

What Really Happened When Santa Susana's Nuclear Reactor Overheated  
Written by Chris Rowe, OurLA.org Writer  
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Editor's Note: The nation's first nuclear reactor to generate electricity went into operation in 1957 at the Santa Susana Field Laboratory in the Simi Hills above Chatsworth with great fanfare including a report by Edward R. Murrow on "See It Now." Two years later, in July 1959, something went wrong and the reactor overheated and was shut down -- giving birth to the belief that a major meltdown had occurred and exposed a wide area in Simi Valley and the San Fernando Valley to dangerous levels of radiation. Fifty years later, questions about what happened still haunt the cleanup of Santa Susana where rocket and nuclear research was conducted for decades, and still fuel controversy and fear. Nearly three years ago, West Hills resident Chris Rowe got concerned about what she was hearing and started asking questions and getting involved. Over many months, she tracked down the more than 20 engineers, scientists and staff who were part of the Sodium Reactor team but had never discussed their experience publicly before, reviewed thousands of pages of documents and wrote this story from their perspective as an open letter to Gov. Arnold Schwarzenegger.

By Chris Rowe, OurLA Writer

As former employees of North American Aviation (NAA), we would like to set the record straight on an issue called the "Sodium Reactor Experiment" also known as the SRE. Atomics International was the division within NAA that was doing reactor research and development for domestic purposes.

We believe that the anniversary that should be celebrated is that in November 1957, the "Sodium Reactor Experiment" went online as the first domestic use of nuclear energy to generate power to supply the community of Moorpark, California.

This event was not a secret - in fact it was celebrated by the late Edward R. Murrow" who broadcasted this event to the world on his program: "See It Now".

The promotional brochure for the Sodium Reactor Experiment can be found here:

Each of us at some time was employed by North American Aviation in various positions -with various levels of education and training including PhDs in Nuclear Engineering, nuclear physicists, chemical engineers, reactor operators, metallurgical engineers, and electrical engineers.

We have recently read media accounts that the "Sodium Reactor Experiment" is being called a "meltdown". At most, the Department of Energy refers to it as a "partial meltdown". It was really the partial decladding of 13 of 43 fuel rods.

This document has become a collaboration based on the memories of numerous former SRE and other Atomics International employees that have knowledge of the practices of

the day at the Santa Susana Field Laboratory and other facilities within North American Aviation.

We believe that the documents speak for themselves. We would like to point out that this document - "SRE Fuel Damage Interim Report" November 1959, states that an Ad Hoc committee was created on July 29, 1959.

American Aviation Vice President Dr. Sidney Siegel requested that Joe Lundholm (now PhD) Chair this Ad Hoc Committee on the SRE. Dr. Lundholm spent about 80% of his time over the course of the next year involved in meetings and writing reports on the SRE. He held these meetings in the conference room of the SRE building with the Ad Hoc Committee members and the Group Leader in charge of the SRE. This conference room was upstairs with the offices of the engineers and secretaries.

Some former employees including Dr. Lundholm and physicists and engineers, operators that were there at this time have reviewed the Interim Report and other documents.

We find that the report called the "Daniel Report" to be as close as we can remember to what occurred at that time at the SRE. There is only one error that was noted in that report- the offices were above the control room - not downstairs.

The media has said that this was an "uncontained facility" unlike a "traditional domed facility" of today. This is true - but there was no need for a "traditional domed facility" because this was not a "Water Cooled Reactor" - a reactor which could be damaged by a steam explosion. Sodium was chosen as the coolant because of the higher operating temperature, low pressure and no chance of a coolant explosion. The "Sodium Reactor Experiment" or SRE was a 20 MW (thermal) reactor. This was a small reactor in today's energy terms. If you would compare 20 MW today to something of your understanding, 20 MW is about the amount of energy produced by wind power in the current Assembly Bill 1106 (Fuentes / Ruskin):

This bill is of course related to "feed in tariffs" , but it shows the energy needs of California today just as the State was looking to its energy needs more than 50 years ago

Living today are many Atomic International et al employees who were involved in every aspect of the "Sodium Reactor Experiment". They include Dr. Joe Lundholm and Dr. Allen Jarrett from the Ad Hoc Committee.

Bud Conners was a construction engineer that was responsible for the construction of the reactor and installation of the assembly for the SRE. He would later go on to be the Program Manager in charge of the decommissioning of nuclear facilities, and he was the Program Manager for the SRE after it was decommissioned.

Bob Campbell PhD was the physicist in charge of making the reactor go "critical" - getting it up to an energy level so that it could produce the power necessary to connect

with a steam generator owned by Edison. This generator in turn, would, produce the energy that would be sent to Moorpark.

