago-Nuclear OR "nuclear fuels" OR "nuclear track emulsion type A"</p> <p>"North American Aviation" "Canoga" OR "Vanowen" NTA OR "occupational radiation exposure" OR occurrence OR "ore concentrate" OR "PC Project" OR permit OR "radiation work permit" OR "safe work permit" OR "special work permit" OR RWP OR SWP</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>"North American Aviation" "Canoga" OR "Vanowen" "phosphate research" OR photon OR picocurie OR pitchblende OR "pocket ion chamber" OR PIC OR problem OR procedure OR radeco OR radiation OR radioactive OR radioactivity OR radiograph OR radiological</p> <p>"North American Aviation" "Canoga" OR "Vanowen" "Radiological Survey Data Sheet" OR RSDS OR radionuclide OR raffinate OR reactor OR respiratory OR "retention schedules" OR roentgen OR sample OR "air sample" OR "dust sample"</p> <p>"North American Aviation" "Canoga" OR "Vanowen" "general area air sample" OR sampling OR "air sampling" OR "dust sampling" OR "general area air sampling" OR "solvent extraction" OR source OR "sealed source" OR spectra OR spectrograph</p> <p>"North American Aviation" "Canoga" OR "Vanowen" spectroscopy OR spectrum OR standard OR operating OR processing OR survey OR "building survey" OR "routine survey" OR "special survey" OR "technical basis" OR "thermal diffusion"</p> <p>"North American Aviation" "Canoga" OR "Vanowen" "thermoluminescent dosimeter" OR TLD OR "Tiger Team" OR "tolerance dose" OR urinalysis OR urine OR "whole body count" OR WBC OR "working level" OR WL OR X-ray OR "X ray" OR Xray</p> <p>"North American Rockwell" "Canoga" OR "Vanowen" americium OR Am241 OR Am-241 OR "Am 241" OR "241Am" OR 241-Am OR "241 Am" OR ionium OR Th230 OR Th-230 OR "Th 230" OR 230Th OR 230-Th OR "230 Th"</p> <p>"North American Rockwell" "Canoga" OR "Vanowen" neptunium OR Np237 OR Np-237 OR "Np 237" OR 237Np OR 237-Np OR "237 Np" OR palm OR palmolive OR polonium OR Po210 OR Po-210 OR "Po 210" OR 210Po OR 210-Po OR "210 Po"</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities

Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>"North American Rockwell" "Canoga" OR "Vanowen" thorium OR thoria OR Th232 OR Th-232 OR "Th 232" OR 232Th OR 232-Th OR "232 Th" OR "Z metal" OR Z-metal OR myrnalloy OR "chemical 10-66" OR "chemical 1066" OR "chemical 10 66"</p> <p>"North American Rockwell" "Canoga" OR "Vanowen" "chemical 18-12" OR "chemical 1812" OR "chemical 18 12" OR "chemical 10-12" OR "chemical 1012" OR "chemical 10 12" OR UX1 OR UX2</p> <p>"North American Rockwell" "Canoga" OR "Vanowen" Th-234 OR Th234 OR "Th 234" OR 234-Th OR 234Th OR "234 Th" OR tritium OR H3 OR H-3 OR mint OR HTO</p> <p>"North American Rockwell" "Canoga" OR "Vanowen" uranium OR U233 OR U-233 OR "U 233" OR 233U OR 233-U OR "233 U" OR U234 OR "U 234" OR U-234 OR 234U OR 234-U OR "234 U" OR U235 OR "U 235" OR U-235 OR 235-U OR 235U OR "235 U"</p> <p>"North American Rockwell" "Canoga" OR "Vanowen" U238 OR "U 238" OR U-238 OR 238-U OR 238U OR "238 U" OR U308 OR "U 308" OR U-308 OR 308-U OR 308U OR "308 U" OR "black oxide" OR "brown oxide" OR "green salt"</p> <p>"North American Rockwell" "Canoga" OR "Vanowen""orange oxide" OR "yellow cake"</p> <p>"North American Rockwell" "Canoga" OR "Vanowen" femptocurie OR film OR fission OR fluoroscopy OR "Formerly Utilized Sites Remedial Action Program" OR FUSRAP OR gamma-ray OR "gamma ray" OR "gas proportional" OR "gaseous diffusion" OR health</p> <p>"North American Rockwell" "Canoga" OR "Vanowen" "health instrument" OR "health physics" OR H.I. OR HI OR HP OR "highly enriched uranium" OR HEU OR hydrofluorination OR "in vitro" OR "in vivo"</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities

Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>"North American Rockwell" "Canoga" OR "Vanowen" incident OR ingestion OR inhalation OR internal OR investigation OR isotope OR isotopic OR "isotopic enrichment" OR "JS Project" OR Landauer OR "liquid scintillation"</p> <p>"North American Rockwell" "Canoga" OR "Vanowen" log OR "log sheet" OR "log book" OR "low enriched uranium" OR LEU OR "lung count" OR "maximum permissible concentration" OR MPC OR metallurgy OR microcurie OR millicurie</p> <p>"North American Rockwell" "Canoga" OR "Vanowen" "mixed fission product" OR MFP OR monitor OR "air monitoring" OR nanocurie OR "nasal wipe" OR neutron OR "nose wipe" OR nuclear OR Chicago-Nuclear OR "nuclear fuels" OR "nuclear track emulsion type A"</p> <p>"North American Rockwell" "Canoga" OR "Vanowen" NTA OR "occupational radiation exposure" OR occurrence OR "ore concentrate" OR "PC Project" OR permit OR "radiation work permit" OR "safe work permit" OR "special work permit" OR RWP OR SWP</p> <p>"North American Rockwell" "Canoga" OR "Vanowen" "phosphate research" OR photon OR picocurie OR pitchblende OR "pocket ion chamber" OR PIC OR problem OR procedure OR radeco OR radiation OR radioactive OR radioactivity OR radiograph OR radiological</p> <p>"North American Rockwell" "Canoga" OR "Vanowen" "Radiological Survey Data Sheet" OR RSDS OR radionuclide OR raffinate OR reactor OR respiratory OR "retention schedules" OR roentgen OR sample OR "air sample" OR "dust sample"</p> <p>"North American Rockwell" "Canoga" OR "Vanowen" "general area air sample" OR sampling OR "air sampling" OR "dust sampling" OR "general area air sampling" OR "solvent extraction" OR source OR "sealed source" OR spectra OR spectrograph</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities

Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>"North American Rockwell" "Canoga" OR "Vanowen" spectroscopy OR spectrum OR standard OR operating OR processing OR survey OR "building survey" OR "routine survey" OR "special survey" OR "technical basis" OR "thermal diffusion"</p> <p>"North American Rockwell" "Canoga" OR "Vanowen" "thermoluminescent dosimeter" OR TLD OR "Tiger Team" OR "tolerance dose" OR urinalysis OR urine OR "whole body count" OR WBC OR "working level" OR WL OR X-ray OR "X ray" OR Xray</p> <p>"Rocketdyne" "Canoga" OR "Vanowen"americium OR Am241 OR Am-241 OR "Am 241" OR "241Am" OR 241-Am OR "241 Am" OR ionium OR Th230 OR Th-230 OR "Th 230" OR 230Th OR 230-Th OR "230 Th"</p> <p>"Rocketdyne" "Canoga" OR "Vanowen"neptunium OR Np237 OR Np-237 OR "Np 237" OR 237Np OR 237-Np OR "237 Np" OR palm OR palmolive OR polonium OR Po210 OR Po-210 OR "Po 210" OR 210Po OR 210-Po OR "210 Po"</p> <p>"Rocketdyne" "Canoga" OR "Vanowen"thorium OR thoria OR Th232 OR Th-232 OR "Th 232" OR 232Th OR 232-Th OR "232 Th" OR "Z metal" OR Z-metal OR myrnalloy OR "chemical 10-66" OR "chemical 1066" OR "chemical 10 66"</p> <p>"Rocketdyne" "Canoga" OR "Vanowen""chemical 18-12" OR "chemical 1812" OR "chemical 18 12" OR "chemical 10-12" OR "chemical 1012" OR "chemical 10 12" OR UX1 OR UX2</p> <p>"Rocketdyne" "Canoga" OR "Vanowen"Th-234 OR Th234 OR "Th 234" OR 234-Th OR 234Th OR "234 Th" OR tritium OR H3 OR H-3 OR mint OR HTO</p> <p>"Rocketdyne" "Canoga" OR "Vanowen"uranium OR U233 OR U-233 OR "U 233" OR 233U OR 233-U OR "233 U" OR U234 OR "U 234" OR U-234 OR 234U OR 234-U OR "234 U" OR U235 OR "U 235" OR U-235 OR 235-U OR 235U OR "235 U"</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities

Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>"Rocketdyne" "Canoga" OR "Vanowen"U238 OR "U 238" OR U-238 OR 238-U OR 238U OR "238 U" OR U308 OR "U 308" OR U-308 OR 308-U OR 308U OR "308 U" OR "black oxide" OR "brown oxide" OR "green salt" OR "orange oxide" OR "yellow cake"</p> <p>"Rocketdyne" "Canoga" OR "Vanowen"UO2 OR UO3 OR UF4 OR UF6 OR C-216 OR C-616 OR C-65 OR C-211 OR U308 OR "uranium extraction" OR "uranium dioxide" OR "uranium hexafluoride" OR "uranium tetrafluoride" OR "uranium trioxide"</p> <p>"Rocketdyne" "Canoga" OR "Vanowen"plutonium OR Pu-238 OR Pu238 OR "Pu 238" OR 238Pu OR 238-Pu OR "238 Pu" OR Pu-239 OR Pu239 OR "Pu 239" OR 239Pu OR 239-Pu</p> <p>"Rocketdyne" "Canoga" OR "Vanowen" "239 Pu" OR Pu-240 OR Pu240 OR "Pu 240" OR 240Pu OR 240-Pu OR "240 Pu" OR Pu-241 OR Pu241 OR "Pu 241" OR 241Pu OR 241-Pu OR "241 Pu"</p> <p>"Rocketdyne" "Canoga" OR "Vanowen"radium OR Ra-226 OR Ra226 OR "Ra 226" OR 226-Ra OR 226Ra OR "226 Ra" OR Ra-228 OR Ra228 OR "Ra 228" OR 228Ra OR 228-Ra OR "228 Ra" OR radon OR Rn-222 OR Rn222 OR "Rn 222" OR 222Rn OR 222-Rn</p> <p>"Rocketdyne" "Canoga" OR "Vanowen""222 Rn" OR thoron OR Rn-220 OR Rn220 OR "Rn 220" OR 220Rn OR 220-Rn OR "220 Rn" OR protactinium OR Pa-234m OR Pa234m OR "Pa 234m" OR 234mPa OR 234m-Pa OR "234m Pa"</p> <p>"Rocketdyne" "Canoga" OR "Vanowen"strontium OR Sr-90 OR Sr90 OR "Sr 90" OR 90-Sr OR 90Sr OR "90 Sr" OR or alloy OR postum OR tuballoy OR "uranyl nitrate hexahydrate" OR UNH OR K-65 OR "sump cake"</p> <p>"Rocketdyne" "Canoga" OR "Vanowen"accident OR "air count" OR "air dust" OR "air filter" OR "airborne test" OR alpha OR "belgian congo ore" OR beta OR bioassay OR bio-assay OR breath OR "breathing zone" OR BZ</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>"Rocketdyne" "Canoga" OR "Vanowen""body burden" OR calibration OR "chest count" OR columnation OR contamination OR curie OR denitration OR "denitration pot" OR derby OR regulus OR "derived air concentration" OR DAC OR dose OR dosimeter</p> <p>"Rocketdyne" "Canoga" OR "Vanowen"dosimetric OR dosimetry OR electron OR environment OR "Ether-Water Project" OR exposure OR "exposure investigation" OR "radiation exposure" OR external OR "F machine" OR fecal OR "feed material"</p> <p>"Rocketdyne" "Canoga" OR "Vanowen"femptocurie OR film OR fission OR fluoroscopy OR "Formerly Utilized Sites Remedial Action Program" OR FUSRAP OR gamma-ray OR "gamma ray" OR "gas proportional" OR "gaseous diffusion" OR health</p> <p>"Rocketdyne" "Canoga" OR "Vanowen""health instrument" OR "health physics" OR H.I. OR HI OR HP OR "highly enriched uranium" OR HEU OR hydrofluorination OR "in vitro" OR "in vivo"</p> <p>"Rocketdyne" "Canoga" OR "Vanowen" incident OR ingestion OR inhalation OR internal OR investigation OR isotope OR isotopic OR "isotopic enrichment" OR "JS Project" OR Landauer OR "liquid scintillation"</p> <p>"Rocketdyne" "Canoga" OR "Vanowen"og OR "log sheet" OR "log book" OR "low enriched uranium" OR LEU OR "lung count" OR "maximum permissible concentration" OR MPC OR metallurgy OR microcurie OR millicurie</p> <p>"Rocketdyne" "Canoga" OR "Vanowen""mixed fission product" OR MFP OR monitor OR "air monitoring" OR nanocurie OR "nasal wipe" OR neutron OR "nose wipe" OR nuclear OR Chicago-Nuclear OR "nuclear fuels" OR "nuclear track emulsion type A"</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>"Rocketdyne" "Canoga" OR "Vanowen"NTA OR "occupational radiation exposure" OR occurrence OR "ore concentrate" OR "PC Project" OR permit OR "radiation work permit" OR "safe work permit" OR "special work permit" OR RWP OR SWP</p> <p>"Rocketdyne" "Canoga" OR "Vanowen""phosphate research" OR photon OR picocurie OR pitchblende OR "pocket ion chamber" OR PIC OR problem OR procedure OR radeco OR radiation OR radioactive OR radioactivity OR radiograph OR radiological</p> <p>"Rocketdyne" "Canoga" OR "Vanowen""Radiological Survey Data Sheet" OR RSDS OR radionuclide OR raffinate OR reactor OR respiratory OR "retention schedules" OR roentgen OR sample OR "air sample" OR "dust sample"</p> <p>"Rocketdyne" "Canoga" OR "Vanowen""general area air sample" OR sampling OR "air sampling" OR "dust sampling" OR "general area air sampling" OR "solvent extraction" OR source OR "sealed source" OR spectra OR spectrograph</p> <p>"Rocketdyne" "Canoga" OR "Vanowen"spectroscopy OR spectrum OR standard OR operating OR processing OR survey OR "building survey" OR "routine survey" OR "special survey" OR "technical basis" OR "thermal diffusion"</p> <p>"Rocketdyne" "Canoga" OR "Vanowen""thermoluminescent dosimeter" OR TLD OR "Tiger Team" OR "tolerance dose" OR urinalysis OR urine OR "whole body count" OR WBC OR "working level" OR WL OR X-ray OR "X ray" OR Xray</p> <p>"Atomics International" "Canoga" OR "Vanowen" americium OR Am241 OR Am-241 OR "Am 241" OR "241Am" OR 241-Am OR "241 Am" OR ionium OR Th230 OR Th-230 OR "Th 230" OR 230Th OR 230-Th OR "230 Th"</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>"Atomics