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HIDDEN TRUTH: THE SODIUM REACTOR EXPERIMENT MELTDOWN OF 1959 AT
THE SANTA SUSANA FIELD LABORATORY

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By

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ABSTRACT

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In July, 1959 a test nuclear reactor near Los Angeles suffered a meltdown. This information remained relatively unknown and continues to remain shrouded in mystery today. Due to corporate and government secrecy, news of the incident came only twenty years after the fact and the information provided is piecemeal. The story has continued far beyond the meltdown incident as many active participants work to discover what really happened over a half century ago. In a larger context of nuclear development in the American West, understanding this incident helps shed light upon years of denigration of Western people, land, culture, and history. The meltdown was a microcosm for Western nuclear development and the cavalier way in which both the land and its people have been treated by the federal government. Juxtaposed against Eastern meltdowns such as Three Mile Island, the Santa Susana Field Laboratory would garner no such media attention or presidential fanfare. Though not a complete picture, knowing the story of the SRE meltdown and ensuing discovery and clean up aids in the understanding of the nuclear West.

INTRODUCTION

The summer of 1959, though benignly similar to that of many others for the residents of burgeoning Cold War suburb of the San Fernando Valley, concealed a nuclear disaster in the nearby Santa Susana Mountains. Unbeknownst to these local residents, a test nuclear reactor suffered a meltdown sometime between the 12th and the 26th of July and released an unknown amount of radiological waste into the outlying areas. Atomics International, a subsidiary of North American Aviation, constructed the Sodium Reactor Experiment and housed it at a privately-owned test site, referred to as the Santa Susana Field Laboratory (SSFL). Because of secrecy, conflicting reports, missing documents, and outright lies, the full extent of the damage caused by the reactor incident remained undisclosed and it may never be fully divulged to the public. Many who are aware of the event consider it little more than a novelty involving a secretive government, corrupt corporations, and eccentric local activists. But the story of the SSFL's meltdown is important in its own right, and it serves as a microcosm of the dangers involved in Western "nuclear cowboyism" and the mismanagement of America's privatized nuclear program.

In the 1950s, Atomics International began experimental nuclear work at the Santa Susana Field Laboratory. Among the many experiments, the company pioneered a new sodium-graphite nuclear reactor, referred to as the Sodium Reactor Experiment (SRE). At that time, the United States invested heavily into experimental projects such as the SRE because the reactor alleviated fears regarding the dwindling domestic resources of uranium, on which the SRE relied less heavily than a conventional reactor. During the meltdown of 1959, the SRE suffered damage to one-third of the fuel cells and exposed the nearby area to an unidentified amount of radiation. This meltdown (just outside of Los Angeles, California) is rarely included in discussions of the

significant and familiar disasters such as Chernobyl (1986), Three Mile Island (1979), and Fukushima (2011). Tucked between the Simi and San Fernando Valleys at the edge of Ventura and Los Angeles County, the Santa Susana Field Laboratory is the location for arguably one of the worst nuclear meltdowns ever to occur, and is within a few miles distance to many of the ten million inhabitants in the area. To this day, regardless of its proximity to the second most populous city in the United States, the destructive potential of the SRE remains unknown.

Not only are the details of the incident vague, but because of corporate and government secrecy, the story has never been appropriately, and completely, told. The Atomic Energy Commission (AEC), formed in 1947 as the federal energy regulatory body, adapted the control of the atom from military to civilian uses. As a descendent of the Manhattan Project, the AEC safeguarded the non-military use of nuclear technology and enforced regulations on the use and production of fissionable material as "restricted" with disclosure punishable by death.¹ Within the context of "national security and secrecy," the AEC created private agriculture, medical, and reactor programs in response to both national and international pressure and worked hand in hand with the history and ideology of the continuing frontier of the American West.

Within the U.S. nuclear program of the twentieth century, the West provided the ideal location for both ample and isolated land for confidential experimentation. As historian Michele Gerber has demonstrated in the case of Hanford, Washington, nuclear engineers often hid many secrets about its privatized and peaceful exploration of the atom including excessive health hazards to employees and local residents. The confidentiality surrounding the plant, Gerber argues, hindered an understanding and correcting of the events that transpired. This same

¹ Gould Gouldman, *Deadly Deceit: low-level Radiation High-Level Cover-up* (New York: Four Walls Eight Windows, 1990), 73.

argument of confidentiality and consequence can be applied to the events which transpired at the SSFL as well.

Furthermore, in what author Valerie Kuletz describes as "nuclear colonialism" within the American West, the U.S. government marginalized the local population, put American-Indian health at risk, and persistently encroached onto Indian territory.² Confidentiality of these sites has done a great disservice to a people already marginalized by the U.S., but add "nuclear cowboyism" and the picture of twentieth century nuclear programs is akin to the images of a Wild West long thought dead.

It is this idea of the "Legacy of the West" that helps explain much of the twentieth century Western nuclear industry. Contrary to the thesis of Frederick Jackson Turner, Patricia Limerick argues that the history and ideology of the West continues today. This idea of a seamless Western history contends that the drive for conquest has affected the West much like slavery did the South.³ Arguing that the history of the West is both a serious and significant pursuit, Limerick attempts to explain the attitudes of both the United States as well as Western expansionists well into the twenty-first century. Her arguments suggest that nuclear cowboy constitute a seamless transition from the gunslingers and bandits of the nineteenth century, and by illuminating the perception of western history as a novelty, she begins to explain how present day populations disregard even the most tragic Western incidents.

Taking the legacy of the Western frontier into the twentieth century, Hal K. Rothman argues one step further in explaining that the West both provided an ideal location for nuclear expansion, and at the same time symbolized the technological frontier much akin to the rugged

² Valerie L. Kuletz, *The Tainted Desert: Environmental Ruin in the American West* (New York: Routledge, 1998).

³ Patricia Nelson Limerick, *The Legacy of Conquest: The Unbroken Past of the American West* (New York: W. W. Norton, 1988).

territory on which experimentation took place. Rothman argues that in the post World War II-era window between conservationism and environmentalism, America's faith in its technological superiority blinded it to the dangers of the new technology. As a result, was not cautious in the furthering development of nuclear advancements. In John F. Kennedy's "Camelot" and in Lyndon B. Johnson's "great society." progress was no longer possible, but essential.⁴ Not only did the national government disregard safety, but it also denigrated the West and cavalierly distributed nuclear programs and waste disproportionately in the region.

Lastly, the concept of the "Nuclear West" established the Western frontier as not only a location but as a denigrated portion of the nation that has been long perceived as distant from "America." Editors Bruce Hevly and John M. Findlay worked extensively to demonstrate that the Atomic Energy Commission (later the Energy Research and Development administration, and even later the Department of Energy), knowingly chose Western locales for the "dirtier" nuclear tasks.⁵ Many scholars have now sought to illuminate the very real and pervasive mindset held by the national government of the "Wild West" as a location to create and hide messes far from its backyard.

The story of the SRE did not begin in 1959, nor did it end there. Four major eras of development have signified key changes regarding the Santa Susana Field Laboratory including the actions and policy at the site, the public opinion surrounding the event, and the state and federal governmental response. The first era, between 1949-1959, includes site selection, SRE construction, initial operation and public opinion, and problem issues leading up to the meltdown. The second era, from July 12, 1959 to the end of 1966, analyzes the meltdown,

⁴ Hal K. Rothman, *Saving the Planet: The American Response to the Environment in the Twentieth Century* (Chicago: Ivan R. Dee, 2000).

⁵ Bruce William Hevly, John M. Findlay, eds., *The Atomic West* (Seattle: University of Washington Press., 1998).

ensuing company cleanup, and the conclusion of the Sodium Reactor Experiment. The third era, between 1979-1989, details the public discovery of the incident and the ensuing federal investigations. The fourth and final era, from 1991 until the present, includes the current status of the legislation and clean up at the SSFL. Within these four major eras there are also four major underlying threads including: an overdeveloped and misplaced trust in technology, restrictive government and company secrecy, the clash between a Western frontier and an urban setting, and the relationship between regional public and law and that of federal establishments and corporate interests. Though not always evenly represented within each era, these issues are a major component that make up the story of the SRE incident.

Federal Regulatory bodies such as the AEC and private companies such as Atomic International have caused the denigration of Western people and history. Blinded by a romance with progress and technologically-induced vanity, many at both the federal and regional level have glossed over tragic nuclear incidents. Both private companies and the federal government have manipulated perceptions of the American "Wild West" to support and nurture irresponsible risk. This has all been done in the name of national security, and the West has become the region of national sacrifice. Here, at the figurative "watering hole" of Western history can the incident of the SRE nuclear meltdown of 1959 find its voice and importance. In a story where the Atomic Energy Commission "deputized" Atomic International, the Santa Susana Field Laboratory can serve as the "O.K. corral" of twentieth century American nuclear program. The incident tells a story of nuclear infancy and the dangers wrought by underestimating the risks involved. It validates arguments that the "Wild West" of cowboys and lawlessness has seamlessly transitioned into the present and explains why so many Americans think tales of nuclear incidents and government secrecy are such novelties. It illuminates the disturbing trend

of the national government to create its messes as far West as possible as well as Western regional acceptance of its denigrated position. In no other location has a nuclear incident been so close to such a major American city and in no other instance have so many American citizens been kept in the dark about the dangers in their own community. The full story must be told because knowledge of the SRE incident can lead to the proper understanding, validation, and healing that has been denied the American West for many years.

ERA ONE A MISPLACED FAITH IN TECHNOLOGY

Between 1949 and 1959 employees at the Santa Susana Field Laboratory as well as many in the Cold War suburb of the San Fernando Valley firmly believed that the atom heralded the new technological frontier. Though the government was actively involved at this time, the image of a meddling federal bureaucracy took a back seat to the impact made by the frontier image that technology presented. Though after the failure of SRE, Atomics International imposed a silence it justified by appealing to "national security," it is interesting to note that before the incident secrecy had not been an issue. Within this period, local support from the San Fernando Valley for Atomics International's work remained substantial and generally enthusiastic. Because of overinflated perceptions of the technological frontier, both Atomics International and the greater Los Angeles area paid the price of nuclear disaster.

After World War II, Congress created the United States Atomic Energy Commission (AEC) in order to foster and control the peace time development of atomic science and technology. This followed President Harry Truman's signing of the McMahon/Atomic Energy Act in 1946 that transferred atomic energy from military to civilian control.⁶ On October 3, 1949 a *Los Angeles Times* article reported the unveiling of a new test facility in the Santa Susana Mountains referred to as the Santa Susana Field Laboratory (SSFL). These mountains lay roughly thirty miles northwest of Los Angeles at the current border of Los Angeles and Ventura County. This project's parent company, North American Aviation, announced the beginning of

⁶ Levi, Edward H. *Bulletin of the Atomic Scientists*; 9/1/1946, Vol. 2 Issue 5/6, pp. 18–19, 2p.[Formatting is incorrect – check Turabian or Chicago Manual of Style]

experimental nuclear testing under a subsidiary company, Atomics International.⁷ This company would later be joined at the SSFL -- also referred to as "the hill" by employees -- by a sister subordinate company, Rocketdyne, which would commence rocket testing. Though the local populace knew little about the work at the SSFL, a hopeful *Los Angeles Times* article assured readers that "It pays to live in the San Fernando Valley...here is Atomics International, pioneer of the creative use of the atom."⁸ Met with anticipation and excitement by locals, the SSFL benefitted from the rugged and remote terrain of the West. Combining Americans' faith in technological progress and preconceived notions of a Western "frontier," Atomics International, in partnership with the Atomic Energy Commission (AEC), worked to further advance nuclear science.

In order to properly foster this technology, a site advisory committee conducted a series of surveys to assess site suitability and proximity which remained the primary concern regarding the Santa Susana Field Laboratory. The panel found that the SSFL's relative inaccessibility and isolation made it eligible as one of six locations considered for the "restricted" testing site in 1949. Because of its seclusion, the SSFL required construction of new roads to access the site.⁹ The evaluation for six potential site locations had been offered for review by the Atomic Energy Commission to decide on a final location for the new plant. The committee ranked the SSFL fifth of six for its "meteorological appropriateness, in part because of nighttime drainage of potentially contaminated air 'into the San Fernando Valley.'"¹⁰ Daytime conditions remained "uncertain" as hydrologic problems had the potential to cause groundwater to "flow into the San

⁷ "Rocket Motor Test Area Being Built in Mountains :Experts Plan to Study Flaming Thrusts at New Government 'Restricted' Center," *Los Angeles Times* (1923-Current File) 3 Oct. 1949, ProQuest Historical Newspapers Los Angeles Times (1881 - 1987), ProQuest. Web. 20 Sep. 2011.

⁸ "Display Ad 178 -- No Title." *Los Angeles Times* (1923-Current File) 1 Feb. 1959, ProQuest Historical Newspapers Los Angeles Times (1881 - 1987), ProQuest. Web. 20 Sep. 2011.

⁹ Ibid.

¹⁰ Ibid, 8.

Fernando Valley water basins.” Put plainly, risks associated with both air and water contamination relegated the SSFL toward the bottom of the list of potential candidates for the new site. The SSFL benefited, however, from the fact that it was a comparably short drive to Los Angeles as opposed to other potential sites. The panel adamantly stressed the desire to keep commute times short as the desired location should be isolated, and yet also relatively close to employees’ homes.¹¹ With all elements considered, the advisory committee selected the SSFL as the site location. As a Western technological frontier, the SSFL proved adequate as it featured isolation, secrecy, and a willing local populace. Both the AEC and Atomic International catered to government demands for safety, but as the desire for expediency challenged this need, construction began at the SSFL.

In its infancy, the SSFL's federal and corporate founders enjoyed strong regional support and a general feeling of excitement from the local populace. With AEC approval, nuclear reactor construction commenced at the SSFL on July 13, 1954.¹² As part of the privatization of nuclear technology programs, and in conjunction with the AEC, North American Aviation (NAA) invested ten million dollars into an atomic energy research program and the new Sodium Reactor Experiment (SRE). The AEC provided three quarters of the funding, and North American Aviation provided the remaining quarter, as well as the testing location. The SRE would create jobs, power, and technological progress within northwest Los Angeles to the benefit of the growing city in exchange for the isolated land and an opportunity to create the test establishment. By 1956, development and construction were in "full swing" and included the interests of 350

¹¹ Ibid, 8.

