

**-LESSONS LEARNED-
GENERAL ATOMICS
HOT CELL FACILITY
DECONTAMINATION & DECOMMISSIONING PROJECT**

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ABSTRACT:

The General Atomics site is a privately owned and operated nuclear research site located in La Jolla, California. The site is regulated by the Nuclear Regulatory Commission (NRC) and the State of California under issued NRC and State licenses.

The General Atomics Hot Cell Facility was constructed in 1958 by the Bechtel Corporation as a heavily-shielded, nuclear material remote-handling laboratory. The facility is a 7,400 ft² building with three hot cells (high level cell, low level cell and a metallography cell), supporting labs, machine shop, temporary nuclear fuel/material storage wells and pit and outside storage/staging pads, and administrative offices. The facility is contained within a fenced 46,740 ft² service yard.

Over the years, the General Atomics Hot Cell Facility has supported a wide variety of Department Of Energy and commercial nuclear fuel and reactor research programs. Because of the type of work performed at the Hot Cell Facility, the building and surrounding yard became contaminated with various radionuclides (primarily Co 60, Cesium, Europium, Strontium 90, Uranium and Plutonium). In December, 1994, General Atomics formally notified the NRC of its intent to cease operations at the Hot Cell Facility and begin preparations for D&D and remediation of the structure and surrounding area.

Throughout the three phases of the project, numerous opportunities to reduce cost , minimize waste, shorten schedules and recycle valuable hot cell equipment and structures (lead glass windows) was realized and acted upon. Due to the undertaking of these various initiatives, the project will be completed one year ahead of the original schedule with approximate cost savings close to \$3 million dollars. Numerous "Lessons Learned" were achieved during this D&D project. Information sharing in the form of papers, posters, conversations and site visits, allows

other similar Department of Energy or commercial sector nuclear D&D projects to benefit from the experiences of those, “who have been there and done that.”

INTRODUCTION:

The General Atomics Hot Cell Facility D&D Project is a unique, cost shared cleanup arrangement between the Department of Energy and General Atomics. Because past Department Of Energy contracts with General Atomics were silent on eventual D&D of the structure and surrounding area, an active Department Of Energy contract was modified with a D&D clause which revealed the Department's responsibility to assist in the cleanup of the site. Following a brief period of contract discussions and negotiations, the Department Of Energy awarded a sole-source contract to General Atomics for Hot Cell Facility D&D and surrounding site soil remediation activities.

Based on the throughput of nuclear material during Hot Cell Facility operations it was determined that the cost share split for the project would be 76% for the Department Of Energy and 24% for General Atomics. Cleanup would be performed to established and agreed upon criteria for the various radionuclides present throughout the structure and surrounding area and, for the eventual release of the facility and yard to unrestricted use.

The D&D project was divided into three separate phases:

- Phase I-** Formulation and issuance of all required and agreed upon Program Management, Health and Safety and other documentation including; the NEPA Environmental Assessment (EA), legacy equipment inventory including tagging (government vs. commercial property) and removal/disposal of certain equipment, Characterization and Sampling Plans, the Characterization Report, actual facility and yard sampling and characterization, and lastly, preparation of the NRC and State of California approved Decommissioning Plan which established the cleanup criteria. That document was approved by the regulatory agencies in June, 1995.
- Phase II-** Decontamination of facility, asbestos removal, dismantlement of the structure and hot cells, packaging and disposal of generated low-level radioactive waste (including 120 ft³ of Remote Handled Category 3, low-level radioactive waste shipped to Hanford for disposal via licensed Fort St. Vrain fuel casks) and

removal and disposal of contaminated soils and small amounts of mixed low-level radioactive waste. In December of 1998, Phase II, structure demolition and soil remediation activities were completed.

Phase III- Final remediation contractor confirmatory sample and survey of the site by General Atomics health physics, Independent Cleanup Verification (IVC by ORISE), NRC and State approval that cleanup is complete based on General Atomics and ORISE submittal of the Final Survey Closeout Report, and lastly, the release of the site to unrestricted use by the NRC and State of California.

Throughout the General Atomics Hot Cell Facility Project, unique initiatives were undertaken to save both time and money at the same time never compromising the safety, health or welfare of the worker, public or the environment.

