

**A REGULATORY PERSPECTIVE OF THE RESTORATION PROCESS FOR THE
FORMER SODIUM DISPOSAL FACILITY AT ENERGY TECHNOLOGY
ENGINEERING CENTER**

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ABSTRACT

The Energy Technology Engineering Center (ETEC) Site Closure program is nearing the completion of a lengthy process to obtain the regulatory approval of a workplan to remediate its Former Sodium Disposal Facility (FSDF) and restore the area, approximately 3 acres (12,000 sq. meter), to its natural state. This remediation project has undergone numerous cleanup phases and has been closely monitored by several regulatory agencies. The FSDF has been released for (radiologically) unrestricted use, but the chemical remediation and final restoration is on hold. This paper provides a brief overview of the regulatory process that will allow an “Interim Cleanup” in the near future and may ultimately allow the closure of this facility. The history of the FSDF project is presented with the emphasis on jurisdictional controls, how a “Closure” project has been reduced to an “Interim Cleanup” project, and how even the interim project is still not close to completion. The lessons learned are included.

To date, the project has cost slightly over \$ 12,000,000 and has extended over a period of nearly eight years. Excavation and disposal of about 9,000 cubic meters of soil and 9,000 kg of debris have been accomplished to date, and more is required (Reference 1). There have been no significant radioactive exposures or other injuries.

The current plan, derived from a human health risk assessment, calls for excavation of another 2,300 cubic meters of contaminated, but non-hazardous non-radioactive, soil. The facility then will be restored by backfilling the excavations, and regrading and revegetating major areas. The additional cost for completion of the “Interim Cleanup” of this facility is expected to be about 2 million dollars. The “final” closure of FSDF is now tied to the RCRA (Resource Conservation & Recovery Act) Closure of the entire SSFL, which is currently scheduled for 2006.

INTRODUCTION

The FSDF is located on the western end of The Boeing Company’s Santa Susana Field Laboratory (SSFL) in Southern California, about 30 miles northwest of Los Angeles City center (see Figure 1). The Department of Energy (DOE) was the primary sponsor of the research, which utilized the disposal facility. The SSFL is adjacent to undeveloped properties and the closest residential areas are over a mile away. There is a vocal, concerned citizenry and an active Environment Activist group. The FSDF remediation/ restoration project has become highly visible as a result.



Figure 1. An Airview of the FSDF

The facility was used during the 1960's and 1970's primarily to clean components that contained alkali metals. There was a limited disposal of chemical, industrial and construction wastes at this site at a time when this was an acceptable practice. A small amount of very low level radioactive waste appears to have been inadvertently disposed of at the site as well. Findings of degraded groundwater below several facilities led to the selection of this site, in April 1991, for immediate remediation that was to be completed by December 31, 1992. The regulatory agency issuing the order was Regional (Los Angeles Region) Water Quality Control Board (RWQCB) (Reference 5).

The concrete structures of the FSDF and a considerable amount of soil and debris were removed during a remediation effort conducted from 1991 through 1994. The lead regulatory agency at the time was RWQCB; however, the California Department of Toxic Substances Control (DTSC) also got involved. At the completion of this effort, a gamma radiation survey, and a sampling of soil and rock were performed, which demonstrated the satisfactory removal of the radioactive contamination. Radioactive contamination falls under the jurisdiction of California Department of Health Services(DHS). DHS has formally released FSDF for (radiologically) unrestricted use (reference 1). However, since the results of soil and sediment sampling and

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analysis showed residual levels of chemical substances, the final remedy of the facility is undergoing a protracted review process.

A SALIENT CHRONOLOGY OF THE FSDF REGULATORY EVENTS:

- 1990 - Water Board (RWQCB) required localized cleanup under TPCA (Toxic Pits Cleanup Act – California)
- 1992 - TPCA closure of localized area completed, RCRA (Fed EPA) oversight of entire facility
- 1992 - RCRA Interim Measures Workplan approved by DTSC
- 1995 - Confirmation sampling of FSDF including channels; PCBs (Polychlorinated Biphenyls) and dioxins found
- 1996 - Draft risk assessment submitted, cleanup levels proposed
- 1996 - Proposal to use 1992 Workplan for further excavation rejected by DTSC
- 1997 - Proposed excavation workplan using updated 1992 Workplan rejected by DTSC
- 1997 - DTSC rescinded approval of 1992 workplan
- May 1998 – “Radioactive Release” granted by DHS. New RCRA Interim Measures Workplan submitted to DTSC
- December 98 – Jurisdiction transferred to another DTSC office at the Agency Head Quarters
- September 99 – CEQA (California Environmental Quality Act) process initiated. Public comments received
- Present (November 21, 1999) – Workplan still under review by DTSC