¹² "Atomic Test Plant Set For This Area: \$10,000,000 North American Project Undertaken With AEC for Nuclear Power. " *Los Angeles Times (1923-Current File)* 13 Jul 1954, ProQuest Historical Newspapers Los Angeles Times (1881 - 1987), ProQuest. Web. 20 Sep. 2011.

southern California industrial businesses and companies.¹³ Atomics International, in conjunction with Southern California Edison Company (SCE), planned to provide nearby residents nuclear powered electricity by summer of that year, a prospect that the media and local public greeted with tremendous amounts of excitement.¹⁴ By the end of 1956, due in part to its provision of electricity and jobs, the SRE had become an important part of the San Fernando Valley.

Atomics International and the AEC further strengthened their link with the greater Los Angeles area when the SRE provided power to local residents. In mid-July 1957, the SRE went critical (describing the self-sustainability of fission reaction within a nuclear reactor), and in conjunction with SCE, lit the skies of Southern California.¹⁵ The initiation of the reactor, according to a *Los Angeles Times* article, launched the beginning of the AEC's five year program to develop both economical and privately owned nuclear power. Not only was the sodium reactor perceived as much safer than conventional reactors of the time, both Atomics International and the AEC hoped that it would alleviate the concern about the limited nature of uranium and make nuclear technology more accessible. Atomics International, with close support of the Atomic Energy Commission, depended on the SRE to provide an alternative power source. Southern California Edison also hoped that the new technology would prove economically competitive with that of coal, oil, and hydroelectric plants, and on November 13, 1957, announced that all power for the city of Moorpark, with a population of roughly 3000, would be provided by the

¹³ "Work Starts on Santa Susana Atomic Reactor," *Los Angeles Times (1923-Current File)* 4 May 1956, ProQuest Historical Newspapers Los Angeles Times (1881 - 1987), ProQuest. Web. 20 Sep. 2011.

¹⁴ "Atom Electricity Set For Southland: Residents of Santa Susana Area Expected to Get Service by Summer; Reactor Being Built," *Los Angeles Times (1923-Current File)* 31 Jan. 1956, ProQuest Historical Newspapers Los Angeles Times (1881 - 1987), ProQuest. Web. 20 Sep. 2011.

¹⁵ "L.A. Gets First Power From Atomic Reactor: Nuclear Generating Plant in Santa Susana Mountains in Operation for Edison Company Atom Reactor Operating Here." *Los Angeles Times (1923-Current File)* 16 Jul 1957, ProQuest Historical Newspapers Los Angeles Times (1881 - 1987), ProQuest. Web. 20 Sep. 2011.

Sodium Reactor Experiment.¹⁶ According to Edison officials, it was the first time that a community would be "lighted entirely by power from a commercial reactor" and proved to be a landmark achievement for nuclear energy. Atomics International, with the AEC as a powerful ally, had successfully harnessed the power of the atom and at the same time corralled the support of both the local business community and the public.

To bolster both local and federal support, Atomics International launched an unofficial public relations campaign to tout the benefits of the SRE. In July 1958 an informational video entitled "SRE construction" presented in-depth information on the new technology. Atomics International assured viewers that due to low operating pressures created by the sodium coolant system, the SRE proved an extremely reliable counterpart to existing reactor models and, at full power, the reactor stability actually exceeded previous expectations of safety.¹⁷ Not only did the SRE provide an economical alternative to coal, but officials at Atomics International insisted at the time that within its "low pressure system, there is no conceivable way in which the release of energy within the reactor could result in the dispersal of radioactivity in any significant quantity."¹⁸ In power output, safety, and efficiency, the SRE appeared to be exactly the technological wonder that so many Americans desired.

Perhaps because of these results, and its abundant faith in technology, Atomics International appears to have adopted a cavalier attitude towards safety. A 1950s television series entitled "Science Lab" filmed a segment on the SRE in 1958.¹⁹ Following host Al Renner, a science teacher at Elliot Jr. High School, the episode included guests Dr. Robert Loftness from

¹⁶ "Atomic Power to Supply Lights for Moorpark," *Los Angeles Times (1923-Current File)* 12 Nov. 1957, ProQuest Historical Newspapers Los Angeles Times (1881 - 1987), ProQuest. Web. 21 Sep. 2011.

¹⁷ U.S. Department of Energy, *Etec: Energy Technology Engineering Center Closure Project*, 2012, <http://www.etc.energy.gov>.

¹⁸ *Ibid.*

¹⁹ *Ibid.*

Atomics International and Ms. Doreen Melindy, a high school student. Instead of being restricted and limited, the visit to the SSFL included both a tour of the reactor and control rooms. Doreen operated the fuel element overhead crane, sat behind the safety dials, moved and transported nuclear materials, and performed all manner of tasks one would not expect a young teenager to partake in at a nuclear facility. Within the SSFL, if operations proceeded smoothly, secrecy and silence disappeared, and, in an effort to demonstrate its transparency, Atomics International went as far as broadcasting day to day activities on channel 9 KCOP Los Angeles. The public relations attempt is only made more surreal as Dr. Loftness was able to draw numerous giggles from Doreen when he referred to the Geiger counter as "cutie pie." At one point, Al Renner commented on the youthful nature of many of the young employees at the SSFL to which Dr. Loftness replied, "all the operators were fairly young fellows and all they need is a high school diploma with a major in science."²⁰ Al Renner unknowingly foreshadowed future events, and the secrecy they entailed, when he remarked, "I surely stand in awe of you nuclear scientists and your profile now as of all the invisible business that goes on under the floor."²¹

As promise and progress abounded at the SSFL, ties between Atomics International, the federal government, and Southern California Edison continued to increase. On April 5, 1959 the *Los Angeles Times* described the growing reliance of SCE, as well as Atomics International, on the test sodium reactor. SCE officials reported that the company was, "unlikely to follow other U.S. utilities in the building of a large atomic power plant, unless the price dropped significantly."²² Vice President of Southern California Edison W.L. Chadwick reported that the company continued to pursue other options, such as the work taking place at the Santa Susana

²⁰ Ibid.

²¹ Ibid.

²² Don Shannon, "Edison Utility Cautious About Nuclear Plants :Southern California Power Official Sees No Large Investment at Present Time," *Los Angeles Times (1923-Current File)* 5 Apr. 1959, ProQuest Historical Newspapers Los Angeles Times (1881 - 1987), ProQuest. Web. 21 Sep. 2011.

Field Laboratory. The Deputy Director of Atomics International, Robert Dickinson, added that not only might the sodium reactor match other water-cooled counterparts; it would also provide the, "hottest steam in the country."²³ Atomics International not only expected the SRE to revolutionize the world of power but the reactor's lack of pressure alleviated the need for an expensive pressure containment sphere to encompass the reactor, saving money and ensuring safety at the same time.²⁴

This enthusiasm, however, remained tempered by the voice of A.C. Werden Jr., a nuclear power engineer with Edison, who cautioned against the quick acceptance of the sodium reactor and reminded the public that the three thousand test hours were not enough to fully accept the viability of an experimental system.²⁵ Also mentioned in the previous article, Werden provided an unusual voice of caution within the burgeoning nuclear development field and suggested further testing before the SRE could be considered a viable solution. Few doubts remained regarding the SRE's infancy, however, and the faith that many Southern Californians placed in technology and Atomics International generally proved sufficient to dispel them.

Not until the beginning of 1959 did doubts about the highly praised technology turn from conjecture to reality as Atomics International scientists began to face their first major issues with the SRE. Issues during test period eight (Classified as Run Eight from December 1958 to January 29, 1959), "were similar to those which existed during Run Fourteen when the damage to the reactor fuel occurred."²⁶ During the test run, while washing the fuel elements, AI engineers noticed that the mysterious "black material" covered several of the fuel elements. To correct the

²³ Ibid.

²⁴ Ibid.

²⁵ Ibid.

²⁶ R. Ashley, R. Beeley, F. Fillmore, W. Hallett, B. Haward Jr., T. Gershun, J. Lundholm Jr., *SRE Fuel Element Damage An Interim Report*, ed. A. Jarrett (Canoga Park Atomics International, 1959), III-1.

situation, engineers began a previously undocumented and untested procedure of "jiggling" the fuel elements during testing as operators found the action to have a "beneficial effect on the sodium outlet temperature of that channel."²⁷ As engineers investigated the nature and source of the mysterious material, they employed temporary solutions to allow for the continuation of testing.

The black material as well as the effectiveness of the "jiggling" process alerted the engineers that a foreign matter might be within the liquid sodium. Upon investigation, engineers discovered that tetralin, an organic lubricating material, had leaked into the primary sodium.²⁸ Tetralin was as a primary lubricant because of the volatility of sodium which burns in the presence of air and explodes in the presence of water. Tetralin was used to cool the bearings of pumps that circulated the liquid sodium coolant that was responsible for carrying heat away from the fuel rods.²⁹ The engineering staffers documented that though they unaware when the leak began, they considered the main primary pump as a potential leak source. Rather than fixing the malfunctioning part, the "practice of jiggling hot elements up and down to dislodge foreign matter continued."³⁰ Either because of their faith in the safety of the SRE, or in a cavalier disregard for safety protocols, Atomics International operators continued testing.

Engineers again observed and documented a continuing tetralin leak during Run Thirteen (May through June, 1959), and upon closer inspection found that the tar-like substance covered seventeen of the fuel elements. This time, staff canceled the test run, and ordered a wash of the fuel cells before testing could continue. On June 4th, during the wash procedure, Atomics

²⁷ Ibid, III-2.

²⁸ Ibid, III-3.

²⁹ U.S. Atomic Energy Commission, the *Sodium Reactor Experiment*, November 1961.
http://www.etc.energy.gov/Reading-Room/Video/SRE_Video/SRE_Recovery.html

³⁰ R. Ashley, et al., *SRE Fuel Element Damage An Interim Report*, ed. A. Jarrett (Canoga Park Atomics International, 1959), III-2.

International documented what they described as a "pressure excursion" of a "sufficient magnitude" to damage the fuel hanger rod. Later, engineers discovered that during the wash procedure, a fuel rod exploded when operators attempted to clean it with water.³¹ Given that sodium was used as the primary coolant, and that the element explodes in the presence of water, it is hard to comprehend why nuclear engineers would utilize water in the cleaning procedure. Regardless, due to the incident the dirty fuel elements remained unwashed.³² Operators decided to move onto Run Fourteen without fixing the washroom, solving the leak, or washing the fuel elements and therefore numerous hazards existed from the beginning of the next run. Despite an array of technological errors, Atomics International insisted on continuing experimentation that put the entire project, and region, at risk.

On June 25, in an attempt to further rally support, General Manager of Atomics International, Chauncey Starr, wrote to Harold Price, the Director of the Division of Licensing and Regulation. Starr expressed his concerns about overly intrusive legislation in the realm of nuclear power, arguing that regulations did, "not stem from a history of accidents but more from a derived fear of radioactivity based on nuclear weapons."³³ Because of this fear, Starr insisted, irrational legislation continuously hindered the development of the atomic age; yet in the same breath he emphasized that, "safety may be prohibitive for certain types of reactors located on certain sites."³⁴ Though it is unclear which reactors and sites Starr referred to, it would appear that he remained more concerned with progress than safety. Though the technological wonder of the SRE had brought nothing but success to Atomics International, it promised to be potentially ruinous to both groups' reputations if it failed.

³¹ Michael Collins, "Hot Zone," *Los Angeles Magazine* June 1998. <http://www.enviroreporter.com/hotzone>.

³² *Ibid*, III-7.

³³ United States Nuclear Regulatory Commission, "Comments of C. Starr, Atomics International, to H. Price, June 1959, <http://pbadupws.nrc.gov/docs/ML0215/ML021500103.pdf>.

³⁴ *Ibid*.

In the events leading up to July, 1959 Atomics International and the AEC suffered from technological hubris as the SRE pushed the nuclear frontier. A misplaced faith in the SRE had caused Atomics International personnel to become careless, cut corners, and disregard the safety of Southern California. The same misplaced regional faith in Atomics International and the SRE remained static as well, as demonstrated by both the press and Atomics International's public relations campaign. As shown consistently within this period, Atomics International had little use for secrecy. Indeed, transparency remained beneficial in generating further funding and support. Located at both the Western and technological frontier and yet nestled within populations surrounding Los Angeles, the SRE was about to show everyone how dangerous their misplaced faith truly was.

ERA TWO
SECRECACY AT THE SSFL

Beginning on June 12, 1959, Atomics International personnel began hiding the full extent of the SRE meltdown in the name of "national security." The events from July 12 through December, 1966 remain unclear and can primarily only be seen through the lens of Atomics International and Atomic Energy Commission reports. To balance this otherwise singular viewpoint, firsthand accounts from individuals present during and shortly after the accident help add to the picture of what happened at the Santa Susana Field Laboratory during and after the SRE meltdown. Though all the details may never be known, certain elements are clear: Atomics International had an overdeveloped faith in SRE technology and did not appropriately respond to the warning signs of the major malfunction taking place; Atomics International and the AEC utilized "national security" to hide the truth of the event from the public; and pervasive actions and attitudes of "nuclear cowboyism" and lawlessness abound within a story of incomplete reports, half-truths, and bold-faced lies. Alvin Weinberg, a preeminent nuclear physicist involved in the Manhattan Project, described nuclear power as a "Faustian bargain that society had made with nuclear industry," to which the author Colin Sweet has added that "more correctly it was a bargain on behalf of society between governments and the nuclear industry."³⁵ Unlike Three Mile Island in Pennsylvania, the SRE would not become the center of media outrage and no call for a reevaluation of nuclear technology would take place as the Western technological frontier met urban sprawl.

³⁵ Colin Sweet, *The Price of Nuclear Power* (London: Heinemann Educational Books, 1983), 7.