International" "Canoga" OR "Vanowen" neptunium OR Np237 OR Np-237 OR "Np 237" OR 237Np OR 237-Np OR "237 Np" OR palm OR palmolive OR polonium OR Po210 OR Po-210 OR "Po 210" OR 210Po OR 210-Po OR "210 Po"</p> <p>"Atomics International" "Canoga" OR "Vanowen" thorium OR thoria OR Th232 OR Th-232 OR "Th 232" OR 232Th OR 232-Th OR "232 Th" OR "Z metal" OR Z-metal OR myrnalloy OR "chemical 10-66" OR "chemical 1066" OR "chemical 10 66"</p> <p>"Atomics International" "Canoga" OR "Vanowen" "chemical 18-12" OR "chemical 1812" OR "chemical 18 12" OR "chemical 10-12" OR "chemical 1012" OR "chemical 10 12" OR UX1 OR UX2</p> <p>"Atomics International" "Canoga" OR "Vanowen" Th-234 OR Th234 OR "Th 234" OR 234-Th OR 234Th OR "234 Th" OR tritium OR H3 OR H-3 OR mint OR HTO</p> <p>"Atomics International" "Canoga" OR "Vanowen" uranium OR U233 OR U-233 OR "U 233" OR 233U OR 233-U OR "233 U" OR U234 OR "U 234" OR U-234 OR 234U OR 234-U OR "234 U" OR U235 OR "U 235" OR U-235 OR 235-U OR 235U OR "235 U"</p> <p>"Atomics International" "Canoga" OR "Vanowen" U238 OR "U 238" OR U-238 OR 238-U OR 238U OR "238 U" OR U308 OR "U 308" OR U-308 OR 308-U OR 308U OR "308 U" OR "black oxide" OR "brown oxide" OR "green salt" OR "orange oxide" OR "yellow cake"</p> <p>"Atomics International" "Canoga" OR "Vanowen" UO2 OR UO3 OR UF4 OR UF6 OR C-216 OR C-616 OR C-65 OR C-211 OR U308 OR "uranium extraction" OR "uranium dioxide" OR "uranium hexafluoride" OR "uranium tetrafluoride" OR "uranium trioxide"</p> <p>"Atomics International" "Canoga" OR "Vanowen" plutonium OR Pu-238 OR Pu238 OR "Pu 238" OR 238Pu OR 238-Pu OR "238 Pu" OR Pu-239 OR Pu239 OR "Pu 239" OR 239Pu OR 239-Pu</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>"Atomics International" "Canoga" OR "Vanowen" "239 Pu" OR Pu-240 OR Pu240 OR "Pu 240" OR 240Pu OR 240-Pu OR "240 Pu" OR Pu-241 OR Pu241 OR "Pu 241" OR 241Pu OR 241-Pu OR "241 Pu"</p> <p>"Atomics International" "Canoga" OR "Vanowen" radium OR Ra-226 OR Ra226 OR "Ra 226" OR 226-Ra OR 226Ra OR "226 Ra" OR Ra-228 OR Ra228 OR "Ra 228" OR 228Ra OR 228-Ra OR "228 Ra" OR radon OR Rn-222 OR Rn222</p> <p>"Atomics International" "Canoga" OR "Vanowen" "Rn 222" OR 222Rn OR 222-Rn</p> <p>"Atomics International" "Canoga" OR "Vanowen" "222 Rn" OR thoron OR Rn-220 OR Rn220 OR "Rn 220" OR 220Rn OR 220-Rn OR "220 Rn" OR protactinium OR Pa-234m OR Pa234m OR "Pa 234m" OR 234mPa OR 234m-Pa OR "234m Pa"</p> <p>"Atomics International" "Canoga" OR "Vanowen" strontium OR Sr-90 OR Sr90 OR "Sr 90" OR 90-Sr OR 90Sr OR "90 Sr" OR oralloid OR postum OR tuballoy OR "uranyl nitrate hexahydrate" OR UNH OR K-65 OR "sump cake"</p> <p>"Atomics International" "Canoga" OR "Vanowen" accident OR "air count" OR "air dust" OR "air filter" OR "airborne test" OR alpha OR "belgian congo ore" OR beta OR bioassay OR bio-assay OR breath OR "breathing zone" OR BZ</p> <p>"Atomics International" "Canoga" OR "Vanowen" "body burden" OR calibration OR "chest count" OR columnation OR contamination OR curie OR denitration OR "denitration pot" OR derby OR regulus OR "derived air concentration" OR DAC OR dose OR dosimeter</p> <p>"Atomics International" "Canoga" OR "Vanowen" dosimetric OR dosimetry OR electron OR environment OR "Ether-Water Project" OR exposure OR "exposure investigation" OR "radiation exposure" OR external OR "F machine" OR fecal OR "feed material"</p>		

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Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>"Rockwell International" "Canoga" OR "Vanowen"spectroscopy OR spectrum OR standard OR operating OR processing OR survey OR "building survey" OR "routine survey" OR "special survey" OR "technical basis" OR "thermal diffusion"</p> <p>"Rockwell International" "Canoga" OR "Vanowen""thermoluminescent dosimeter" OR TLD OR "Tiger Team" OR "tolerance dose" OR urinalysis OR urine OR "whole body count" OR WBC OR "working level" OR WL OR X-ray OR "X ray" OR Xray</p> <p>"United Technologies" "Canoga" OR "Vanowen"americium OR Am241 OR Am-241 OR "Am 241" OR "241Am" OR 241-Am OR "241 Am" OR ionium OR Th230 OR Th-230 OR "Th 230" OR 230Th OR 230-Th OR "230 Th"</p> <p>"United Technologies" "Canoga" OR "Vanowen"neptunium OR Np237 OR Np-237 OR "Np 237" OR 237Np OR 237-Np OR "237 Np" OR palm OR palmolive OR polonium OR Po210 OR Po-210 OR "Po 210" OR 210Po OR 210-Po OR "210 Po"</p> <p>"United Technologies" "Canoga" OR "Vanowen"thorium OR thoria OR Th232 OR Th-232 OR "Th 232" OR 232Th OR 232-Th OR "232 Th" OR "Z metal" OR Z-metal OR myrnalloy OR "chemical 10-66" OR "chemical 1066" OR "chemical 10 66"</p> <p>"United Technologies" "Canoga" OR "Vanowen""chemical 18-12" OR "chemical 1812" OR "chemical 18 12" OR "chemical 10-12" OR "chemical 1012" OR "chemical 10 12" OR UX1 OR UX2</p> <p>"United Technologies" "Canoga" OR "Vanowen"Th-234 OR Th234 OR "Th 234" OR 234-Th OR 234Th OR "234 Th" OR tritium OR H3 OR H-3 OR mint OR HTO</p> <p>"United Technologies" "Canoga" OR "Vanowen"uranium OR U233 OR U-233 OR "U 233" OR 233U OR 233-U OR "233 U" OR U234 OR "U 234" OR U-234 OR 234U OR 234-U OR "234 U" OR U235 OR "U 235" OR U-235 OR 235-U OR 235U OR "235 U"</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>"United Technologies" "Canoga" OR "Vanowen"U238 OR "U 238" OR U-238 OR 238-U OR 238U OR "238 U" OR U308 OR "U 308" OR U-308 OR 308-U OR 308U OR "308 U" OR "black oxide" OR "brown oxide" OR "green salt" OR "orange oxide" OR "yellow cake"</p> <p>"United Technologies" "Canoga" OR "Vanowen"UO2 OR UO3 OR UF4 OR UF6 OR C-216 OR C-616 OR C-65 OR C-211 OR U308 OR "uranium extraction" OR "uranium dioxide" OR "uranium hexafluoride" OR "uranium tetrafluoride" OR "uranium trioxide"</p> <p>"United Technologies" "Canoga" OR "Vanowen"plutonium OR Pu-238 OR Pu238 OR "Pu 238" OR 238Pu OR 238-Pu OR "238 Pu" OR Pu-239 OR Pu239 OR "Pu 239" OR 239Pu OR 239-Pu</p> <p>"United Technologies" "Canoga" OR "Vanowen""239 Pu" OR Pu-240 OR Pu240 OR "Pu 240" OR 240Pu OR 240-Pu OR "240 Pu" OR Pu-241 OR Pu241 OR "Pu 241" OR 241Pu OR 241-Pu OR "241 Pu"</p> <p>"United Technologies" "Canoga" OR "Vanowen"radium OR