The following "Lessons Learned" can be attributed to the General Atomics Project and made available to others for use within the Department Of Energy Complex:

Pre Phase I/Phase I:

Contract Strategy - A sole source, cost-plus, no-fee contract was awarded to General Atomics for Hot Cell Facility D&D and site remediation because the facility and property were privately owned. By virtue of ownership status, General Atomics possessed the expertise and knowledge of past Hot Cell Facility operations and the radioactive/hazardous materials handled therein. General Atomics had access to the people involved in past program work for "process knowledge" interviews. General Atomics also maintained excellent contract and personnel records that included; training, health and other work related records and logs. In addition, utilization of the General Atomic site's cadre of experienced professionals, eliminated the duplication of various Hot Cell Facility D&D functions. In particular; health & safety, Q&A, waste handling, packaging and transportation and, health physics which were all well established professions at General Atomics Complex. The project also utilized an experienced workforce from a prior on-site D&D project (SVA Fuel Fabrication Facility) which helped the Hot Cell Facility Project in various scales of efficiencies.

The cost-shared arrangement between the Department Of Energy and General Atomics was calculated and based on the throughput of nuclear material in the Hot Cell Facility

throughout its existence and operations (government vs. commercial). This was considered the easiest and fairest way to determine the cost share percentages. Following an historical review of Hot Cell Facility contracts (both government and commercial), a cost-shared agreement between the two parties was reached. With this unique arrangement, General Atomics had a vested interest in keeping project costs down and maintaining or accelerating schedules.

Latitude was provided to the Department Of Energy Field and Headquarters Project/Program managers that allowed the use of a graded approach in determining what Department Of Energy Orders and accompanying documentation would be required and imposed on the project. In early contract discussions, General Atomics had indicated that they did not want any additional requirements imposed on the project other than those required by the NRC. They felt that the NRC regulations and requirements were sufficient. The Department Of Energy (DOE) was able to convince General Atomics that some DOE orders were necessary and would be required of the project. Imposition of several DOE Orders probably drove Phase 1 costs a bit higher but, the Department was providing the more significant share of the cleanup dollars and, would've imposed the same requirements on a DOE-owned site cleanup. The Department also stressed the significant waste disposal savings being provided General Atomics with the shared cost arrangement and the use of government disposal versus commercial disposal sites. If General Atomics had performed the work without government assistance, their disposal costs would've been astronomical.

Pre-D&D inventory, tagging and disposal of past program legacy waste and equipment was also deemed very helpful. General house cleaning allowed for easy access in and around the facility during characterization sampling activities and, allowed sample results to depict a more realistic site worker, radioactive and hazardous contaminant exposure scenario.

Department Of Energy and General Atomics also negotiated an agreement to temporarily transfer and store legacy Hot Cell Facility irradiated fuel material at a modified on-site storage facility/bunker. This solution allowed established D&D schedules to remain intact and avoided a shutdown of activities due to the continued presence of the fuel in the facility (in order to perform proper facility characterization and decontamination, the fuel had to be moved out of Hot Cell Facility). The additional \$30K to modify the General Atomics storage bunker was considered money well spent considering the much

more significant costs to shut down and restart the Project if the material could not have been relocated. Countless attempts to move the material to a Department Of Energy capable spent fuel storage facility were made but were not successful primarily due to a state's imposed moratorium on spent fuel shipments.

Another significant Phase I action that allowed schedules to be maintained and a work stoppage avoided was the NRC "Interim Approval" of the Decommissioning Plan (Phase II Critical Path Item). This action came about primarily for three reasons. First, General Atomics had established an excellent operations record over the years and had built both strong relationships and trust with the NRC. Second, throughout the life of this project, NRC staff were involved and participated in various project planning meetings with both General Atomics and Department of Energy staff. Lastly, persistence on the part of assigned Department of Energy Program/Project Managers (Headquarters and Field Office) to develop, discuss and negotiate with the NRC, the granted unprecedented Decommissioning Plan "Interim Approval" status. Three to four additional months of NRC document review time were eliminated, allowing set D&D work schedules to remain in tact and work stoppage and project staff layoffs to be avoided.

Phase II:

The Project budgeted for, off-site visits to maintain a working relationship/exchange of information with other sites doing similar work. General Atomics Hot Cell Facility staff visited the Energy Technology Engineering Center (ETEC) Hot Cell Facility D&D Project. Because of the similar age and design of the ETEC Hot Cell Facility, many of their lessons learned and approaches were considered and/or implemented at the General Atomics Project.

Project managers/staff also attended various workshops to maintain and update their working knowledge base. (example, project staff attended a "Disposal of Lead and Debris and the Use of Macroencapsulation" at Envirocare in Clive, Utah).