Atomics International personnel remained fully aware that multiple safety hazards and technological malfunctions existed within the SRE as Run Fourteen began at 0650 on July 12, 1959. As the reactor reached criticality, operators documented that due to experiences observed during Run Eight, an "expectation of encountering difficulties was foreseen."³⁶ From the very beginning of the run, problems occurred at a dramatic rate. During test periods, failsafe emergency reactor shutdowns referred to as "scrams" were sometimes required to address reactor issues, and by 1142 on the morning of July 12, a required scram shut down the reactor due to the loss of auxiliary primary sodium flow.³⁷ After a tertiary inspection, operators gave the green light and within one hour had brought the reactor back online. By 1530 the high bay area showed increased activity, and numerous attempts by operators to regulate it by adjusting reactor pressure were of no avail in the ensuing hours. Due to high radiation levels, operators agreed to shut down the reactor at 1700 in order to remove and replace various parts. After conducting tests on the sodium, engineers brought the reactor to criticality at 0440 on July 13th. The frequency of reactor shutdowns was highly abnormal as engineers ran into issues of coolant blockage as well as unexplained high radiation levels at an alarming rate. Disregarding the knowledge of the dirty fuel cells and the presence of tetralin in the reactor coolant, Atomics International engineers continued their work.

On day two of Run Fourteen issues reached a critical point and brought the engineers working the SRE seconds from a reactor explosion. Throughout the day of the 13th, reactor temperature remained unresponsive to increased sodium flow and signaled what Atomics International staff documented as a "potential foreign substance." Operators, aware of the existence of tetralin within the sodium coolant, ignored the information and continued testing.

³⁶ R. Ashley, et al., *SRE Fuel Element Damage An Interim Report.*, III-9.

³⁷ *Ibid*, III-9.

Around 1800, reactor power began rising rapidly on its own as operating engineers scrambled to bring the temperatures under control. With what later Atomics International reports describe as a "negative period of about 45 seconds," engineers became extremely alarmed that even though the temperatures decreased within this period, radioactivity within the reactor remained at a high level.³⁸ Between 1821 and 1825, despite attempts by engineers to stop it, the power again began rising uncontrollably and reached ten times the normal radioactivity limit before an engineer manually scrambled the process.³⁹ Of major concern was the failure of an automatic shutdown device that should have been initiated during the process. As safety routines and failsafe devices failed, engineers' faith in the SRE technology nearly paralyzed operators when seconds were the difference between life and death.

Upon closer inspection of the "Reactor Excursion," two main events took place between 1700 and 1825 that caused catastrophic damage to the SRE: the negative period, and the positive excursion. Engineers believed that the negative period of roughly 45 seconds was caused by a buildup of vapor among the fuel elements which stemmed from tetralin blockages which prevented coolant flow. In order to alleviate the increased radioactivity, operators dropped power levels and once again brought the reactivity under control.⁴⁰ The "positive excursion" remained the major concern that led up to the point of the manual scram at 1825 as reactor temperatures and reactivity reached levels well beyond safety limits. Within hours, however, "it was decided that the power excursion had not affected the reactor adversely," and with warranted caution personnel brought the reactor back on-line as of July 14th. Only later, after further and more thorough investigation, did engineers discover that the nuclear fuel rods had been damaged

³⁸ Ibid, III-11.

³⁹ Ibid, III-11.

⁴⁰ F.L. Fillmore, *Analysis of SRE Power Excursion of July 13, 1959* (Canoga Park, Atomics International, 1961), 39.

and melted and that the core released radioactive gases into the system as early as day two of Run Fourteen. To put the issue into perspective, what was described as a power excursion at the SRE later occurred at the better-known SL-1 reactor in Idaho and the Chernobyl reactor in the Ukraine. The only major difference was that the SRE was shutdown seconds before the reactor would have exploded.

Only in the twenty-first century did new evidence appear that shed light on what happened at the SRE during the summer of 1959, as survivors of the incident came forward to talk about their experiences at the SSFL. John Pace was a twenty-year-old trainee in the control room of the SRE on July 13, 1959.⁴¹ According to a *Ventura County Star* article, Pace explained that employees were "excited" after the scram following the "power excursion" and that, "the key to the excitement was they barely got the thing shut down before going critical and having an explosion ...they just felt so good ... that they were still alive." On the job for only four months, Pace was given a roll of tape to seal doorways and openings leading from the reactor to protect against radiation.⁴² Pace explained that his forty-nine years of silence regarding the SRE were due to his commitment to the confidential nature of his workplace, but guilt eventually caused him to take his story public in 2008.

As Run Fourteen continued through mid-July 1959, continued issues with gas leaks at the SRE alerted employees at the Atomic International Health Department that worker safety had been compromised. In a document dated July 17, 1959, R. Owen (employee at the Atomic International health physics department) advised R.K. Durand (supervisor of engineering for the

⁴¹ Teresa Rochester, "Field Lab Meltdown 50 Years Later - Delayed Reaction - '59 nuclear reactor accident remains vivid for former Santa Susana Field Laboratory worker," *Ventura County Star*, 12 July 2009, http://infoweb.newsbank.com/iw-search/we/InfoWeb?p_product=NewsBank&p_theme=aggregated5&p_action=doc&p_docid=12966D5AD7AB2C70&p_docnum=58&p_queryname=3, 8 Feb. 2012.

⁴² *Ibid.*

SRE) that because of airborne radioactive contamination in the SRE High Bay he “recommended that the SRE be shut down until the sources of the airborne radioactive contamination ... [were] located and repaired.”⁴³ Owen continued by admitting that airborne activity had "long been a problem" but that he was primarily concerned with the conditions occurring July 12, 1959. Though acknowledging long standing radiation emission issues, Durand remained very concerned that as of July 17, engineers measured airborne radioactive contamination at “three hundred times the maximum permissible concentration.”⁴⁴ He concluded that even if the leak was at a much lower level, it would still be advisable to repair the leaks before any further testing proceed. Not only did R. Owen acknowledge that the current problems were severe, he also opted towards the side of caution to ensure site safety. Contrary to his advice, it took another six days before supervisors decided to shut down the reactor and yet another three days for the shutdown actually to occur. Why Durand's advice was ignored and shutdown prolonged for another nine days remains undocumented. Whatever the motivation, Atomics International personnel did not err on the side of caution.

In the days to follow, alarmingly high levels of radioactivity and continued shutdowns plagued Run Fourteen. Corresponding with incredibly high radioactivity and reactor temperatures manual scrams happened regularly, occurring three times between July 14 and July 21.⁴⁵ Though engineers remained concerned about radioactivity within the reactor cover gas, damaged monitors did not "permit a reliable evaluation of its magnitude." Only a day later, temperatures in the high bay area was thought to have reached 1465 degrees Fahrenheit, but

⁴³ R.E. Durand, *Airborne Radioactive Contamination in SRE High Bay During Reactor Operation*, July 1959.

⁴⁴ Ibid.

http://www.etc.energy.gov/library/SRE_Historical_Library/Doc_No_54_Internal_Letter_Owen_to_Durand_1959-07-17.pdf.

⁴⁵ R. Ashley, et al., *SRE Fuel Element Damage An Interim Report.*, III-15-16.

engineers remained uncertain due to malfunctioning equipment.⁴⁶ The SRE was not only running hot and releasing dangerous amounts of radiation, but monitoring devices damaged during the power excursion prevented accurate readings. In possession of inconclusive and yet alarming information, engineers agreed to continue to monitor temperatures before taking further action.

On July 23, engineers decided to shut down the reactor because "fuel-channel exit-temperature spread was not improving noticeably." On July 24, during what had become a routine process of "jiggling" the elements, operators discovered that four fuel elements remained stuck in place.⁴⁷ On July 26, fourteen days after the beginning of the run, operators shut down the reactor and first observed the fuel element damage.⁴⁸ Only at that point did it become clear to Atomics International that the SRE had suffered a major meltdown. Teams from other areas of the site came to aid in the cleanup, an interim investigation team began an investigation into the reactor failure, and a press release was prepared to notify the public of the incident.

Ironically, as Atomics International prepared the press release, an article in the July 19 *Los Angeles Times* reported on the magnitude of secret government projects currently prevalent within the United States. The article depicted two dramatized Atomics International employees in conversation and stressed the importance of employees' responsibility to keep quiet regarding the happenings at their workplace.⁴⁹ It is unclear what the connection between the article and the SRE incident might be, but a more perfect coincidence is difficult to imagine. Up to that time Atomics International had shown their operations to be transparent and safe, and the local populace could do little more than trust in the judgment of operators and engineers at the SSFL.

⁴⁶ Ibid., III-16.

⁴⁷ R. Ashley, et al., *SRE Fuel Element Damage An Interim Report*, ed., A. Jarrett (Canoga Park Atomics International, 1959), III-17.

⁴⁸ Ibid, III-18.

⁴⁹ Fred Baumberger, "100,000 in Area Work on Secret Projects," *Los Angeles Times (1923-Current File)* 19 Jul 1959, ProQuest Historical Newspapers Los Angeles Times (1881 - 1987), ProQuest. Web. 21 Sep. 2011.

Five weeks passed before the Atomic Energy Commission issued a press release in which it stated that a "parted fuel element had been observed" and that "no radiation had been released."⁵⁰ Though the Atomics International investigative committee discovered that damage occurred to thirteen of the forty-three fuel elements by December of 1959, they did not report the information to the press or public. The release also stated that the damage was not "an indication of unsafe reactor conditions" and that the importance of the documentation was "from a technical standpoint" only. In a clear attempt by Atomics International and the Atomic Energy Commission to assuage public fear, the release used half-truths and technical jargon to hide the full extent of the SRE meltdown. Unlike the incident at Three Mile Island, the news of the release did not make major headlines. Because the public was either misinformed or minimally interested, the story of the SRE incident disappeared from the public consciousness for twenty years and proved to be the harbinger of an ongoing policy of secrecy at the SSFL.

As Atomics International organized both an investigation and clean up, the inadequacy of the protective fission containment devices became impossible to ignore. The AEC relaxed safety regulations for the SRE both because of its perceived safety qualities and the size of the test reactor. Unlike the giant concrete stacks regularly associated with a nuclear reactor, the SRE was housed in one much smaller. Unlike safety precautions for much larger, conventional reactors, shielding for the SRE was a four-foot-thick, reinforced-concrete pad poured on a limestone base which supported the cavity liner. An Annular cylinder of reinforced concrete about three feet thick surrounded the cavity liner.⁵¹ Also, the reactor building was not "designed as a containment pressure vessel" because of an AEC safety ruling. In fact, the building was only there to

⁵⁰ Atomics International, "Press Release: During Inspection of Fuel Elements- SRE- Parted Fuel Element" (Canoga Park, Atomics International, 1959).

⁵¹ R. Ashley, et al., *SRE Fuel Element Damage An Interim Report*, ed. A. Jarrett (Canoga Park Atomics International, 1959), III-2.

“provide reactor shelter, office space, and support for a 75-ton bridge crane.”⁵² If there had been a leak, the potential damage to the surrounding area could be catastrophic, and would be extremely damaging to the local water, air, and human population as well as the reputation of both Atomics International and the Atomic Energy Commission.

To further investigate whether the SRE posed unforeseen health risks and to determine the cause and effect of the incident, Atomics International created an ad hoc committee on October 19, 1959. In one month's time the committee released the “SRE Fuel Element Damage Interim Report” to explain the situation, judge potential issues within the reactor, and ascertain the future of the SRE. Upon inspection, the ad hoc committee found that within the primary cold trap, utilized to remove fission products from the sodium stream, the “radiation levels increased by almost a factor of 100 from April to August 1959.”⁵³ Investigators also found that the Helium cover gas, utilized to capture radioactivity within the SRE, also contained high levels of radioactivity. Engineers remained limited to estimates of the amount of fission product during Run Fourteen because no accurate monitoring took place until August 8th. Investigators found that the radioactivity of the analyzed samples was off the charts and required measurement tools to be calibrated within that range.⁵⁴ Upon further analysis of the helium tanks, the committee found that the worst of the reactor damage must have occurred at the beginning of Run Fourteen (likely during the reactor excursion) and that the high radioactivity was present during most of the fourteen day period and therefore signified long term radioactive release.⁵⁵ Though plagued with inconclusive data, malfunctioning monitoring equipment, and potential safety hazards the

⁵² Ibid, II-A-22.

⁵³ Ibid, IV-C-12.

⁵⁴ Ibid, IV-C-16.

⁵⁵ Ibid, IV-C-15.

committee concluded that because the coolant was able to retain a large amount of the fission product, “no hazard was presented to the reactor environs.”⁵⁶

John Pace's eyewitness testimony related in 2012 runs directly counter to both the press release and the investigative committee's report. Pace recounted that radioactive gases were released the night of the 13th, the very same day of the power excursion and the highest readings of radioactivity. Dressed only in cotton coveralls and very concerned with "which way the wind was blowing," employees vented the lines “and it went out over the San Fernando Valley where all their children and families were, and they couldn't say a thing about it because it was top secret.”⁵⁷ If Pace is to be believed, he offers proof that Atomics International released massive amounts of radiation knowingly into the atmosphere. His recollections also confirm that Atomics International was not only negligent of safety, but knowingly put both employees and nearby residents at risk. Only in the guise of national security were the actions of the company allowed to continue. Also, it is impossible to know how fully aware of the SRE incident the AEC was, but their negligence in overseeing such blatant disregard for safety would also border on the criminal.

Jim Palmers, a former employee at the SSFL, corroborates John Pace's story. In later life Palmers related that the vent systems of the storage tanks required regular purging and that these fumes were visible during the day. Atomics International's solution was to pump the fumes at night so as to hide their presence as they funneled down into the San Fernando and Simi Valleys.

⁵⁶ Ibid, V-4.

⁵⁷ Teresa Rochester, "Field Lab Meltdown 50 Years Later - Delayed Reaction - '59 nuclear reactor accident remains vivid for former Santa Susana Field Laboratory worker," *Ventura County Star*, 12 July 2009, http://infoweb.newsbank.com/iw-search/we/InfoWeb?p_product=NewsBank&p_theme=aggregated5&p_action=doc&p_docid=12966D5AD7AB2C70&p_docnum=58&p_queryname=3, 8 Feb. 2012.

“There was an instance,” Palmers recounted, “that people had clothes on the line and the nitrogen tetroxide coming out of the vents would deteriorate the material.”⁵⁸

Apart from the assessment of the interim committee, G. Borg (Health Physics Department) sent another assessment of SRE radioactivity within an Atomics International Inter-office memorandum to W. L. Fischer dated November 20, 1959. Mr. Borg clarified that periods between July 25th and August 22nd, and from the 22nd to September 16th were "due to slow release rate."⁵⁹ According to the official line, Atomics International employees, concerned with the release of the gas to the atmosphere, decreased the amount of release during those periods. Beginning on July 20th and until September 17th, engineers recorded a very small amount of release, much of it too small to mention. Between July 12th and July 20th, however, there is no mention of the rates of release nor is there any mention as to why that information would be missing from the report. Again, Atomics International personnel did not document crucial information regarding the full extent of the incident and made an absolute assessment of the damage impossible. Given all of this missing information, it is difficult to understand how the investigative committee could prove that no hazards were possible in or around the SSFL. Indeed, the gaps within company documents appear intentional.

