Special Exposure Cohort (SEC) Petition
Santa Susana Field Laboratory (SSFL)
Areas I, II, III & IV
1955 - Present

Supplemental Information

Rec'd
8/9/2016
@ ABRWH
meeting

For Review by:
National Institute for Occupational Safety and Health (NIOSH)
Presidential Advisory Board on Radiation and Worker Health (ABRWH)

Presented to NIOSH / ABRWH at the Idaho Falls, ID ABRWH Meeting, August 9, 2016

Special Exposure Cohort Petition
under the Energy Employees Occupational Illness Compensation Program Act

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

OMB Number: 0920-0639 Expires: 07/31/2016

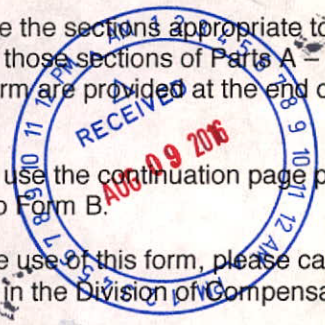
Special Exposure Cohort Petition — Form B

Use of this form is voluntary. Failure to use this form will not result in the denial of any right, benefit, or privilege to which you may be entitled.

General Instructions on Completing this Form *(complete instructions are available in a separate packet)*:

Except for signatures, please **PRINT** all information clearly and neatly on the form.

Please read each of Parts A – G in this form and complete the sections appropriate to you. If there is more than one petitioner, then each petitioner should complete those sections of Parts A – C of the form that apply to them. Additional copies of the first two pages of this form are provided at the end of the form for this purpose. A maximum of three petitioners is allowed.



If you need more space to provide additional information, use the continuation page provided at the end of the form and attach the completed continuation page(s) to Form B.

For Further Information: If you have questions about the use of this form, please call the following NIOSH toll-free phone number and request to speak to someone in the Division of Compensation Analysis and Support about an SEC petition: 1-877-222-8570.

If you are:	☐ A Labor Organization,	Start at D
	☐ An Energy Employee (current or former),	Start at C
	☐ A Survivor (of a former Energy Employee),	Start at B
	☐ A Representative (of a current or former Energy Employee);	Start at A

A. Representative Information — Complete Part A if you are authorized by an Energy Employee or Survivor(s) to petition on behalf of a class.

A.1 **Are you a contact person for an organization?** ☐ Yes (Go to A.2) ☐ No (Go to A.3)

A.2 **Organization Information:**

_____
Name of Organization

_____
Position of Contact Person

A.3 **Name of Petition Representative:**

_____
Mr./Mrs./Ms. First Name Middle Initial Last Name

A.4 **Address of Petition Representative:**

_____
Street Apt # P.O. Box

_____
City State Zip Code

A.5 **Telephone Number of Petition Representative:** (_____)_____

A.6 **Email Address of Petition Representative:** _____

A.7 ☐ Check the box at left to indicate you have attached to the back of this form written authorization to petition by the survivor(s) or energy employee(s) indicated in Parts B or C of this form.

If you are representing a Survivor, go to Part B;
if you are representing an Energy Employee, go to Part C.

B. Survivor Information — Complete Part D if you are a Survivor or representing a Survivor.

B.1 **Name of Survivor:**

First Name Middle Initial Last Name

B.2 **Address of Survivor:**

Street Apt # P.O. Box

City State Zip Code

B.3 **Telephone Number of Survivor:** (_____)_____

B.4 **Email Address of Survivor:** _____

B.5 **Relationship to Energy Employee:**

Go to Part C.

C. Energy Employee Information — Complete Part C UNLESS you are a labor organization.

C.1 **Name of Energy Employee:**

First Name Middle Initial Last Name

C.2 **Former Name of Energy Employee** (e.g., maiden name/legal name change/other):

Mr./Mrs./Ms. First Name Middle Initial Last Name

C.3 **Address of Energy Employee** (if living):

Street Apt # P.O. Box

City State Zip Code

C.4 **Telephone Number of Energy Employee:** (_____)_____

C.5 **Email Address of Energy Employee:** _____

C.6 **Employment Information Related to Petition:**

C.6a Energy Employee Number (if known): _____

C.6b Dates of Employment: Start 1964 End 1969

C.6c Employer Name: NORTH AMERICAN AVIATION

C.6d Work Site Location: SANTA SUSANA FIELD LABORATORY
AREA I / AREA II / AREA III / AREA IV

C.6e Supervisor's Name: UNKNOWN

Go to Part E.

D. Labor Organization Information — Complete Part D ONLY if you are a labor organization.

D.1 **Labor Organization Information:**

Name of Organization

Position of Contact Person

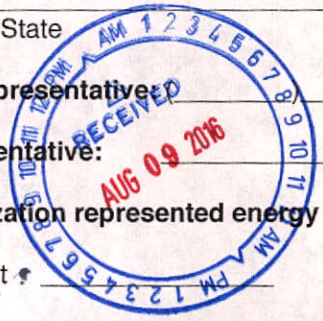
D.2 **Name of Petition Representative:**

Mr./Mrs./Ms. First Name Middle Initial Last Name

D.3 **Address of Petition Representative:**

Street Apt # P.O. Box

City State Zip Code



D.4 **Telephone Number of Petition Representative:**

D.5 **Email Address of Petition Representative:**

D.6 **Period during which labor organization represented energy employees covered by this petition** (please attach documentation):

Start End

D.7 **Identity of other labor organizations that may represent or have represented this class of energy employees** (if known)**:**

Go to Part E.

E. Proposed Definition of Energy Employee Class Covered by Petition — Complete Part E.

E.1 **Name of DOE or AWE Facility:** Santa Susana Field Laboratory (SSFL)

E.2. **Locations at the Facility relevant to this petition:**

E.3 **List job titles and/or job duties of energy employees included in the class. In addition, you can list by name any individuals other than petitioners identified on this form who you believe should be included in this class:**

E.4 **Employment Dates relevant to this petition:**

Start 1964 End Present

Start 1955 End Present

Start _____ End _____

E.5 **Is the petition based on one or more unmonitored, unrecorded, or inadequately monitored or recorded exposure incidents?:**

If yes, provide the date(s) of the incident(s) and a complete description (attach additional pages as necessary):

F. Basis for Proposing that Records and Information are Inadequate for Individual Dose Reconstruction — Complete Part F.

Complete **at least one** of the following entries in this section by checking the appropriate box and providing the required information related to the selection. You are not required to complete more than one entry.

F.1 I/We have attached either documents or statements provided by affidavit that indicate that radiation exposures and radiation doses potentially incurred by members of the proposed class, that relate to this petition, were not monitored, either through personal monitoring or through area monitoring.

(Attach documents and/or affidavits to the back of the petition form.)

Describe as completely as possible, to the extent it might be unclear, how the attached documentation and/or affidavit(s) indicate that potential radiation exposures were not monitored.

F.2 I/ We have attached either documents or statements provided by affidavit that indicate that radiation monitoring records for members of the proposed class have been lost, falsified, or destroyed; or that there is no information regarding monitoring, source, source term, or process from the site where the energy employees worked.

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(Attach documents and/or affidavits to the back of the petition form.)

Describe as completely as possible, to the extent it might be unclear, how the attached documentation and/or affidavit(s) indicate that radiation monitoring records for members of the proposed class have been lost, altered illegally, or destroyed.

Part F is continued on the following page.

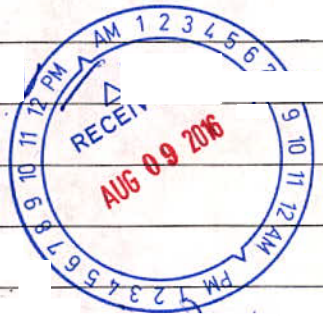
Special Exposure Cohort Petition
under the Energy Employees Occupational Illness Compensation Program Act

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

Special Exposure Cohort Petition — Form B

OMB Number: 0920-0639 Expires: 07/31/2016
Appendix — Continuation Page

Continuation Page — Photocopy and complete as necessary.



Attach to Form B if necessary.

F.3 I/We have attached a report from a health physicist or other individual with expertise in radiation dose reconstruction documenting the limitations of existing DOE or AWE records on radiation exposures at the facility, as relevant to the petition. The report specifies the basis for believing these documented limitations might prevent the completion of dose reconstructions for members of the class under 42 CFR Part 82 and related NIOSH technical implementation guidelines.

(Attach report to the back of the petition form.)

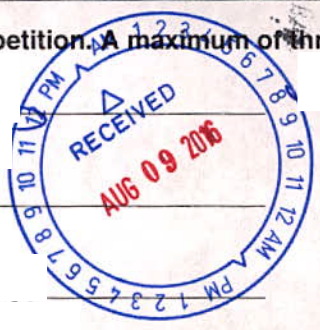
F.4 I/We have attached a scientific or technical report, issued by a government agency of the Executive Branch of Government or the General Accounting Office, the Nuclear Regulatory Commission, or the Defense Nuclear Facilities Safety Board, or published in a peer-reviewed journal, that identifies dosimetry and related information that are unavailable (due to either a lack of monitoring or the destruction or loss of records) for estimating the radiation doses of energy employees covered by the petition.

(Attach report to the back of the petition form.)

Go to Part G.

G. Signature of Person(s) Submitting this Petition — Complete Part G.

All Petitioners should sign and date the petition. A maximum of three persons may sign the petition.



Signature _____ Date _____

Signature _____ Date _____

Signature _____ Date _____

Notice: Any person who knowingly makes any false statement, misrepresentation, concealment of fact or any other act of fraud to obtain compensation as provided under EEOICPA or who knowingly accepts compensation to which that person is not entitled is subject to civil or administrative remedies as well as felony criminal prosecution and may, under appropriate criminal provisions, be punished by a fine or imprisonment or both. I affirm that the information provided on this form is accurate and true.

Send this form to:

SEC Petition
Division of Compensation Analysis and Support
NIOSH
4676 Columbia Parkway, MS-C-47
Cincinnati, OH 45226

If there are additional petitioners, they must complete the Appendix Forms for additional petitioners. The Appendix forms are located at the end of this document.

Public Burden Statement

Public reporting burden for this collection of information is estimated to average 5 hours per response, including time for reviewing instructions, gathering the information needed, and completing the form. If you have any comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, send them to CDC Reports Clearance Officer, 1600 Clifton Road, MS-E-11, Atlanta GA, 30333; ATTN: PRA 0920-0639. Do not send the completed petition form to this address. Completed petitions are to be submitted to NIOSH at the address provided in these instructions. Persons are not required to respond to the information collected on this form unless it displays a currently valid OMB number.

Privacy Act Advisement

In accordance with the Privacy Act of 1974, as amended (5 U.S.C. § 552a), you are hereby notified of the following:

The Energy Employees Occupational Illness Compensation Program Act (42 U.S.C. §§ 7384-7385) (EEOICPA) authorizes the President to designate additional classes of employees to be included in the Special Exposure Cohort (SEC). EEOICPA authorizes HHS to implement its responsibilities with the assistance of the National Institute for Occupational Safety (NIOSH), an Institute of the Centers for Disease Control and Prevention. Information obtained by NIOSH in connection with petitions for including additional classes of employees in the SEC will be used to evaluate the petition and report findings to the Advisory Board on Radiation and Worker Health and HHS.

Records containing identifiable information become part of an existing NIOSH system of records under the Privacy Act, 09-20-147 "Occupational Health Epidemiological Studies and EEOICPA Program Records and WTC Health Program Records, HHS/CDC/NIOSH." These records are treated in a confidential manner, unless otherwise compelled by law. Disclosures that NIOSH may need to make for the processing of your petition or other purposes are listed below.

NIOSH may need to disclose personal identifying information to: (a) the Department of Energy, other federal agencies, other government or private entities and to private sector employers to permit these entities to retrieve records required by NIOSH; (b) identified witnesses as designated by NIOSH so that these individuals can provide information to assist with the evaluation of SEC petitions; (c) contractors assisting NIOSH; (d) collaborating researchers, under certain limited circumstances to conduct further investigations; (e) Federal, state and local agencies for law enforcement purposes; and (f) a Member of Congress or a Congressional staff member in response to a verified inquiry.

This notice applies to all forms and informational requests that you may receive from NIOSH in connection with the evaluation of an SEC petition.

Use of the NIOSH petition forms (A and B) is voluntary but your provision of information required by these forms is mandatory for the consideration of a petition, as specified under 42 CFR Part 83. Petitions that fail to provide required information may not be considered by HHS.

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This SEC Petition is submitted with the following documents:

- 2016 Site Description: Santa Susana Field Laboratory
- "Your Guide to Site-Seeing Hot Spots at SSFL - DOE Operations in Areas I, II & III"
- The following supplemental document.

The following SEC Petition supports the immediate inclusion of all North American Aviation employees, regardless of presumed work location. North American Aviation was a "DOE Contractor." The original AEC-NAA contract verifies eligibility of Atomics International and Rocketdyne workers to EEOICPA. It is not possible to reliably or consistently determine any monitored, or unmonitored worker's location at SSFL; thus employment in the covered area cannot be ruled out. All workers should be eligible, and evidence supports the implementation of an SEC classification at this site.

Special Exposure Cohort (SEC) Petition - SSFL Areas I, II, III, IV

Thank you for the opportunity to submit the following information in support of this SEC Petition for the following locations and time periods:

Area IV - Santa Susana Field Laboratory (SSFL) 1965 - Present
Areas I, II, III - Santa Susana Field Laboratory (SSFL) 1955 - Present

This SEC Petition is submitted on behalf of

Thank you for your review and consideration of the following information.

Sincerely.

This SEC Petition is accompanied by the following supportive documentation:

- **2016 Site Description: Santa Susana Field Laboratory (SSFL) - Proposed Corrections to Technical Basis Documents, ORAUT-TKBS-0038-1 / ORAUT-TKBS-0038-2**

  The 2016 Site Description provides additional information that is not contained in the 2006 Site Profile currently used in dose reconstruction of SSFL workers. Information pertaining to an additional 50+ radiological facilities (Area IV), additional DOE-ETEC facilities (Area I), and 381 radiological incidents involving worker exposure (monitored and unmonitored workers) is provided. This information is derived exclusively from documents authored by DOE and its predecessor agencies, The Boeing Company and its predecessor contractors, Boeing's Incident Database, and the Environmental Protection Agency (EPA) during the 2009 Area IV Radiological Study and Historical Site Assessment.

  This information supports not only the determination that Areas I, II and III meet statutory criteria as defined under 42 U.S.C. § 73841(12), but supports the immediate determination that all North American Aviation (NAA) employees of Atomics International and Rocketdyne are eligible for EEOICPA, regardless of presumed work locations, pursuant to the original Atomic Energy Commission (AEC) contract at Santa Susana Field Laboratory (SSFL).

- **"Your Guide to Site-Seeing Hot-Spots of the Santa Susana Field Laboratory ~ DOE Operations in Areas I, II and III"**

  In 2014, the President's Advisory Board on Radiation and Worker Health (ABRWH) toured SSFL. Prior to the tour, ABRWH requested my research on DOE operations in Areas I, II and III. In response, provided each ABRWH member and the National Institute for Occupational Safety and Health (NIOSH) with a comprehensive guidebook of DOE operations at SSFL that included cited documentation of Area I-III facilities and operations. Each guidebook was accompanied by a CD-Rom containing all cited documents in their entirety, with specific page numbers and paragraphs, so the information could be easily referenced. Over 300 formal worker interviews that were conducted by EPA and DOE were also included on the disks; these formal interviews were part of the EPA Area IV Radiological Study and Historical Site Assessment conducted in 2009. The information provided to ABRWH, which was predominantly authored by DOE, its predecessor agencies, and its contractors, clearly illustrated that Areas I, II and III fulfill statutory criteria under 42 U.S.C. 73841 (12) defining DOE proprietary interests, and a "DOE Facility" under EEOICPA. However, regardless of any determination pertaining to Areas I, II and III, evidence provided shows that all employees, regardless of presumed work location or area, are employees of the DOE contractor. Pursuant to the original AEC-NAA contract, all employees of North American Aviation should be eligible for EEOICPA, and evidence supports the implementation of an SEC classification.

- The following supplemental information further supports the passage of this SEC Petition.

DEEOIC Acknowledged AEC-NAA Contract / Eligibility of Area I-III Workers in 2005

According to Division of Energy Employee Occupational Illness Compensation (DEEOIC) in 2005: "On February 28, 1948 the AEC entered into a contract with North American Aviation (NAA) to perform research and to develop nuclear reactors. *NAA was permitted its discretionary use of its facilities and locations owned by the company* ***or*** *leased by the AEC to perform functions affiliated with fulfilling its contractual obligations.*[1] [Emphasis added]. North American Aviation was the DOE contractor; both its divisions of Atomics International and Rocketdyne are included, and employees of both divisions have been determined to be eligible for EEOICPA. The only requirement has been for employees to provide proof of documented Area IV employment. However, it is not possible to reliably determine any worker's location at SSFL, or to rule out employment in the covered area, based on "Time Clock Locations," designated work locations, job titles, or "nuclear" vs. "non-nuclear" designations.

NAA's discretionary use of its facilities, divisions, materials, and personnel is clearly evidenced in the passage of SEC's at the Canoga / DeSoto Facilities where Atomics International and Rocketdyne employees, many of which routinely rotated to all areas of SSFL as needed, performed a variety of job duties alongside one another.

The all-encompassing nature of Canoga / DeSoto SEC's acknowledges NAA's precedent of interdivisional collaboration, and reflect the original contractual language. There is no body of work indicating that DOE operations at SSFL were exclusive to Area IV. In fact, to the contrary, there is a substantive body of work authored by DOE, Boeing, and their predecessors that illustrates DOE operations throughout Areas I, II and III and National Aeronautics and Space Administration's (NASA) operations in Area IV, along with joint DOE-NASA projects and supportive operations in all areas.

Pursuant to the site's original contract, which has been acknowledged by DEEOIC in 2005, all NAA workers regardless of presumed work location or divisional affiliate should be eligible for EEOICPA. The following information further supports such a determination.

The Supportive Documents Illustrate the Following:

1. It is not possible to consistently or reliably determine worker location among monitored or unmonitored employees at SSFL, regardless of presumed work locations, designation as "nuclear" or "non-nuclear" workers, job titles, job classifications, or "Time Clock Locations."

2. Boeing's "Employment Summaries" routinely obscure covered employment by only depicting worker "Time Clock Locations." It has been established that SSFL workers routinely rotated into and out of all areas (covered / non-covered) at SSFL, following the use of a "Time Clock" located outside the current "covered area." "Time Clock Locations" do not establish eligibility or accurately depict work locations.