REGULATORY HISTORY OF THE PROJECT

Site Description

For purposes of site remediation, the FSDF has been subdivided into four work areas (Reference 3) as depicted in Figure 2. FSDF-1 is a region upslope of the facility and required minor remediation. FSDF-2, is the region where the cleaning apparatus was located and the upper earthen bermed pond (“upper pond”) was located, and includes the area to the west. It was partially remediated and requires the majority of the planned excavations. It was not as severely contaminated as FSDF-3 (the “lower pond”). FSDF-3 is the region of the second earthen bermed pond (the “lower pond”), that was initially selected for remediation, and was excavated to bedrock. No further work is planned in this region. FSDF-4 collectively includes the drainage channels, from which soils and sediments will be removed as part of the final cleanup.



Figure 2. FSDF Areas

Initiating Activities

The key initiating activity for this project occurred in April 1990 when a directive was received from the Regional (Los Angeles) Water Quality Control Board (RWQCB) to characterize the lower water impoundment at the facility. This action was taken under RWQCB's authority provided in the California Code of Regulations as a consequence of findings of halogenated solvents in groundwater at various locations of the overall field laboratory (Reference 4).

On April 30, 1991, RWQCB issued "Cleanup and Abatement Order No.91-061" to Rockwell International (now Boeing) to close the lower pond impoundment, and to investigate and cleanup soil and groundwater contamination resulting from activities at the site (FSDF) (Reference 5).

On July 31, 1991, Rockwell (now Boeing) submitted a closure plan for the FSDF in response to the closure order, and requested a 30-day approval to enable achievement of the 31 December 1992 schedule (Reference 6).

Unrelated to the FSDF project, but which had costly ramifications, DOE (in July 1991) placed a nationwide moratorium on shipping hazardous wastes that originated within a radioactive materials area, and set guidelines for lifting the moratorium. This action was taken because an

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erroneous shipment of hazardous waste containing radioactive materials was sent to an unlicensed site (Boeing was not involved in this project). All DOE contractors were subsequently required to develop procedures to obtain the lifting of the moratorium at their respective sites.

Project Activities – Phase I, August 1991 to June 1993

In early September RWQCB informally notified Rockwell (now Boeing) that the closure plan was unacceptable because it proposed unnecessary additional characterization but insufficient cleanup activity.

Involvement in the project by California-EPA, Department of Toxic Substance Control (DTSC) occurred as a result of Rockwell's intention to consolidate regulatory oversight. A sitewide RCRA investigation was in progress, and included the FSDF as an area of interest. California DTSC was expected to be involved in the activities sooner or later and early coordination with RWQCB was thought to be beneficial, which was the reason that all correspondence was distributed to both agencies, although conflicting directions were to become an issue.

On November 1, 1991, a combined (RWQCB and DTSC) formal response to the Closure plan was received which provided that if the list of 38 identified items was complied with, approval would be granted. The items requested ranged from providing detailed plans and procedures, to performing remedial actions themselves. Rockwell (now Boeing) submitted a response on 3 January 1992.

In March 1992, DOE issued its NEPA (National Environmental Policy Act) determination and authorized Rockwell (now Boeing) to proceed with the project. A categorical exclusion was granted because the project is a positive impact environmental action.

March 14, 1992 - The baseline radiation survey of the site was completed. The findings confirmed the prior knowledge base. There was no migration of contamination and there were no unexpected findings. Elevated radiation levels were found in the lower pond (the highest being 27.5 $\mu\text{R/hr}$, or approximately twice natural background levels), and the upper pond slightly above background. The results of the survey were factored into the site cleanup strategy and procedures.

On May 22, 1992 DTSC imposed more new requirements; chief among them was that areas surrounding the ponds would be characterized and if they are above cleanup levels (which were not yet defined), they will also be excavated.