By interesting coincidence, Dr. Sidney Siegel of Atomics International made a statement at the same time the ad hoc committee began its work up on the hill. In a *Los Angeles Times* article Siegel explained that, “it will be at least five years before atomic plants can produce electrical power as cheaply as today’s conventional plants.”⁶⁰ He continued to explain that the

⁵⁸ Brigham Maher, Joh Hofius, “Corrupted Nature,” Simi Valley 2007. Youtube: <http://www.youtube.com/watch?v=acwgSa9Obug>.

⁵⁹ G. Borg, *Quarterly Report of Activity Released to Atmosphere* (Canoga Park, Atomics International, 1959).

⁶⁰ “Atomic Power Held 5 Years From Reality,” *Los Angeles Times (1923-Current File)* 13 Oct. 1959, ProQuest Historical Newspapers Los Angeles Times (1881 - 1987), ProQuest. Web. 21 Sep. 2011.

“timetable for competitive production of nuclear power had to be revised because of the high cost of operating the four American atomic plants now in use.” Up until this point speed and expediency had been all that Atomics International mentioned to the press regarding its nuclear program. The connection between Dr. Siegel’s comments and the SRE incident may never be known, but it does raise interesting questions.

Again, apparently unaware of the potential connection, on April 4, 1960 California Governor Edmund G. Brown appointed ten officials to the State Atomic Energy Commission whose sole purpose was to assess “potential hazards and peacetime uses of nuclear technology.”⁶¹ This commission, originally created in 1959, was to be a liaison between the government and privately developed nuclear technology. Again, connections between federal and state legislation and the events transpiring at the Santa Susana Field Laboratory appear likely, but remain unproven. By June 1960, perhaps due to state pressure, engineers integrated various changes into the SRE. The changes included the elimination of tetralin as a lubricant as well as the overhaul of the fuel washing system as the new wash cell would utilize steam rather than water to remove sodium from components.⁶² Atomics International's documentation noted that the “SRE fuel damage which occurred in July 1959 pointed out the need for additional instrumentation which would provide the operating staff with more information on [the] behavior of the system.”⁶³

Due perhaps to increasing governmental pressure, Atomics International began another follow-up investigation of the SRE in 1961 and concluded that a tetralin leak of roughly four

⁶¹ "Brown Names State Atomic Energy Panel," *Los Angeles Times (1923-Current File)* 4 Apr. 1960, ProQuest Historical Newspapers Los Angeles Times (1881 - 1987), ProQuest. Web. 21 Sep. 2011.

⁶² *Ibid.*, 4.

⁶³ *Ibid.*, 4.

gallons into the primary sodium system had caused the incident.⁶⁴ The organic compound created by the tetralin in the sodium environment proved responsible for "voids" which allowed vapor buildups to occur. The damage caused by these blockages was exacerbated by the introduction of nitrogen as engineers attempted to remove the tetralin once operators discovered the leak.⁶⁵ The report summarized that the contamination remained contained to the reactor building but acknowledged "several instances where minor contamination of the asphalt blacktop occurred just outside of the SRE access door."⁶⁶ The investigation found that contamination remained minimal and that clean-up crews had been within acceptable radiation limits during the cleanup process. The report also asserted that continued monitoring of soil, vegetation, water, and air revealed no increase in background radiation levels.⁶⁷ Atomics International concluded that the accident was relatively well contained, was not a cause for alarm, and that "resumption of operation of the SRE [was] recommended."⁶⁸ Both the Interim and Final reports were categorized as "AEC Research and Development Reports" and linked Atomic International's clean-up process with federal support.

Once the investigation was completed, the AEC presented its version of the meltdown when in November, 1961 it created an informational movie entitled "SRE Core Recovery Following the Element Damage" to explain both the incident and the ensuing cleanup activities.⁶⁹ The video displays the SRE control room shown in "Science Lab" but absent were the young employee operators manning the controls. In this depiction, two older gentlemen in

⁶⁴ R. Ashley, R. Beeley, F. Fillmore, W. Hallett, B. Haward Jr., *SRE Fuel Element Damage Final Report*, ed. A. Jarrett (Canoga Park Atomics International, 1961), III-19.

⁶⁵ F.L. Fillmore, *Analysis of SRE Power Excursion of July 13, 1959* (Canoga Park, Atomics International, 1961), 39.

⁶⁶ *Ibid*, III-20.

⁶⁷ *Ibid*, III-21.

⁶⁸ *Ibid*, V-1.

⁶⁹ U.S. Department of Energy, *Etec: Energy Technology Engineering Center Closure Project*, 2012, <http://www.etc.energy.gov>.

lab coats, most likely aged around forty to fifty years, thoughtfully scan the displays and check off data on their clipboards. The AEC reported that though extensive core damage had occurred, estimates of "ten thousand curies of fission product activity [was] released from ruptured fuel elements," and that all products were retained within the system. Taking note of this clean bill of health as well as flawless repair and modification work, the AEC asserted that, "The fact that recovery was achieved with a reasonable amount of effort without endangering personnel demonstrates that maintenance may be performed on the entire plant complex of a sodium-cooled nuclear powered reactor."⁷⁰ In this attempt at public relations, the AEC indicated that no serious damage nor injury had occurred, and that the entire experience had only confirmed the viability of the technology. On September 7, 1960 Atomics International personnel once again brought the SRE to criticality. With so much on the line, both Atomics International and the Atomic Energy Commission would have had a lot to lose if the SRE had no longer been considered a promising technology.

Jim Palmer, on the other hand, had an entirely different recollection of the cleanup of the SRE that contradicted AEC statements. In relating the events directly following the meltdown, Palmer claimed employees "knew [they] had a meltdown...I knew it because I went in there and helped clean it up but for some reason or another the word never got around very much on the hill."⁷¹ "Even when people found out about it," Palmer explained, "they didn't think anything of it... radioactivity, except for the atomic bomb and how it affected those people, well we thought it was a different type of radioactivity." The details of the SRE incident were not only kept secret from the public, they remained a mystery to many of the employees at the plant. Even members

⁷⁰ Ibid.

⁷¹ Brigham Maher, Joh Hofius "Corrupted Nature," Simi Valley 2007. Youtube: <http://www.youtube.com/watch?v=acwgSa9Obug>.

of the Atomics International cleanup crew remained unaware of the dangers to which they were being exposed as engineers used hazardous materials such as trichloroethane to assist in the cleanup of contaminated portions of the plant. Employees filled large buckets with the substance and used paint brushes on contaminated materials.⁷² This was all done, Palmers explained, without the use of safety uniforms. Once cleanup crews finished their work, they would pour the materials into a concrete ditch for disposal and the materials would run into the large drainage holding ponds. In later life, Palmers found traces of trichloroethane (declared hazardous in 1986 for its adverse effects on the nervous system) in his skin from his time as part of the cleanup crew. Those who disposed of the chemicals didn't fare much better. His coworker, Gene Pope, drove the forklift at the time and died of cancer. Four of the five "firemen" that worked the Sodium Burn Pit Area also died of cancer. In his explanation, there was simply "no control."⁷³ Jim Palmers' story incriminates Atomics International as a company not only keeping the public, but its own employees unaware of the dangers that they were facing.

John Pace also tells a story of a SRE cleanup that was much more dangerous than Atomics International had previously documented. Pace insisted that cleanup crews utilized soap and water to clean radiation off the walls and women's "sanitary napkins" to clean contaminated surfaces.⁷⁴ Pace also claimed that it was Atomics International's policy to require employees to wear film badges to record radiation exposure levels. If the level reached a certain height, Pace related, the employee was "banned from the reactor site for thirty days." To avoid this, however, workers were often told not to wear their badges. Pace insisted that though undocumented,

⁷² Ibid.

⁷³ Ibid.

⁷⁴ Ibid.

company supervisors had encouraged these actions because, “That’s what they wanted.”⁷⁵ Pace's testimony not only runs counter to Atomics International documentation, but if it is to be believed, changes the actions of the company from cavalierly irresponsible to criminally negligent.

Atomics International's cleanup operation also comes under serious question as John Pace refuted many of the claims made by the company that it was a safe and controlled procedure. In one instance, for example, as employees attempted to remove one of the damaged fuel rods, it broke apart leaving a portion of the item lodged in the reactor core and another in the removal cask tool. In a panic, Pace explained, the operator attempted to stop the machine but in the process pushed the wrong button and “lifted the lead shield off the floor that protected against radiation leaking out of the reactor core.”⁷⁶ Atomics International declared the building and surrounding area off-limits for the following two weeks in the hopes that it would diminish the released radiation. Unlike the 1961 video showing a calm and coordinated removal process, Pace's recollections give a much more human and flawed view into what happened.

In a continuing effort to understand and monitor the SRE, Atomics International employee R. S. Hart issued the confidential report "Distribution of Fission Product Contamination in the SRE" on March 1, 1962. Hart described the 1959 incident as an "opportunity" to obtain data on recovery measures and reactor components.⁷⁷ Much like other AI reports, Hart concluded that despite the speed and effectiveness of recovery operationsl “about five to ten thousand curies of fission product activity was unexpectedly released to the primary sodium system, no radiological emergency of any nature occurred.” Hart's report, though

⁷⁵ Ibid.

⁷⁶ Ibid.

⁷⁷ R.S. Hart, *Distribution of Fission Product Contamination in the SRE* (Canoga Park: Atomics International, 1962), 24.

intending to demonstrate in detail the safety of the SRE, is plagued with unexplained and unresolved issues.

Hart's report is the first to address the issue of the potential release of the radionuclide, Iodine-131 known for its fatal release during the nuclear incident in Windscale, Great Britain. There is a strong correlation between exposure to Iodine-131 and thyroid cancer later in life.⁷⁸ This radionuclide was mysteriously missing from the first sodium coolant sample even though researchers expected to find high values of Iodine in the results.⁷⁹ One theory for its absence conjectured that Iodine might have escaped from the primary sodium to the cover gas system, and if this was the case would have been vented continuously into the atmosphere during Run Fourteen. Hart concluded that the sample "may not present a true picture of the initial fission product release distribution." and though Atomics International insisted that no harm to employees or the local environment had been caused, the "low sodium value for iodine remained unexplained."⁸⁰

In response to questions about safety, in May 1962 R. L. Ashley of Atomics International reassessed the adequacy of the SSFL as a nuclear development site so close to local populations. Ashley concluded that a major benefit the site location provided was the SSFL's distance from the populations of the Simi and San Fernando Valleys. The closest inhabitants to the site, he noted, resided roughly two miles from any reactor.⁸¹ It was also believed that the natural boundary would continue to insure safety because "estimates of expected population growth in the Valley areas do not indicate that the population density in this zone will change

⁷⁸ Scott A. Rivkees, Charles Sklar, and Michael Freemark J. Clin. Endocrinol *The Management of Graves' Disease in Children, with Special Emphasis on Radioiodine Treatment*, 1998.

⁷⁹ Ibid, 20.

⁸⁰ Ibid, 20.

⁸¹ Ibid, VI-6.

appreciably.”⁸² Given that the San Fernando Valley's population was nearing two million by 2012 and that of Simi Valley had reached over one hundred thousand, it is clear that such population assessments were naïve. Ashley remained concerned, however, with the ability of wind patterns to spread gaseous radionuclides. If the primary protection to nearby residents was distance, as Ashley reported, the location of the SRE at the northernmost edge of Area IV, located at the west end of the site put Simi Valley residents at a high risk. To the south of the SSFL, a large buffer zone separates the site from any population and yet there is nearly no designated buffer between the northern edge of the plant and Simi Valley. Population proximity was not a new issue, as it had already been discussed in a confidential AEC Research and Development brief created February 19, 1954.⁸³ Much like Ashley's report, the brief concluded that the nearby areas of the San Fernando and Simi Valleys would not have a "sharp increase in population ...because of the water shortage in the area." Though this report agreed that the expectations were for little growth, it differs in its final conclusion. The report argued Simi Valley's growth would remain negligible because the "mountains around the valley make this task a very difficult and costly one."⁸⁴ Again, in hindsight, it is hard to believe that the Simi and San Fernando Valleys could ever be considered remote locations unlikely to experience population growth.

Ashley concluded his safety study by analyzing the wind patterns in both the Santa Susana hills as well as in the surrounding valleys. He discovered that in a rare inversion situation, it was possible for massive amounts of wind to flow from the SSFL down into the

⁸² Ibid, VI-6.

⁸³ ‘The Staff’ *Confidential AEC Research and Development Report*, W.E. Abbott ed., Feb. 19, 1954.

⁸⁴ Ibid.

nearby valleys.⁸⁵ To analyze the density of gaseous elements within this airflow, Atomics International personnel conducted a balloon and aerosol diffusion study. Though there was a potential for high concentrations, the report concluded that due to wind diffusion, the particles would not be found in any concentrated form.⁸⁶ He believed that even in situations of high airflow, radiation would become entrapped in gullies and ravines. Ashley concluded that no danger existed 93 percent of the time and a 7 percent risk assessment remained liberal.⁸⁷

Still, there remained multiple issues with Ashley's study, and numerous questions were left unresolved. In the Santa Susana Mountains during the summer months a stronger than average wind pattern did and does exist, and yet all of Ashley's tests took place during the spring and did not account for this increased wind flow. The most startling aspect of the report found that "it is interesting to note that the maximum count of 15 particles per square feet was observed at fifteen miles from the site and represents a concentration three hundred times that for 'ideal diffusion.'"⁸⁸ Ashley's report confirmed the potential for heavily concentrated gases being transported long distances. These distances would cover the entirety of Simi Valley and travel half the distance to downtown Los Angeles. Regardless of the potential threats, Ashley concluded that "the SRE installation at Santa Susana presents no serious hazard to the public."⁸⁹

Since all Atomics International reports concluded that no hazards existed to the SSFL or nearby residents, the Atomic Industrial Forum created a committee to "study the future peaceful uses of nuclear power," and to discuss the future of the United States privatized nuclear

⁸⁵ Ibid.