3. Boeing is under contract with DOE to provide complete, authentic employment records in response to Document Acquisitions Requests (DARs) (DE-AC0S-99SF21530, Modification

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[1] Division of Energy Employees Occupational Illness Compensation (DEEOIC) Peter M. Turcic Memorandum to Christy Long, District Director of Seattle, Subject: *Atomics International and Energy Technology Engineering Center,* September 7, 2005

108). However, it does not appear that Boeing is providing actual employment records since the recent retirement of two primary Boeing employees ( ), who were chiefly responsible for fulfilling Document Acquisitions Requests (DARs) under EEOICPA in the past. Currently, it appears that the transfer of this duty to the Boeing corporate office in Seattle may have resulted in only the Time Clock Summary being provided in response to the DAR, which effectively obscures covered employment and is insufficient to determine both worker eligibility and potential exposures while participating in DOE processes.

4. Visitor Log Entry sheets contained in the records of monitored employees depict indecipherable Building Location Codes, because Boeing did not provide the "key" required to decipher the codes. Current Boeing employees do not have access to any type of "key" used in the past. It is unclear whether or not the "key" was devised by Boeing, or its predecessor contractor (pre-1996), however, without the ability to establish the location of a monitored employee during rotation to various radiological facilities, NIOSH cannot cross-reference the Incident Database to rule out a worker's involvement in an exposure incident or establish the actual location of a worker's radiation exposure.

5. As documented in the 2016 Site Description submitted by some designated "non-nuclear" facilities engaged in radiological processes as site operations changed over the years. In some cases, it does not appear the facilities were re-designated accordingly. There are growing indications that workers assigned to the facilities were not re-designated as "nuclear workers," or provided with proper radiation protection. To the contrary, there are indications that worker monitoring was based solely on facility designation, and facility designation may have been unreliable and inappropriate. This issue is described in further detail, below.

6. In 2014, Boeing provided commentary to ABRWH describing the "phenomenon" wherein employment records for 8,400 "non-nuclear" employees contained radiation records that were "blank." Based on changes in facility operations that involved non-nuclear facilities with inappropriate designations, it does not appear that worker designations were adequately updated, in sync with facility operations. More information provided below.[2]

7. Boeing's Incident Database, summarized in detail in the 2016 Site Description submitted by contains numerous incident reports documenting radiological releases and worker exposures at "non-nuclear" facilities where radioactive materials were not supposed to be used; it is unlikely workers were appropriately monitored for radiation exposure.

8. Both EPA and DOE determined inappropriate and insufficient worker and environmental monitoring practices at SSFL, from inappropriate sampling practices to the lack of a meteorological tower, to the use of inappropriate data and counting methods.

9. EPA determined Rocketdyne "didn't have a handle" on where it dumped or distributed radioactivity over the course of site operations.

10. Boeing's Incident Database contains numerous incident reports wherein workers that were either not assigned to a radiological location, or not equipped with appropriate radiation

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[2] The Boeing Company, *"Commentary on the ABRWH Meeting, Redondo Beach, California,"* November 6, 2014.

protection, were involved in an exposure incident. In some cases, the workers were unauthorized sub-contractor employees that had unfettered access to radiological locations and radioactive materials.

11. The EPA-DOE worker interviews contain several formal interviews from employees describing unmonitored and undocumented worker rotation between areas, on an as-needed basis, and full accessibility into and out of Area IV with or without radiation badges.

12. The Site Profile is routinely contradicted by actual employment records, historical facility documents, and the Incident Database.

13. Boeing has provided written statements that company policy changes to payroll and accounting systems prohibit the contractor from accurately identifying a worker's location, or job duties in Area IV, for numerous EEOICPA claimants / SSFL workers. Even the contractor has stated that it is not possible to reliably determine worker locations.

14. The 2006 Site Profile is currently missing 50+ radiological facilities, 381 radiological incidents involving releases and worker exposures, an additional hot laboratory and particle accelerator, and a low-level radioactive waste incinerator. All data associated with these facilities has also been excluded, thus calling into question the validity of all environmental data associated with site operations as the data pertains to dose reconstruction, and an accurate characterization of site operations.

"Non-Nuclear" Employee Involved in Radiological Incident

On July 10, 2007 The Boeing Company responded to the Document Acquisitions Request (DAR) pertaining to According to Boeing, no records exist because "was not a radiation worker and did not work with radioactive materials." No incident reports exist, because "was not involved in a radiation incident or accident." Boeing indicated no safety or industrial hygiene records existed for and as usual, Boeing only provided the "Employment Summary" that showed assigned "Time Clock Locations" between 1964-1969. Boeing withheld all of the "coded" records that provide actual details about employment, and only submitted the summary data that so often obscures eligibility and exposures.

designated "Time Clock Location" in Area IV was According to the EPA Historical Site Assessment, was constructed in for use in testing "non-radiological" equipment.[3] However, documentation shows that was a radiological facility that used radioactive materials. and other employees of should have been monitored for radiation exposure.

Incident Report provides details about an incident that occurred in the

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[3] EPA Final Historical Site Assessment

[4] Boeing's Incident Database

was subsequently found to be free of contamination. The area around the workbench was decontaminated. According to the October 1966 Monthly Progress Safety Report,[5] following the incident all personnel were instructed that no equipment would be worked on, unpackaged, or removed from without Radiation Safety concurrence. In addition, the report indicates that operations in progress at included the completion of modifications and installation of machining equipment, vacuum checkout of the induction and tilt-pour furnaces, repair of the radioactive exhaust system, and final painting of the installed equipment and ducting.

There were no radiological use authorizations issued for EPA identified uranium oxide release at this location. In addition, was located approximately 600 feet south of which was a primary source of radioactivity at SSFL. EPA noted the potential for other radionuclides associated with a SNAP reactor building, to migrate to the area of Potential radioactive contaminants associated with SNAP operations in Building 4059 include U-238, U-234, U-235, Pu-238, Pu-239, Pu-240, Pu-241, Am-241, Cs-137, Sr-90, H-3, Fe-55, Co-58, Co-60, Ni-63, Ba-133, Eu-152, Eu-154, Eu-155, Pm-147, Ta-182. EPA determined that met the criteria for a Class I MARSSIM Classification due to its location within ETEC, close proximity to SNAP reactor and because no site investigation had been conducted (despite the documentation of uranium oxide use/incident).

The Atomics International Safety Progress Report acknowledged routine use of radiological materials by specifying that the Radiation Safety Department would need to be actively involved before employees were allowed to work on instruments or equipment. In addition, the report specifies ongoing work and repair of the radioactive exhaust system. Its need for repair suggests that it had been formerly used, and it is reasonable to assume that it was radioactively contaminated as a result. Moreover, employees involved in incidents at were sent to for showering and decontamination procedures. If employees were not considered to be "nuclear workers," they should not have been exposed to radiation, or sent to a radioactive facility where it would be presumed non-monitored workers would not even have access.

This report is one example of a non-radiological location being used for radioactive processes; a non-nuclear and un-monitored worker associated with the location and potentially present in proximity to radiological materials; and workers from this location having access to restricted nuclear areas like the

In addition, this is one instance that exemplifies Boeing's decision to withhold complete and authentic worker records based on the worker being "unmonitored" and presumably *not* a designated radiation worker. However, further investigation into assigned work locations indicates the employee clearly should have been monitored for radiation exposure based on the operations associated with the designated "work / time-clock location."

During review and evaluation of EEOICPA case files for SSFL employees, there are numerous instances that are similar to this; where "non-nuclear" workers have documented employment at "non-nuclear" designations with documented handling of radioactive materials, and incident reports contained in Boeing's Incident Database. The

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[5] Atomics International Monthly Progress Report, October 1966. R.E. Remley.

presence of documented incidents alone should require Boeing to provide all records in their entirety (not just "summarized" written explanations), and buildings/locations with documented radiological incidents should not be represented to DOL or NIOSH as "non-radiological" facilities. Given the frequency of similar instances discovered in denied EEOICPA case files, concerted evaluation is called for. will provide all worker DAR and corresponding documentation to NIOSH and ABRWH upon request, via copies of DAR documents or simple Case ID Numbers. This has been an ongoing, recurring problem among SSFL workers.

"Non-Radiological" Facilities Handled Radioactive Materials

Many facilities throughout SSFL were designated as "non-radiological" locations. In some cases, they were not constructed with the intention of ever handling radiological materials. Presumably, the majority of these locations were excluded from the 2006 Site Profile based on their designations and the assumption that their operations were of no consequence to potential worker exposure. However, a number of facilities have been discovered to have handled radioactive materials despite their designations as "non-radiological" facilities. In many cases, the Incident Database contains reports describing radiological incidents, environmental releases, and worker exposures at these locations.

It appears that as facility operations changed, some "non-radiological" locations adopted new processes that involved the handling of radioactive materials. It does not appear that their designations were updated accordingly, in some cases. While this problem may be due to clerical or administrative oversight, it suggests some locations handled radioactive materials without proper licensing or use authorizations from the AEC or DOE. In addition, some or all of the improperly designated locations may have failed to meet specific criteria for safe handling of radioactive materials.

Given the nature of site operations, worker rotation, divergent job duties, an inability to decipher building-location codes among monitored workers, and a systemic deficiency in adequate records review, it is already difficult to reliably determine a worker's location or probability of radiation exposure. Adding to this problem are the growing number of improperly designated facilities, and substantive indications that the decision to monitor workers for radiation exposure was based solely on the worker's assignment to a designated radiological facility.

In 2014, Boeing acknowledged a "phenomenon" among an unusually high number of SSFL employees whose radiation records were "blank," indicating a "zero recorded dose."[6] Boeing estimated the number of workers with "blank" radiation exposure records to be approximately 8,400. With the current challenges, there appears to be no way to determine which of these workers were assigned to a "non-radiological" work location that was actually involved in radiological processes.

Another example of potential difficulty in determining adequate facility designations are those facilities where one side of the building was designated as a radiological facility, while the other side was not, as in the case with While worker processes on each side involved each other, the employees on one side of the building were considered to be "non-radioactive" workers, while the workers on the other side were monitored for radiation exposure.

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[6] The Boeing Company, *"Commentary on the ABRWH Meeting, Redondo Beach, California,"* November 6, 2014.

Compounding the issue was the decision to knock down the wall that separated each side of the building. However, the building was never re-designated, and photographs of employees continue to show that some were monitored for radiation, while others were not. Photographs of these workers will be provided to NIOSH / ABRWH upon request.

It is not possible to determine any SSFL employee's likelihood of exposure based on designated work location, job title, job classification, or an absence of dosimetry data in employment records. In addition, it may be impossible to reliably determine work location for the majority of SSFL workers. Lastly, it may not be possible to determine which workers should have been monitored for radiation exposure, verses which workers did not require such monitoring. In addition, based on difficulties determining employee likelihood of exposure, it may not be possible to reliably determine appropriate use of coworker data.

Defective Dosimeter and Film Badges / Badges Exposed to Source Material

The Incident Database contains numerous reports documenting worker exposure. In an unusual number of incidents, the exposure event is followed by the discovery that the employee's film badge or dosimeter was defective, resulting in a grossly overestimated value of radiation exposure. Given the number of employees at SSFL, the assumption that most badges functioned properly, and the rarity of severe exposure events, it seems unlikely that so many employees' use of defective badges would coincide with the rare exposure incident. One of the following explanations is more plausible:

Assuming the majority of film and dosimeter badges were functional, it is reasonable to conclude that an exposure to a high level of radiation was purposely downplayed to minimize the severity of the incident, by blaming the high reading on a defective badge. Another plausible scenario is that a large number of dosimeter/film badges were defective, in which case all employee dosimeter data may be called into question.

Atomics International documented at least two occasions of accidental exposure of the majority of its employee film badges,[7] [8] which were provided to workers who wore the badges with unpredictable results. When the problems were discovered, it took nearly a week to resolve. Over 2,600 personnel film badges among SSFL and Canoga employees were accidentally exposed to radiation. In one case it was unknown how the radiation exposure occurred, and in the other case it was determined a source at Atomics International Shipping and Receiving exposed the badges. To account for perceived over-exposures indicated in the badge readings, some corrections to employee dosimeter files were attempted. It is not clear which employees were impacted.

However, given the dates of the accidental exposures and the number of employees affected, a review of the Incident Database during this time period calls into question whether workers were adequately monitored during exposure incidents at the facilities where the faulty badges were discovered. These events could raise questions about the margin for error in trying to assign corrective values as a result of the "exposure to badges," the accuracy of dosimetry data for workers at large, and potential chain of custody; the badges were not sent off-site to the

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[7] Atomics International, November 1962: Accidental Exposure of Atomics International Film Badges During the Latter Part of November, 1962. BNA00616543 / HDMSp01720392.pdf

[8] Internal Letter, Atomics International, May 18, 1965: Accidental Exposure of Film Badges. HDMSP001852735.pdf

subcontractor (Landauer) but were processed in-house by Atomics International, reinterpreted, and attempts to correct worker dosimetry records were made.

Lapses in dosimetry record keeping, chain of custody, adequate monitoring practices, worker rotation, building designations, worker designations, and "faulty" badges has been documented from the 1950's into the Site Remediation period (which is ongoing).

Site Remediation

After Boeing assumed SSFL operations, a DOE-Boeing contract[9] for Environmental Restoration and Remediation of the Former ETEC Site included a phase for the decontamination, decommissioning and demolition (DD&D) of all DOE Facilities at ETEC. was unable to locate any contractual provision within the agreement that limited remediation activities to Area IV or specified that DOE operations were confined to Area IV. Since DOE-ETEC operated facilities in Area I, it is reasonable to expect they would have been included by implied agreement, "all DOE Facilities at ETEC."

The site remediation contract directed Boeing to provide all workers engaged in Site Remediation activities with appropriate protective gear, which includes radiation monitoring protection. However, as discussed above, there are numerous indications that workers employed at radiological facilities (some of which may have been incorrectly designated as "non-radiological") were not appropriately monitored. Additionally, there are growing indications that some locations tasked with handling and processing of radioactive materials may have been improperly licensed or failed to meet the criteria to be considered "radiological" facilities.

Environmental Monitoring and Sampling Practices

On July 12, 1989 the U.S. EPA assessed the relative magnitude of health hazards, health risks, past, present, and future environmental problems, and how those concerns may be addressed with the site contractor.[10] EPA reviewed previous Rockwell-Rocketdyne environmental reports, contractor reports, DOE site reviews, and conducted interviews with laboratory personnel to review procedures for sampling. In addition, EPA visited specific locations at the site, and took samples and measurements.

EPA questioned the validity of some, if not all, of the environmental data. According to laboratory personnel, the laboratory had never had a thorough review or audit by Rockwell-Rocketdyne or DOE (DOE's environmental audit had yet to be finalized at the time of the EPA site visit).

EPA made it clear: "Rocketdyne does not have a good "handle" on where radiation has been inadvertently or intentionally dumped onsite. Most of the evidence of on-site spills is incompletely documented or anecdotal."

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[9] The Boeing Company and U.S. Department of Energy (DOE) Contract for Environmental Restoration and Remediation of ETEC Facilities at SSFL, Contract #DE-AC03-99SF21530

[10] Dempsey, Gregg: *"Site Visit to Santa Susana Field Laboratory,"* EPA Memorandum

In 1989 and 1991, DOE's Office of Environmental Audit[11] and Tiger Team[12] concluded that worker and environmental monitoring practices at SSFL were inadequate and provided unreliable dose assessments among the worker population throughout the site's operational history.

Both the Office of Environmental Audit and the Tiger Team concluded that SSFL's lack of a meteorological tower presented inaccurate dose assessments following radiation releases. Both noted that on-site sampling locations were inappropriate because they had been chosen based on the intended locations of reactor operations. However, the selected locations for reactor operations were finalized, the sampling locations did not change accordingly.

Both research teams noted no formal chain of custody for sampling data; no quality environmental surveillance program had been implemented; insufficient monitoring of radioactive airborne particulate releases created consistent difficulties in estimating worker dose; and failure to adequately monitor radionuclide emissions from point sources (including those from remedial actions) resulted in misleading and inappropriate worker dose estimations. Moreover, both research teams called attention to consistently poor filter changing-and-handling practices, which resulted in a loss of particulate matter and inaccurate radioactivity measurements.

Both the Office of Environmental Audit and the Tiger Team noted Rockwell International's unilateral decision to cease all manner of soil and water sampling by notifying the Nuclear Regulatory Commission (NRC) that future sampling would only occur on an "as needed" basis. Rockwell International failed to inform the NRC of legitimate reasoning behind ceasing the environmental sampling program, and did not provide a definition of its conditional approach to sampling going forward. It is interesting to note that the timing of this decision coincided with EPA's observation that incorrect and insufficient practices were being used for soil sample analysis.

DOE's Office of Environmental Audit and the Tiger Team address DOE operations at SSFL that occurred outside Area IV; worker rotation site-wide; joint DOE-NASA projects that involved employees from both divisions of North American Aviation (Atomics International and Rocketdyne); and a degree of site operations verses a lack of adequate environmental and worker monitoring practices that call into question the validity of dose reconstruction outcome for SSFL workers.

Please review the 2016 SSFL Site Description and "Your Guide to Site-Seeing Hot Spots at the Santa Susana Field Laboratory (SSFL) - DOE Operations in Areas I, II and III" for further supportive documentation.

The SEC should encompass all North American Aviation Rocketdyne & Atomics International workers at SSFL, regardless of presumed work location, and regardless of whether or not Areas I, II or III are determined to be "DOE Facilities" under the Act. While these areas certainly meet the statutory criteria, the fact remains that the *employees* meet eligibility criteria under EEOICPA, based on the original contractual language between AEC-NAA. Moreover, difficulty

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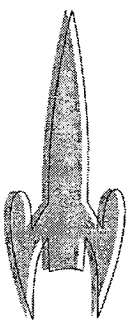
[11] U.S. DOE Office of Environmental Audit, *"Environmental Survey Preliminary Report, U.S. DOE Activities at SSFL,"* 1989.

[12] DOE Office of Environment, Safety and Health (ES&H), Tiger Team Assessment - ETEC, April 1991.

establishing worker locations or estimating worker exposures prohibit reliable determinations of eligibility and dose reconstructions.

Thank you for your review and consideration.



FOR THE HEROES WHO BUILT THE ROCKETS
THAT TOOK MEN TO THE MOON
AND BROUGHT THEM BACK TO EARTH AGAIN.