On May 22, 1992 Rockwell (now Boeing) issued a letter to DOE/RWQCB/DTSC stating that the excavation work has been stopped at the FSDF due to the conflict of regulations and that a joint meeting should be held to seek methods to resolve the impasse. RWQCB was requested to extend the time for its compliance order because of the federal and state regulation conflicts.

Rockwell (now Boeing) continued excavating, segregating hazardous and radioactive wastes, and storing mixed wastes. In mid-December 1992, RWQCB verbally declared that Rockwell had complied with the order to remove the contaminated soil and debris [in the lower pond-as ordered], and that upon submission of data and a satisfactory post-closure plan document,

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RWQCB would issue a notice of compliance. The post-closure plan (plan for activities to be conducted after site closure) was submitted on December 22. On December 29, 1992 RWQCB issued a letter stating that "...all Board requirements have been met for closure of this facility". It confirmed the requirement to manage water that enters the site and stated that it had no further regulatory interest in this site, deferring to DTSC for future guidance.

In mid-January, 1993, DTSC asserted its authority over the remaining site cleanup work and the mixed waste treatment that Rockwell had proposed to perform at its on-site radioactive materials disposal facility (RMDF). Although the RMDF was licensed to store and treat radioactive wastes, this issue promised to further complicate and delay the project completion. DTSC also became the sole regulatory agency for the site chemical cleanup, noting that radioactive materials control and radiological release of the site remained the purview of the DHS.

On June 10, 1993, the DHS took eight additional soil samples from the lower pond and the recently (partially) excavated upper pond. No radioactivity above background was found.

Project Activities – Phase II, June 1993 to October 1995

No additional site remediation has been performed since June 1993, except for some limited excavations of subterranean objects in August 1996. Phase II was occupied with establishing the requirements for site closure, and the disposal of accumulated wastes.

In July 1994, Rocketdyne (Boeing) performed a radiation exposure (ambient gamma) survey of the entire FSDF area, including all the drainage channels. This survey was documented (Reference 7) and submitted to the California DHS. Again no radiation anomalies were detected, showing that no residual radioactivity above prevailing background exists at the site. DOE declared the FSDF site non-radioactive, and the RMMA (Radioactive Materials Management Area) designation for the site was removed.

In June 1995, an independent contractor (ICF Kaiser) issued a workplan for the site verification sampling and analysis (Reference 3). The prime objectives of the workplan were:

- To characterize the site in its current partially remediated condition by evaluation of the species and concentrations of chemical contaminants, if any.
- Assess the potential risk to human health and the environment associated with residual chemical concentrations, and finally
- To define health-based cleanup levels for additional work if necessary. Residual radiological contamination was to be investigated by others, with a similar objective.

The soil and bedrock sampling tasks were conducted in July 1995. The specific locations, depths, sampling and analysis methods, parameters of interest and detailed results are presented in reports (Reference 2). The general findings of the on-site chemical samples were:

- No volatile organic compounds (VOCs) were found, except for naturally occurring chemicals from native plant species.
- High boiling point petroleum hydrocarbons were detected in all regions of the site. No low boiling hydrocarbons were found.
- Semi-volatile organic compounds were found only in the FSDF-2 area (upper pond and western area) which had received partial remediation prior to the sampling.

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- Dioxin compounds were found in all regions
- PCBs were found in all regions. The highest concentrations of PCBs were found in the upper region of channel B (nearest the lower pond)
- Metals found were comparable to naturally occurring backgrounds, except for mercury that was found in all regions, but does not occur naturally.

Of the many samples taken by ICF Kaiser, the Oak Ridge Institute of Science and Education (ORISE) analyzed 78 samples for radioisotopes. A soil sample report (Reference 8) was subsequently prepared (April 1997) and submitted to the California DHS, with a request to release the facility for (radiologically) unrestricted use.

A plan for final closure of the site that, at this time, merely discussed interim site management actions, was drafted. The document later came to be known as the interim remedial measures (IRM) workplan.

Project Activities – Phase III, October 1995 to November, 1999

The finalization and acceptance of the cleanup levels for chemical contamination was the main activity during this phase. Radiological closure (release) of the project was accomplished during this period.

A (Human) Health Based Risk Assessment (HBRA) workplan was submitted to DTSC, which it found unacceptable. The general objections related to: selection of chemicals of concern, risks and hazards to all possible receptors, improper terminology, ambiguous nomenclature, models and criteria issues, and the plan did not conform to DTSC and USEPA guidelines.