Ra-226 OR Ra226 OR "Ra 226" OR 226-Ra OR 226Ra OR "226 Ra" OR Ra-228 OR Ra228 OR "Ra 228" OR 228Ra OR 228-Ra OR "228 Ra" OR radon OR Rn-222 OR Rn222 OR "Rn 222" OR 222Rn OR 222-Rn</p> <p>"United Technologies" "Canoga" OR "Vanowen""222 Rn" OR thoron OR Rn-220 OR Rn220 OR "Rn 220" OR 220Rn OR 220-Rn OR "220 Rn" OR protactinium OR Pa-234m OR Pa234m OR "Pa 234m" OR 234mPa OR 234m-Pa OR "234m Pa"</p> <p>"United Technologies" "Canoga" OR "Vanowen"strontium OR Sr-90 OR Sr90 OR "Sr 90" OR 90-Sr OR 90Sr OR "90 Sr" OR oralloy OR postum OR tuballoy OR "uranyl nitrate hexahydrate" OR UNH OR K-65 OR "sump cake"</p> <p>"United Technologies" "Canoga" OR "Vanowen"accident OR "air count" OR "air dust" OR "air filter" OR "airborne test" OR alpha OR "belgian congo ore" OR beta OR bioassay OR bio-assay OR breath OR "breathing zone" OR BZ</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>"United Technologies" "Canoga" OR "Vanowen""body burden" OR calibration OR "chest count" OR columnation OR contamination OR curie OR denitration OR "denitration pot" OR derby OR regulus OR "derived air concentration" OR DAC OR dose OR dosimeter</p> <p>"United Technologies" "Canoga" OR "Vanowen"dosimetric OR dosimetry OR electron OR environment OR "Ether-Water Project" OR exposure OR "exposure investigation" OR "radiation exposure" OR external OR "F machine" OR fecal OR "feed material"</p> <p>"United Technologies" "Canoga" OR "Vanowen"femtpocurie OR film OR fission OR fluoroscopy OR "Formerly Utilized Sites Remedial Action Program" OR FUSRAP OR gamma-ray OR "gamma ray" OR "gas proportional" OR "gaseous diffusion" OR health</p> <p>"United Technologies" "Canoga" OR "Vanowen""health instrument" OR "health physics" OR H.I. OR HI OR HP OR "highly enriched uranium" OR HEU OR hydrofluorination OR "in vitro" OR "in vivo"</p> <p>"United Technologies" "Canoga" OR "Vanowen"incident OR ingestion OR inhalation OR internal OR investigation OR isotope OR isotopic OR "isotopic enrichment" OR "JS Project" OR Landauer OR "liquid scintillation"</p> <p>"United Technologies" "Canoga" OR "Vanowen"log OR "log sheet" OR "log book" OR "low enriched uranium" OR LEU OR "lung count" OR "maximum permissible concentration" OR MPC OR metallurgy OR microcurie OR millicurie</p> <p>"United Technologies" "Canoga" OR "Vanowen""mixed fission product" OR MFP OR monitor OR "air monitoring" OR nanocurie OR "nasal wipe" OR neutron OR "nose wipe" OR nuclear OR Chicago-Nuclear OR "nuclear fuels" OR "nuclear track emulsion type A"</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>"United Technologies" "Canoga" OR "Vanowen" NTA OR "occupational radiation exposure" OR occurrence OR "ore concentrate" OR "PC Project" OR permit OR "radiation work permit" OR "safe work permit" OR "special work permit" OR RWP OR SWP</p> <p>"United Technologies" "Canoga" OR "Vanowen" "phosphate research" OR photon OR picocurie OR pitchblende OR "pocket ion chamber" OR PIC OR problem OR procedure OR radeco OR radiation OR radioactive OR radioactivity OR radiograph OR radiological</p> <p>"United Technologies" "Canoga" OR "Vanowen" "Radiological Survey Data Sheet" OR RSDS OR radionuclide OR raffinate OR reactor OR respiratory OR "retention schedules" OR roentgen OR sample OR "air sample" OR "dust sample"</p> <p>"United Technologies" "Canoga" OR "Vanowen" "general area air sample" OR sampling OR "air sampling" OR "dust sampling" OR "general area air sampling" OR "solvent extraction" OR source OR "sealed source" OR spectra OR spectrograph</p> <p>"United Technologies" "Canoga" OR "Vanowen" spectroscopy OR spectrum OR standard OR operating OR processing OR survey OR "building survey" OR "routine survey" OR "special survey" OR "technical basis" OR "thermal diffusion"</p> <p>"United Technologies" "Canoga" OR "Vanowen" "thermoluminescent dosimeter" OR TLD OR "Tiger Team" OR "tolerance dose" OR urinalysis OR urine OR "whole body count" OR WBC OR "working level" OR WL OR X-ray OR "X ray" OR Xray</p> <p>neptunium OR Np237 OR Np-237 OR "Np 237" OR 237Np OR 237-Np OR "237 Np" OR palm OR palmolive OR polonium OR Po210 OR Po-210 OR "Po 210" OR 210Po OR 210-Po OR "210 Po" Downey OR De-Soto "North American Aviation"</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities

Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>thorium OR thoria OR Th232 OR Th-232 OR "Th 232" OR 232Th OR 232-Th OR "232 Th" OR "Z metal" OR Z-metal OR myrnalloy OR "chemical 10-66" OR "chemical 1066" OR "chemical 10 66" Downey OR De-Soto "North American Aviation"</p> <p>"chemical 18-12" OR "chemical 1812" OR "chemical 18 12" OR "chemical 10-12" OR "chemical 1012" OR "chemical 10 12" OR UX1 OR UX2 Downey OR De-Soto "North American Aviation"</p> <p>uranium OR U233 OR U-233 OR "U 233" OR 233U OR 233-U OR "233 U" OR U234 OR "U 234" OR U-234 OR 234U OR 234-U OR "234 U" OR U235 OR "U 235" OR U-235 OR 235-U OR 235U OR "235 U" Downey OR De-Soto "North American Aviation"</p> <p>U238 OR "U 238" OR U-238 OR 238-U OR 238U OR "238 U" OR U308 OR "U 308" OR U-308 OR 308-U OR 308U OR "308 U" Downey OR De-Soto "North American Aviation"</p> <p>"black oxide" OR "brown oxide" OR "green salt" OR "orange oxide" OR "yellow 5cake" Downey OR De-Soto "North American Aviation"</p> <p>UO2 OR UO3 OR UF4 OR UF6 OR C-216 OR C-616 OR C-65 OR C-211 OR U308 OR "uranium extraction" Downey OR De-Soto "North American Aviation"</p> <p>"uranium dioxide" OR "uranium hexafluoride" OR "uranium tetrafluoride" OR "uranium trioxide" Downey OR De-Soto "North American Aviation"</p> <p>plutonium OR Pu-238 OR Pu238 OR "Pu 238" OR 238Pu OR 238-Pu OR "238 Pu" OR Pu-239 OR Pu239 OR "Pu 239" OR 239Pu OR 239-Pu Downey OR De-Soto "North American Aviation"</p> <p>"239 Pu" OR Pu-240 OR Pu240 OR "Pu 240" OR 240Pu OR 240-Pu OR "240 Pu" OR Pu-241 OR Pu241 OR "Pu 241" OR 241Pu OR 241-Pu OR "241 Pu" Downey OR De-Soto "North American Aviation"</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>radium OR Ra-226 OR Ra226 OR "Ra 226" OR 226-Ra OR 226Ra OR "226 Ra" OR Ra-228 OR Ra228 OR "Ra 228" OR 228Ra Downey OR De-Soto "North American Aviation"</p> <p>228-Ra