The conceptual direction for this book was inspired by the "Tomorrowland" era, the Race to Space in the Atomic Age, reflected by North American Aviation's illustrators. In manuals peppered with whimsical illustrations, we learned about new technology, hazardous substances, and were even influenced about how to feel about toxic chemical and radiation exposure. North American Aviation's technological and scientific advancements expanded our understanding of nuclear technology, enabled space exploration, shaped Southern California's postwar culture, and changed the world. But these achievements came at a cost to worker and public health and the environment. Today, we must acknowledge history, do right by the workers who made that history, and repair the environment that was damaged by it to protect the very thing the workers gave their lives for: the future.

Information in this Guidebook is taken primarily from:

U.S. Department of Energy
Environmental Survey Preliminary Report:
U.S. DOE Activities at Santa Susana Field Laboratory
U.S. Department of Energy
Office of Environmental Audit, c. 1989

This is not a complete history of site operations at Santa Susana Field Laboratory (SSFL). This compilation of declassified historical facility documents, studies, and worker testimony are the result of research, collaboration and Freedom of Information Act (FOIA) requests. Its purpose is to illustrate operations of Department of Energy (DOE) and its predecessor agency, the Atomic Energy Commission (AEC) in Areas I, II, III and IV of SSFL. Documented history challenges DOE's current position of confinement within Area IV boundaries. Until history is acknowledged, workers will remain excluded from federal legislation and the public will be denied an informed cleanup. Documents referenced herein are provided on the accompanying disk. Suggestions, additions, corrections, or requests for digital copies may be sent to:

The Energy Employee Occupational Illness Compensation Program Act of 2000 – EEOICPA

42 U.S.C. § 7384l(12):

"The term "Department of Energy facility" means any building, structure, or premise, including the grounds upon which such building, structure, or premise is located

(A) in which operations are, or have been, conducted by, or on behalf of, the Department of Energy (except for buildings, structures, premises, grounds, or operations covered by Executive Order No. 12344, dated February 1, 1982 (42 U.S.C. 7158 note), pertaining to the Naval Nuclear Propulsion Program); and

(B) with regard to which the Department of Energy has or had

i. a proprietary interest; or

ii. entered into a contract with an entity to provide management and operation, management and integration, environmental remediation services, construction, or maintenance services.

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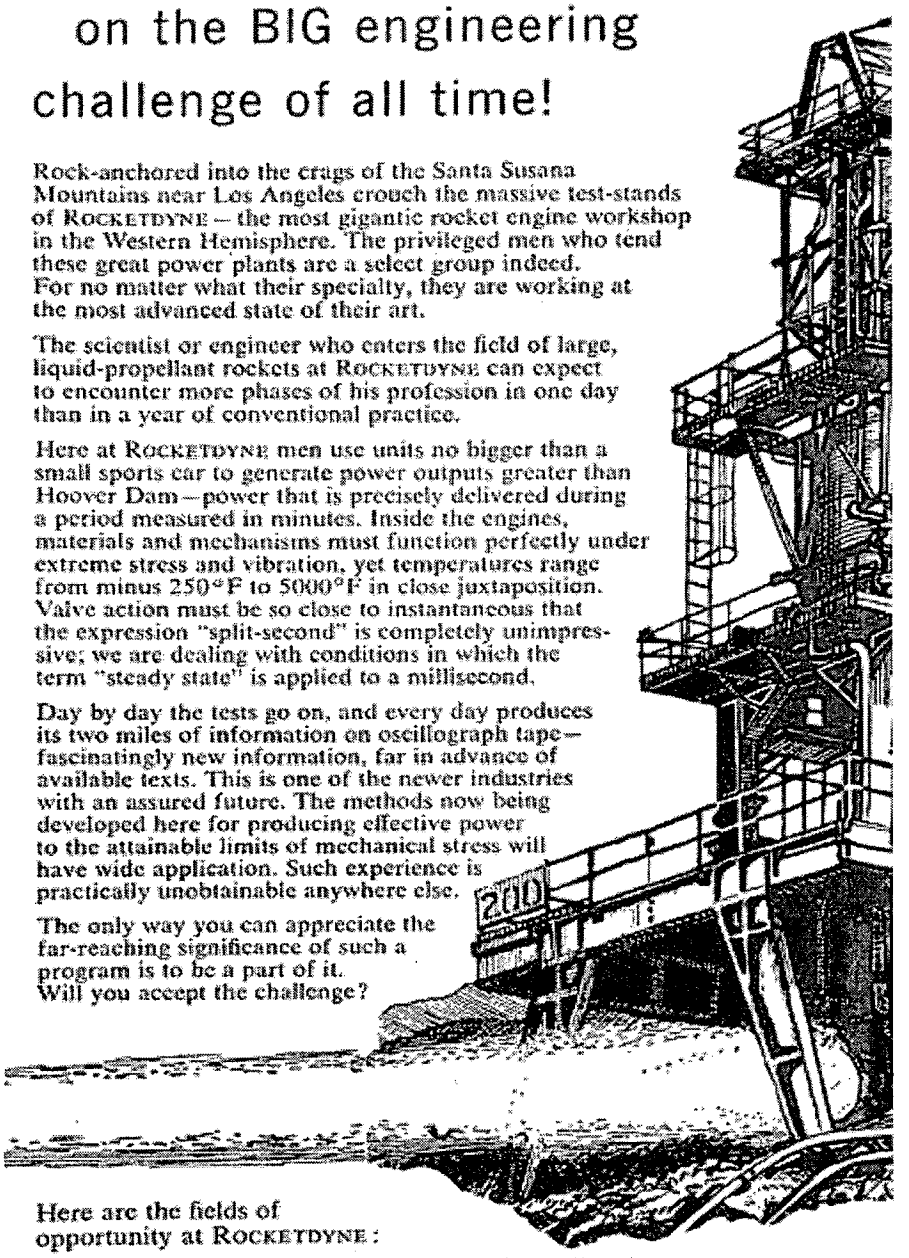

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BUILDERS OF POWER FOR OUTER SPACE

Table of Contents

Atomic Energy Commission = AEC / Department of Energy = DOE
California Department of Toxic Substances Control = DTSC
Atomics International = A.I.

< Photo, Opposite Page: North American Aviation Advertisement, c. 1950's. Rocketry/nuclear research and development were intertwined in descriptions of opportunities at SSFL. Ads inspired optimism, adventure, and bravado that accompanied atomic/aerospace research during the Cold War and Race to Space.

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"Historically, great benefits have been obtained by separating growing, diverse programs and test facilities [at SSFL]."[1]
- U.S. Department of Energy

"Rocketdyne moved us all over the place.
That's what they didn't understand
when I filed my health [EEOICPA] claim."
- SSFL Employee,

• • • • •

"Many incidents that occurred at Rocketdyne and A.I. [Atomics International] occurred not because we were doing things that were unsafe, but because we were doing things that had never been done before."
- SSFL Employee,

"Sometimes a sample result would show more radiation than expected, but this was not considered an accident or incident, as it was part of the experimental process."
- SSFL Employee,

"We were always doing something different ... it wasn't boring!"
- SSFL Employee,

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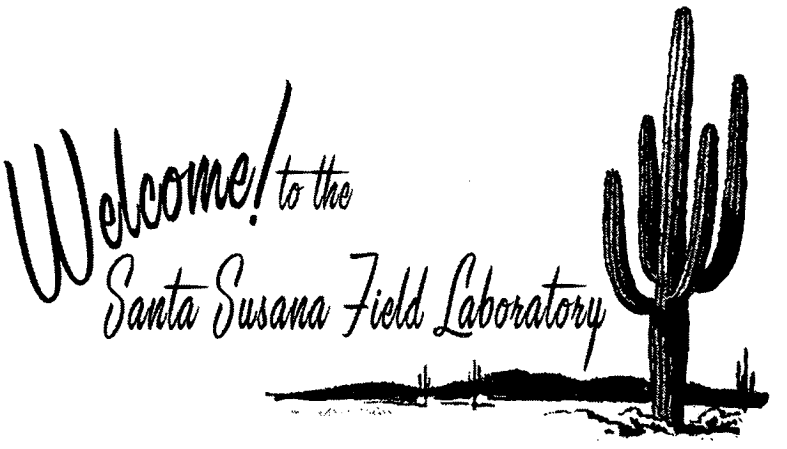
[1] Rockwell International, "*Coal Hydropyrolysis Conversion Test Facility.*" HDMSt00012824.pdf
[2] U.S. Department of Energy & Federal Environmental Protection Agency, *"Historical Site Assessment (H.S.A.), Santa Susana Field Laboratory (SSFL), Employee Interview Report."*
Former_Worker_Interview_Final_Report.pdf
4_Appendix-B_Draft-Final_Interview_Report.pdf
[3] Ibid.



With this Guidebook, the research of worker advocates, site historians, and the words of former employees will accompany you on your tour of the Santa Susana Field Laboratory (SSFL).

During your tour, it is likely you will be told that Department of Energy (DOE) and its predecessor agency, the Atomic Energy Commission (AEC) operated in strict confinement of Area IV boundaries; that no contamination crossed into adjacent work areas or off-site; and that Area I, II, and III personnel were safe from radioactive releases, nuclear waste, and any risks associated with AEC-DOE Atomics International Area IV activities.

These assertions exist in flagrant contradiction to AEC-DOE's own history of published documents referenced in this Guidebook (and provided on the accompanying disk), which repeatedly reference DOE and Atomics International operations, facilities, waste storage, disposal, off-site releases, site-wide impacts, and rotation of personnel throughout all areas of the facility.

This book was created for the President's Advisory Board on Radiation and Worker Health (ABRWH) to provide a more balanced perspective on actual site history. Please enjoy your tour of Santa Susana Field Laboratory, where Space Race history was made during the era of the "nuclear cowboy."

Sincerely,

Santa Susana Field Laboratory

"We would run tests and try to simulate the worst kinds of accidents we could imagine ..." - SSFL Employee,

• SSFL was intentionally given the 'field laboratory' status as an experimental facility at its inception (1948). This status provided relaxed regulatory guidelines for operations, emissions, and wastes. It is currently accepted that only AEC-DOE and Atomics International used radioactive material at SSFL.

• Because of the "experimental" nature of the facility, none of the ten nuclear reactors were housed in regulatory containment structures. They were vented to the outdoors as needed. To determine operational thresholds, reactors were pushed beyond failure. They were allowed to operate in continued states of malfunction for the purpose of research and development. Employees working outdoors or downwind were not warned of releases, which were often unplanned. High radiation readings were considered part of the experimental process, and often undocumented. The lack of a meteorological tower prohibited accurate dose assessments to workers and the public.[5]

• Employees were rotated between areas and projects based on individual skill sets. It was common for workers to rotate between several areas/projects in a day. Therefore, it is difficult to reliably determine worker exposures based on job titles or designated work locations. Accurate assessment is further hampered by missing records, poor monitoring practices,[6] the unpredictable nature of the facility and research undertaken there, accessibility to nuclear areas, and AEC-DOE's documented history in all areas. Glaring questions and inconsistencies in EEOICPA eligibility must be addressed.

• SSFL is embroiled in environmental cleanup controversy. Agency and contractor obligations to EEOICPA and cleanup are lessened if the history of Areas I, II and III remains ignored/overlooked.

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[4] DOE-EPA, "H.S.A. SSFL Employee Interviews," 2009.
[5] U.S. DOE Office of Environmental Audit, "*Environmental Survey Preliminary Report: US DOE Activities at Santa Susana Field Laboratory,*" 1989. Section 3.1.4.
4 DOE_Environmental_Survey.pdf
[6] Ibid., 3-21, Section 3.1.4.

The Site-Wide Reclaim Water and Surface Water Drainage System

"All Area IV towers release their blowdown to the drainage ditch, which eventually leads to Pond R-2B [Area II]."[7]
– U.S. Department of Energy (DOE)

The Site-Wide Water Reclaim and Surface Water Drainage System exposed workers in Areas I, II and III to nuclear materials generated in Area IV and resulted in off-site drainage to Bell Canyon (headwaters to the LA River), Chatsworth Reservoir (an agricultural and residential reservoir to the San Fernando Valley) and the Arroyo Simi.

Upon careful comparison of the Site-Wide Water Reclaim and Surface Water Drainage System to the legislative statute defining a DOE Facility, one must acknowledge that the system functioned to keep Area IV (the DOE area) from flooding and to transport industrial effluent and contaminated wastewaters throughout all areas of the facility (Areas I-IV) and off-site. Atomics International (DOE) and Rocketdyne worked jointly to provide management, operation, integration, environmental remediation services, construction, and maintenance to this entire system (which was crucial to DOE operations and interests).

During a site inspection conducted by DOE in 1989, the agency described the system's purpose: "An integral part of the surface drainage system is the Site-Wide Reclaim Water System, which recovers most of SSFL's industrial water, rainfall, and treated sewage treatment plant effluents from all four areas ... [providing] much-needed water for use as flame-bucket coolant to all rocket testing facilities in Areas I, II, and III."[8]

The system consisted of two parallel, *interconnected* loops. The first served operations in Area I (the Bowl / Canyon Areas' R-1 Pond). As supply to R-1 Pond exceeded demand, it overflowed to Perimeter Pond (Area I). A few times a year, Perimeter Pond discharged effluent and collected runoff water to Bell Canyon

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[7] DOE, "Survey: DOE Activities at SSFL," 1989. P. 3-45, Surface Water. DOE_Environmental_Survey.pdf.
[8] Ibid., 3-35

Creek (headwaters to the LA River).[910] The second loop served Areas II, III, and IV. Besides individual catch-basins and retention ponds adjacent to rocket test stands at Alfa, Bravo, Coca, and Delta Areas (Area II), there were two large containment basins serving the loop; Silvernale Pond (Area III) and the R-2 Ponds in Area II.[11]

Over 30,000 rocket engine tests were conducted at SSFL, each using between 640,000-700,000 gallons of water that had traveled through the Site-Wide Water Reclaim and Surface Water Drainage System.

DOE noted several Area IV radioactive materials facilities that contributed contaminated wastewaters and hazardous materials to this system. Those facilities and their contributions to the Site-Wide Water Reclaim and Surface Water Drainage System are explained more fully on the following pages. It was also noted during the site inspection that diversion dikes meant to convey wastewater around hazardous areas had been breached and allowed to languish in disrepair. This enabled water to flow over radioactive material burial sites and through burn pits on its way off-site.[12]

DOE admits the Area II R-2 ponds were "likely affected by DOE activities in Area IV, since most natural runoff from Area IV arrived there."[13]

DOE acknowledged that, "Area IV, where DOE operations are based, has had no problem with flooding. All industrial waters and most of the storm water runoff are drained through open channels and culverts to the large retention ponds R2A and R2B in Area II."[14] The R-2 Ponds tested positive for radioactivity in a subsequent study.[15]

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[9] Google Earth Path from SSFL to LA River:
https://www.youtube.com/watch?v=oXdnao3qBoo
[10] The Boeing Company, "*SSFL Reclaim Water Flow Schematic,*"
ssflonsitewatersystems.pdf
[11] DOE, "Survey: DOE Activities at SSFL," 1989. P. 3-42, Surface Water.
DOE_Environmental_Survey.pdf.
[12] Ibid., 3-42
[13] Ibid., 3-52/53 Table 3-14, Characterization of Runoff Waters
[14] Ibid., 3-42
[15] Groundwater Resources, *"Assessment of Pond Sediments,"* 1990.
Ponds_Radioactivity.pdf

In 1959 the system was still under construction and relied on a "master plan" to "meet requirements at the new Engineering Building in Area I and the expanded A.I. [Atomics International] Facilities in Area III."[16] Analysis of reclaimed water was requested by A.I. and revealed that since the Site-Wide Water Reclaim System had been "activated without a filtration system of any kind,"[17] the water had "impurities" that would make it unsuitable for its dual purpose: to use in fire extinguishers and as flame-bucket coolant. Grave concern was expressed about the potential corrosion such a hazardous mixture posed to valuable equipment. No concern was expressed about worker safety or environmental impact.

It is noteworthy that it was not Rocketdyne to request the testing of ponds in Areas I, II, and III; it was Atomics International [Area IV]. It was decided that subsequent recommendations for "changes in treatment and water testing practices would be passed on to Atomics International," since they'd expressed concern about water quality. Had A.I.'s industrial effluent and contaminated wastewaters been confined within Area IV boundaries and all operations kept separate as we are told today, it is unlikely that Atomics International would have given the water in Areas I, II, or III a second thought.[18]

Throughout SSFL historical documents, Atomics International (DOE) is repeatedly documented as present and operating in Areas I, II and III.

Maps of the interconnected systems (The Boeing Company) can be reviewed on pages 15 and 16. High-resolution images are included on the disk accompanying this Guidebook.