Boeing responded to each of DTSC's comments about the HBRA Workplan, defending the basis for the draft plan. Agreement to correct ambiguities and terminology was made. Agreement to furnish additional explanations and information was made. More correspondence (verbal, written, meetings, etc.) involving comments, clarifications, justifications, and requests for additional activities followed. Repeated reviews, staff changes and the delays in reaching decisions substantially delayed the project and increased the costs.

On July 29, 1996, the California DHS visited SSFL and took soil samples from the Sodium Disposal Facility lower pond and drainage channels for radiological analysis. Results from this round of sampling again showed no radiological contamination above background.

A draft risk assessment was submitted to DTSC in early November 1996. The risk assessment showed that although total cancer and non-cancer risks are within acceptable ranges, further risk reduction and elimination of potential "downstream" impacts can be achieved by removing PCBs and dioxin/furan contaminated soils and sediments from the FSDF and channels. A summary of the final interim measures proposed for closure of the FSDF site was later submitted to DTSC. Approval of the risk assessment, excavation plan and site restorations was requested.

DTSC responded that the plans were technically incomplete, inadequately described and did not conform to standards for closure. Further, DTSC required that "an adequate cap must be designed with appropriate run-off and erosion control provisions and that vadose [geologically

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shallow-above the water table] zone monitoring for residual contaminants be performed...as a final remedy for the FSDF.” The requests for approvals to perform excavations were denied. The correspondence between Boeing and DTSC continued. DOE was anxious to clean up the site, so on August 7, 1997, it informed DTSC of its intention to proceed with excavation and restoration of FSDF. DTSC issued a Cease and Desist Order in response. DOE yielded to the order and requested DTSC to review the latest interim remedial measures (IRM) workplan.

On September 16, 1997, DHS revisited the FSDF and took 25 soil samples at nine locations from the upper pond and western area. Results from this round of sampling again showed no radiological contamination above background.

In a letter dated September 22, 1997, DTSC explained that the prior (1992) approval given to the site cleanup plan was invalid because it did not meet current requirements. The approvals inferred from subsequent agreements relating to additional work at the site were declared by DTSC to be non-existent. DTSC rescinded all approvals and asked for an acceptable interim measures work plan.

On May 6, 1998, the DHS removed the Sodium Disposal Facility from Boeing's California Radioactive Materials License 0015-19, and formally released the facility for (radiological) unrestricted use.

Boeing submitted revised interim measures (IRM) workplan several times over the next few months; each time DTSC asked for modifications. Finally, on November 2, 1998, DOE directed Boeing to stop FSDF restoration related work until a solution to the DTSC approval process could be found.

On January 29, 1999 a new, dedicated regulatory staff was assigned to SSFL projects, and assurances given that the FSDF project would be a high priority.

On March 18, 1999, another revision to the interim measures remedial actions workplan for the site was issued. It reflected the continuing DTSC reviews.

On July 15, 1999 DTSC approved the FSDF Interim Measures Workplan (Workplan) as complete and acceptable for public notice and review. DTSC also approved the FSDF Final Interim Measures Risk Assessment. The cleanup levels identified herein will be used for site remediation.

The FSDF Workplan has undergone a public review. Presently DTSC is in the final stages of completing its review of the Workplan. This time the Workplan may be approved and the FSDF cleanup may actually take place*.

LESSONS LEARNED

Get Your Regulators Involved in the Project from the Beginning

Establishment of a cooperative panel of the regulators will not be easy, but is well worth the effort. The main regulators on the FSDF project are depicted in Figure 3.

The FSDF project was further complicated by the change of the lead agency from RWQCB to DTSC. Interactions with DOE (as the cleanup project sponsor), California Department of Health Services (for radiological issues), DTSC, RWQCB and other agencies for various activities became more and more complex. If all the regulatory functions had been clarified and contacted in the beginning of the project, a coordinated overview might have been accomplished, and the project probably would have had less regulatory conflicts.