⁸⁶ Ibid.

⁸⁷ Ibid.

⁸⁸ Ibid, 25.

⁸⁹ Ibid, 26.

program.⁹⁰ In 1962, Members of committee included the chairman of the board of Southern California Electric and multiple representatives of Atomics International, including the president of the company, Chauncey Starr. The committee released a six point proposal that it felt would assist the growth of the nuclear industry. This proposal requested increased funding and suggested that “the government should relax ‘unnecessarily conservative’ nuclear safety regulations and adopt a more constructive policy to help in approving sites for atomic reactors.”⁹¹ Despite the company’s full knowledge of what had occurred at the SSFL just three years prior, Atomics International still believed that government regulations were oppressive to the industry.

As the proposal stirred political interest, the media once again focused attention on Atomics International. According to a June 1962 *Los Angeles Times* article, a congressional allocation awarded \$2.5 million to Atomics International to double the power level of the SRE and in January 1963, the Atomic Energy Commission approved Atomics International for a four year extension of its contract.⁹² This contract extended the nuclear testing until 1966 as well as increased investment by infusing an additional \$69 million into the program. News media once again heralded the promising nature of the extended contract.⁹³ Regardless of the setbacks and failures of the SRE, both the Atomic Energy Commission and Atomics International remained willing to provide whatever truth, and withhold whatever secrets, to continue work at the SSFL. Only because of this willingness, coupled with federal and state government support for the promising experimental work at the SSFL, was the SRE allowed to remain a reality.

⁹⁰ George Getze, "Atomic-Electricity Cost Expected to Go Down :Nuclear Power Will Compete With Oil, Gas and Coal in 70s, Expert Predicts STARR," *Los Angeles Times (1923-Current File)* 1 Apr. 1962, ProQuest Historical Newspapers Los Angeles Times (1881 - 1987), ProQuest. Web. 21 Sep. 2011.

⁹¹ Ibid.

⁹² "Commission Extends Pact for Research," *Los Angeles Times (1923-Current File)* 30 Jan. 1963, ProQuest Historical Newspapers Los Angeles Times (1881 - 1987), ProQuest. Web. 21 Sep. 2011.

⁹³ Ibid.

The "promising" nature of the SRE remained short lived. According to a December 1966 *Los Angeles Times* article, Atomics International ruled the SRE "obsolete" and too costly "to convert the reactor to new procedures."⁹⁴ Within ten years the SRE had proven to be an unreliable source of nuclear technology. Atomics International and the Atomic Energy Commission, presented with inconclusive reports and troubling findings, repeatedly presented these issues as "learning tools" on display for the investors to demonstrate the safety and security of the SRE.

After the SRE incident in 1959, secrecy became necessary for Atomics International to continue its work on the test reactor. The public remained unaware of the health hazards because of half-truths and silence on the part of the AEC and AI. Even certain employees remained unaware of the gravity of the situation during both the incident and the ensuing cleanup and remained silent due to the top secret nature of their work. The truth would have revealed the worst and would have stopped Atomics International dead in its tracks. The Faustian deal had been struck, however, and the AEC did its part to aid Atomics International in continuing its work at the SSFL. As the technological frontier vanished before their eyes, Atomics International was left only with a nuclear disaster in a Western Frontier nestled inside urban sprawl.

Why was the SSFL incident and ensuing cleanup so different from that of Three Mile Island? There was no evacuation; President Eisenhower did not personally investigate the site; and media coverage of the event would not occur for another twenty years. Like many other nuclear sites located in Western locations, the SSFL did not receive the amount of attention that

⁹⁴ Irv Burleigh, "Deactivation Ordered: Reactor Ruled Obsolete," *Los Angeles Times (1923-Current File)* 7 Dec. 1966, ProQuest Historical Newspapers Los Angeles Times (1881 - 1987), ProQuest. Web. 21 Sep. 2011.

it deserved, and its historical significance was long buried. Within a context where definitive answers are difficult to come by, the concept of the SSFL as a Western nuclear dumping ground is not only likely, but probable.

ERA THREE THE WESTERN FRONTIER MEETS URBAN SPRAWL

Beginning in 1979, Atomics International's actions at the Santa Susana Field Laboratory became known to the public, and the ensuing years drastically effected the standard operation at the site. No longer were the AEC or AI able to maximize the benefits provided by the top secret western location. As Los Angeles urban sprawl continued to spread across the land, headlines of the SSFL alerted the public to the dangers involved up on the "hill." Public opinion, however, is a fickle thing and quickly thereafter either misunderstanding or apathy regarding the SRE took hold of the majority of Los Angelinos. Rumors of government and corporate corruption became a novelty of local Los Angeles history if not forgotten altogether. Whether from ignorance or apathy, the issue of the SRE at the SSFL would remain the interest of only the closest and most affected local residents as federal investigations discovered a long history of nuclear mismanagement.

How the 1959 incident at the Santa Susana Field Laboratory was introduced to the press is a story one would expect to find in a quirky spy novel. In 1979, the meltdown at the Three Mile Island plant in Pennsylvania caught major media attention. Some of those that were intrigued by the event included Professor Daniel Hirsch and some of his students at UCLA. Curious if anything like the Three Mile Island incident had happened before within California they decided to look further.⁹⁵ In a strange coincidence, students discovered that an ex-employee of Atomics International had subsequently become the dean of engineering at UCLA and had stored boxes of documents within the engineering library. The collection included documents

⁹⁵ "Modern Marvels." Youtube Video, 8:41, from a performance televised by the History Channel, posted by michaelfreudiger on Aug 25, 2007, <http://www.youtube.com/watch?v=jAHmaEs5cYU>.

showing melted fuel rods and films of the SRE recovery. With their discovery, Dan Hirsch released the documents to the press to a quick media response.

The headlines of the local papers declared the outrage felt by both the hazardous situation and the fact that the issue had remained unreported for twenty years. A November 6, 1979 article of the *Los Angeles Times* released the truth to the public and described the incident as "messy." The article was also accompanied with Atomics International's assertion that the little known accident "posed no danger to the public."⁹⁶ Many of the public, both confused and concerned, became convinced that the reassurance of Atomics International was not enough and with the aid of growing anti-nuclear groups such as Bridge the gap and Alliance for Survival, began digging deeper. This proved a difficult task as many struggled with incomplete documents and company employees sworn to secrecy.

Many of the documents provided by Atomics International displayed a company conscious of safety regulations and willing to comply with appropriate state and federal law to clean up the SRE. Within a March, 1982 documentary, the decommissioning and decontamination of the SRE displayed not only the safe operation but the thorough and complete conclusion of the experiment. Described by Atomics International as a technologically trailblazing effort, the film documented the SRE dismantling and reclamation procedure. As of 1967 engineers removed the nuclear fuel rods and drained the sodium coolant, and by 1974 transported most of the contaminated material to a commercial nuclear waste disposal site in Beatty, Nevada, where it was buried. What the AEC described as "slightly contaminated" sodium was placed within fifty-five gallon drums and shipped to the government facility in Hanford,

⁹⁶ Robert Gillette. "Experimental Reactor Accident Detailed :Incident at Southland Facility in 1959 Described as 'Messy'." *Los Angeles Times (1923-Current File)* 6 Nov. 1979, ProQuest Historical Newspapers Los Angeles Times (1881 - 1987), ProQuest. Web. 21 Sep. 2011.

Washington.⁹⁷ A letter from W. Kittinger of Atomics International dated June 7, 1977, discussed in detail the safety protocol involved in the transport of the contaminated sodium.⁹⁸ In total, Atomics International planned to ship one hundred fifty-eight drums containing a total of fifty-five thousand pounds of contaminated sodium to storage facilities. The contents were shipped via "exclusive use" trucks marked as "flammable sodium" as well as with the appropriate Yellow II Radioactive labels. Atomics International, in compliance with local law, routed the shipment to avoid traffic and notified local authorities of the hazardous contents. It appeared that most of Atomics International's disposal policies were extremely safe and well-managed. Reports such as these helped assuage the nerves of the local populace that the personnel at the SSFL were in full compliance with safety regulations and that there were no hidden risks to residents.

The final steps of the SRE dismantling as documented by Atomics International showed a flawless team of engineers at their most ingenious. In July, 1974 Atomics International began the SRE fuel decladding process to remove and appropriately store the reactor cores. Core I and II were removed shortly following the 1959 incident and stored in the irradiated fuel storage vault at the Radioactive Materials Disposal Facility (RMDF).⁹⁹ By the end of summer, 1978, with most of the operation complete, only the concrete casing and minor insulation remained of the SRE.¹⁰⁰ Atomics International assured that the site had "no more radiation than that naturally found" in the surrounding California area. In his report, W. Dennison, lead engineer in the

⁹⁷ Ibid.

⁹⁸ W.D. Kittinger, "Letter from W. D. Kittinger to C. D. Jackson dated June 7, 1977: shipment of SRE Sodium to Rockwell Hanford Operations"1977.

⁹⁹ W. F. Dennison, *Final Report – SRE Fuel Decladding*, (Canoga Park, Atomics International, 1977),1.

¹⁰⁰ Ibid.

dismantling process concluded "Thus ends the Sodium Reactor Experiment leaving a legacy of knowledge that is today's leading edge for man's quest for energy, energy without end."¹⁰¹

An eyewitness account of the dismantling procedure, however, tells a very different story than the Atomics International release. Jim Garner worked as a contractor at the SSFL in the late seventies and aided in the dismantling procedure. Garner recalls an eerie scene within the sixty foot steel vault as he worked to remove old ironwork. As he was working in little more protection than gloves, a hard hat, and a t-shirt, he noticed:¹⁰²

"two gentlemen about ten feet away from me with full-on hazardous-material; fresh-air-breathers and Geiger counters. I asked my foreman, 'What's going on? Who are these people?' His reply was, 'Don't worry about it. They work for Rocketdyne [Atomsics International]. Just go back to work.' Later; I find they're taking radiation levels and that there was also a gamma radiation detector installed at the bottom of the vault."

Garner's recounting of events tells the story of unknowing contractors knowingly put at risk during the decommissioning process. Garner, who contracted cancer later in life, remained convinced that Rocketdyne caused the condition and insisted that Atomics International, "... put me in jeopardy, deliberately. They knew what was there. They did not protect me whatsoever. They did not care whether I lived or died."¹⁰³

Claims, such as Garner's, did not reach the news media and many of the efforts of Atomics International assuaged a suspicious public. The outrage flare-up that had occurred in 1979 quickly faded leaving residents with the vague recollection of a "secret meltdown somewhere in Los Angeles." Other than a small group of vigilant activists, and knowing eyewitnesses, the topic of the SRE once again faded from awareness.

¹⁰¹ Ibid.

¹⁰² Michael Collins. "Hot Zone." *Los Angeles Magazine* June 1998. <http://www.enviroreporter.com/hotzone>.

¹⁰³ Ibid

Even with public knowledge, outrage, and subsequent apathy, action regarding the SSFL remained slow and secretive. In 1986 Dan Hirsch, then president of Committee to Bridge the Gap (a nuclear safety activist group), was in the Washington D.C. area when the accident at Chernobyl occurred. Many Americans, concerned that U.S. nuclear plants might be susceptible to the same weaknesses that plagued the Ukrainian plant, focused their attention once again on nuclear technology. Invited by the House Interior Committee to join a nuclear briefing, Dan Hirsch heard claims from the Department of Energy (the DOE is essentially the offspring of the Atomic Energy Commission and came into existence in 1977) that the same event was not possible on U.S. soil because there were no "uncontained, unlicensed, graphite reactors."¹⁰⁴ Dan Hirsch was quick to correct the officials, notifying the committee that an uncontained graphite reactor was located at the SSFL and that reactor had in fact, had a meltdown. He continued by citing the long history of the DOE's federal exemptions and how many environmental rules were put aside regarding nuclear technology. His testimony, and that of others like him, convinced Congress that further investigation was necessary to ascertain the true nature of American nuclear programs. In an ensuing chain of inspections of nuclear facilities Congress decided that further official investigation of certain nuclear sites was both appropriate and necessary and that one such site would be the SSFL. Ten years after the rediscovery and thirty years after the incident itself, outside investigation would assess the working practices of Atomics International at the SSFL.

As opposed to Atomics International's descriptions of safe disposal techniques, the two regulatory bodies in charge of investigating the SSFL, the DOE and ERCE, found a history of

¹⁰⁴ Daniel Hirsch, "Statement of Daniel Hirsch Before the Committee on Environment and Public Works: United States Senate: Oversight Hearing on Cleanup Efforts at Federal Facilities, Washington D.C., 18 September, 2008, pg. 6.

mismanagement and safety violations. The ERC Environmental and Energy Services and the U.S. Department of Energy, created findings reports in the years 1989 and 1990 respectively which contained very different results from those found in the Interim and Final reports compiled by Atomics International. A list of potentially hazardous policies included, “Chemical waste burning, storage and repackaging of radioactive material and wastes, decladding of nuclear fuel elements, and high-level radioactive material storage.”¹⁰⁵ As the investigation continued, the fears of many were realized that Atomics International had not been forthcoming with information and that thirty years of secretive business practice hid an untold amount of dangerous happenings.

Between the corporate and the federal investigations certain high risk disparities arose that were hard to reconcile. A major issue discovered by the ERCE was the chemical waste burning at the onsite Sodium Disposal Facility. Unlike Atomics International's report explaining that waste was safely packaged and shipped to appropriate disposal sites, the ERCE found that in order to eliminate this contaminated sodium, AI employees would expose it to the air and have the ensuing chemical reaction burn the waste. These policies extended during the entirety of nuclear testing at the plant and were in practice during the months of the SRE incident. Upon questioning, a company official admitted that, “an inadvertent release of radioactive sodium to the Sodium Disposal Area Occurred” and further disclosed that it was common practice to burn sodium and other chemicals in an uncontrolled burn pit.¹⁰⁶ Not once within Atomics International's reports was there mention that during the SRE failure personnel burnt and

¹⁰⁵ ERC Environmental and Energy Services. “Santa Susana Field Laboratory Exposure Assessment Phase 1: Initial Evaluation Study,” San Francisco, September 1990, 2-10.

¹⁰⁶ Ibid, 3-5.

dispersed radioactive sodium into the atmosphere. This made an assessment of damage difficult if not impossible due to the gap of thirty years between the action and investigation.