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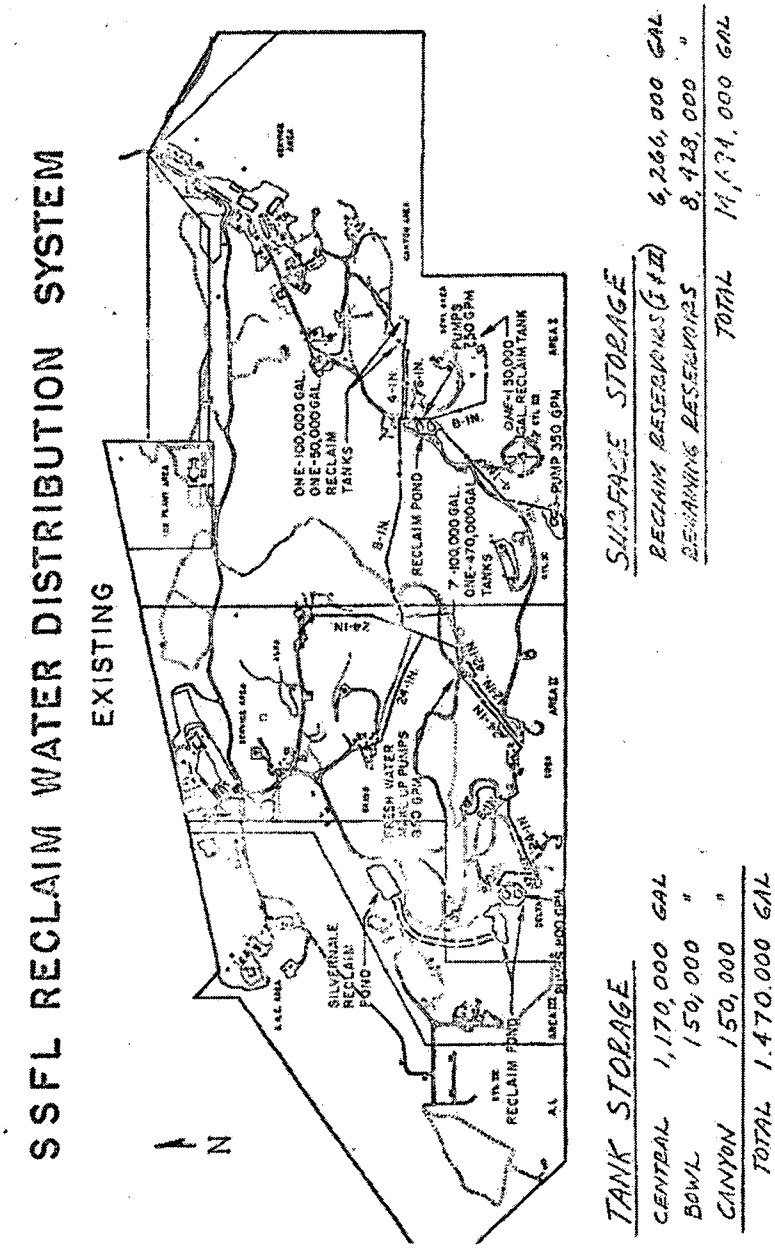
[16] Wright, B.L., Rocketdyne Inter-Office Letter, Monthly Water Report, March 1957. HDMSE00404527.pdf

[17] Breese, L.S. Rocketdyne Interoffice Letter, July 1957. "Data for Reclaimed Water Treatment." HDMSt00014723_2.pdf

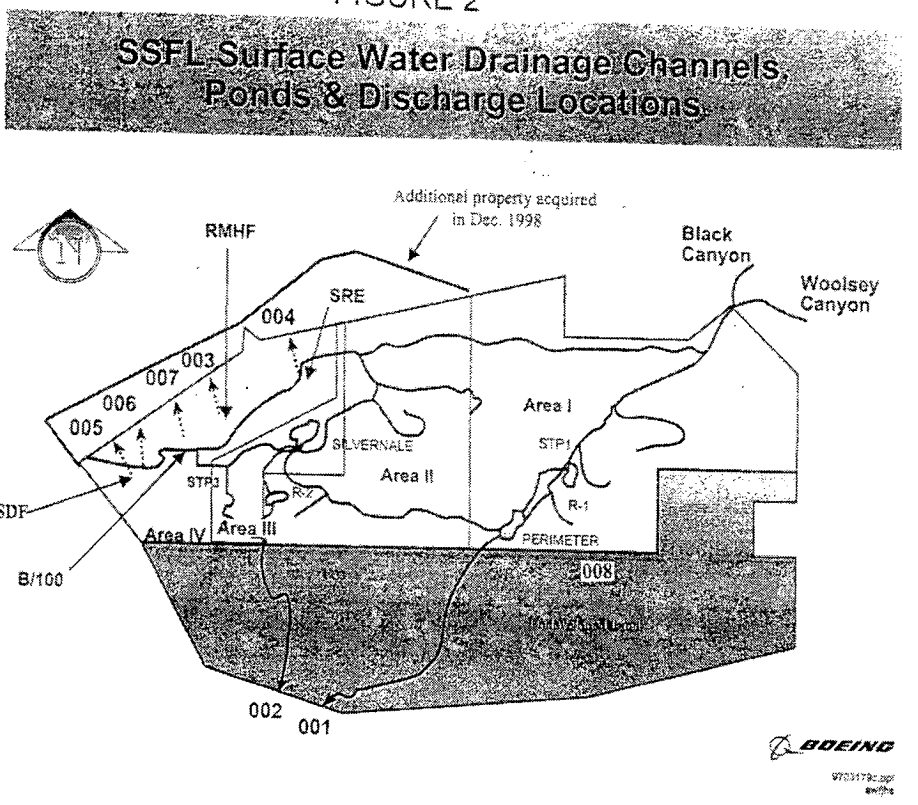
[18] Ibid.

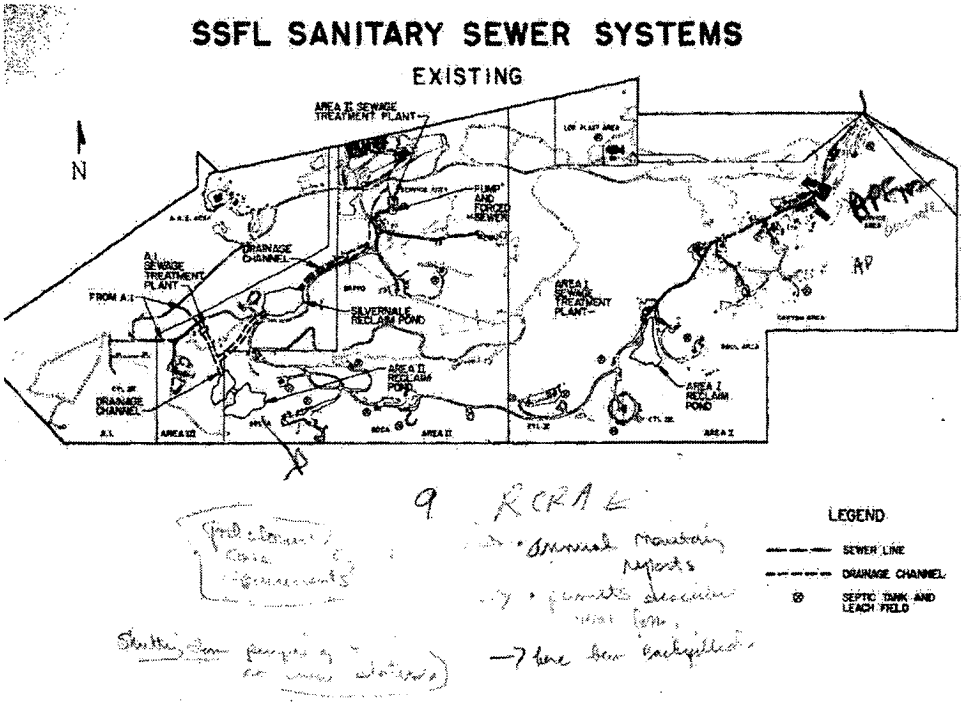
The Boeing Company's Map of the
Site Wide Water Reclaim and Surface Water Drainage[19]



[19] The Boeing Company, "*SSFL Reclaim Water Flow Schematic,*" ssflonsitewatersystems.pdf

FIGURE 2


SSFL Surface Water Drainage Channels, Ponds & Discharge Locations
Additional property acquired in Dec. 1998
RMHF
Black Canyon
Woolsey Canyon
SRE
004
003
007
006
005
Area I
SILVERNALE
STP1
Area II
STP3
R-2
R-1
FSDF
Area IV
Area III
PERIMETER
008
B/100
002
001
BOEING


SSFL SANITARY SEWER SYSTEMS
EXISTING
AREA II SEWAGE TREATMENT PLANT
N
A-1 SEWAGE TREATMENT PLANT
DRAINAGE CHANNEL
FROM A-1
SILVERNALE RECLAIM POND
AREA II RECLAIM POND
AREA I SEWAGE TREATMENT PLANT
AREA I RECLAIM POND
LEGEND
SEWER LINE
DRAINAGE CHANNEL
SEPTIC TANK AND LEACH FIELD

DOE: Surface Water Monitoring Program

• DOE noted in 1989 that the SSFL/Area IV surface water monitoring program failed to include periodic sampling of runoff leaving the site and entering Meier or Runkle Canyons to the north of Area IV, possibly resulting in undetected releases of contaminants off-site.[20]

• Questions were raised about adequacy of the monitoring system, since asbestos detection behind the Area IV
revealed 225 million structures per liter, of which 165 million were chrysotile fibers, and this release remained undetected until Proposition 65 (State of California) mandated appropriate sampling measures.[21]

DOE: Groundwater Monitoring Program

"There is no formal groundwater monitoring program on the DOE optioned land at SSFL [which includes some areas beyond Area IV]. The Environmental Control Unit, contained within the Operations Division of Rocketdyne, has been responsible for performing the site-wide monitoring program and investigations relative to closure of approximately 10 ponds at the SSFL site. Although none of these ponds are in Area IV, five monitoring wells were installed in Area IV.[22]... The groundwater monitoring program is inadequate at known or suspected sources of contamination. The groundwater monitoring program has a number of inadequacies that make it difficult to reliably monitor or accurately characterize groundwater contamination."[23]

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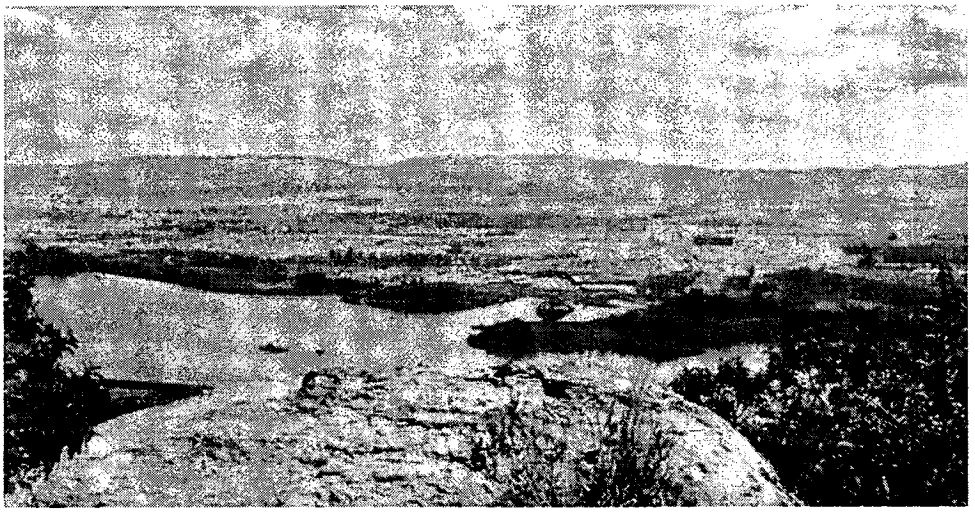
[21] DOE, "Survey: DOE Activities at SSFL," 1989. DOE_Environmental_Survey.pdf
[22] Ibid., 3-66
[23] Ibid., 3-69



Chatsworth Reservoir, c. 1962 Courtesy,

The Chatsworth Reservoir

Chatsworth Reservoir operated from 1919 to 1969 as an agricultural and residential reservoir. Maps show several drainage routes from Santa Susana Field Laboratory (SSFL) to the reservoir, which was functional for 21 years' of SSFL operations. In 1969, due to "water quality" issues, diversion dikes were constructed to divert run-off from SSFL away from the reservoir. Until that time, it was allowed to enter Chatsworth Reservoir from several inlets.

AEC Research and Development Reports on Environmental Monitoring[24] detail samples taken from the supply inlets. In 1961, it was noted that beta-gamma radioactivity showed a "definite increase" over the previous quarter, and radiation readings of the lake water were consistently higher than the samples taken at various supply inlets. Special efforts were undertaken to explain the high radiation readings by connecting them to atmospheric nuclear testing being conducted by the Russians, rather than having

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[24] Atomics International, 1962. "Environmental Monitoring Semiannual Report, January 1, 1962 to June 30, 1962," AEC Research & Development Report pp. 6-8. Environmental_Monitoring-1962Q12.pdf

anything to do with the experimental nuclear facility nearby, draining into the creeks that fed the reservoir.

In 2004,
and
based on radiation mass balance calculations using Rocketdyne data (1960-1970) on radiation measurements at Chatsworth Reservoir. reportedly offered a grant if he agreed to increase the scope of his study to include chemical and radioactivity data. expressed discomfort at being under contract to provide data that could be used against his former employer and opted out, but agreed to share data developed in the course of writing his thesis.

observed that radioactivity would be unlikely to pose a problem, since 1969 "improvements" (construction of the diversion dikes) and subsequent drainage of the reservoir had addressed shallow areas and other issues arising from stream input from SSFL (thus acknowledging that input from SSFL had occurred and likely contained hazardous substances). He then acknowledged that it was likely his mass balance analysis would show inflow to be highly radioactive.

When he learned the foundation with which he was sharing data alleged to have documents proving that Los Angeles Department of Water and Power (LADWP) had knowingly distributed water contaminated with chemicals and radioactive material to the public, abandoned his thesis. He suggested to LADWP to, "be prepared to address the issue; it was going to come up whether or not I provided the inflow data."

Subsequent analysis detected radioactivity and combustible chemical constituents related to SSFL operations, noting the reservoir "is the terminus for drainage from the western portion of the lab." The western portion of SSFL is Area IV, the nuclear area.[25] Areas I, II and III are located in between Area IV and the Chatsworth Reservoir.

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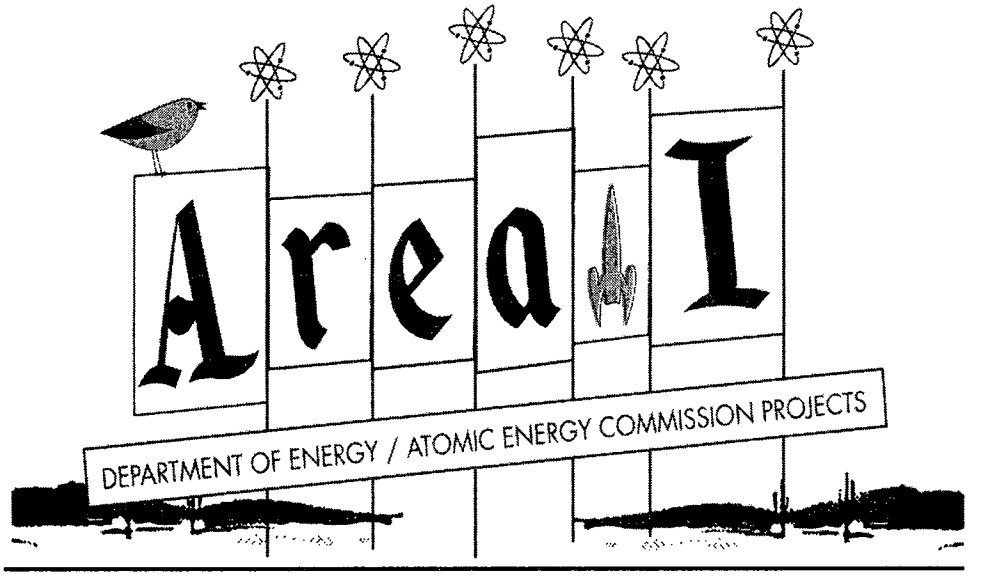
[25] Plumb, Clifford. "*Draft, Chatsworth Reservoir Environmental Site Investigation for Los Angeles Department of Water and Power (LADWP),*" *2004.*



Area I was accessible to all SSFL employees.

AEC-DOE Projects in Area I:

- Atomics International (DOE) MOC Fuel Tower
- Atomics International AEC License to use St-90 at Chem-Lab
- Laser Engineering Facility (LETF)
- Radionuclides & Off-Site Contamination (LOX)
- Waste Storage at The Bowl Test Area and Area I Land Fill (AILF)
- Atomics International (DOE) Uranium Carbide Fuel Fire (B/901)
- Beryllium Use and Contamination at Happy Valley
- Steam Accumulation Blowdown Evaluation Rig (SABER)
- Coal Hydropyrolysis Conversion Test Facility
- Waste Disposal in the Area I Burn Pit
- Area IV Water to Site-Wide Reclaim Water System

Area I: MAIN GATE

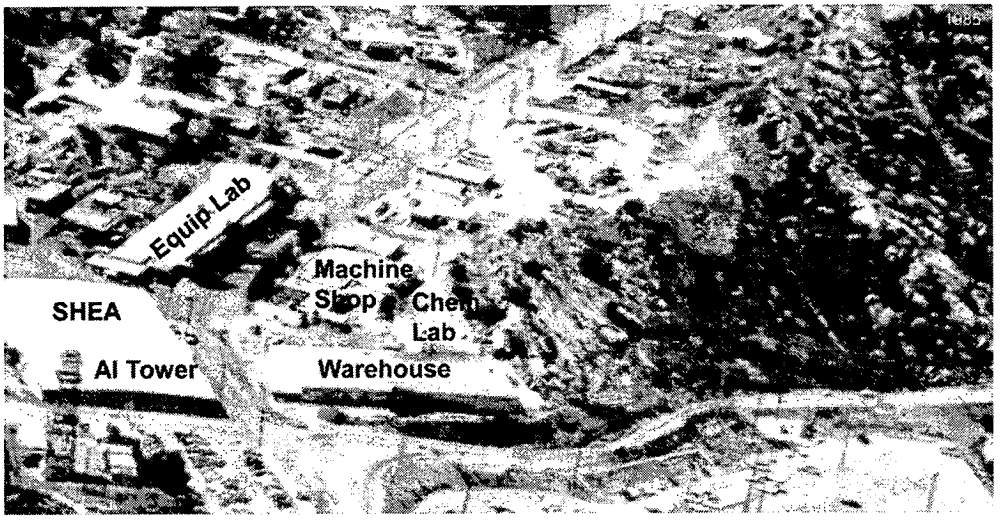
The Main Gate is located at the end of Woolsey Canyon Road and Black Canyon Road. Woolsey Canyon Road was constructed by the Contractor and has provided access to SSFL Area I since 1948, used by all trucks, construction deliveries and equipment, site personnel, and all deliveries of hazardous substances.

Woolsey Canyon Road winds down the mountain to the San Fernando Valley, and the Chatsworth Reservoir. Black Canyon Road is a treacherous switchback access road that resolves in the Knolls area of the Simi Valley.

From the Main Gate, which provides entrance to Area I, SSFL stretches before you in a westerly direction. Each area (I, II, III and IV) is sequential. To access Area IV, one must travel across Area I, Area II, and Area III.

Photo (c. 1993) courtesy of

Area I: ATOMICS INTERNATIONAL MOC Fuel Rod Tower



Above, the Atomics International (AI) MOC Fuel Rod Tower (located in the bottom left-hand corner of the photograph, near the SSFL Main Gate).