OR "228 Ra" OR radon OR Rn-222 OR Rn222 OR "Rn 222" OR 222Rn OR 222-Rn Downey OR De-Soto "North American Aviation"</p> <p>"222 Rn" OR thoron OR Rn-220 OR Rn220 OR "Rn 220" OR 220Rn OR 220-Rn OR "220 Rn" OR protactinium OR Pa-234m OR Pa234m OR "Pa 234m" OR 234mPa OR 234m-Pa OR "234m Pa" Downey OR De-Soto "North American Aviation"</p> <p>strontium OR Sr-90 OR Sr90 OR "Sr 90" OR 90-Sr OR 90Sr OR "90 Sr" OR oralloid OR postum OR tuballoy OR "uranyl nitrate hexahydrate" OR UNH OR K-65 OR "sump cake" Downey OR De-Soto "North American Aviation"</p> <p>accident OR "air count" OR "air dust" OR "air filter" OR "airborne test" OR alpha OR "belgian congo ore" OR beta OR bioassay OR bio-assay OR breath OR "breathing zone" OR BZ Downey OR De-Soto "North American Aviation"</p> <p>"body burden" OR calibration OR "chest count" OR columnation OR contamination OR curie OR denitration OR "denitration pot" Downey OR De-Soto "North American Aviation"</p> <p>derby OR regulus OR "derived air concentration" OR DAC OR dose OR dosimeter Downey OR De-Soto "North American Aviation"</p> <p>dosimetric OR dosimetry OR electron OR environment OR "Ether-Water Project" OR exposure OR "exposure investigation" Downey OR De-Soto "North American Aviation"</p> <p>"radiation exposure" OR external OR "F machine" OR fecal OR "feed material" Downey OR De-Soto "North American Aviation"</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	femptocurie OR film OR fission OR fluoroscopy OR "Formerly Utilized Sites Remedial Action Program" OR FUSRAP Downey OR De-Soto "North American Aviation" gamma-ray OR "gamma ray" OR "gas proportional" OR "gaseous diffusion" OR health Downey OR De-Soto "North American Aviation" "health instrument" OR "health physics" OR H.I. OR HI OR HP OR "highly enriched uranium" OR HEU OR hydrofluorination OR "in vitro" OR "in vivo" Downey OR De-Soto "North American Aviation" incident OR ingestion OR inhalation OR internal OR investigation OR isotope OR isotopic OR "isotopic enrichment" OR "JS Project" OR Landauer OR "liquid scintillation" Downey OR De-Soto "North American Aviation" log OR "log sheet" OR "log book" OR "low enriched uranium" OR LEU OR "lung count" OR "maximum permissible concentration" OR MPC OR metallurgy OR microcurie OR millicurie Downey OR De-Soto "North American Aviation" "mixed fission product" OR MFP OR monitor OR "air monitoring" OR nanocurie OR "nasal wipe" OR neutron OR "nose wipe" Downey OR De-Soto "North American Aviation" nuclear OR Chicago-Nuclear OR "nuclear fuels" OR "nuclear track emulsion type A" Downey OR De-Soto "North American Aviation" NTA OR "occupational radiation exposure" OR occurrence OR "ore concentrate" OR "PC Project" OR permit OR "radiation work permit" Downey OR De-Soto "North American Aviation" "safe work permit" OR "special work permit" OR RWP OR SWP Downey OR De-Soto "North American Aviation"		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>"phosphate research" OR photon OR picocurie OR pitchblende OR "pocket ion chamber" OR PIC OR problem OR procedure Downey OR De-Soto "North American Aviation"</p> <p>radeco OR radiation OR radioactive OR radioactivity OR radiograph OR radiological Downey OR De-Soto "North American Aviation"</p> <p>"Radiological Survey Data Sheet" OR RSDS OR radionuclide OR raffinate OR reactor OR respiratory OR "retention schedules" OR roentgen OR sample OR "air sample" OR "dust sample" Downey OR De-Soto "North American Aviation"</p> <p>"general area air sample" OR sampling OR "air sampling" OR "dust sampling" OR "general area air sampling" OR "solvent extraction" OR source OR "sealed source" OR spectra Downey OR De-Soto "North American Aviation"</p> <p>spectrograph OR spectroscopy OR spectrum OR standard OR operating OR processing OR survey OR "building survey" OR "routine survey" OR "special survey" OR "technical basis" Downey OR De-Soto "North American Aviation"</p> <p>"thermal diffusion" OR "thermoluminescent dosimeter" OR TLD OR "Tiger Team" OR "tolerance dose" OR urinalysis OR urine Downey OR De-Soto "North American Aviation"</p> <p>"whole body count" OR WBC OR "working level" OR WL OR X-ray OR "X ray" OR Xray Downey OR De-Soto "North American Aviation"</p> <p>americium OR Am241 OR Am-241 OR "Am 241" OR "241Am" OR 241-Am OR "241 Am" OR ionium OR Th230 OR Th-230 OR "Th 230" OR 230Th OR 230-Th OR "230 Th" Downey OR De-Soto "Rocketdyne"</p> <p>"chemical 18-12" OR "chemical 1812" OR "chemical 18 12" OR "chemical 10-12" OR "chemical 1012" OR "chemical 10 12" OR UX1 OR UX2 Downey OR De-Soto "Rocketdyne"</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>Th-234 OR Th234 OR "Th 234" OR 234-Th OR 234Th OR "234 Th" OR tritium OR H3 OR H-3 OR mint OR HTO Downey OR De-Soto "Rocketdyne"</p> <p>uranium OR U233 OR U-233 OR "U 233" OR 233U OR 233-U OR "233 U" OR U234 OR "U 234" OR U-234 OR 234U OR 234-U OR "234 U" OR U235 OR "U 235" OR U-235 OR 235-U OR 235U OR "235 U" Downey OR De-Soto "Rocketdyne"</p> <p>U238 OR "U 238" OR U-238 OR 238-U OR 238U OR "238 U" OR U308 OR "U 308" OR U-308 OR 308-U OR 308U OR "308 U" Downey OR De-Soto "Rocketdyne"</p> <p>"black oxide" OR "brown oxide" OR "green salt" OR "orange oxide" OR "yellow 5cake" Downey OR De-Soto "Rocketdyne"</p> <p>UO2 OR UO3 OR UF4 OR UF6 OR C-216 OR C-616 OR C-65 OR C-211 OR U3O8 OR "uranium extraction" Downey OR De-Soto "Rocketdyne"</p> <p>"uranium dioxide" OR "uranium hexafluoride" OR "uranium tetrafluoride" OR "uranium trioxide" Downey OR De-Soto "Rocketdyne"</p> <p>plutonium OR Pu-238 OR Pu238 OR "Pu 238" OR 238Pu OR 238-Pu OR "238 Pu" OR Pu-239 OR Pu239 OR "Pu 239" OR 239Pu OR 239-Pu Downey OR De-Soto "Rocketdyne"</p> <p>"239 Pu" OR Pu-240 OR Pu240 OR "Pu 240" OR 240Pu OR 240-Pu OR "240 Pu" OR Pu-241 OR Pu241 OR "Pu 241" OR 241Pu OR 241-Pu OR "241 Pu" Downey OR De-Soto "Rocketdyne"</p> <p>radium OR Ra-226 OR Ra226 OR "Ra 226" OR 226-Ra OR 226Ra OR "226 Ra" OR Ra-228 OR Ra228 OR "Ra 228" OR 228Ra Downey OR De-Soto "Rocketdyne"</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>228-Ra OR "228 Ra" OR radon OR Rn-222 OR Rn222 OR "Rn 222" OR 