The SRE as you would enter it would appear as a "large factory room - 50 - 60 feet" high known as the "high bay". This room needed to be this high to accommodate a large crane. The control and instrumentation room was in the low bay section of the building, adjacent to the high bay. Engineering and administrative offices were on the 2nd floor of the low bay section. This is significant because this structure was not considered contaminated enough to require evacuation by its employees. Dale Johnson, operation manager and Jim Owens, test and experiments manager and their secretaries, were located here.

Jim Owens was in and out of this office - he was also involved with the planning for another sodium cooled reactor that would go online in the early 1960's - the Hallam Nuclear Power Facility, located in Hallam, Nebraska. Several employees of Atomics International located at the De Soto facility (the headquarters for North American Aviation - the parent company of Atomics International) and the Santa Susana Field Lab, worked on various sodium cooled reactors at the same time.

A series of "Runs" or outputs of energy had occurred during this time period. A power excursion occurred. On July 13, 1959, for some reason, the systems detected that there was radioactivity in the system after "Run 14". The reactor operator manually shut the reactor down for about two hours. This manual shutdown is called a "scram". The operator on duty at the time could not determine that there were any problems within the reactor itself. Someone made the decision to go back online. And over the next two week period, the temperature of the reactor was inconsistent. The decision was made to shut down the reactor for further study.

It was not until the reactor was shut down and cooled down briefly (reactors do not become instantly cold - they take weeks to cool) that the reactor employees could view the reactor core itself.

At no time were any employees or any community members in any danger. Atomics International workers wore dosimeters to monitor their exposure to radiation. They also wore film badges that were checked on a monthly basis. There was always a health physicist present. In fact, some employees remember that areas that had already been checked for leaks and found to be clean were often rechecked by health physicists.

In looking into the core, it was determined that the cladding on 13 of 43 fuel rods had melted. This cladding was a steel material that combined with the uranium fuel. It was later learned that this combination - iron and uranium eutectic (an alloy) - would lower the melting point of this combination as opposed to the melting point of uranium alone. The normal melting point of uranium is 2070 degrees F.

The eutectic material melted at 1337 degrees F.

"Only very limited melting of an iron-uranium eutectic (alloy) occurred, causing failure of the steel cladding."

John Walters was an engineer that was in charge of running experiments at the SRE. He was there during the time frame of the incident. He recalls that there was no radiation detected in the building itself, and that he stayed there with his employees while the fuel rods were being retrieved. Some of the cladding material had melted on the bottom of the cans. Special tools were designed to retrieve the fuel rods. Some had become brittle and snapped. Others had to be twisted and pulled out.

At no time did the reactor building become contaminated with any significant level of radiation. If any radioactive particles had fallen off these broken materials during the time of retrieval, the floor was mopped up with absorbent pads.

At all times that these activities were occurring the appropriate safety methods were in place according to AEC guidelines. Again, health physicists were monitoring.

Jim Owens had a window in his office that was above the reactor control room. That window that looked out over the reactor core, and it had a view of the crane. He recalls that when the crane stopped, that meant that activity had stopped. He recalls going down those steps more than once to ask why the crane had stopped. HUH???

The reactor itself was beneath the floor of the high bay with openings in the top of the reactor vessel. The fuel handling machine would move over the ports in the reactor top shield. A grappling tool would grip the top of the fuel element shield plug and withdraw the fuel element into the lead shielded fuel handling machine. A new fuel element would then be inserted into the reactor. This was a closed system. The Fuel handling machine would then move to another position on the floor of the high bay. There it would insert the fuel element down to the hot lab below. There the fuel rod could be examined through a glass shield to determine its condition.

The radioactive material of concern was the fission products produced in the uranium fuel. The sodium was slightly irradiated by interaction with the neutrons. The half life of irradiated Sodium 24 is 15 hours. This sodium was kept in holding tanks until the radiation decayed.

According to reactor specialist Dr. Jerry Christian who has reviewed the "Sodium Reactor Experiment" documents and the other reports produced by other physicists that have reviewed the SRE, he has concluded that:

"Approximately 1% of the iodine-131 (16 curies) was released from the fuel into the sodium coolant in the reactor core. It then formed sodium iodide, a solid, and stayed in the reactor coolant system.

Approximately 1% of cesium-137 (28 curies) was released from the fuel into the sodium coolant in the reactor core, and all of this cesium-137 stayed in the reactor coolant system.