• 1950's – 1960's: The Atomics International (A.I.) MOC Fuel Rod Tower was used in the Tower Experiment (1952) and to support the Sodium Reactor Experiment (SRE), a DOE Area IV project.[26]

• The location of the Area I A.I. Tower is an area of radiological interest to the California Department of Toxic Substances Control (DTSC) due to fuel rods stored for the SRE mock-up tests, which were conducted here.[27]

"I remember one guy wanted to develop new instrumentation to measure sodium flow. He needed a sodium tower so he could take advantage of gravity flow. He submitted a proposal requesting two kinds of funding, expense (wages, purchases, etc.) and capital (buildings, etc.) The expense portion was approved. The capital portion was rejected, leaving him with approval to proceed, but no facility to proceed in. He got a guy in facilities engineering to design him a tower made up of a small variety of standardized

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[26] California Department of Toxic Substances Control (DTSC), "*RCRA Facility Investigation (RFI) Data Gap Work Plan*," 2013. 66074_1Anorth_PublicMeeting_05163_rev8_draft.pdf

[27] Carpenter, P., PG, CHG California Environmental Protection Agency, "*Santa Susana Field Laboratory RCRA Facility Investigation Report, Group 1A.*" 3830_GROUP1ARFIREPORT.pdf

components, submitted purchase requisitions (each just under the amount which would have been routed to me for review), personally hijacked a cement truck intended for another project on the hill, had PhD's out working with wrenches and trowels constructing his tower, and got the job done – which made him a hero within the technical community, but not to me. Once the new building had been built, an AEC guy saw it on a new aerial photo and said, "What's this?" He obviously hadn't approved the construction. The scientists were forever trying to figure out a way to work around the administrators. The sodium tower was located in the AEC Triangle."[28] *– SSFL Employee,*

Note: The above statement illustrates the improvisation and innovation among employees that made SSFL's achievements possible. It also brings our attention to AEC's failure to keep track of employees and their activities at all times. Note that employees referring to the "AEC Triangle" in Area I acknowledged that it was known among the workforce that Atomics International (AEC-DOE) maintained operations well beyond Area IV boundaries.

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[28] DOE-EPA, "H.S.A. SSFL Employee Interviews," 2009.

Area I: Research Center Building / Chem-Lab

AEC-DOE:
AEC License to Store St-90.

1958-1959: An application was submitted by Rocketdyne's Special Project Group to AEC to use St-90, in collaboration with Atomics International (AEC-DOE) to provide health physicists and leak tests every six months. Employees to handle the material had gained experience during past employment at AEC-DOE facilities, Idaho Falls and New Brunswick Laboratory.[29]

1960: AEC provided product material license and specified that material would be exclusive to the Area I Research Center Building Chemistry Laboratory, in collaboration with Atomics International (AEC-DOE) to provide health physicists and leak tests.[30]

"I was a *at SSFL; I had access to the entire site."*[31]
– SSFL Employee,

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[29] North American Aviation, Inc., "*Application for Byproduct Material License, Form AEC-313,*" (1959 & 1960). ML072540416.pdf / ML072540403.pdf
[30] AEC, "Product Material License." strontium_area1.pdf
[31] DOE-EPA, "H.S.A., SSFL Employee Interviews," 2009. 4_Appendix-B_Draft-Final_Interview_Report.pdf / Former_Worker_Interview_Final_Report.pdf

Area I: LETF/CTL I
Laser Engineering Test Facility, Pond, and Components Test Lab I

AEC-DOE:
Laser Engineering / Coal Gasification

• Active from 1949 – 2000's for variety of uses, from rocket engine component testing and machine shop, to DOE laser and coal gasification programs.

• LETF Pond: Site of Radiological Concern: Tritium discharge in the 1980's (DOE).[32]

The LETF and CTL-1 were used by DOE to test Coal Gasification technology. This location was eventually deemed undesirable for continued use due to the mutually-exclusive nature (explosion hazards, experimental hardware, and non-coded vessels) of testing competing programs in direct proximity to one another.[33] A proposal to relocate the facility and modify existing structures was submitted.

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[32] Carpenter, P., EPA, "SSFL RCRA, Group 1A."
3830_GROUP1ARFIREPORT.pdf
[33] Rockwell International, "Coal Hydropyrolysis Conversion Test Facility."
HDMSt00012824.pdf

Area I: LOX
Liquid Oxygen Facility

AEC-DOE:
Cesium, Strontium, and Tritium Found.

• Located near Outfall 009 and Northern Buffer Zone in a "Non-Nuclear Area." Radiological contamination discovered off-site; resulted in the 1998 purchase of the Northern Buffer Zone.

• Cesium-137, Strontium-90, Tritium findings current to January, 2013.[34]

• The Boeing Company acknowledged discovery of Cesium-137, Strontium-90, and Tritium, which exceeded maximum local background (September, 2009) and informed the Chief Radiological Health Branch of the California Department of Public Health that soil removal would occur to mitigate NPDES storm water run-off exceedances. The Boeing Company further indicated soil would be disposed of at a Class 1 Hazardous Waste Landfill.[35]

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[34] MWH, November, 2012. "*Outfall 009 ELV-1C Waste Characterization Sample Location Map.*" NASA-CESIUM-CONFIRM-JAN2013.pdf

[35] The Boeing Company, SHEA-109081. Rutherford, P., Butnger, G., Chief, Radiologic Health Branch, California Department of Public Health, Re: "*Disposal of ISRA Outfall 009 Soil to a Class-1 Hazardous Waste Landfill.*" SSFLCDPHDisposalReq_1.pdf

Area I: AILF - Old Area I Landfill

AEC-DOE:
Site of Radiological Interest
Potential AEC-DOE waste disposal and storage.

• Potential radiological issues due to unscreened debris disposed of between 1949-1970.[36]

• No records of landfill inventory exist for this location, which also contains a leach field.[37]

• Consists of approximately 2.4 acres and is located in the Boeing portion of Area I. From the 1970's to recent years, the surface of the landfill was used for equipment storage.[38]

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[36] DTSC, "RCRA Data Gap Work Plan," 2013. 66074_1Anorth_PublicMeeting_05163_rev8_draft.pdf
[37] Ibid.
[38] Ibid.

Area I: CTL II
(Components Test Lab II)

AEC-DOE:
Documented Waste Storage and Possible Disposal

1989: DOE documented storage of DOE waste in Building B-231, part of the CTL-II complex located near rocket engine test stands.[39] Workers from all areas of SSFL could access this area without restriction.

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[39] DOE, "*DOE Activities at SSFL*," 1989. Page 4-18. DOE_Environmental_Survey.pdf

Area I: The Bowl Test Area
Test Stands, Retention Pond, Skim Pond & Control Center

AEC-DOE Projects:
Coal Hydropyrolysis Conversion Test Facility
Steam Accumulator Blowdown Evaluation Rig (SABER)
Sigma Tau Deuterium Fluorine (STDF) Laser
Liquid Fluorine Laser (The Rachel)
Waste Storage & Disposal
Site-Wide Water Reclaim (Retention Pond)

• First test stand area established at SSFL consisting of three Vertical Test Stands (VTS-I, VTS-II, VTS-III) originally used for rocket engine testing.

• **DOE Coal Gasification, DOE Contract # EX077-C-01-2518:** ¼-Ton Per Hour Coal Hydropyrolysis Conversion Test Facility required construction and modification of existing VTS test stands.[40]

• "... Two Flash Hydropyrolization (FHP) facilities in the Bowl Area were operated jointly by Rocketdyne and the DOE ..." [Records for disposal of hazardous waste (gas, light and heavy oils, Benzene, Toluene, Xylene (BTX) and char residue, reportedly allowed to sit in drums at the bottom of the Bowl Area for an undeterminable amount of time, could not be located].[41] "Green Liquor" wastewater was generated, and at one time, approximately 80,000 gallons of green liquor were in storage.[42]

• **DOE SABER:** (Steam Accumulator Blowdown Evaluation Rig), resulted "from an agreement with DOE for ETEC (Energy Technology Engineering Center) to provide steam valve testing services, and is classified as a development project."[43] It was allocated to a DOE contract with the Morgantown Energy Office

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[40] Rockwell International, "*Coal Hydropyrolysis Conversion Test Facility.*" HDMSt00012824.pdf
[41] Report, 1992. "*Bowl Area: (Bowl Retention Pond, Bowl Skim Pond, and Bowl Test Stands).*" HDMSp01739799.pdf
[42] DOE, "Survey: DOE Activities at SSFL,"1989. Page 4-5. DOE_Environmental_Survey.pdf
[43] Rockwell International, *"SABER Memorandum,"* 1989. HDMSP00019780.pdf

for use in a coal liquefaction process development project.

"The gamma densitometers were designed, manufactured and tested by a Nuclear Regulatory Commission licensee and are certified to meet the regulatory requirements for transportation from the manufacturer to the SSFL site and for the intended use in the LSSVT [Large Scale Steam Valve Test]." [Cesium-137] "The Rocketdyne site permit for the possession and use of radioisotopes covers use of the gamma densitometers in the LSSVT.

"An 'Authorization for Use of Radioactive Materials or Radiation-Producing Devices' (Authorization Number 152) has been issued and is available at the SABER facility."[44]

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[44] Ibid., References: ETEC letter, DOE-SAN, "WFO Checklist and Revision B to Field Work Proposal ID #6951, 88-ETEC-DRF-295, December, 1988.

Area I: Buildings 901, 923, 934

AEC-DOE:
Radiological Incident Documented
SABER (ETEC)
DOE-optioned land

Building 901: (1959) Atomics International (AEC-DOE) personnel opened a container that was under vacuum, wherein a Uranium-Carbide slug oxidized rapidly and ignited tissue wrapping. This incident report was used by SC&A in the SSFL Site Profile (without noting that the incident occurred in Area I).[45]

Building 901 was later used as the pre-test building for DOE-ETEC's Steam Accumulation Blowdown Evaluation Rig (SABER). The test system design, procurement and construction management was performed by ETEC (DOE) in Area I on DOE-optioned land.[46]

Building 923: SABER test facility, civil works, and structure building.

Building 924: SABER steam system building.

Building 934: SABER control room.

SABER was formerly known as, "VTS-3" and was originally used for rocket engine tests. Later, in the 1970's, it was allocated to a DOE contract with the Morgantown Energy Office for use in a coal liquefaction process development project.

"I had a supervisor that heated uranium carbide in a cement mixer in a shed to dispose of it." – SSFL Employee

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[45] Atomics International, "*Radiological Incident Safety Report: Area I, Building 901*," August 1959. Bldg901_1959.pdf *Used in SC&A Site Profile, SSFL
[46] Rockwell International, *"SABER Memorandum,"* 1989. HDMSP00019780.pdf
[47] DOE-EPA, "H.S.A. SSFL Employee Interviews," 2009.

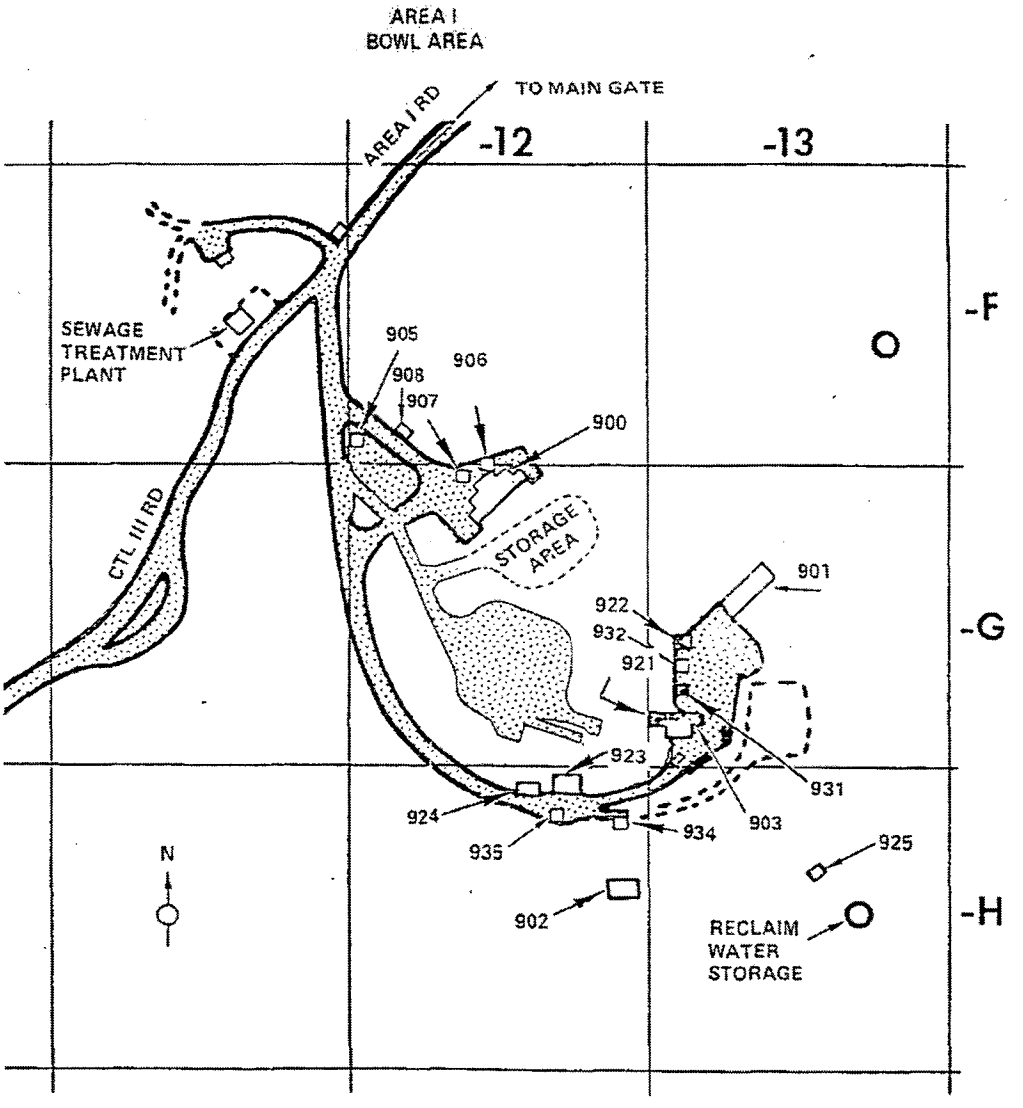

Figure 2 Location of Bowl Area Facilities

HDMSP00019783

Diagram Above:
From the report, "*Steam Accumulator Blowdown Evaluation Rig (SABER) Action Description Memorandum*," HDMSP00019780.pdf

Area I: Happy Valley
Building 387, The Old Chem-Lab, and Other Areas

AEC-DOE:
Beryllium Manufacturing[48]

Active since 1948. Accessible to all personnel without restriction.

• 1964: Beryllium contamination tests revealed levels to exceed recommended allowance in several locations, deemed inaccurate to "unknown degree" due to readings that exceeded limits of analytical testing equipment available at the time.

• Excessive contamination noted throughout Building 387 and the Old Chem-Lab. All other areas in Happy Valley (including the soil) were deemed to be within an acceptable range, indicating that all areas of Happy Valley were subject to Beryllium exposure.

• The addition of a ventilation system and provision of respiratory gear for workers were recommended, indicating that prior to 1964, no such concerns existed.

"In Area I, on a hill overlooking Happy Valley, is or was a mix building, where beryllium projectiles were manufactured. There was a tank set down in the hill to catch excess beryllium attached to the building by a hose. we cut off that hose and let beryllium go to the ground because of a structural issue with the tank." - *SSFL Employee,*

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[48] NAA., "Study: Happy Valley, SSFL," 1964. HDMSe00420866.pdf
[49] DOE-EPA, "H.S.A., SSFL Employee Interviews," 2009. 4_Appendix-B_Draft-Final_Interview_Report.pdf / Former_Worker_Interview_Final_Report.pdf

Area I: R-1 Reclaim Pond

R-1 Pond served the Canyon Test Area and was part of the Site-Wide Reclaim Water System.

According to DOE, "As the supply of water in this part of the system exceeds demand, Pond R-1 overflows to a smaller pond, identified as Perimeter Pond. A few times a year, Perimeter Pond discharges treated effluents and collected runoff water to Bell Canyon Creek ..."[50]

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[50] DOE, "Survey: DOE Activities at SSFL," 1989. P. 3-39 DOE_Environmental_Survey.pdf

Area I: CTL III (Components Test Laboratory III)

AEC-DOE:
Conversion to a Laser Testing Facility, c. 1970's

1950's: Pump Test Facility for J-2, Atlas, and F-1 Engines
1960's: Module 3 converted to test J-2 Engines
1970's: Modules deactivated and converted to Laser Test Facility
Sigma Tau Deuterium Fluorine (STDF) Laser
"The Rachel" (Liquid Fluorine Laser) [51]

"The Sodium Burn Pit stayed in the same place. We had other disposal areas in Area I and in Area II near CTL-3."
– SSFL Employee
Note: Likely reference to the Area I Burn Pit, which is located near CTL-III.

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[51] RCRA, "*Report on Solid Waste Management Units, Draft, Area IV.*" Includes several SWMU's located in Areas I, II and III. HDMSe00399178.pdf
[52] DOE-EPA, "H.S.A. SSFL Employee Interviews," 2009. Former_Worker_Interview_Final_Report.pdf / 4_Appendix-B_Draft-Final_Interview_Report.pdf

Area I: CTL V (Components Test Laboratory V)

AEC-DOE:
Chosen as the least-costly alternative for the relocation of DOE's Coal Gasification Research Program.

1978: It was decided that CTL V would be the least costly alternative for the relocation of DOE-sponsored Coal Gasification Research[53], which would involve the modification of existing facilities and the construction of new structures, on behalf of DOE under contract #EX077-C-01-2518, which may satisfy legislative criteria used to determine a DOE Facility under 42 U.S.C. § 7384l(12), Section B (proprietary interest).