Both of the investigate groups chose to reinvestigate the SRE failure to better assess the level of radiological damage and exposure. The report found that two radioactive elements (xenon 133 and krypton 85) were transported to the gas holding tanks and from there the fission gases were "vented to the atmosphere through exhaust stacks approximately three months later, in September 1959."¹⁰⁷ It was company policy to retain the gases for three months to allow for xenon 133 and Iodine-131 to decay. This policy proved shortsighted as krypton 85's half-life was roughly eleven years and remained present in the environment until 1981.¹⁰⁸ This posed multiple problems for the federal investigators. There was little way to reconcile Atomics International's claims that no radiation leaked with the fact that reports showed that active krypton 85 was intentionally released into the air. Also, due in part to the late nature of the investigation, it was nearly impossible to assess the damage done by the released element as it's life would have expired nearly ten years prior. The secrecy of Atomics International had successfully prevented an investigation at a time when results would have shown the full scale of the incident.

Unlike the 1961 report collected by Atomics International, the ERCE concluded that based on legitimate concerns regarding the companies' policies it recommended that they be "evaluated for impact on target populations."¹⁰⁹ Though difficult to ascertain, the ERCE assured that, "Radioactive releases at the SSFL have not been dismissed, and in fact ERCE recommends that specific radiological emissions be modeled, such as the 1959 accident at the Sodium Reactor

¹⁰⁷ Ibid, 3-7.

¹⁰⁸ Ibid.

¹⁰⁹ Ibid, 6-1.

Experiment Facility.”¹¹⁰ The fact that the ERCE’s investigation happened over thirty years after the incident did much to mask the damage. The exposure of the events of 1959 was not enough to fully reveal the impact of the SRE on the local environment. The report concluded that because “offsite consequences are not directly related to ERCE’s scope of work... a series of studies must be carried out to quantify the emissions that have been generated by the SSFL.”¹¹¹ Even more time would pass before a health study to ascertain the potential health consequences to nearby residents would take place.

Unlike the ERCE report, The DOE audit did shed some light on the exposure risk of ‘off-site’ individuals in the nearby regions of the Simi and San Fernando Valleys. Assessing average wind patterns of the area the report discovered that from the months of April through October an, “almost daily wind of five to ten knots from the northwest occurs from about noon to an hour or so after sunset.”¹¹² Another chart showed an increase of between seven or eight times the wind force during the summer season over the rest of the year. This wind flow, which coincides with the season of the SRE incident of 1959, would have directed much of the airborne radioactive contamination towards both the communities of Simi and San Fernando Valleys. These winds were present during the releases of krypton 85 in September, 1959 and therefore occurred within the months of increased wind flow creating a large health hazard. Definitive answers remained elusive, but the indications that the damage was not contained to the SSFL was an important discovery for the DOE.

Based on these results, levels of soil and vegetation contamination became a high priority for the DOE. Its assessment found that radioactivity showed negligible amounts of damage

¹¹⁰ Ibid.

¹¹¹ Ibid, 6-10.

¹¹² U.S. Department of Energy. *Environment, Safety and Health Office of Environmental Audit: Preliminary Report DOE Activities at Santa Susana Field Laboratories*. Washington D.C., February 1989.

ranging from the dates of 1964-1983, but from 1984 onward, the alpha readings conservatively jump to forty or fifty times higher than that of the previous period.¹¹³ The DOE explained that the change was the “result of an improved calibration method that provided a true measure of alpha activity.” Atomics International personnel utilized incorrect monitoring to validate reports that alpha readings were within safety limits, and not until federal oversight thirty years later was it correctly calibrated. Regardless, Atomics International concluded that the risk of radiation exposure at the northern boundary of the site remained negligible because the “rugged terrain along the north boundary and daily security patrols” made a human presence difficult and did little to assess the potential risk of the high volume of irradiated atmosphere diffused towards the nearby valleys during the summer season.¹¹⁴ The DOE found the risk of contamination on and off site remained high and both the assessment tools and techniques of Atomics International were put in serious question.

The DOE discovered one such incident that emphasized Atomics International's cavalier attitude regarding the SSFL upon investigating the leachfield incident. In 1962 an “accidental release of radioactively contaminated water” leaked into the soil including strontium 90, yttrium 90, and cesium 137.¹¹⁵ Admittedly, yttrium 90's half-life is a short 2.67 days, but the half-lives of strontium 90 and cesium 137 are 28.8 and 30.17 years respectively. According to the parent company at the time, Rockwell International, the area was, “excavated to bedrock, backfilled, and released for unrestricted use.” Certain discrepancies within the reports leave a few disturbing and unanswered questions. How long was the radioactive material allowed to settle into the leachfield? How effective was the cleanup process and where was the massive amount of

¹¹³ Ibid, 3-29.

¹¹⁴ Ibid, 4-34.

¹¹⁵ ERC Environmental and Energy Services. “Santa Susana Field Laboratory Exposure Assessment Phase 1: Initial Evaluation Study,” San Francisco, September 1990, 3-7.

irradiated Earth taken? The ERCE's report noted that Rockwell did install "four monitoring wells" to assess radioactive substances in the ground water.¹¹⁶ Unfortunately, these monitors were not installed until 1989 and were roughly thirty years late. Upon investigation by Atomic International, further contamination was "found to extend downward into joints and fractures in the Chatsworth formation... [and] there [was] a high probability that contaminants reached the groundwater through infiltration from the leachfield."¹¹⁷ The company concluded that the onsite risk remained negligible because the area was excavated at the time of the incident and all the radioactive materials were removed. In 1978, however, the leachfield was once again exhumed and, radioactivity remained in the bedrock cracks well below the SSFL.¹¹⁸ Atomic International's solution to this discovery was to fill the cracks with asphaltic tar and rebury the entire site. Once again expediency, quick fixes, and irresponsible safety practices were the reality that Atomic International reports failed to document. The DOE's findings were inconclusive, and could only document that "no radioactive parameters were analyzed...[and] no groundwater monitoring has been performed." As the investigation continued the disparity between Atomic International reports and reality continued to grow.

The Sodium Burn Pit area was another location at the SSFL that posed major ecological problems. Used in the 1960's and 70's as a disposal area it was located at the northwest edge of the plant. Here flammable chemicals were, "poured into open pits and burned" and reactive metals were placed "into a concrete pit and...reacted."¹¹⁹ It was alleged that within the Area IV sodium burnpit "sodium-coated reactor components were placed, reacting violently with the

¹¹⁶ Ibid, 3-7.

¹¹⁷ Ibid, 3-65.

¹¹⁸ Ibid, 4-46.

¹¹⁹ Ibid, 4-48.

water, burning and boiling days in the open air."¹²⁰ An undisclosed amount of radioactive material was "disposed" of at the location and winds would carry the hazardous waste in the direction of the Simi or the San Fernando Valleys. If Atomics International had not already proven themselves as "cowboy nuclear scientists," the DOE uncovered their lawless nature. Investigators found that "occasionally, firearms were used on vessels to 'safely' open containers to the atmosphere."¹²¹ When seen as unsafe, company employees would shoot radioactive and chemical waste until it burnt or exploded. One such disposal caused an explosion that, "reportedly sent the barrel high in the air, crushing a pickup truck when it landed."¹²² The flagrant and abusive techniques in which Atomics International handled nuclear material differed greatly with the documentation of the safe shipment techniques to Hanford and other waste sites. The DOE's official conclusion stated that the technique "did not facilitate capturing the contents... [that] included reactive metals." Nuclear handling procedures at the SSFL lacked protocol, safety, and caution and showed a cavalier and dangerous disregard for the law.

The differences between the DOE and ERCE findings and the findings of Atomics International were substantial. Atomics international claimed that there was no radioactive damage to the environment and that safe disposal techniques were the standard at the site. The ERCE found both condoned acts of radioactive sodium burning as well as radioactive air venting and those releases had the potential to contaminate both neighboring communities of Simi Valley and Chatsworth. Atomics International, no longer hidden behind the curtain of secrecy, had a long history of disregard and dangerous nuclear practices with little to no oversight and the

¹²⁰ Hirsch, pg. 5.

¹²¹ ERC Environmental and Energy Services, 3-12..

¹²² Hirsch, pg. 5.

regional government was unable to fix the exorbitant amount of health issues until Atomics International's action became transparent.

In 1989, and in response to the new developments at the SSFL, Congressman Elton Gallegly (R-Simi Valley) asked the EPA to "provide independent oversight." In response, EPA officer Gregg Dempsey, from the Las Vegas National Radiation Lab, came onsite to investigate.¹²³ In a Memorandum from Mr. Dempsey to the On-Scene Coordinator, Daniel M. Shane, many concerns were highlighted. He began by clarifying that his purpose of investigation was to help assess the relative magnitude of the health hazards, and "address....concerns."¹²⁴ Beginning with soil contamination, Dempsey observed irregular sampling procedures and upon request on procedural policy employee Mr. Moore informed him that the, "procedure was worked out a long time ago and he did not know where that documentation might be or if it existed." The same type of irregularities existed in water samples as well. Mr. Dempsey concluded that soil tests were not a true representation of the conditions present in the environment and Atomics International policies contaminated findings.¹²⁵

Dempsey found that whereas documentation remained absent in the soil sampling, procedural documentation for vegetation sampling actually corrupted the research. Dempsey found policy instructing employees to "Gently wash the vegetation in the container with warm tap water to remove external foreign matter."¹²⁶ This action would remove any traces of airborne radiological contamination and make a true reading impossible. Dempsey also noted the within his report that the process of superheating the vegetation to five hundred degrees Celsius, normal

¹²³ Hirsch, 7.

¹²⁴ EPA memorandum, from Gregg Dempsey to Daniel Shane, "Site Visit to Santa Susana Field Laboratory Operated by Rockwell/Rocketdyne," 28 July 1989.

¹²⁵ Ibid.

¹²⁶ Ibid.

practice at the site, could have potential misleading ramifications. Again, whether by outdated policy or with flagrant disregard of the law, Atomics International policy interfered with testing results.

The lack of documentation continued to plague Gregg Dempsey's assessment of areas of high radiological risk. Upon his investigation of the "Special Nuclear Materials Storage Area" company employees showed Dempsey to a location with high radiation readings that were more than tripled when he used a shovel to dig up the dirt. Almost as startling as the high radiation values, company employees were unable to tell Mr. Dempsey the cause or exact time of the spill. Documentation gaps continuously plagued independent investigations at the plant and prohibited definitive answers regarding the safety of the SSFL.

In conclusion, Gregg Dempsey echoed the concerns of the DOE with the well and air sampling at the SSFL and offsite.¹²⁷ He reported that, "Rocketdyne does not have a good "handle" on where radiation has been inadvertently or intentionally dumped onsite." Concerns for offsite impact, both past and future, were dependent upon correcting the existing environmental program at the SSFL. Dempsey found many on-site policies responsible for incorrect environmental conclusions and Atomics International directly responsible for the incomplete findings.

As independent investigations showed an entirely new picture of the SSFL, the western lawlessness of Atomics International came crashing into the ever growing Los Angeles urban sprawl. Whether Atomics International personnel were truly nuclear bandits and disregarded federal and state safety laws or whether their cavalier attitude towards policy and standards arose

¹²⁷ Ibid.

in a region that regulations went unenforced is hard to decide. Whatever the reasoning behind Atomics International's actions, policies existed at the SSFL that prevented the discovery of the truth and its current history is made up of various, and conflicting, descriptions of events. Glaring differences between Atomics International, Federal, and eyewitness reports emphasized a story riddled with lingering questions. Early secrecy as well as incomplete and incorrect documents on the part of Atomics International and the Atomic Energy Commission, have made a definitive recounting of events impossible. Public opinion, usually changeable and inconsistent, never fully accepted or condemned the actions at the SSFL and only the most ardent local actors have continued interest in the matter. Atomics International assured that nothing but the safest policies were enacted and encouraged nothing but the most helpful and compliant attitude. Eyewitness accounts argued that AI policies remained undocumented and a hidden truth of dangers remained unknown. At the very least, Atomics International and the Atomic Energy Commission have hindered the full discovery of the events of the summer of 1959 and actively hid their cavalier and lawless actions. With discovery, however, the once top secret site tucked in the Santa Susana mountains in the rugged West, came into direct conflict with the laws of urban sprawl.

ERA FOUR REGIONAL VERSUS FEDERAL CONFLICT

At the close of the twentieth century and at the dawn of the twenty-first, local residents invested in the fate of the SSFL eagerly awaited justice. With increased congressional support, and with both the federal and the state government actively pursuing the truth of the incident many hoped that the secrecy and lawlessness at the SSFL would finally come to a close. This has not been the case and herein lies the most important aspect of the SSFL as a microcosm of the national disregard of the west. As federal and state investigations and litigation continue today, striking differences between the way incidents such as Three Mile Island and the SSFL were handled show a hidden bias whether it be towards the east or against the west. With the SSFL finding its rightful place within historical memory, it will aid in demonstrating to the entire nation the dated and flawed policies of Western denigration.

The climate surrounding the experimental programs has changed since the SRE's infancy in 1959 and requires further clarification. In March, 1967 Rockwell Standard acquired and merged with North American Aviation to form North American Rockwell, and in 1973, due to further acquisitions, became Rockwell International. In 1978 as Atomics International's focus drifted from nuclear research, it merged with fellow subordinate company at the SSFL, Rocketdyne Division. Rockwell International sold its defense and aerospace business, which included North American Aviation and Rocketdyne to Boeing Integrated Defense Systems in December 1996. Since then Boeing has been embroiled in lawsuits regarding the proper cleanup of the plant. Pratt & Whitney purchased Boeing's Rocketdyne division in 2005, but declined to acquire the SSFL as part of the sale.

Federal regulatory bodies on the scene have also changed dramatically as the years progressed. The Atomic Energy Commission met with increasing criticism during the 1960's regarding charges that certain regulations including radiation standards, nuclear safety, and environmental protection issues were not sufficiently addressed. Due to increasing pressure, Congress passed the Reorganization Act of 1974 which abolished the AEC and dispersed its functions to the Energy Research and Development Administration (ERDA) and the Nuclear Regulatory Commission (NRC).¹²⁸ As increasing public scrutiny of the ERDA and NRC demanded further reorganization, the ERDA became the United States Department of Energy (DOE) in 1977 which has shouldered nuclear regulatory roles nationally as well as specifically at the SSFL.