222Rn OR 222-Rn Downey OR De-Soto "Rocketdyne"</p> <p>"222 Rn" OR thoron OR Rn-220 OR Rn220 OR "Rn 220" OR 220Rn OR 220-Rn OR "220 Rn" OR protactinium OR Pa-234m OR Pa234m OR "Pa 234m" OR 234mPa OR 234m-Pa OR "234m Pa" Downey OR De-Soto "Rocketdyne"</p> <p>strontium OR Sr-90 OR Sr90 OR "Sr 90" OR 90-Sr OR 90Sr OR "90 Sr" OR oralloy OR postum OR tuballoy OR "uranyl nitrate hexahydrate" OR UNH OR K-65 OR "sump cake" Downey OR De-Soto "Rocketdyne"</p> <p>"body burden" OR calibration OR "chest count" OR columnation OR contamination OR curie OR denitration OR "denitration pot" Downey OR De-Soto "Rocketdyne"</p> <p>derby OR regulus OR "derived air concentration" OR DAC OR dose OR dosimeter Downey OR De-Soto "Rocketdyne"</p> <p>dosimetric OR dosimetry OR electron OR environment OR "Ether-Water Project" OR exposure OR "exposure investigation" Downey OR De-Soto "Rocketdyne"</p> <p>"radiation exposure" OR external OR "F machine" OR fecal OR "feed material" Downey OR De-Soto "Rocketdyne"</p> <p>femtocurie OR film OR fission OR fluoroscopy OR "Formerly Utilized Sites Remedial Action Program" OR FUSRAP Downey OR De-Soto "Rocketdyne"</p> <p>gamma-ray OR "gamma ray" OR "gas proportional" OR "gaseous diffusion" OR health Downey OR De-Soto "Rocketdyne"</p> <p>"health instrument" OR "health physics" OR H.I. OR HI OR HP OR "highly enriched uranium" OR HEU OR hydrofluorination OR "in vitro" OR "in vivo" Downey OR De-Soto "Rocketdyne"</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities

Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>incident OR ingestion OR inhalation OR internal OR investigation OR isotope OR isotopic OR "isotopic enrichment" OR "JS Project" OR Landauer OR "liquid scintillation" Downey OR De-Soto "Rocketdyne"</p> <p>log OR "log sheet" OR "log book" OR "low enriched uranium" OR LEU OR "lung count" OR "maximum permissible concentration" OR MPC OR metallurgy OR microcurie OR millicurie Downey OR De-Soto "Rocketdyne"</p> <p>"mixed fission product" OR MFP OR monitor OR "air monitoring" OR nanocurie OR "nasal wipe" OR neutron OR "nose wipe" Downey OR De-Soto "Rocketdyne"</p> <p>nuclear OR Chicago-Nuclear OR "nuclear fuels" OR "nuclear track emulsion type A" Downey OR De-Soto "Rocketdyne"</p> <p>NTA OR "occupational radiation exposure" OR occurrence OR "ore concentrate" OR "PC Project" OR permit OR "radiation work permit" Downey OR De-Soto "Rocketdyne"</p> <p>"safe work permit" OR "special work permit" OR RWP OR SWP Downey OR De-Soto "Rocketdyne"</p> <p>"phosphate research" OR photon OR picocurie OR pitchblende OR "pocket ion chamber" OR PIC OR problem OR procedure Downey OR De-Soto "Rocketdyne"</p> <p>radeco OR radiation OR radioactive OR radioactivity OR radiograph OR radiological Downey OR De-Soto "Rocketdyne"</p> <p>"Radiological Survey Data Sheet" OR RSDS OR radionuclide OR raffinate OR reactor OR respiratory OR "retention schedules" OR roentgen OR sample OR "air sample" OR "dust sample" Downey OR De-Soto "Rocketdyne"</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>"general area air sample" OR sampling OR "air sampling" OR "dust sampling" OR "general area air sampling" OR "solvent extraction" OR source OR "sealed source" OR spectra Downey OR De-Soto "Rocketdyne"</p> <p>spectrograph OR spectroscopy OR spectrum OR standard OR operating OR processing OR survey OR "building survey" OR "routine survey" OR "special survey" OR "technical basis" Downey OR De-Soto "Rocketdyne"</p> <p>"thermal diffusion" OR "thermoluminescent dosimeter" OR TLD OR "Tiger Team" OR "tolerance dose" OR urinalysis OR urine Downey OR De-Soto "Rocketdyne"</p> <p>"whole body count" OR WBC OR "working level" OR WL OR X-ray OR "X ray" OR Xray Downey OR De-Soto "Rocketdyne"</p> <p>americium OR Am241 OR Am-241 OR "Am 241" OR "241Am" OR 241-Am OR "241 Am" OR ionium OR Th230 OR Th-230 OR "Th 230" OR 230Th OR 230-Th OR "230 Th" Downey OR De-Soto "Atomics International"</p> <p>"chemical 18-12" OR "chemical 1812" OR "chemical 18 12" OR "chemical 10-12" OR "chemical 1012" OR "chemical 10 12" OR UX1 OR UX2 Downey OR De-Soto "Atomics International"</p> <p>Th-234 OR Th234 OR "Th 234" OR 234-Th OR 234Th OR "234 Th" OR tritium OR H3 OR H-3 OR mint OR HTO Downey OR De-Soto "Atomics International"</p> <p>uranium OR U233 OR U-233 OR "U 233" OR 233U OR 233-U OR "233 U" OR U234 OR "U 234" OR U-234 OR 234U OR 234-U OR "234 U" OR U235 OR "U 235" OR U-235 OR 235-U OR 235U OR "235 U" Downey OR De-Soto "Atomics International"</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>U238 OR "U 238" OR U-238 OR 238-U OR 238U OR "238 U" OR U308 OR "U 308" OR U-308 OR 308-U OR 308U OR "308 U" Downey OR De-Soto "Atoms International"</p> <p>"black oxide" OR "brown oxide" OR "green salt" OR "orange oxide" OR "yellow 5cake" Downey OR De-Soto "Atoms International"</p> <p>UO2 OR UO3 OR UF4 OR UF6 OR C-216 OR C-616 OR C-65 OR C-211 OR U3O8 OR "uranium extraction" Downey OR De-Soto "Atoms International"</p> <p>"uranium dioxide" OR "uranium hexafluoride" OR "uranium tetrafluoride" OR "uranium trioxide" Downey OR De-Soto "Atoms International"</p> <p>plutonium OR Pu-238 OR Pu238 OR "Pu 238" OR 238Pu OR 238-Pu OR "238 Pu" OR Pu-239 OR Pu239 OR "Pu 239" OR 239Pu OR 239-Pu Downey OR De-Soto "Atoms International"</p> <p>"239 Pu" OR Pu-240 OR Pu240 OR "Pu 240" OR 240Pu OR 240-Pu OR "240 Pu" OR Pu-241 OR Pu241 OR "Pu 241" OR 241Pu OR 241-Pu OR "241 Pu" Downey OR De-Soto "Atoms International"</p> <p>radium OR Ra-226 OR Ra226 OR "Ra 226" OR 226-Ra OR 226Ra OR "226 Ra" OR Ra-228 OR Ra228 OR "Ra 228" OR 228Ra Downey OR De-Soto "Atoms International"</p> <p>228-Ra OR "228 Ra" OR radon OR Rn-222 OR Rn222 OR "Rn 222" OR 222Rn OR 222-Rn Downey OR De-Soto "Atoms International"</p> <p>"222 Rn" OR thoron OR Rn-220 OR Rn220 OR "Rn 220" OR 220Rn OR 220-Rn OR "220 Rn" OR protactinium OR Pa-234m OR Pa234m OR "Pa 234m" OR 234mPa OR 234m-Pa OR "234m Pa" Downey OR De-Soto "Atoms International"</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>strontium OR Sr-90 OR Sr90 OR "Sr 90" OR 90-Sr OR 90Sr OR "90 Sr" OR oralloy OR postum OR tuballoy