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[53] Rockwell International, "Coal Hydropyrolysis Conversion Test Facility." HDMSt00012824.pdf

Area I: Burn Pit

AEC-DOE
Waste Disposal

• DOE: "In addition to these actual and potential hazardous-substance release locations, one additional area at SSFL appears to have received waste and flammable solvents and waste oils (for fire training exercises) from DOE-sponsored activities. This area is the Area I Burn Pit. ... After 1970 when there was only one fire department on the Hill, waste from Areas I-III sometimes went to the B/886 Sodium Burn Pit [Area IV] and Area IV waste sometimes went to Area I."[54]

• Radioactive isotopes in the Area I Burn Pit are still under review and characterization: Cesium-137, Europium-152, Lead-210, Polonium-210, Radium-226, Thorium-230, Uranium-233/234, Uranium-235/236, Uranium-238.[55] Cesium-137 bound on both drainage tanks.
• Historical monthly waste disposal logs document Area IV waste transport and disposal in the Area I Burn Pit. Transport required crossing Areas III and II to arrive in Area I.[56]
• Storm water runoff was allowed to course through the Area I Burn Pit on its way off-site.[57]

"Beginning in 1958, I worked in Rocketdyne . until this department was split and discontinued in 1961. During this time, I and other would get weekly or bi-weekly deliveries of sodium in chunks (in barrels or bags) to dispose of in the Area I Burn Pit."– SSFL Employee,

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[54] DOE, "Survey: DOE Activities at SSFL," 1989. Page 4-47, Paragraph 6. DOE_Environmental_Survey.pdf
[55] to The Boeing Company, "Addendum to Master RFI Data Gap Work Plan – Radioactive Isotopes, Area I Burn Pit RFI Site, Santa Susana Field Laboratory," June, 2014. 66401_Master_RFI_Data_Gap_Work_Plan_Addendum_-_Radioactive_Isotopes_-_Area_I_Burn_Pit.pdf
[56] Rocketdyne, *"Monthly Report, Pits," 1960.* rocketdyneburnpitlog3_1_1960.pdf
[57] Fujikawa, N., Rockwell International Interoffice Memo, *"The Leachable Legacy,"* 1983. Leachable_Legacy.pdf
[58] DOE-EPA, "H.S.A. SSFL Employee Interviews," 2009.

Area I: Perimeter Pond

AEC-DOE

Part of SSFL's Site-Wide Water Reclaim System
(Serving Areas I, II, III and IV)

• Reclaim ponds occasionally overflowed, resulting in surface water coursing through burn pits and across leach fields and burial sites, before draining off-site.[59]

• Rockwell International: "The runoff from R2A and the Perimeter Pond combine in the natural flow pathway that is about ¼ mile from the property line. After the property line has been reached, the water goes down the Bell Canyon, over natural terrain, and could conceivably trickle its way to the Boise Canyon Housing Development which lies beyond."[60]

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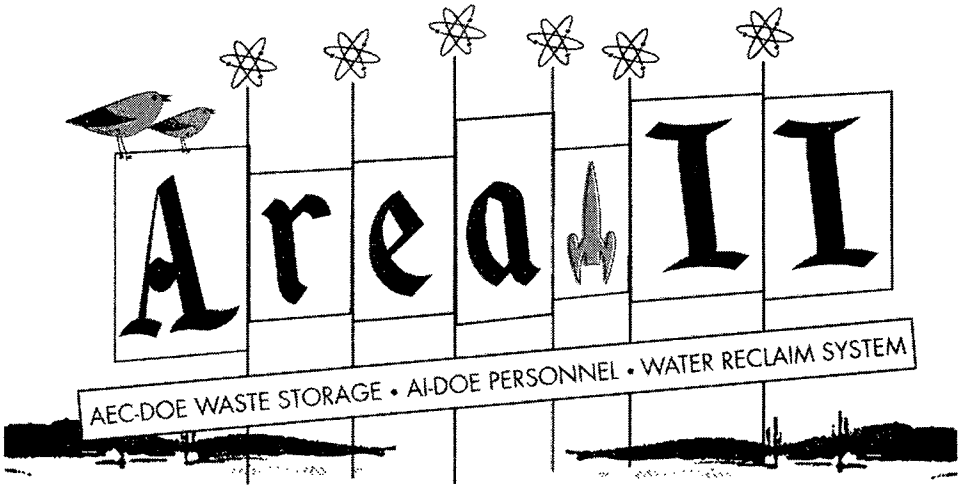
[59] Science Applications International Corporation (SAIC), *"RCRA Facility Assessment Report for Rockwell International Corporation, Rocketdyne Division, Santa Susana Field Laboratory,"* 1991. U.S. Environmental Protection Agency. RCRA_1991.pdf

[60] Fujikawa, N., Rockwell, "Run-Off Dilution, Ponds." HDMSE00368310.pdf



Area II was accessible to all SSFL employees.

Sites of Interest in Area II:

- Area II Building 203 Machine Shop[61]
Atomics International Personnel Monitored for Radiation Exposure

- Area II Hazardous Waste Storage Facility[62]
DOE Waste Storage Prior to Area I Burn Pit Disposal

- Area II R-2 Reclaim Ponds[63]
Received Area IV Wastewaters via Site-Wide Reclaim Water System

- Proximity to the Area I Burn Pit (Area IV waste disposal).[64]

- Area II: Unrestricted access to Area IV S.E. Drum Storage Yard.[65]
Open Access to Area IV Waste Storage, Shared by DOE-NASA

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[61] EEOICPA Claimant. Redacted records provided upon request.
[62] DOE, "Survey: DOE Activities at SSFL," 1989. Page 4-14 DOE_Environmental_Survey.pdf
[63] Ibid., 3-39
[64] Rocketdyne, *"Monthly Report, Pits," 1960.* rocketdyneburnpitlog3_1_1960.pdf
[65] DOE, "Survey: DOE Activities at SSFL," 1989. 4-61. DOE_Environmental_Survey.pdf

Area II: Building 203 Machine Shop
(a.k.a. Atomics International Machine Shop / Laser Lab)[66]

AEC-DOE

Personnel Monitored for Radiation Exposure
Documented job duties in Area IV & DeSoto Facility (SEC)
Radionuclides Discovered / Off-Site Contamination

• Employee's have referenced this location as, "The Atomics International Machine Shop," indicating knowledge among personnel that Atomics International (AEC-DOE) operated beyond Area IV.[67]

• Records show Atomics International personnel with dosimeter badges were employed here for years; documented at various locations in Area IV and DeSoto Facility regularly, performing jobs that involved radiation exposure. Additionally, "unknown locations" corresponding to dosimeter issuance and usage locations, coupled with an Area II designation, bring into question the likelihood that radiation exposure occurred in Area II, coincidental to discovery of Cesium-137, Strontium-90, and Tritium at this location.[68]

• Whether we view this scenario as an Area IV worker employed in Area II while monitored for radiation, or an Area II worker given a radiation badge and allowed entry to Area IV, DOE can no longer claim that nuclear personnel were confined to Area IV.

• Please note the proximity of this building to the Northern Buffer Zone, where off-site radiological contamination resulted in the purchase of property in 1998.

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[66] The Boeing Company, *"Hazardous Materials Release Response Business Plan and Inventory,"* 1999. Page 23. HDMSe00143109.pdf
[67] DOE-EPA, "H.S.A. SSFL Employee Interviews," 2009.
[68] Boeing, Rutherford-Butnger, "ISRA Outfall 009," SSFLCDPHDisposalReq_1.pdf

Area II: Hazardous Waste Storage

AEC-DOE

Hazardous waste improperly stored.

• DOE acknowledged storage of DOE-generated hazardous wastes at this location, as well as inadequacies in the facility that likely resulted in the "improper storage or release of DOE wastes."[69]

• Insufficient dikes and poorly paved (or unpaved) storage areas failed to allow proper segregation of incompatible wastes. Insufficient aisle space between containers impeded access. Leakage and spillage was apparent on inspection and in aerial photos, but no inventory data exists. Storage of containers outdoors, where temperatures fluctuate between freezing in the winter months and in excess of 100 degrees in summer led to swelling of drums, rusting, and leakage.[70]

• Area I Burn Pit Records detail Area IV (DOE) hazardous waste being transported to this area for storage prior to disposal in the Area I Burn Pit.[71]

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[69] DOE, "Survey: DOE Activities at SSFL," 1989. Page 4-14, Item 3. DOE_Environmental_Survey.pdf

[70] Ibid., Page 4-4, Finding 4.1.2.4.3

[71] Rocketdyne, *"Monthly Report, Pits," 1960.* rocketdyneburnpitlog3_1_1960.pdf

Area II: Alpha, Bravo, COCA, and Delta Test Areas

AEC-DOE

Several locations provide line-of-sight to Area IV operations.
All locations access ponds served by Site-Wide Reclaim Water and Surface Water Drainage System.

Many of the rocket engine test stands, like COCA, provide unobstructed views of Area IV nuclear facilities and waste disposal ponds and pits. Workers at test stands worked outdoors and downwind from the nuclear area. They relied on water from the Site-Wide Reclaim Water System to flush test stands and work areas, and even to wash their hands or lunch boxes, etc. They were never warned of releases of radionuclides, their proximity to burning radiological waste, or that ponds were contaminated with industrial effluent from Area IV.

"I remember the dumping in Area IV. We'd hear two explosions; one when the sodium hit the air, and the second when the sodium hit the water, which created a reactive explosion. A silvery mist would engulf the mountaintop where we were working. Black sludge rained down on us; everybody scrambled for Kim-Wipes to wipe down their faces and hardhats, and pulled up their collars. We asked the safety inspector if that stuff was hot [radioactive] and he'd look so disgusted. He'd say, 'You mean to tell me you think North American Aviation, much less the United States Government, would risk the health and safety of those dedicated to the space program?' After trying to shame us for our concern, he'd tell us to get back to work. I'd wonder if all that overtime was really going to pay off, and get us to the moon. I guess it did. But they knew the whole time the risks we were taking. And we didn't. Now that we've all got cancer, the Department of Labor won't even consider most of us eligible for the program. [EEOICPA]."

Area II: R-2A & R-2B Reclaim Ponds

AEC-DOE

"All Area IV towers release their blowdown to the drainage ditch, which eventually leads to Pond R-2B [Area II]."[72]
– U.S. Department of Energy

• DOE: "One of the largest sources of industrial wastewaters under DOE control is the Sodium Components Test Installation (SCTI) located in Building 356 [Area IV] ... wastewaters then flow by gravity to Pond R-2B ... The brines from [reverse osmosis] are also released to Pond R-2B for reclaim." [73]

Other Area IV Contributors to R-2 Pond via Water Reclaim and Surface Water Drainage System:

- Component Handling & Cleaning Facility (CHCF/ Bldg. 463)
- Sodium Burn Pit Facilities
- SRE, SNAP, and MORE[74]
Steam cleaning lances used to remove sodium prior to switching to ethanol instead of water contaminated soils and drainage with heavy metals, organics, and low-level radioactivity (principally Cs-137).[75]

- Old Molten Salt Test Facility (Building 005):
"Another former operation that generated wastewaters was a coal gasification experiment ... Up to a ton of coal was converted to gas, ash, and a hazardous aqueous waste, each hour of operation ... Tests ran for four years (1977-1981) ... Noncontact cooling waters released to the drainage ditch for transfer to Pond R-2B and the Reclaim Water System."[76]

- Hydraulic Test Facility (Building 863)
Tests included use of dilute sodium hydroxide, phenolphthalein, acetic acid. Monthly "losses" from the facility reuse system was about 1,980-3,960 gallons, assumed to have reached the drainage

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[72] DOE, "Survey: DOE Activities at SSFL," 1989. Page 3-45, Paragraph 1. DOE_Environmental_Survey.pdf
[73] Ibid., 3-43, Surface Water.
[74] Ibid., 3-49, Surface Water.
[75] Ibid.
[76] Ibid., p. 3-44

ditch serving Area IV and the R-2 Pond, or to have percolated into the ground.

• Radionuclides were found in samples collected at the R-2 Ponds in 1990, despite selectively biased sampling locations that were common practice, described in DOE's Environmental Survey.[77] [78]

• An incident in the 1960's at the Radioactive Materials Handling Facility occurred when a tank valve opened, releasing radioactive wastewater that was sent to drainage mechanisms that resolved in the R-2 Reclaim Ponds.[79]

• Rockwell International warned of overflow conditions existing in the "interconnected" Water Reclaim System, citing an incident in Area IV when a valve left open for 24-hours flooded the system with nearly 500,000 gallons of water into the already-full R-2 Pond.[80]

"Years ago I did as a member of the and was dispatched to work at the SSFL ... I was assigned to help near the test area for rockets. ... I wore a radiation badge and had to leave the badge at the end of the day." SSFL Employee

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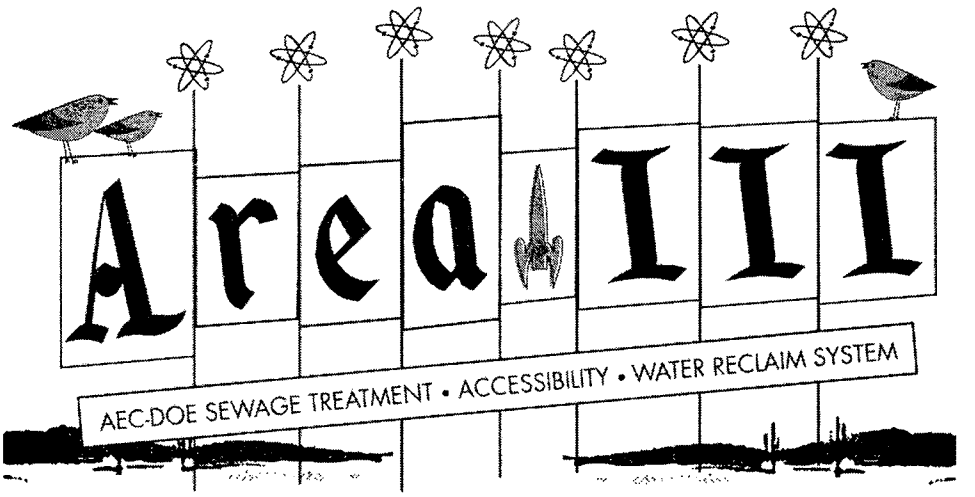
[77] Groundwater Resources Consultants, Inc., "*Assessment of Pond Sediments in R2, SRE and Perimeter Ponds at the Rockwell International Corporation Rocketdyne Division Santa Susana Field Laboratory,*" 1990. Page 12. Ponds_Radioactivity.pdf
[78] DOE, "Survey: DOE Activities at SSFL," 1989. Page 3-34 DOE_Environmental_Survey.pdf
[79] SAIC, 1991. "RCRA, SSFL," EPA. RCRA_1991.pdf
[80] Fujikawa, N., Rockwell International, *"Internal Letter Re: Run-Off and Dilution Effects for the SSFL Retention Ponds."* HDMSE00368310.pdf
[81] DOE-EPA, "H.S.A. SSFL Employee Interviews," 2009.



Area II was accessible to all SSFL employees.

Sites of Interest in Area III:

- Silvernale Reclaim Pond[82]

- Area IV Atomics International Sewage Treatment Plant

This area is immediately adjacent to Area IV. In its northern area, the narrow strip of land provides unrestricted access to the Area IV S.E. Drum Storage Yard, a shared NASA-DOE waste storage area with no waste inventory, unfenced and accessible to all SSFL employees.

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[82] Science Applications International Corporation (SAIC), *"RCRA Facility Assessment Report for Rockwell International Corporation, Rocketdyne Division, Santa Susana Field Laboratory,"* 1991. U.S. Environmental Protection Agency. RCRA_1991.pdf

Area III: Silvernale Reclaim Pond

AEC-DOE

Received drainage from SRE and SNAP Facilities (Area IV)
Part of the Site-Wide Reclaim and Surface Water Drainage System

DOE: "There are two groundwater contamination issues at the B/059 [SNAP, Area IV] building ... The organics contaminated water from the French drain is passed through a carbon filter, stored and analyzed, before being discharged to the surface drainage. In the winter it may reach the Area III [Silvernale] pond."[838485]

"In 1989-90, I was working at Bravo [Area II] and they decided they needed to clean the place up. They came and interviewed me. They asked if we ever dumped anything on the ground. I told the truth, just like my supervisor has always said. Then they came along and told me I wasn't acting like a team player... The catch basin between Alpha and Bravo collected everything that dumped down onto the test stands. It all flushed down and eventually ended up in Silvernale Pond. ... They lost my medical records. Can you believe that? I got a physical every year for 25 years, and now they can't find those records. How could they lose my medical records? Why would they lose my medical records?"[86] *–SSFL Area I, II, III and IV Employee Interview*

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[83] DOE, "Survey: DOE Activities at SSFL," 1989. Page 4-58. DOE_Environmental_Survey.pdf

[84] Tuttle, R.J., CHP, Radiation Protection and Health Physics Services, "*Tritium Production and Release to Groundwater at SSFL,*" 1992. Tritium_Production_at_SSFL.pdf

[85] U.S. Environmental Protection Agency, "*Rocketdyne SSFL Sample Analysis Report," 1989*

[86] DOE-EPA, "H.S.A. SSFL Employee Interviews,"2009

Area III: Atomics International (DOE)
Sewage Treatment Plant (STP)

AEC-DOE

This DOE Facility was located in Area III.
Released Area IV effluent to the Site-Wide Reclaim Water System.