A unique and aggressive recycle/re-use/waste minimization program was established and actually used throughout all Project Phases. Recycle re-use of Hot Cell Facility equipment using the INTERNET to advertise its availability and condition was very successful. The considered marketable equipment was all in good working order and most, slightly contaminated. The equipment was free if the interested party could provide for pickup, packaging and transportation (considered a project cost avoidance which was a

Department of Energy initiative - less low-level radioactive waste to package, ship and dispose). General Atomics also subcontracted out the removal of the three foot thick, hot cell, lead glass windows (Hot Cell Services). Because of special window removal equipment and techniques, Hot Cell Services saved time and allowed General Atomics to avoid generation of additional mixed low-level radioactive waste (lead in the windows). All Hot Cell Facility remote manipulators, plus spares and parts and, a Kolmorgan Periscope were provided to General Electric Vallicitos Nuclear Center for continued use at their Hot Cell Facility. General Atomics also recycled water during concrete saw cutting operations to minimize generation of liquid waste and recycled all the steel and lead bricks that was releasable, some after minimal decontamination. The Project also made use of a site-owned waste compactor for more efficient waste packaging, and used water filtration and ion exchange processes to minimize generation of liquid wastes.

Use of conventional technologies vs. use of new, unproven, possibly more costly technologies to decontaminate wall and floor surfaces (Vacu-Blast) was decided upon. Machinery downtime was minimized and schedules were maintained using tried and true techniques. Several newer technologies were considered and requests for "Small Scale Demonstrations" through the DOE/METC were submitted but that program reprioritized its available funds for use with several larger scale demonstrations at some of the bigger Department Of Energy sites. The use of acetylene torches vs. other torches to cut interior and exterior hot cell stainless steel liners was decided upon and was another example of wise, project technology-use, decisions. After testing several available torch cutters, the acetylene torch was chosen because it generated less hot slag and greatly reduced the danger of fire and other hazards to the workers.

Use of a commercial disposal site was made available to the project through an Oakland Operations Office contract (Envirocare). The Hot Cell Facility project had a need for such an option when it was determined that the Hanford site would not except lead shot, a mixed low-level waste stream for disposal at their site. Envirocare was also chosen and used for the disposal of site contaminated soils. This disposal option saved the project a significant amount of money.

Phase III:

Early planning and coordination for Independent Verification (IV) work was a wise project decision. General Atomics provided the IV contractor (ORISE) with key project documents; the Decommissioning Plan, Characterization Report, and Sampling and

Analysis Plan and, had the IV contractor on-site in late stages of building demolition to meet General Atomics staff, resolve comments from the ORISE review of project documents and lastly, provided a site tour for preparation of the IV Work Plan and scoping activities.

Other things done:

- Hired good highly seasoned and experienced Project and Resource Managers (key to a successful project)
- Assembled a Project Team that is well trained, experienced and technically competent in Federal/State/DOE regulations (RCRA, CERCLA, NRC, RAD/Industrial Safety, waste receiving facility Waste Acceptance Criteria (WAC), transportation, QA/QC)
- Good communication and high staff morale are key to running a successful project. Held frequent, informal project staff meetings (weekly) and gatherings.
- Developed and set project intermediate and long range goals/milestones and took maintaining set schedules very seriously (worked two shifts and weekends when necessary).
- Moved project administrative operations out of the facility and into trailers very early on.
- Restricted the use of all chemicals to avoid additional generation of mixed waste streams.
- Before accepting rented or equipment acquired from other site projects, inspections were performed for completeness and operability.
- Allowed up to one year for regulatory approval of key documents (NEPA Environmental Assessment was a Phase I critical path milestone)
- Cross-trained staff to maintain flexibility. This limited the workforce number and saved in labor costs.
- Maintained a good inventory and order system for necessary supplies (avoided work stoppages and delays).
- Considered and used specialty contractors (subs) who were sometimes better equipped, more experienced and qualified to perform certain jobs or tasks (an example was the hired asbestos removal contractor, Hot Cell Services for removal of lead glass windows and a concrete cutting and drilling contractor.
- Conducted numerous internal assessments and walkthroughs (Department of Energy health and safety assessments were also frequently performed), utilized QA and other internal auditor sitewide experience that was made available to the

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project.

- Conducted exit interviews - every customer/regulatory visit was considered an audit. Something could be learned from each visit. A different set of eyes and perspective probably helped in avoiding possible accidents.

Many unique and innovative techniques and approaches were used during the General Atomics/Department of Energy Hot Cell Facility D&D project. Hopefully the knowledge gained and “Lessons Learned” will be passed on to others, so that future Department of Energy projects can benefit from this Project’s experiences.