OR "uranyl nitrate hexahydrate" OR UNH OR K-65 OR "sump cake" Downey OR De-Soto "Atomics International"</p> <p>accident OR "air count" OR "air dust" OR "air filter" OR "airborne test" OR alpha OR "belgian congo ore" OR beta OR bioassay OR bio-assay OR breath OR "breathing zone" OR BZ Downey OR De-Soto "Atomics International"</p> <p>"body burden" OR calibration OR "chest count" OR columnation OR contamination OR curie OR denitration OR "denitration pot" Downey OR De-Soto "Atomics International"</p> <p>derby OR regulus OR "derived air concentration" OR DAC OR dose OR dosimeter Downey OR De-Soto "Atomics International"</p> <p>dosimetric OR dosimetry OR electron OR environment OR "Ether-Water Project" OR exposure OR "exposure investigation" Downey OR De-Soto "Atomics International"</p> <p>"radiation exposure" OR external OR "F machine" OR fecal OR "feed material" Downey OR De-Soto "Atomics International"</p> <p>femtocurie OR film OR fission OR fluoroscopy OR "Formerly Utilized Sites Remedial Action Program" OR FUSRAP Downey OR De-Soto "Atomics International"</p> <p>gamma-ray OR "gamma ray" OR "gas proportional" OR "gaseous diffusion" OR health Downey OR De-Soto "Atomics International"</p> <p>"health instrument" OR "health physics" OR H.I. OR HI OR HP OR "highly enriched uranium" OR HEU OR hydrofluorination OR "in vitro" OR "in vivo" Downey OR De-Soto "Atomics International"</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
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Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>accident OR "air count" OR "air dust" OR "air filter" OR "airborne test" OR alpha OR "belgian congo ore" OR beta OR bioassay OR bio-assay OR breath OR "breathing zone" OR BZ Downey OR De-Soto "Boeing"</p> <p>"body burden" OR calibration OR "chest count" OR columnation OR contamination OR curie OR denitration OR "denitration pot" Downey OR De-Soto "Boeing"</p> <p>derby OR regulus OR "derived air concentration" OR DAC OR dose OR dosimeter Downey OR De-Soto "Boeing"</p> <p>dosimetric OR dosimetry OR electron OR environment OR "Ether-Water Project" OR exposure OR "exposure investigation" Downey OR De-Soto "Boeing"</p> <p>"radiation exposure" OR external OR "F machine" OR fecal OR "feed material" Downey OR De-Soto "Boeing"</p> <p>femptocurie OR film OR fission OR fluoroscopy OR "Formerly Utilized Sites Remedial Action Program" OR FUSRAP Downey OR De-Soto "Boeing"</p> <p>gamma-ray OR "gamma ray" OR "gas proportional" OR "gaseous diffusion" OR health Downey OR De-Soto "Boeing"</p> <p>"health instrument" OR "health physics" OR H.I. OR HI OR HP OR "highly enriched uranium" OR HEU OR hydrofluorination OR "in vitro" OR "in vivo" Downey OR De-Soto "Boeing"</p> <p>incident OR ingestion OR inhalation OR internal OR investigation OR isotope OR isotopic OR "isotopic enrichment" OR "JS Project" OR Landauer OR "liquid scintillation" Downey OR De-Soto "Boeing"</p> <p>log OR "log sheet" OR "log book" OR "low enriched uranium" OR LEU OR "lung count" OR "maximum permissible concentration" OR MPC OR metallurgy OR microcurie OR millicurie Downey OR De-Soto "Boeing"</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	<p>"mixed fission product" OR MFP OR monitor OR "air monitoring" OR nanocurie OR "nasal wipe" OR neutron OR "nose wipe" Downey OR De-Soto "Boeing"</p> <p>nuclear OR Chicago-Nuclear OR "nuclear fuels" OR "nuclear track emulsion type A" Downey OR De-Soto "Boeing"</p> <p>NTA OR "occupational radiation exposure" OR occurrence OR "ore concentrate" OR "PC Project" OR permit OR "radiation work permit" Downey OR De-Soto "Boeing"</p> <p>"safe work permit" OR "special work permit" OR RWP OR SWP Downey OR De-Soto "Boeing"</p> <p>"phosphate research" OR photon OR picocurie OR pitchblende OR "pocket ion chamber" OR PIC OR problem OR procedure Downey OR De-Soto "Boeing"</p> <p>radeco OR radiation OR radioactive OR radioactivity OR radiograph OR radiological Downey OR De-Soto "Boeing"</p> <p>"Radiological Survey Data Sheet" OR RSDS OR radionuclide OR raffinate OR reactor OR respiratory OR "retention schedules" OR roentgen OR sample OR "air sample" OR "dust sample" Downey OR De-Soto "Boeing"</p> <p>"general area air sample" OR sampling OR "air sampling" OR "dust sampling" OR "general area air sampling" OR "solvent extraction" OR source OR "sealed source" OR spectra Downey OR De-Soto "Boeing"</p> <p>spectrograph OR spectroscopy OR spectrum OR standard OR operating OR processing OR survey OR "building survey" OR "routine survey" OR "special survey" OR "technical basis" Downey OR De-Soto "Boeing"</p>		

Table A1-2: Database Searches for Canoga Ave., De Soto Ave., and Downey Facilities			
Database/Source	Keywords / Phrases	Hits	Uploaded
	"thermal diffusion" OR "thermoluminescent dosimeter" OR TLD OR "Tiger Team" OR "tolerance dose" OR urinalysis OR urine Downey OR De-Soto "Boeing" "whole body count" OR WBC OR "working level" OR WL OR X-ray OR "X ray" OR Xray Downey OR De-Soto "Boeing"		
National Academies Press http://www.nap.edu/ COMPLETED 11/10/2009	Downey California De Soto California "North American Aviation" Rocketdyne "Atomics International" "North American Rockwell" "Rockwell International" "United Technologies"	1,083	0
NNSA - Nevada Site Office www.nv.doe.gov/main/search.htm COMPLETED 11/10/2009	"North American Aviation" Rocketdyne "Atomics International" "North American Rockwell" "Rockwell International" "United Technologies" Downey or "De Soto"	0	0
NRC ADAMS Reading Room http://www.nrc.gov/reading-rm/adams/web-based.html COMPLETED 11/14/2009	"Atomics International" "North American Aviation" "Rocketdyne" "North American Rockwell" "Rockwell International" "United Technologies" Downey or "De Soto" (Advanced Search Boolean)	2,075	23
U.S. Transuranium & Uranium Registries http://www.ustur.wsu.edu/ COMPLETED 11/10/2009	"North American Aviation" Rocketdyne "Rockwell International" "United Technologies" "Atomics International" "North American Rockwell" Downey De Soto	4	1

Table A1-3: OSTI Documents Requested for Canoga Ave., De Soto Ave., and Downey Facilities			