DOE: "Domestic sewage from all areas in Area IV was transferred to the Sewage Treatment Plant (STP) in Area III, which served Areas II, III and IV. The treated effluents from the Area III STP flow by gravity to the R-2B Pond [Area II] as part of the Reclaim Water System."[87]

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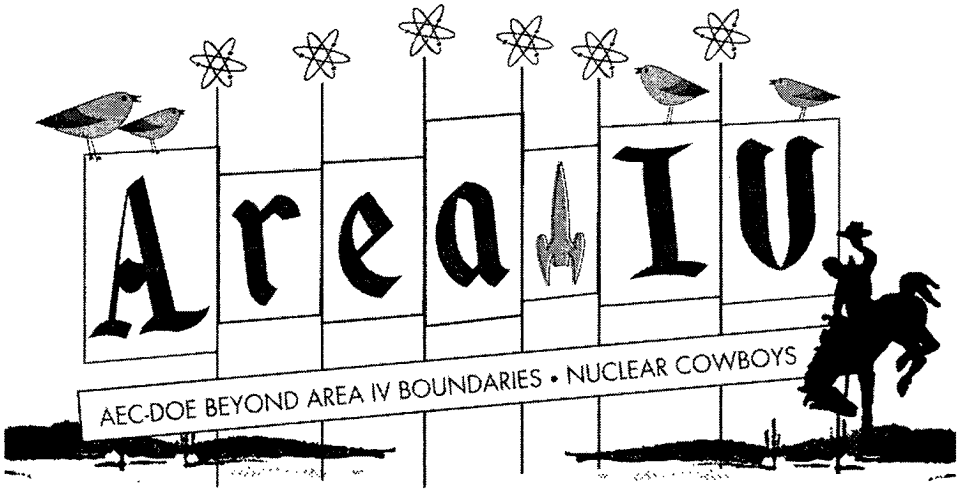
[87] DOE, "Survey: DOE Activities at SSFL," 1989. Page 3-47, Paragraph 2. DOE_Environmental_Survey.pdf



Area IV: The "DOE Area"

"We were learning about and improving our knowledge on safety as we did tests; the policies and procedures evolved as we learned." – SSFL Employee

Since currently only Area IV is considered a "DOE Facility" under EEOICPA, some may prefer to review only the Area IV section of this Guidebook. However, review of AEC-DOE activities at SSFL as they relate to Area IV operations provides sufficient (albeit somewhat redundant) overview while detailing Area IV's potentially site-wide impacts. This section provides:

- A partial summary of AEC-DOE operations supported by facilities or undertaken beyond Area IV

- Notable Area IV Contributors to Site-Wide Reclaim Water System (as described by DOE) and a "Summary of Incidents or Releases" (1969-1989) where remedial actions to spills, pipe ruptures, etc. were remedied by using the Site-Wide Reclaim Water System.[89]

- Waste Storage/Disposal Facility Problems and Accessibility Issues

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[88] DOE-EPA, "H.S.A. SSFL Employee Interviews," 2009.
[89] Summary of Incidents or Releases Pursuant to Lic. SNM-21 or to DOE Activities Conducted in Area IV or in Close Proximity to Licensed Activities Since 1969. Hot_Lab_Closure_and_Accidents.pdf

Partial Summary of AEC-DOE Activities Supported by Facilities or Undertaken Beyond Area IV and Area IV Site-Wide Impacts

AEC-DOE Facilities Beyond Area IV

• Area I

1950's-1960's: AI Tower (SRE support) / AEC Triangle[90]
1970's: Coal Gasification (ETEC support) / SABER[91]
1980's-1990's: Laser Research
Site-Wide Water Reclaim & Surface Water Drainage

• Any AEC-DOE operations at SSFL that supported Area IV activities would require transport of material, waste, and personnel across the facility.

• The purpose of the Site-Wide Water Reclaim & Drainage System was to transport industrial waste and effluent generated in Area IV to Areas I, II and III in order to avoid Area IV flooding and provide flame-bucket coolant to non-DOE areas and personnel prior to off-site drainage.

Atomics International (DOE) Personnel

• Operated DOE facilities in Area I
• Participated in construction activities in Area I[92]
• Were designated Area I, II, or III employees, yet had dosimeter badges with "unknown" issuance and use locations
• Participated in joint DOE-NASA projects (SNAP)
• Delivered waste for storage/disposal to Areas I & II[93]
• Describe undocumented rotation between Areas I, II, III, IV, and SEC Facilities, Canoga and DeSoto[94]
• Participated in using, constructing, servicing, etc. the Site-Wide

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[90] DTSC, "RCRA Data Gap Work Plan," 2013. 66074_1Anorth_PublicMeeting_05163_rev8_draft.pdf
[91] Rockwell International, "Coal Hydropyrolysis Conversion Test Facility." HDMSt00012824.pdf
[92] DOE-EPA, "H.S.A. SSFL Employee Interviews," 2009.
[93] Rocketdyne, *"Monthly Report, Pits," 1960.* rocketdyneburnpitlog3_1_1960.pdf
[94] Ibid.

Water Reclaim System as required

Non-DOE Personnel (Area I, II, III designated employees)

• Describe undocumented worker rotation into Area IV
• Were provided dosimeter badges with "unknown" issuance and use locations, and have Area IV dosimeter data while designated outside of Area IV
• Participated in joint DOE-NASA projects (SNAP)
• Delivered Area I, II, III waste to Sodium Burn Pit[95]
• Picked up DOE Area IV waste for disposal at Area I Burn Pit
• Had access to DOE operations in Area I
• Had access to DOE waste storage in Area II[96]
• Had access to S.E. Drum Storage Yard[97] in Area IV
• Rotated between areas and SEC Facilities, Canoga and DeSoto, yet remain ineligible to EEOICPA.
• Participated in using, constructing, servicing, etc. the Site-Wide Water Reclaim System as required

Waste

• DOE waste storage [Area II] and disposal [Area I] [9899100]
• NASA waste storage and disposal in Area IV[101]

Water

• Site-Wide Reclaim Water System: Area IV industrial wastewater, treated and untreated effluent and residual contamination due to incidents and accidents routed to Area I, II, and III ponds, where it

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[95] DOE, "*Tiger Team,*" 1991. Page 3-40. 556518.pdf
[96] DOE, "Survey: DOE Activities at SSFL," 1989. Page 4-14, Item 3. DOE_Environmental_Survey.pdf
[97] DOE, "Survey: DOE Activities at SSFL," 1989. P. 4-61 DOE_Environmental_Survey.pdf
[98] Ibid., 4-47, Paragraph 6. DOE_Environmental_Survey.pdf
[99] Rocketdyne, *"Monthly Report, Pits," 1960.* rocketdyneburnpitlog3_1_1960.pdf
[100] *"Addendum; Radioactive Isotopes, Area I Burn Pit, SSFL,"* June, 2014. 66401_Master_RFI_Data_Gap_Work_Plan_Addendum_-_Radioactive_Isotopes_-_Area_I_Burn_Pit.pdf
[101] DOE, "*Tiger Team,*" 1991. Page 3-40. 556518.pdf

mixed with rocketry contaminants and water from other sources.[102]
• Pond over-flow; wastewater through surface water drainage routes, over burn pits, leachfields, and burial sites, off-site to creeks, canyons, the Chatsworth Reservoir, LA River, Arroyo Simi, etc.
• Radioactivity detected in "non-nuclear" Areas I, II and III.[103][104]
• Radioactivity, Northern Buffer Zone = property acquisition (1998)
• Groundwater contamination of the Chatsworth Formation.

Wind

• Uncontained "experimental" nuclear reactors were vented as needed. Outdoor employees Areas I-IV were not warned.
• Lack of meteorological tower prohibited accurate wind speed and direction data prior to radiological releases and waste disposal, compromising dose assessment for workers and the public.[105]
• Line-of-sight visibility to Area IV disposal and operations from adjacent rocketry testing areas raised likelihood of airborne exposures.

"I remember several incidents where people were running out of buildings to escape potential contamination ... people would be eating outside and not even know that contamination was blowing in their direction."- SSFL Employee,

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[102] DOE, "Survey: DOE Activities at SSFL," 1989. Page 3-45, Paragraph 1. DOE_Environmental_Survey.pdf
[103] Groundwater Resources, *"Assessment of Pond Sediments,"* 1990. Ponds_Radioactivity.pdf
[104] Stamets, "*Radioactive Isotopes, Area I Burn Pit SSFL,"* June, 2014. 66401_Master_RFI_Data_Gap_Work_Plan_Addendum_-_Radioactive_Isotopes_-_Area_I_Burn_Pit.pdf
[105] DOE, "Survey: DOE Activities at SSFL," 1989, 3.1.4.4 DOE_Environmental_Survey.pdf.
[106] DOE-EPA, "H.S.A. SSFL Employee Interviews," 2009.

Poor Monitoring and Sampling Practices

• Insufficient, selective and biased monitoring/sampling practices based on locations chosen *before* nuclear facilities were built. While monitoring locations did not change, location selection for 10 experimental nuclear reactors, radioactive fuel storage, and waste disposal facilities did. Sampling locations were sometimes strategically chosen; radiologically 'hot' areas were avoided to assure the samples could be handled in the Chemistry Laboratory."[107]

• Personnel recall failure to document exposures and high radiation readings due to the perception that "incidents" were merely part of the experimental process, resulting in undocumented events.[108]

Missing Records

• Employee records, incident reports, and waste storage/disposal inventories are missing. Dosimeter issuance and usage location keys are incomplete and reflect "unknown locations" for Area I, II and III personnel monitored for radiation exposure, calling into question whether or not exposures occurred in Area IV (and supported by radionuclide discovery at designated work locations in Areas I, II and III).

Atomics International and Rocketdyne collaborated on numerous projects, particularly joint DOE-NASA projects, like SNAP.

"They were grateful to have the experience of the rocket people that crossed over ... In 1969 I was at the Downey Division working on facilities, but AI needed people with hands-on experience and they asked me and others to come up to Area IV at SSFL. The supervisors at AI knew of our experience and they wanted it, so we crossed over into AI to help
SSFL Employee

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[107]DOE, "Survey: DOE Activities at SSFL," 1989, 4-52 thru 4-57 DOE_Environmental_Survey.pdf.
[108] DOE-EPA, "H.S.A. SSFL Employee Interviews," 2009.
[109] DOE-EPA, "H.S.A. SSFL Employee Interviews," 2009.

Area IV: Problems at Area IV Waste Storage / Disposal Sites

DOE identified numerous problems at Area IV Waste Storage & Disposal Sites.[110]

- Accessibility by all SSFL personnel; unrestricted access
- Significant contributions of radioactivity to Site-Wide Reclaim Water System
- Suspected or known groundwater contamination
- Lack of inventory data beyond aerial photos that depict years' of outdoor storage, hundreds of containers, rusted drums, and leaks/spills.
- Inspection revealed content compatibility issues; containers stored so closely, that access without spillage or accidents was a problem.

- **B-056 Landfill**
- **ESADA Chemical Storage Yard**
- **B-100 Trench**
- **S.E. Drum Storage Yard** "Although the storage area is clearly located in Area IV it is relatively close to Area II, to which it is connected by dirt roads and not separated by fences."[111]
- **New Conservation Yard**
- **Old Conservation Yard:** Used by DOE-Rocketdyne in support of SNAP research/development between 1952-1977 to store excess equipment, some contaminated with either uranium or mixed fission products. Radiological survey (1988) showed elevated concentrations of Cs-137 with assumed equivalence of Sr-90, believed to have resulted from an undocumented liquid spill. "Leaks and spills were likely in an area with no containment, and no protection."[112]

"The Old Conservation Yard was a favorite place to get recycled equipment. We would go there to get equipment or materials for building things. We could reuse parts left there and we were

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[110] U.S. DOE Environmental Survey; "*DOE Activities at SSFL.*" Page 4-46- 4-49 DOE_Environmental_Survey.pdf
[111] Ibid., 4-61.
[112] Lee, M., Department of Energy Internal Letter Re: *"Completion of Projects Outside of DOE Area,"* 1996. HDMSP001869636.pdf

encouraged to do so."[113] - *SSFL Employee,*

took lumber from the yard to build a house on the Colorado River in Nevada. People could bid on items in the junkyard in an auction.[114]*"* – *SSFL Employee*.

Area IV: B-886 Sodium Burn Pit, and Sodium Pond

• 1960's – 1970's: Chemical (Na/NaK) and radioactive waste disposal. Zirconium hydride sacrificial slugs contaminated with 93% enriched Uranium (U-235). No records available.

• DOE acknowledged source of contaminated wastewaters pumped to R-2 Pond in Area II via Site-Wide Reclaim Water System, after steam cleaning lances were used to remove sodium during the 1960's and 1970's from components used in several DOE-sponsored programs (SRE, SNAP, MORE, and others).[115]

• Unauthorized radioactively contaminated equipment buried in trenches or placed on the surface.[116] [117] [118]

• DOE states the only written documentation available was an internal letter (Lang, 1980), which described, "A piece of pipe-like material was removed from the pit in 1980 that appeared to be the source reading >3,000 uR per hour. On December 4th, 1980, after an inch of rain, the excavation completely filled and the dam between the upper and lower pond washed out, allowing the run-off from the upper pond to run through the excavated area across the lower pond, and out into the road to follow its natural run-off pattern…"[119]

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[113] DOE-EPA, "H.S.A. SSFL Employee Interviews," 2009.

[114] Ibid.

[115] DOE, "Survey: DOE Activities at SSFL," 1989. P. 3-49, Surface Water. DOE_Environmental_Survey.pdf

[116] Ibid.

[117] Groundwater Resources, *"Assessment of Pond Sediments,"* 1990. Ponds_Radioactivity.pdf

[118] Ibid., 4-42, Item 4.5.1.1

[119] Ibid., 4-48, Item 4.5.2.3

• Groundwater contamination documented.[120] [121] Waste from Areas I, II and III commonly disposed of in B/886 Sodium Burn Pit, and vice versa, according to DOE.[122] Burn Pit log sheets corroborate.[123]

• Sodium explosions visible to rocket engine test stand personnel, who recall mist that rained black mud onto test stand workers who were not informed of risk.[124]

• Unobstructed line of sight at rocket engine test stands bring attention to the lack of a meteorological tower to reliably predict wind direction and speed.[125]

• DOE acknowledged biased sampling at the Sodium Burn Pit to aid in *underestimating* contamination. Radiologically "hot" areas were avoided to assure that samples could be handled in the Chemistry Laboratory.[126]

• During "Unusual Occurrences" (read: accidents), spillage was diverted to drainage ditches that conveyed water to the R-2 Pond.[127] Note: The exploding tank of sodium had been left in the elements for 11 years, sealed with duct tape and plastic; this is indicative of facility precedent.

"If there was extra sodium or sodium leaked out of the system, they'd clean it up and dispose of it in that pond ... in that waste pond. But that was on Rocketdyne property, I think. I don't believe that was on what we considered to be Atomics International fenced-in area. I think that was on Rocketdyne [property]. But it was our sodium; no question about it."[128] - SSFL Employee,

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[120] DOE, "*Tiger Team,*" 1991. Page 3-40. 556518.pdf
[121] DOE, "Survey: DOE Activities at SSFL," 1989. Page 3-64 DOE_Environmental_Survey.pdf
[122] Ibid., 4-47.
[123] Rocketdyne, "*Monthly Report, Pits,*" *1960.* rocketdyneburnpitlog3_1_1960.pdf
[124] Sworn worker testimony,

[125] DOE, "Survey: DOE Activities at SSFL," 1989. Item 3.1.4.4. DOE_Environmental_Survey.pdf
[126] Ibid., 4-52 thru 4-57
[127] Atomics International Unusual Occurrence Report, 1986. Building_4009_at_SSFL_Unusual_Occurrence_Report_June_1986.pdf
[128] DOE-EPA, "H.S.A. SSFL Employee Interviews," 2009.

Area IV: RMHF / RMDF and Leachfield (Radioactive Materials Handling/Disposal Facility)

"Barrels of waste oil were ... used to suppress dust on all the roads. In the 1960's, at least one time that I know of, a barrel of waste oil was determined to be hot with radioactivity and it had been used on the roads."[129] *SSFL Employee*

• In 1962, approximately 3,750 gallons of combustible oils were excluded from a waste inventory (Ferreri, 1962). Oil was reportedly used on roads for dust suppression, a practice that was approved at SSFL to "establish Radiation Safety standards for the purification of radioactively contaminated oil for use as road oil at the NDFL [Nuclear Development Field Lab, a.k.a. SSFL]. There is no indication that such oil was used exclusively on roads within Area IV, and no conceivable reason such a distinction would have been enforced since the practice itself was deemed to be acceptable.[130][131]

• In the early 1960's, a tank valve to a container of radioactively contaminated wastewater (St-90 and Y-90) was left open, flooding the leach field. Contamination extended downward into joints and fractures of the Chatsworth Formation. Over 20 years later, DOE Survey Team Members noted no groundwater testing had taken place, and that contamination had been allowed to follow predictable surface drainage routes that eventually reached Area II R-2 Ponds.[132] [133] [134]

• "The principal source of potential radiation dose to the public from SSFL is the RMDF... Airborne dose assessments may be

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[129] DOE-EPA, "H.S.A. SSFL Employee Interviews," 2009, *(Heine, 1966)*
[130] DOE, "Survey: DOE Activities at SSFL," 1989. 1989. Page 4-42, DOE_Environmental_Survey.pdf
[131] Heine, W.F., 1966. Radiation Engineering Analysis approved by R.E. Alexander: "Radiation Standard Analysis – Use of Low Level Radioactively Contaminated Oil as Road Oil on the NDFL Site" No. REA-RSSA-14 Atomics International. HDMSE00033600.pdf
[132] Ibid. 4-46
[133] Ibid., 3-65, Finding 4.5.2.3.1c.
[134] SAIC, 1991. *RCRA, SSFL.* RCRA_1991.pdf

imprecise because of AIRDOS computer modeling difficulties." [135]

• North Boundary Penetrating Radiation Doses: Changing operations involving radioactive material handling suggested exposure rates may have exceeded DOE guidelines of 100 mrem/year for continuous exposure from all pathways at property boundary north of the RMDF.[136]

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[135] DOE, "Survey: DOE Activities at SSFL," 1989. Page 4-33, Finding 4.3.4.4.3. DOE_Environmental_Survey.pdf

[136] Ibid., 4-34, Section 4.3.4, Item 4.3.4.4

Sodium Components Test Installation (SCTI) B/356

"One of the largest sources of industrial wastewaters under DOE control is the Sodium Components Test Installation (SCTI) located in Building 356 [Area IV]. ... Separate batches of spent acids and caustic solution rinses are released slowly at the same time, yielding nearly neutral wastewaters. These wastewaters then flow by gravity to Pond R-2B, where this small flow mixes with other wastewaters from Areas II and III. The brines from [reverse osmosis] are also released to Pond R-2B for reclaim."[137]

Component Handling and Cleaning Facility (CHCF) B/463

"... steam cleaning lances were used to remove sodium at two primary locations (Building 143 and Building 886). Prior to switching to ethanol in place of water, soils in the B-886 burn pit area had become contaminated with heavy metals, organics, and low-level radioactivity, principally cesium-137."[138]

Old Molten Salt Test Facility B/005

"Another former operation that generated wastewaters was a coal gasification experiment which ran in Building 005. Up to a ton of coal was converted to gas, ash, and a hazardous aqueous, waste each hour of operation ... Tests ran for four years (1977-1981) ... Ash sluice water was passed through a clarifier and filtered before release. Noncontact cooling waters were released to the drainage ditch for transfer to Pond R-2B and the Reclaim Water System."[139]

B/863 Hydraulic Test Facility

Tests included use of dilute sodium hydroxide, phenolphthalein, acetic acid. Monthly "losses" from the facility reuse system was about 1,980-3,960 gallons, assumed to have reached the drainage ditch serving Area IV and the R-2 Pond, or to have percolated into the ground.