Events up on the hill have also become much more complex. Boeing, the DOE, and now even NASA are in charge of cleanup activities. Boeing owns the land for Area's one, three, and four (four being the location of the SRE). NASA acquired area two from the United States Air Force In 1973 and further acquired a small portion of area one in 1976. Boeing, and NASA, are under regulatory oversight by the California Department of toxic substances control (DTSC) as well as the Los Angeles Regional Water Quality Board. The 2008 Federal Appropriations law (HR2764) required the DOE to utilize a portion of its funding for the SSFL to enter an interagency agreement with the EPA to conduct a radiological study of Area IV in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).¹²⁹ The EPA is now in charge of both the radiological background and gamma radiation scan of Area IV while the DTSC is still in charge of the general cleanup. The SSFL is

¹²⁸ United States Nuclear REgulatory Commission, 'Atomic Energy Commission', October, 2011, <http://www.nrc.gov/reading-rm/basic-ref/glossary/atomic-energy-commission.html>.

¹²⁹ U.S. Environmental Protection Agency, *Region 9: Superfund San Fernando Valley*, San Francisco, 2010. <http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/7508188dd3c99a2a8825742600743735/a7dbbd3edaaf5cd788257007005e945f!OpenDocument>.

not on the EPA's National Priority List (NPL) and therefore does not qualify as a federal 'Superfund' site. In January 2009, the EPA requested clarification from the state of California and the state government decided that the SSFL would not be listed on the NPL.¹³⁰ Due to this ruling, the California DTSC remains to this day the lead regulatory agency with EPA providing the role of limited technical assistance on radiological issues at Area IV. No further testing takes place at the SSFL.

How the SSFL shifted from being a test site to a hotbed of federal investigation is a tragic story of how Atomics International's lawlessness cost two employees their lives and could no longer be ignored. On July 26, 1994, scientists Otto Heiney and Larry Pugh were killed in an explosion while disposing of chemicals on site.¹³¹ Initially, there was general confusion as to the true nature of the accident due to the claims by company employees that they were involved in legitimate research and that employees were not illegally disposing of chemicals. What had been described as "questionable circumstances" ended in a FBI raid of the site and to the seizure of documents pertaining to the incident. Under investigation, several employees admitted that illegal hazardous waste disposal not only continued at the site but also that they considered the practice directly responsible for the explosion. Rocketdyne employee Mr. Lee Wells confirmed that illegal waste disposal remained common at the SSFL during his testimony on trial testifying that at the time of the explosion he, "assumed we were burning waste."¹³² He continued to describe the blast recounting that its intensity was enough to make his, "shirt come apart" and afterwards, knowing he was suffering from intense chemical burns, he "felt to see if [he] was all

¹³⁰ Ibid.

¹³¹ "Scientist Fined \$100 in Lab Blast That Killed 2," Los Angeles Times, December 11, 2003 Thursday; also see "Executive Sentenced in '94 Blast; A former Rocketdyne official gets probation for violations linked to two scientists' deaths." Los Angeles Times, January 28, 2012.

¹³² "Ex-Rocketdyne Worker Describes Fatal 1994 Blast," Los Angeles Times, January 28, 2012.

there."¹³³ Investigators discovered a company annoyance with safety regulations as they investigated deeper into the incident. The wife of fatally wounded Otto Heiney testified in court about comments her husband made regarding his frustration with, "stupid environmental rules" and in 1996 Cal/OSHA referred to the incident as Rocketdyne's "disguise for destroying waste explosive materials."¹³⁴ Disregard of both law and safety continued to be practiced at the SSFL well into the 1990s and right under the noses of federal regulatory bodies. Their actions exposed Atomics International (Rocketdyne) for the lawless company they were and the ensuing cover up proved to be one of many utilized to hide incriminating evidence. After over forty years ardent activists received the first definitive proof of Atomics International's illegal activities. In 2004, after ten years of litigation, three Rocketdyne employees pleaded guilty to illegally storing explosive materials yet the jury remained deadlocked on the charges of illegal hazardous waste burning.¹³⁵ The court ruled that Rocketdyne be fined \$6.5 million which remains the largest penalty for an environmental crime to date in California. Public, State, and federal attention all took notice of the flippant disregard that Atomics International/Rocketdyne had for safety and law.

In the early 1990's, the Santa Susana Field Laboratory Advisory Panel, created in response to increasing pressure to investigate the goings on at the SSFL, began "overseeing the independent scientific studies of potential health effects." The panel consisted of a team of researchers from UCLA as well as five members that were selected by local legislators as "community representatives" in a two-fold investigation to assess separately the risk of

¹³³ Ibid.

¹³⁴ "Scientists Face Trial in 1994 Rocketdyne Explosion," San Diego Source, October 22, 2001. San Diego Source, April 8, 2012.

¹³⁵ Scientist Fined \$100 in Lab Blast That Killed 2, Los Angeles Times.

radiological and chemical hazards to company employees.¹³⁶ This study would focus on health ramifications of employees and if the initial panel study were to find health risks to on-site personnel, which logically would have had increased exposure, then a more thorough, follow-up assessment of dangers to off-site locations would take place. In June 1997, the report identified 875 externally monitored worker deaths of which 258 were due to cancer.¹³⁷ The report found that of 875 deaths of internally monitored workers, 134 were due to cancer. Exposure of SSFL workers was associated with an increased mortality rate of individuals suffering of cancers of the blood and lymph systems and from lung cancer.¹³⁸ The panel also found that "radiosensitive" solid cancer increased as external radiation doses increased as well. The study concluded that SSFL nuclear sites had "experienced excess deaths from cancer associated with their work-related exposures to radiation."¹³⁹ With a direct correlation between nuclear exposure at the SSFL and fatal cancer cases, the panel recommended an offsite investigation to discover health effects to the local populace.

The most startling find, however, was the high risk of "low dose" radiation. The panel found that the "excess relative risk of 'low-dose' radiation was at least 6 to 8 times greater than risks previously assumed on the basis of atomic bomb survivor data."¹⁴⁰ Many existing policies had been implemented based on the studies of the atomic bombs dropped during World War Two and served as the safety regulations during the half century of activity at the SSFL. Errors in the assessment of low dose radiation effected the current safety standards of the United States. With the discovery coming as late as 1997, not only Atomics International but the entire nation

¹³⁶ Santa Susana Field Laboratory Epidemiological Study: Report of the Oversight Panel, D. Hirsch, D. Michaels Ed., September 1997, 5.

¹³⁷ *Epidemiologic Study to Determine Possible Adverse Effects to Rocketdyne/Atomics International Workers: Final Report*, Dr. Hal Morgenstern Ed., June 1997, vi.

¹³⁸ *Ibid*, 5.

¹³⁹ *Ibid*, 5.

¹⁴⁰ *Ibid*, 6.

had been utilizing incorrect low dose ratings for over forty years. The study not only recommended a follow-up investigation into off-site hazards, but also recommended that U.S. nuclear regulations be assessed and reevaluated based on this new data.

In response to recommendations made by the panel the federal Agency for Toxic Disease Registry (ATSDR) led an investigation into the possibility of off-site contamination and links to cancer. To lead the investigation, the agency contracted both Dr. Morgenstern (Chair of Epidemiology at University of Michigan) and Dr. Yoram Cohen of UCLA.¹⁴¹ The study suggested that the closer the proximity of off-site civilians, the more at risk they were of contracting certain forms of cancer.¹⁴² Of the numerous types of cancer investigated, nine specific cases showed higher than normal occurrence patterns of which thyroid cancer had the highest incidence rate ratio. Morgenstern listed the presence of cesium and iodine, released from the partial meltdown of the SRE, as a potential culprit for the increased cases of thyroid cancer in the local area.¹⁴³ The findings helped insinuate a link between increased documentation of cancer and incidents of chemical and radiological mistakes at the SSFL.

With proof of offsite contamination, it became clear how different the nearby areas of Simi Valley and Chatsworth were in the 1990's as opposed to the small towns of 1959. Both cities have grown nearly ten times over the ensuing half-century and what was once an isolated test site is now contained by two large residential locations. In crude measurement, the SSFL is within two miles of heavily populated areas of southern Simi Valley. Area IV, in particular, is within one and a half miles distance from nearby residential neighborhoods where Sequoia Avenue and Fitzgerald Road intersect. The half-life of cesium-137 is 30.17 years and traces of

¹⁴¹ Hirsch, 8.

¹⁴² Hal Morgenstern, Ph. D., *Cancer Incidence in the Community Surrounding the Rocketdyne Facility in Southern California*, ATSDR, March 2007, 3.

¹⁴³ *Ibid*, 4.

the contamination will remain well into 2019. Iodine-131, with its quick decay time, still remains a potential threat because of the numerous correlations between exposure to I-131 and occurrences of thyroid cancer later in life.¹⁴⁴ With the questionable and secretive activities at the SSFL continuing until 1994, there is no telling how much more damage occurred as the cities grew around the plant. In conclusion, Morgenstern admitted that certain estimates could have been made imprecisely and certain findings might merely represent chance occurrence but urged that further research into the potential health risks for off-site locals was imperative. As always with the SSFL, more questions remain than answers but as the amount of those who questioned the results of Rocketdyne/Atomics International increased, so did the increasing amounts of incriminating data.

In 1998, Coupled with these findings, courts approved a class action suit against Rocketdyne corporation under the plaintiffs claim that "activities at four facilities, including the SSFL, fouled their property and harmed their health."¹⁴⁵ U.S. District Judge Audrey B. Collins gave increasing credence to community claims as she allowed the addition of two hundred thousand new plaintiffs in the nearby Simi and San Fernando Valleys from the eight original claimants. The lawsuit demanded compensation for damages that had occurred during a half century of nuclear research and rocket testing at the Santa Susana Field Laboratory, as well as three other plants owned by the company in the nearby area.¹⁴⁶ The plaintiffs also sought medical monitoring to promptly and adequately detect cancers and other health risks.

¹⁴⁴ Scott A. Rivkees, Charles Sklar and Michael Freemark J. Clin. Endocrinol 'The Management of Graves' Disease in Children, with Special Emphasis on Radioiodine Treatment, 1998.

¹⁴⁵ Kate Folmar, 'Class Action OK'd Against Rocketdyne' July 1998, Los Angeles Times, January 31, 2012. <http://articles.latimes.com/1998/jul/14/local/me-3599>.

¹⁴⁶ Ibid.

The court battle, which lasted over seven years, included scientific testimony to argue both for and against the plaintiff. As the court battle dragged on into the beginning years of the twenty-first century the Division of Health Assessment and Consultation concluded in defense of Rocketdyne/Atomics International that they had "not identified an apparent public health hazard to the surrounding communities because people have not been, and currently were not being exposed to chemicals and radionuclides."¹⁴⁷ Directly counter to this report, the testimony of Dr. Arjun Makhijani, president of the Institute for Energy and Environmental Research and former advisor to the EPA, argued that the off-site contamination was on a massive scale. Brought in as a nuclear expert, Dr Makhijani's research and testimony asserted that the release of radioactive iodine-131 was much worse than previously assumed. In a 2006 interview Makhijani described his findings:¹⁴⁸

In Arriving at the estimates of how much iodine was released...our best estimate was about 1,300 curies. that would make it the third largest release of iodine-131 in a reactor accident in the history of nuclear power. First there was Chernobyl; then Windscale in England in 1957 and the third worst would be this sodium reactor experiment in Simi Valley. Because the records were incomplete, and the investigations were incomplete, it was like solving a mystery with partial information. And so essentially we filled in the gaps through scientific analysis.

After seven years of litigation, one hundred local residents received a settlement of thirty million dollars as a result of the lawsuit. Information regarding the verdict and conclusions found remain elusive, with only the settlement as evidence of the conclusion.

Even though the outcome of the class action suit was positive for the plaintiffs, certain former employees of the SSFL felt entitled to compensation and were been denied. Former Santa Susana Field Laboratory worker Bonnie Klea commented on her denial of workers compensation

¹⁴⁷ Agency for Toxic Substances & Disease Registry, *Public Health Assessments & Health Consultations*, Atlanta, 2009, http://www.atsdr.cdc.gov/hac/pha/PHA.asp?docid=78&pg=3#_1_63.

¹⁴⁸ Living on Earth, A Nuclear Incident 'Worse Than Three Mile Island', 2002, <http://www.loe.org/shows/shows.html?programID=06-P13-00003#feature1>.

for damages caused by the company. A Rocketdyne employee from 1963 to 1971, Mrs. Klea was diagnosed with bladder cancer in 1995.¹⁴⁹ As a former employee, however, Bonnie Klea was ineligible for the class action suit and sought retribution by applying for workers compensation, where, at first, she met with success. Upon her first consultation, "their doctor that they sent me to wrote a six-page letter, and he said it was work-related... the company's health physicist found out...and made him change his letter, so I had a little one paragraph that said it wasn't work related, and I consequently lost my case."¹⁵⁰ Like many others that were displeased with the denial of workers compensation claims, Bonnie Klea attended a meeting in July 2002 to convince Rocketdyne of her claims. Current Rocketdyne employees decided that the working conditions for all attending "did not cause them extra death or harm."¹⁵¹ Former Atomic International documentation was used as proof that federal and state safety limits were consistently being met.

In 2006, David A. Lochbaum, Director of the Nuclear Safety Project for the Union of Concerned Scientists and an engineer with seventeen years of experience in the nuclear field created a report on the SRE failure. Within this report Mr. Lochbaum attempted to give an educated assessment to the gaseous radioactivity that followed Run Fourteen. During research, Lochbaum felt confident that there were many factors that pushed the percentage to the upper bound of the scale including the fact that the primary sodium boiled, that operators vented helium cover gas to the storage tanks soon after the onset of significant fuel damage, and that unusually high radioactivity levels were present for the extent of the run. Lochbaum also heavily emphasized that regardless of all this data, the SRE continued to be operated for nearly two

¹⁴⁹ Ibid.

¹⁵⁰ Ibid.