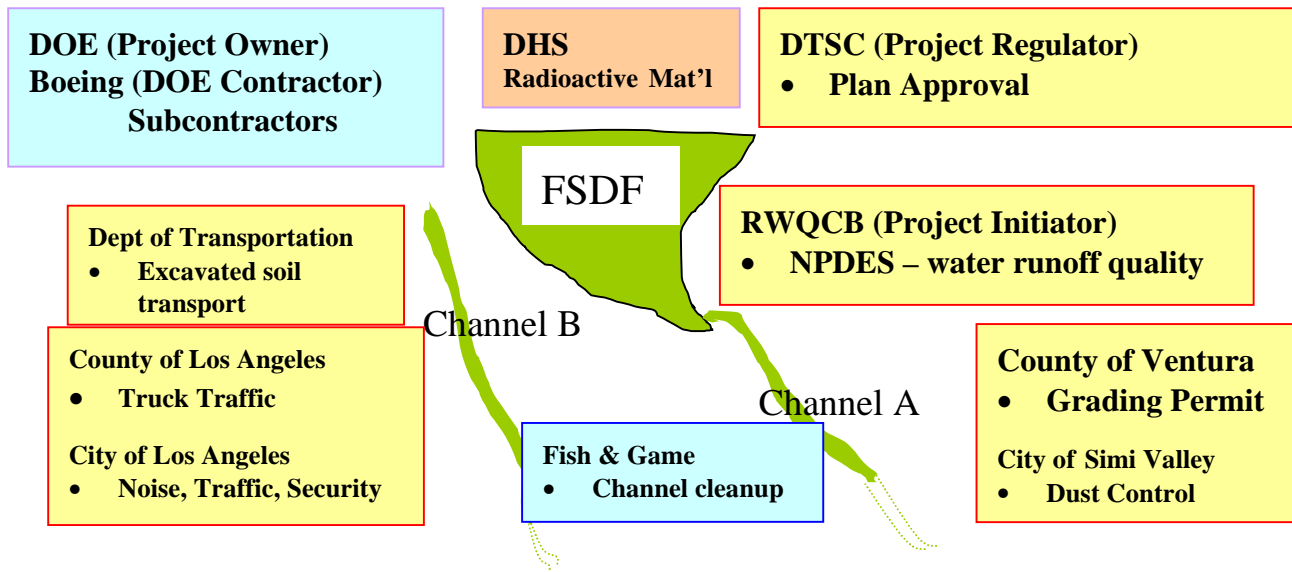


Figure 3. Various Regulators

Insist on Clarity

Resist any regulatory directives that are vague or provisional. Insist on clarification; work to remove conditions accompanying approvals or releases. RWQCB gave a conditional release for the FSDf project, which passed the project jurisdiction to DTSC. DTSC attached many conditions before any activity could be performed.

The original “Closure” plan that was approved, called for removal of all soil to bedrock, in the lower pond zone only, followed by sampling of the exposed surfaces. The absence of the cleanup criteria at the time has prevented any constructive site work for seven years so far.

It is likely that an attempt to establish agreed-upon standards at the outset of this project would have been highly contentious, but such actions may have significantly limited activities that continue to date. The existence of Federal and State standards for radiological release made it possible to achieve that objective in a straightforward, although lengthy, way.

Open Communication with Public

Generally, the public does not have sufficient data, or the technical understanding to interpret the available data, for making an “informed” decision about a project or an operation. In the absence of the relevant technical data, the public may get partial or incorrect information from a vocal minority or the news media. A policy of Open Communications with the public is recommended to, hopefully, soften the atmosphere of public mistrust towards government and corporations.

SUMMARY

The Former Sodium Disposal Facility cleanup project has had an exceptionally large amount of regulatory scrutiny and public involvement, incurring a considerable cost and schedule impact. The contribution made by the remediation of this facility towards improvement of the degraded groundwater, the original reason for the FDSF cleanup, remains to be determined. Clearly, however, the removal of contaminants from the site can only be considered a step in the right direction to prevent further migration of such substances into the environment. A key ingredient to completing future remediation projects in a timely way is to establish formal criteria approved by the Regulators. The Boeing Company and the Department of Energy (DOE) are currently working very diligently to accomplish this objective. An agreement with the regulatory agencies regarding the project scope is anticipated in near future, and it is hoped that the “interim cleanup” of the FDSF will be completed soon after the current rainy season is over.

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FOOTNOTES

*The California Department of Toxic Substances Control (DTSC) approved the FDSF Workplan (on 14 December 1999), with some conditions, to clean up the facility as an interim measure. The preparatory work has been initiated.

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