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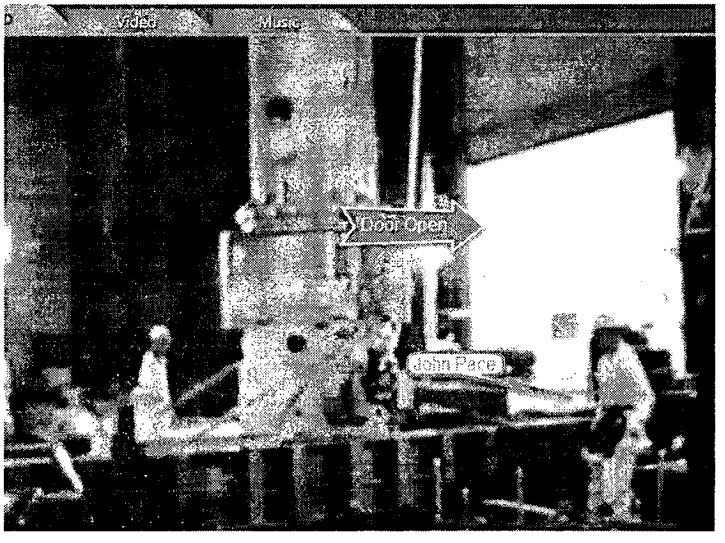
[137] DOE, "Survey: DOE Activities at SSFL," 1989. P. 3-43, Surface Water. DOE_Environmental_Survey.pdf
[138] Ibid.
[139] Ibid., p. 3-44

Other Area IV Facilities
SRE – The Sodium Reactor Experiment (SRE) and SRE Pond

"It was an experimental reactor. You operate the reactor to find out what is wrong with your design."[140] *- SSFL Employee,*

The Sodium Reactor Experiment (SRE) was the first power-producing reactor in the U.S. and provided electricity to Moorpark, California. In 1959, it suffered a partial meltdown. The reactor was restarted and allowed to run for nearly two weeks while personnel attempted to troubleshoot and repair.

"It was my impression that AI [Atomics International] had been given verbal instructions (never written down) from the AEC to test the reactor to destruction. ... They were pushing the limits on purpose." – SSFL Employee



The photo above (provided courtesy of) shows the open bay door as workers scrambled to remedy the problem.

"They did not write records on what we had to do ... It should have never been done." – SSFL Employee on using homemade equipment to remove broken fuel rods from the SRE reactor core.

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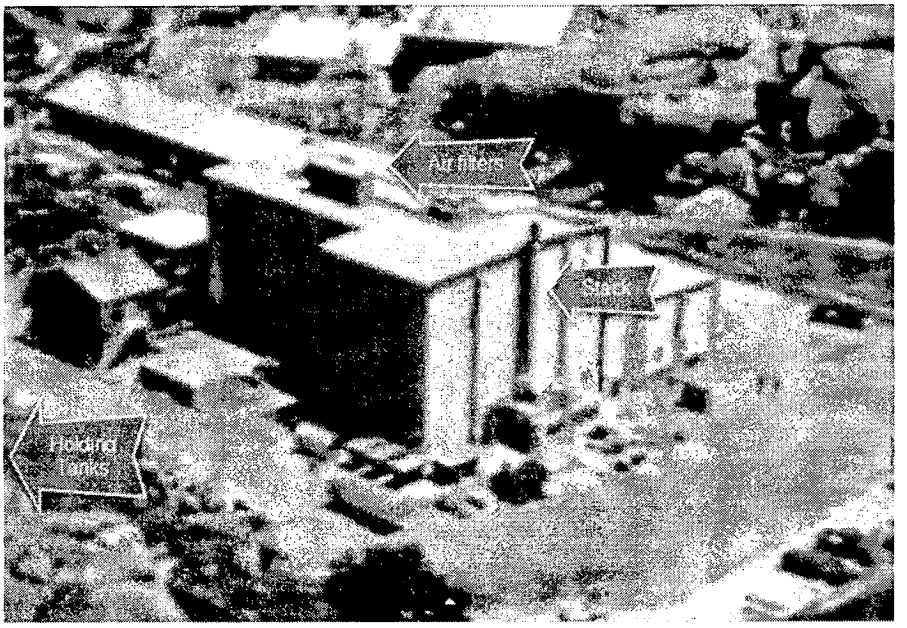
[140] DOE-EPA, "H.S.A. SSFL Employee Interviews," 2009.
[141] DOE-EPA, "H.S.A. SSFL Employee Interviews," 2009.



Above, the exterior of the SRE building. *"The air filter on top of the building got so contaminated that it was no longer useful, so we had to open the large back door ... The radiation traveled all over the hill into other areas; it was free to go where the wind took it."* –
Photo courtesy of

Contaminated office equipment, furniture, and worker records were removed and placed in a pile behind the SRE building. They were left there for weeks, pending disposal. Contaminated sodium drained from the reactor was reportedly placed into 55-gallon drums and dropped into the Sodium Pond prior to being shot with a rifle to aid in dispersal of contents and submersion of drums.[142] The SRE Pond is known to drain beyond the site's northern boundary, and is reportedly linked to Silvernale Pond and the Site-Wide Reclaim Water System.

DOE expressed concern about the SRE Pond's contributions to the Site-Wide Reclaim Water System due to the use of steam cleaning lances to remove sodium, prior to SSFL's switch to ethanol use.[143]

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[142] Testimony of former employee, present at the 1959 SRE Incident. Interview with NIOSH pending.
[143] DOE, "Survey: DOE Activities at SSFL," 1989. P. 3-43, Surface Water. DOE_Environmental_Survey.pdf

SNAP – Systems Nuclear Auxiliary Power

The SNAP program was a joint DOE-NASA project undertaken at SSFL. It is one example of the strategic decision to situate North American Aviation's nuclear and rocketry divisions alongside one another at SSFL. According to DOE, "By the mid-1950's, research had begun in earnest on ways to use nuclear power in space. These efforts resulted in the first radioisotope thermoelectric generators (RTGs), which are nuclear power generators built specifically for space and special terrestrial uses."[144] DOE and NASA made no secret of joint interests in the SNAP program;

worked alongside

to publicly argue for continued AEC funding for this joint project, the research and development of which occurred at SSFL under contract with North American Aviation Atomics International *and* Rocketdyne. Collaborative effort between divisions resulted in employee rotation between Areas I, II, III and IV, documented by DOE,[145]

According to DOE, "Nuclear fuel has proven to be an ideal source of energy in space because of its high power, acceptable weight and volume, and excellent reliability and safety when used in RTGs," and, "Without the technology to reliably power [these] instruments in space, our knowledge of the solar system would be only a fraction of what it is today. RTG technology was developed to provide that electric power."[146]

DOE operated buildings beyond the DOE portion of Area IV in support of the SNAP. [147] All SNAP reactors at SSFL were considered "experimental," and were not housed in regulatory containment structures. The SNAP8ER and the SNAP8DR experienced fuel loss resulting in radionuclides being vented to the atmosphere, in 1964 and 1969. SNAP Building 59 is known for

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[144] U.S. Department of Energy Office of Nuclear Energy, Science and Technology, "Nuclear Power in Space."
nuc_pow_space.pdf
[145] Lee, M., DOE: "Projects Outside DOE Area," 1996. HDMSP001869636.pdf
[146] U.S. Department of Energy Office of Nuclear Energy, Science and Technology, "Nuclear Power in Space." P. 29
[147] Lee, M., DOE: "Projects Outside DOE Area," 1996. HDMSP001869636.pdf

Cobalt-60 and Tritium contamination to groundwater.[148][149][150] SNAP described as notable contributor to Site-Wide Water Reclaim System.[151]

The Quest for Reliable Power: *On January 16, 1959, a dramatic photograph appeared in a Washington, D.C., newspaper. The headline proclaimed, "President Shows Atom Generator." The photograph, above, pictured President Eisonhower and a group of U.S. Atomic Energy Commission (AEC) officials in the Oval Office at the White House. They were gathered around the president's desk, staring at a strange grapefruit-shaped object. Dubbed the world's first atomic battery, it was actually one of the earliest models of a radioisotope thermoelectric generator (RTG), a nuclear generator specifically developed by the AEC to provide electric power during space missions."* [152]

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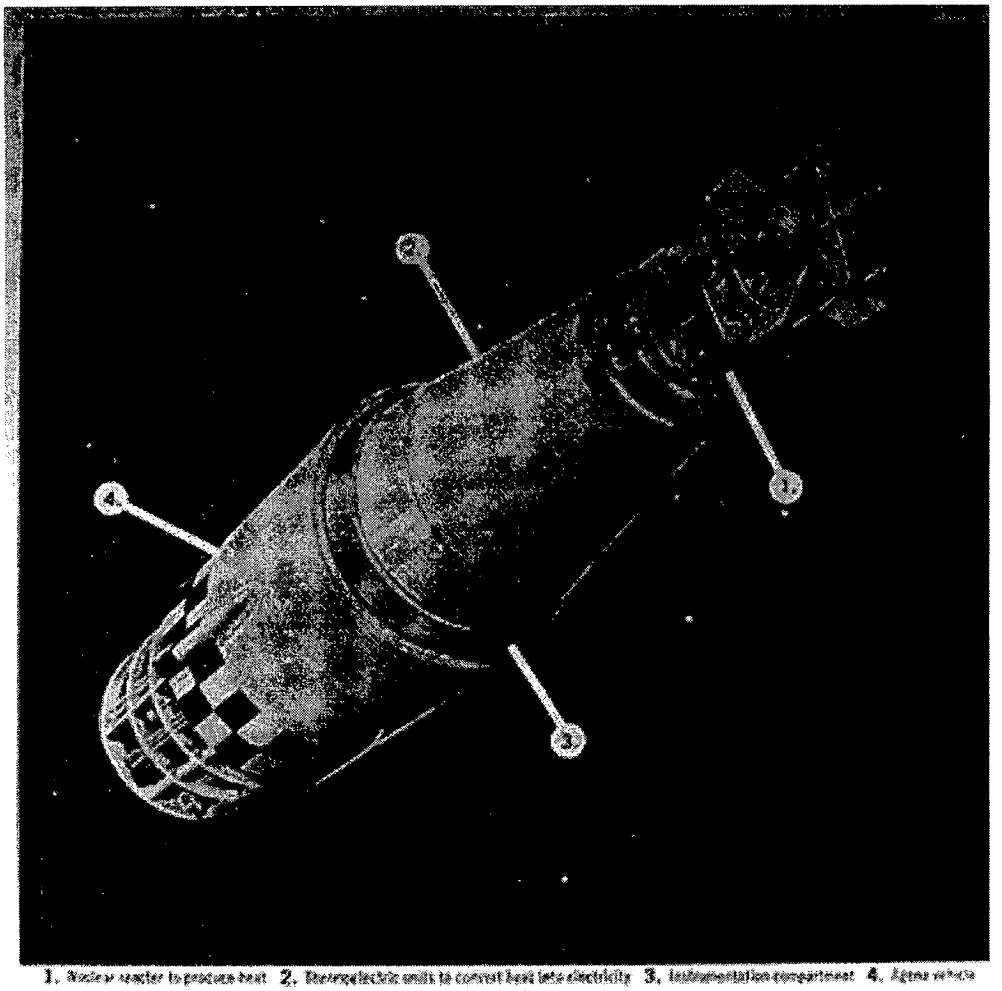
[148] Tuttle, R.J., CHP, Radiation Protection and Health Physics Services, "*Tritium Production and Release to Groundwater at SSFL,"* 1992. Tritium_Production_at_SSFL.pdf

[149] U.S. Environmental Protection Agency, "*Rocketdyne SSFL Sample Analysis Report," 1989.*

[150] DOE, "Survey: DOE Activities at SSFL," P. 3-62 1989. DOE_Environmental_Survey.pdf

[151] Ibid., 3-43, Surface Water. DOE_Environmental_Survey.pdf

[152] U.S. Department of Energy Office of Nuclear Energy, Science and Technology, "Nuclear Power in Space." P. 5 nuc_pow_space.pdf



1. Nuclear reactor to produce heat 2. Thermoelectric units to convert heat into electricity 3. Instrumentation compartment 4. Agena vehicle

This is SNAP 10A

the world's first nuclear reactor in space and the newest addition to America's space power from North American Aviation

SNAP 10A is more than 700 miles out in space . . . circling the earth every 112 minutes in a 4,000 year orbit. During its 43 days of uninterrupted, flawless operation, it produced over 500,000 watt-hours of electricity. SNAP reactor systems can provide power for observation and weather satellites, orbiting laboratories, electrical propulsion in space, and for communicating directly from space to ordinary antennas on the ground. The SNAP 10A system was designed and built by North American Aviation/Atomics International Division for the Atomic Energy Commission. NAA/Rocketdyne built the Atlas rocket engines that launched it. North American Aviation is a leader in electronics, aviation, life sciences, space flight, atomic energy, rocketry, and basic research.

North American Aviation

Atomics International, Autonetics, Columbus, Los Angeles, Rocketdyne, Science Center, Space & Information Systems

HOT LAB (RIHL/AIHL/CDHC) / Building 4020

• The SSFL Hot Lab was, at one time, the largest in the country. It accepted irradiated and spent nuclear fuel from commercial reactors around the country for the purpose of inspection and analyses.

• Irradiated fuel declad program (SRE, Hallam, EBR-1, Sefor, EBR-II, and Fermi) were conducted at the RIHL from 1974-1988.[153]

• Employee described high radiation readings outside the building for extended time periods, due to a leaking roof (which not only let rain in, but allowed radioactivity to escape).[154][155]

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[153] Rockwell International, "*Decontamination Plan for Rocketdyne Facilities Licensed Under SNM-21*" 1989. Decon_Hot_Lab_SNM-21.pdf
[154] DOE-EPA, "H.S.A. SSFL Employee Interviews," 2009
[155] Employee Testimony, Santa Susana Field Laboratory Inter-Agency Workgroup Meeting, October 1, 2014
[156]DOE-EPA, "H.S.A. SSFL Employee Interviews," 2009.

17TH Street Drainage

• Drains to the LA River.

• Natural rainwater channel where the construction of a berm (1962) permitted the area to serve as a hold-up pond.[157]

• 1997 surveys identified elevated levels of Cs-137 in samples collected from the area, which exceeded site-specific guidelines provided by DOE (1996).[158]

• 1998: Some elevated radiation measurements in localized areas at ground level were observed at a maximum of twice background levels.[159]

• Note the proximity of the 17th St. Drainage to the Area III boundary line. In 2009, Environmental Protection Agency (EPA) conducted a radiological survey of Area IV and noted that radiological contamination at this area had crossed the Area IV boundary line into Area III. EPA was prohibited by DOE and Boeing from following the contamination to interpret its reach or severity.

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[157] The Boeing Company, "*Verification Survey of Building 4059, Building 4133, and the 17th Street Drainage Area, Santa Susana Field Laboratory.*" HDMSP00062568.pdf

[158] Department of Energy, "*Final Report – Verification Survey of the 17th Street Drainage Area, Santa Susana Field Laboratory,"2000* Document: 757433.pdf

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Thank you for visiting the Santa Susana Field Laboratory (SSFL).

When site layout, geography, and history are carefully considered, it becomes apparent that it wasn't possible for AEC-DOE and Atomics International to function exclusively within Area IV boundaries. Even if it were possible, the opposite is well documented by DOE.

The worker health and environmental issues surrounding SSFL go hand-in-hand. The purposeful deflection of site history has been designed to downplay AEC-DOE's reach into areas of SSFL that today deserve closer environmental scrutiny. As a result, workers of those areas are being excluded from EEOICPA in error. The reality is that employees of a DOE contractor at SSFL sacrificed greatly for science and technology and their achievements came at a cost to worker health, public safety, and the environment. EEOICPA was enacted to compensate those who made such sacrifices, and in an effort to evade environmental accountability by rewriting site history, DOE is willing to throw thousands of workers under the proverbial bus.

Please support the inclusion of Area I, II and III personnel to EEOICPA *and* the requirement for a site-wide radiological survey (inclusive of Areas I, II and III). Employees deserve a fair shake under the worker program, and the public deserves an informed and responsible environmental cleanup.

If you have questions about the information provided, please contact

Below are some questions ABRWH may wish to ask DOE-Boeing:

1. DOE's 1989 inspection of SSFL identified DOE operations, waste disposal, and off-site contamination in Areas I, II, III and IV. Why does DOE's version of site history differ so greatly today?

2. California Department of Toxic Substances Control (DTSC) identified Area I as an area of "Radiological Interest," due in part to fuel rod storage in the Area I Atomics International MOC Fuel Rod Tower (used to support an AEC-DOE project, the Sodium Reactor Experiment, or "SRE"). How does Area I fail to satisfy criteria used to determine a DOE Facility under EEOICPA?

3. Historic waste inventory and disposal logs document Area IV waste disposal in the Area I Burn Pit. A 2013 report lists radionuclides discovered there that could only have resulted from AEC-DOE waste, since AEC-DOE/Atomics International were the only ones to use radionuclides at SSFL. How did such a broad spectrum of radioactive isotopes enter the Area I Burn Pit? Can you provide us with any document that discounts historical facility log sheets that detail radioactive waste disposal there?

4. What can you tell us about the coal gasification research facilities at test stands in The Bowl (Area I)? Can you explain how DOE did not fulfill DOE Contract #EX077-C-01-2518 to construct and operate such a facility at SSFL?

5. Recently, a designated Area II worker's records showed he was monitored for radiation during his 'non-nuclear' employment, and participated in job processes in Area IV and at DeSoto Facility. How does this define DOE-personnel's exclusivity to Area IV?

6. Several site schematics of the Site-Wide Water Reclaim and Surface Water Drainage System show an interconnected system that benefitted AEC-DOE operations by transporting industrial wastewaters and effluent to the R-2 Ponds in Area II. Can you provide us with a similar schematic that illustrates the control and confinement of surface water run-off and industrial wastewater that kept them within Area IV boundaries?

7. The Atomics International Sewage Treatment Plant was located in Area III and discharged effluent to the Site-Wide Water Reclaim System. Can you explain to us what disqualifies this structure from being a "DOE Facility?"

8. Can you provide us with scientific explanations or evidence as to how boundary lines, fences, and other property markers contain radiation and chemical contaminants?

9. Based on what scientific evidence are Areas I, II and III free of radiological contamination, the potential result of well-documented AEC-DOE activities in those areas?

10. There exists a voluminous collection of DOE-published documents that describe AEC-DOE activities throughout Areas I, II, III, and IV. Can you provide us with a compelling reason to disregard all historical evidence in favor of verbal reassurances today?

11. What would happen if Areas I, II and III were reclassified as "DOE Facilities" under EEOICPA? What would happen if a radiological survey of Areas I, II, and III revealed contamination about which we are currently unaware?

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