Measurements of the reactor cover gas indicated only noble gases (xenon-133 and krypton-85) were present. No iodine-131 or cesium-137 was detected in the cover gas, which is contrary to the alleged pathway for release through the stack, as theorized by the Lochbaum Report.

“Only very limited quantities of noble gases (xenon-133 and krypton-85) were released to the environment from the stack.”

All reactor experiments were reviewed by a safety analysis committee. The Ad Hoc Committee formed for the SRE included: At least two of the members of this team have been interviewed for this letter.

Why are we employees revealing ourselves today? We have heard the media reports recently that have taken what we have achieved for science - the safe domestic use of nuclear energy, and made it into a "worst case scenario" for the "Sodium Reactor Experiment".

The SRE had a "hand and foot" monitor that employees utilized on exiting the building. Only one time did this sensor alarm. Investigation determined that the radiation was outside the building, fallout from a Russian nuclear test.

All Atomics International facilities had reverse ventilation systems in place to prevent the release of contaminants. There were HEPA filters in place. And all Atomic International facilities had air monitors spaced to at least 10 miles from the site.

The activists that discuss the SRE have no real understanding of how the SRE worked. They make statements that "radioactive furniture and documents" were put outside to "cool off". Radionuclides do not "cool off" due to any exposure to weather. The only way for radionuclides to become less radioactive is by time - their half lives.

Atomics International and its affiliates had a good employee health system. There were annual physicals which included chest x-rays, urinalyses, and blood tests. In fact it has been stated that that Atomics International employees were healthier than other residents in the area due to this annual examination.

Of the more than 20 employees that have been a part of the recent discussion on the SRE to compile this document, none have any health problems that they attribute to working at the Santa Susana Field Lab or any other Atomics International facilities. The age of these employees ranges from the mid 70's to the late 80's. Three have had prostate cancer which they do not attribute to their work at any of these facilities.

The expected risk of prostate cancer is one in six in a normal life time. "About 80% of the men who reach 80 have prostate cancer". "About two thirds of all prostate cancers are diagnosed in men age of 65 and older."

We believe that the activists in the community are creating alarm. Our friends are being frightened by media reports on the SRE. We want you to know that we had the most exposures to the SRE, or we worked at the SSFL at some point before, during, or after the SRE incident. We are alive and healthy today, and we do not believe that anyone has any health problems that can be attributed to the "Sodium Reactor Experiment".

We are those Atomics International and North American Aviation employees that brought the Sodium Reactor Experiment online. This facility - while shut down for about a year - had a second core inserted. The reactor went back online until 1964. Some of us worked on the SNAP reactors, others worked on the Hallam Reactor, and others of us worked on other "reactor experiments". If the SRE was as contaminated as the activists claim, the SRE could not have been safely repaired and gone back online. The Ad Hoc Committee and other engineers and physicists would not have continued to work in this facility if they felt that there was any health risk in doing so.

The SRE was decommissioned beginning in 1974. It was independently reviewed by Argonne National Lab in 1984. It was released by the DOE for unrestricted use in September 1985.

"The SRE structure was torn down in 1999."

"In the summer and fall of 2000, the SRE septic tank, leachfield and associated drainage pipes were excavated. Radiological sampling was performed. All radiological measurements of the SRE septic tank, leachfield and surrounds displayed either background levels of radioactivity or levels that were well below the DOE and DHS approved soil cleanup standards."

"In 2001, soil sampling was conducted at SRE for areas that were being planned for excavation as part of the RCRA (chemical cleanup) corrective action effort. No elevated radioactivity levels were found in the area proposed for excavation, but elevated levels were found in two distinct locations in a drainage ditch north and west of the former location of Building 4143. The areas were remediated and resurveyed and shown to be below cleanup standards."

"In 2001, the DHS conducted soil sampling at the location of elevated soil mercury levels east of the prior SRE location. All radionuclide concentrations met the site-wide release criteria"

We believe that it was very difficult to keep a secret "on the hill". The idea that this site was covered up is hard to imagine.

One employee, Bill Littleton recalls spending a day with reporters for "The Mirror", and the "Valley Green Sheet" - which was later to become the "Los Angeles Daily News". A news clip reporting this incident is found here from August 1959:

Photos of the SRE facility are shown on that link as well.

But what can be more telling of the safety of the SRE than having Mayor Sam Yorty of Los Angeles at its controls in 1963. "Mayor Sam" was given the "Honorary Title" of Nuclear Reactor Operator".

If we can answer any further questions on this site, some of us will be glad to do so. Others find that our ages prevent further involvement. We request that our names and contact information be kept confidential with respect for our ages and for our families.

Thank you.