Document Number	Document Title	Requested	Received
DOC Number: NA OSTI ID: NA Ref ID: 73068	The Effects Of Internal Radiation Exposure On Cancer Mortality In Nuclear Workers At Rocketdyne/Atomics International. Author(S): Ritz, B., Morgenstern, H., Crawford-Brown, D., Young, B. B. Journal Date: 2001 Journal Name: Environmental Health Perspectives Journal Volume: 108:743-751 BFSID: 1481	09/03/2009	09/03/2009
DOC Number: TID-26442 OSTI ID: 4442347 Ref ID: 73065	Environmental Monitoring. Annual Report, 1972 Creator/Author Moore, J.D. Publication Date 1972 Jan 01	09/03/2009	09/03/2009
DOC Number: AI-77-14 OSTI ID: 7294807 Ref ID: 73073	Atomics International Environmental Monitoring And Facility Effluent Annual Report, 1976 Creator/Author Moore, J.D. Publication Date 1977 Jan 01	09/03/2009	09/03/2009
DOC Number: TID-13863 OSTI ID: 4840693 Ref ID: 73070	Environmental Monitoring Report, January 1, 1961-March 31, 1961 Publication Date 1961 Oct 31	09/03/2009	09/03/2009
DOC Number: NA OSTI ID: NA Ref ID: 73078	Health Bulletin: Mortality Study Of Rocketdyne/Atomics International Workers BFSID: 3522	09/03/2009	09/03/2009
DOC Number: NAA-SR-3989 OSTI ID: 4203423 Ref ID: 73052	Gamma-Ray And Fast Neutron Annular Streaming Evaluation Through Sodium Reactor Experiment (Sre)-Mark Ii Control And Safety Rod Assemblies Creator/Author Anderson, F.D. Publication Date 1959 Oct 15	09/03/2009	09/03/2009
DOC Number: NAA-SR-3990 OSTI ID: 4233098 Ref ID: 73054	Sodium Reactor Experiment (Sre) Shielding Evaluation For Thermal Neutron Streaming At Reactor Vessel Coolant Pipe Penetrations Creator/Author Anderson, F.D. Publication Date 1959 Oct 31	09/03/2009	09/03/2009
DOC Number: NAA-SR-1536 OSTI ID: 358658 Ref ID: 73063	Fast Neutron Monitoring With Nta Film Packets Creator/Author Hart, R.S.; Hale, J.P. Jr. Publication Date 1956 Jul 15	09/03/2009	09/03/2009

Table A1-4: Cincinnati Public Library Documents Ordered for Canoga Ave., De Soto Ave., and Downey Facilities			
Document Number	Document Title	Requested	Received
DOC Number: NA OSTI ID: 4748756 Ref ID: 75053	Atomics International's L-88 Nuclear Reactor For Neutron Radiography. Creator/Author Henrie, J.O. Journal Name: Isotopes And Radiation Technology Vol 9: No. 1, 41-4(Fall 1971)	09/10/2009	10/28/2009
DOC Number: A/CONF.15/P/1780 OSTI ID: 4322507 Ref ID: 75059	Methods And Equipment For Low Decontamination Processing Of Metallic Nuclear Fuels Creator/Author Brand, G.E. ; Sinizer, D.I. ; Murbach, E.W. ; Hansen, W.N. ; Foltz, J.R. ; Mattern, K.L. Publication Date 1958 Oct 31	09/10/2009	10/06/2009
DOC Number: NA OSTI ID: 030059777 Ref ID: 73543	The Radiolysis Of Deuterated Biphenyls: Mechanism Of Hydrogen Formation, Journal Of Physical Chemistry, October 1960, Vol. 64(10):1367-1374	09/24/2009	09/30/2009
DOC Number: A/CONF.15/P/785 OSTI ID: 4306907 Ref ID: 75060	Thorium-Uranium Fuel Elements For Sre Creator/Author Hayward, B.R. & Corzine, P. Publication Date 1958 Oct 31 Prepared For The Second U.N. International Conference On The Peaceful Uses Of Atomic Energy, 1958	09/10/2009	09/30/2009
DOC Number: NA OSTI ID: NA Ref ID: 75057	Effects Of Radiation And Chemical Exposures On Cancer Mortality Among Rocketdyne Workers: A Review Of Three Cohort Studies. Author(S): Morgenstern, H., Ritz, B. Journal Name: Occupational Medicine: State Of The Art Reviews Journal Volume: 16(2):219-237 Bfsid: 1490 Dated 2001	09/10/2009	09/30/2009
DOC Number: NA OSTI ID: 4000032 Ref ID: 73111	Prepare Thorium-Aluminum Alloys... By Direct Reduction Creator/Author Raleigh, D.O. Publication Date 1961 Jun 01 Journal Name: Industrial And Engineering Chemistry Vol: 53(6):445-448	09/14/2009	09/15/2009
DOC Number: NA OSTI ID: 4211191 Ref ID: 73098	Low-Decontamination-Processing Of Uranium Dioxide By Oxidation And Reduction Creator/Author Strausberg, S. ; Luebben, T.E. ; Rosen, F.D. ; Guon, J. ; Murbach, E.W. Publication Date 1960 Jan 01 Journal Name: Industrial And Engineering Chemistry Vol: 52(1):45-46	09/14/2009	09/15/2009
DOC Number: NA OSTI ID: 4275332 Ref ID: 73084	A Portable Calibrator For Beta/-Gamma Survey Instruments Using Sr90 Creator/Author Nelson, C.T. Publication Date 1959 Mar 01 Health Physics Journal Vol 1 Pp 447-448??	09/11/2009	09/11/2009
DOC Number: NA OSTI ID: 4811731 Ref ID: 73090	Sea Water Monitoring Following Radioactive Waste Disposal Operations Creator/Author Alexander, R.E. Publication Date 1961 Dec 01 Health Physics Journal Vol: 7: Nos. 1 And 2, Pp 106-113	09/11/2009	09/11/2009
DOC Number: NA OSTI ID: 4059901 Ref ID: 73096	Disposal Of Omr High Boiler Fractions By Burning Creator/Author Stiens, R.P. Publication Date 1961 Jun 01 Journal Name: Trans. Am. Nuclear Soc.Vol: 4: No. 1 Pp 41-42;	09/11/2009	09/11/2009

Table A1-4: Cincinnati Public Library Documents Ordered for Canoga Ave., De Soto Ave., and Downey Facilities

Document Number	Document Title	Requested	Received
DOC Number: NA OSTI ID: 4089327 Ref ID: 73093	Beta-Gamma Delayed Coincidence Method For U-238 Activation Analysis Creator/Author Beller, L.S. Publication Date 1961 Jun 01 Journal Name: Trans. Am. Nuclear Soc.; Journal Volume: Vol: 4: No. 1 Pp 28-29	09/11/2009	09/11/2009
DOC Number: NA OSTI ID: 4293816 Ref ID: 73118	Pyroprocessing Thorium Fuels Creator/Author Murbach, E.W. ; Hansen, W.N. Publication Date 1959 Feb 01 Journal Name: Industrial And Engineering Chemistry Journal Volume: Vol: 51(2):177-178	09/11/2009	09/11/2009
DOC Number: NA OSTI ID: 4308032 Ref ID: 73120	Special Safety Devices Creator/Author Huston, N.E.; Miller, N.C. Publication Date 1958 May 01 Other Number(S) Nucleonics Vol 16(5):86-87 Dated May 1958	09/10/2009	09/10/2009
DOC Number: NA OSTI ID: 4280405 Ref ID: 73115	Processing Re-fabrication Of Metallic-Uranium Fuel Creator/Author Sinizer, D.I.; Mattern, K.L.; Foltz, J.R.; Kendall, E.G. Publication Date 1959 Jan 01 Nucleonics Vol 17(1):50-53 Jan 1959	09/10/2009	09/10/2009
DOC Number: NA OSTI ID: 4325061 Ref ID: 73103	Plutonium Recycling With Molten Uf4 Creator/Author Buyers, A.G. Publication Date 1957 Nov 01 Nucleonics Vol 15(11):100-103 Nov 1957	09/10/2009	09/10/2009