¹⁵¹ Ibid.

weeks after these actions.¹⁵² Admittedly, he conceded that leaked tetralin worked to absorb fission product and that measurements within the gaseous storage tanks after July 15th worked to push the result to the lower bound. Based on the factors of both high and low, Lochbaum decided that hazardous amounts of airborne radioactivity did exist at the SSFL. Whether by increasingly sensitive monitors or a more legitimate research attempt, Lochbaum's assessment added to a growing amount of independent investigation that found hazardous situations left undiscovered by previous Atomics International reports.

In 2006, the DOE, and its predecessor the AEC, came under scrutiny when the California government discovered that it continued to illegally dispose of waste at the SSFL. It came to the state government's attention that the DOE transported waste from the SSFL and disposed of it at sites that were not qualified to retain chemical or radiological waste. Senator Barbara Boxer of California initiated a closer look into how the DOE disposed of the radioactive waste. In a letter sent to Energy Secretary Samuel Bodman, Senator Boxer inquired about radioactive waste material from the SSFL to the Kettleman Hills landfill in Kettleman City, California.¹⁵³ Senator Boxer cited the SSFL's incorrect disposal patterns as well as mentioning the illegal shipment of waste to Buttonwillow landfill, a disposal facility not qualified to dispose of radioactive waste and was only resolved in a 2002 Executive Order (EO D-62-02) that placed limits on the disposal of radioactive waste.¹⁵⁴ The DOE's actions alarmed activist groups and local residents and gave credence to local opinion that the DOE's claim demonstrated the irresponsible and illegal actions. Many felt that the DOE, continuing the careless actions of its predecessors, was more interested in burying and forgetting its mess and felt no remorse in the process. Senator Boxer gave

¹⁵² Ibid, 18.

¹⁵³ Barbara Boxer, Boxer Asks Bodman about dump of Rocketdyne waste in Kettleman Hills. November 3, 2006. <http://boxer.senate.gov/en/press/releases/110306.cfm>.

¹⁵⁴ Ibid.

credence to these beliefs as she concluded in her report that, "this incident raises serious legal questions, including whether the Department of Energy is improperly deregulating the disposal of radioactive material."¹⁵⁵ This was not an isolated incident, and local residents again implored Senator Barbara Boxer to step in to represent Californian interests. According to Dan Hirsch, Senator Boxer became aware that "contaminated modular buildings were sold to a children's zoo and a school" and forced the retrieval and disposal of the buildings at an appropriate disposal facility.¹⁵⁶ Certain issues regarding the SSFL can be dismissed because of the lack of suitable monitoring or documentation, but it is hard to explain away that the DOE, a federal regulatory body, would attempt to sell contaminated facilities to children. Only by the intervention of state government were extremely questionable and illegal acts by the DOE and Rocketdyne prevented.

Because of the questionable activities of the DOE, a federal court in San Francisco under Judge Conti ruled as of May, 2007 that the DOE suspend clean up at the SSFL until completion of an Environmental Impact Statement regarding the cleanup of Area IV (currently scheduled to be completed in 2013). A follow-up 2008 Federal Appropriations Law (HR2764) instructed the DOE to use "a portion of DOE funding for the SSFL site to enter into an interagency agreement with the EPA to conduct a joint comprehensive radioactive site characterization of Area IV of the SSFL in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)."¹⁵⁷ As per the legislation, the EPA and DOE discussed terms for the execution of the investigation and in early June 2008, and the DOE proposed that it would perform the initial radiological survey while the EPA would perform the background testing. In a memorandum to the DOE, EPA representative Michael Montgomery acknowledged that though

¹⁵⁵ Ibid.

¹⁵⁶ Hirsch, 5.

¹⁵⁷ U.S. Environmental Protection Agency, *Region 9: Superfund San Fernando Valley*, San Francisco, 2010. <http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/7508188dd3c99a2a8825742600743735/a7dbbd3edaaf5cd788257007005e945f!OpenDocument>.

this path was not what lawmakers of H.R. 2764 had in mind, nor was it the desire of the public, the EPA chose to go along with the plan because it was consistent with "enforcement first" policies.¹⁵⁸

Unfortunately, Michael Montgomery and others at the EPA became concerned with the how the DOE was handling its side of the joint investigation. The DOE originally acknowledged that it would utilize the "EPA default Agricultural preliminary remediation goals for radionuclides...for screening levels of radiological work conducted on site" and yet within the DOE report EPA officials found that the data provided was in "some cases several orders of magnitude higher than published EPA standards."¹⁵⁹ EPA officials were shocked to find that certain items were hundreds or even thousands of times higher than accepted EPA standards and upon further correspondence, Mr. Montgomery found that the DOE's response to these allegations had been inconclusive and evasive. Upon further investigation, the EPA also found that as of June 20 of that year the DOE shared responsibility of sampling with Boeing Corporation, the very company in question and in direct violation of the terms of the investigation.¹⁶⁰ As if these elements were not enough to show the misunderstanding between the two groups, the DOE notified the EPA on June 30, 2008 that it could only fund half a million dollars (of the initial 13 million granted from H.R.2764) to comply with the legislation. Upon further discourse, the DOE also perceived the allocation to be restrained to the fiscal year of 2008 and that no further funding would be forthcoming. In short, the DOE did not utilize previously agreed upon EPA standards, shared testing responsibilities with Boeing, and refused to deliver congressionally ordered funds. The comparisons between Boeing and the DOE in the

¹⁵⁸ Desi Crouther (DOE), *United States Environmental Protection Agency*, San Francisco, Ca, July 2008.

¹⁵⁹ Ibid.

¹⁶⁰ Ibid.

twenty-first century and the relationship between Atomics International and the Atomic Energy Commission in the twentieth are shocking. The seamless history of secrecy, half-truths, and evasion continue to this day to further hide the truth of all that has happened at the SSFL.

As the situation quickly spiraled out of control, the EPA sought to supersede the DOE and regain control of a situation. Michael Montgomery warned that if the DOE did not provide the appropriate funding, and that if the EPA was not placed in charge of the investigation, the EPA would alert all interested individuals and elected officials. Montgomery added that, "these recent events demonstrate a significant lack of transparency in DOE's interaction with the EPA and the public [and] these events have damaged DOE's credibility and DOE has misrepresented EPA's role as an oversight agency."¹⁶¹ Returning to the debate with congressional support, the EPA stepped in to take charge of the entire testing operation to the great relief to many. Congressman Elton Gallegly emphasized the importance of an outside agency conducting the investigation and added that the EPA's presence would make community members, "feel much more comfortable."¹⁶² Senator Diane Feinstein also applauded the action in her belief that, "independent EPA oversight is a critical part of reaching that goal." In 2009, congress amended the Inter-Agency agreement between the EPA and DOE and provided the EPA with a total of forty-one and a half million dollars to fund its radiological study of Area IV and the adjacent northern buffer zone.¹⁶³ A large part of the funding provided came from DOE coffers under the American Recovery and Reinvestment Act of 2009. Not only was the DOE made to pay a much larger sum than originally intended, but the EPA was also put in charge of both the background

¹⁶¹ Ibid.

¹⁶² "EPA set to take charge of survey at Field Lab - Energy Department criticized for work at contaminated site." Ventura County Star 20 July 2008, http://infoweb.newsbank.com/iw-search/we/InfoWeb?p_product=NewsBank&p_theme=aggregated5&p_action=doc&p_docid=1220C18CC63ED4C8&p_docnum=96&p_queryname=3, 8 Feb. 2012.

¹⁶³ U.S. Environmental Protection Agency, *Region 9 Superfund: Santa Susana Field Laboratory (SSFL)*, November, 2011. <http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/ViewByEPAID/CAN000908498>.

study and investigation of radiological contaminants.¹⁶⁴ Local activists, state congressmen, the EPA, and congress itself all voiced a vote of no confidence against the DOE as an unbiased entity in the current investigation at the SSFL.

Motivated by these concerns, the question of leadership at the SSFL during the continuing investigation is an ever contentious subject. Senate Bill 990, passed September 11, 2007 and effective on January 1, 2008, granted the California Department of Toxic Substance Control authorization to clean up the site under the requirements and procedures of the California Superfund Law, and to be enforced under the authority of either the California Superfund Law or the Resource Conservation and Recovery Act (RCRA).¹⁶⁵ This law, focused entirely on the SSFL, granted the DTSC the authority to oversee all aspects of the cleanup including both chemical and radioactive wastes, and allowed the use of the State Superfund's risk assessment process for both the radiological and toxic contamination. For the first time control of the SSFL cleanup was under state and not federal oversight. Within these standards it granted the state of California the power to use, "the highest and most protective cleanup standards provided under the "rural residential (agricultural)" land use designation."¹⁶⁶ Both NASA and the Department of Energy signed Administrative Orders on Consent (AOC) that required them to comply with the DTSC's control and with the new cleanup procedure. Though the EPA had proven to many local activists its altruistic intentions, the state government denied the EPA's request to have the SSFL put on the NPL and therefore be under its jurisdiction. Nearly fifty years after the SRE incident, Western regulatory bodies achieved control over both Rocketdyne (Boeing) as well as the existing federal regulatory bodies.

¹⁶⁴ Ibid.

¹⁶⁵ California Department of Toxic Substances Control, *Santa Susana Field Laboratory*, California 2007. http://www.dtsc.ca.gov/SiteCleanup/Santa_Susana_Field_Lab/index.cfm.

¹⁶⁶ Ibid.

Based on issues of state versus federal oversight, Boeing began a lawsuit in 2009 as a response to the Senate Bill 990. Previously, all nuclear regulations were controlled by the federal government but bill 990, “amended existing California law to authorize the California Department of Toxic Substances Control ‘to compel a responsible party or parties to take or pay for appropriate removal or remedial action’ of radiological materials, as ‘necessary to protect the public health and safety and the environment at the Santa Susana Field Laboratory site.’”¹⁶⁷ Boeing argued that state intervention within federal jurisdiction was unconstitutional and that to amend a California law to focus solely on one area of the state is illegal. The company also argued that the cleanliness standards set forth by SB 990 and the EPA are arbitrary and irrational in demanding higher standards at the SSFL than at any other location within California.¹⁶⁸ Boeing argued that because of the nature of the site, regulations have been severe and unnecessary. One of the company's largest complaints included cleaning the area to standards of "rural residential" which would create standards much more stringent than traditional residential zoning. The company argued that rural residential is predominantly reserved for areas of heavy farming which is untenable at the SSFL location based on natural conditions and that the bill overstepped its bound in restricting the resale of the area until approval from the DTSC. Strikingly similar to memorandums from AI or the AEC, Boeing corporation attempted to show a long history of federal nuclear regulation both broadly and specifically to the SSFL in an attempt to have bill 990 overthrown and a return to the previous, less restrictive, regulations.

After two years of deliberating the state versus federal debate Judge John F. Walter of the United States District Court of California ruled in favor of Plaintiff Boeing Company in all three

¹⁶⁷ California Department of Toxic Substances Control, *Santa Susana Field Laboratory*, California 2007. http://www.dtsc-ssfl.com/files/lib_boeinglawsuit%5Clegaldocs/64509_BoeingComplaint11-13-2009.pdf

¹⁶⁸ Ibid.

counts of its lawsuit On May 5, 2011.¹⁶⁹ The ruling found California Senate Bill 990 to be unconstitutional under the Supremacy Clause of the Constitution and removed the DTSC's role as lead regulator at the SSFL. Whereas Boeing spokesperson Kamara Sams stated that Boeing was "pleased" with the ruling Environmental Protection Secretary Linda Adams was quoted as saying, "the community deserves better."¹⁷⁰ Though a major blow to state control of the SSFL cleanup, as of June 2011 the DTSC appealed the court ruling arguing that based on past actions as well as the AOC with both the DOE and NASA that Boeing could not claim that federal law superseded SB 990. The DTSC cited that in the past the SSFL remained subject to California legislation and the AOC's have bound both the DOE and NASA, both federal entities, to clean their areas of concern to acceptable state levels. The DTSC also claimed that since the DOE accepted the AOC and remained in charge of "remediating contamination in [area IV] to background levels" that Boeing had no claim of injury against the state.¹⁷¹ These arguments as of December 2011 signify the newest developments in the on-going battle between Boeing corporation and the DTSC.

Boeing Corporation was not alone in fighting the California DTSC's control of the SSFL as flare-ups of resistance occurred among many groups involved on-site. environmental reporter Michael Collins reported that neither the DOE nor NASA honored the senate bill 990 or cleaned up their portions of the SSFL to background or "normal" radiation levels until September, 2010, nearly two years after senate bill 990 went into effect.¹⁷² To further complicate the situation and dishearten many local residents, it became public knowledge that the DTSC would only be cleaning the 2,850 acre property to the agreed upon standards and that all the surrounding areas

¹⁶⁹ Ibid.

¹⁷⁰ "Boeing Prevails; State Cleanup Law is Struck Down," *Ventura County Star*, April 2011. <http://www.vcstar.com/news/2011/apr/27/federal-judge-slaps-down-state-santa-susana-lab/>.

¹⁷¹ California DTSC.

¹⁷² Collins, *LA Weekly*.

would remain untouched. Even before the striking down of senate bill 990, NASA and the DOE resisted and undermined the law. If it was agreed upon that the SSFL had created a hazardous situation, it is hard to fathom why the investigation would not also investigate the potential for off-site contamination and hazards.

The issue of off-site contamination came to a head when KB homes, a Westwood-based reality company, announced its plan to develop 1,595 acres within the nearby Runkle Canyon area.¹⁷³ Runkle Canyon is as of yet an undeveloped portion of Simi Valley at the southern end of Sequoia Avenue less than one mile west of the Santa Susana Field Laboratory. This area would remain excluded from the cleanup currently proceeding at the SSFL and would pose a potential health risk to both current and future residents of Simi Valley. As of July, 2010 the DTSC approved KB Homes to clean up the Runkle Canyon area and proceed with the development of 461 homes and condos.¹⁷⁴ Certain groups argued the potential risks involved in this decision as a 1999 report by Foster Wheeler Environmental Company of Costa Mesa listed various health hazards in the canyon, including soils containing radioactive Strontium-90 at the average rate of twenty-seven times normal levels. Another study conducted in 2007, conducted by the grassroots activist group "Radiation Rangers" found extremely high levels of arsenic in both soil and water within the area.¹⁷⁵ Though Runkle canyon would be the closest residential development to the SSFL, because of current rulings it would not be subject to the same cleanliness standards found on-site. In response to a questionnaire, Rick Brausch, project director the Rocketdyne and Runkle Canyon cleanups, wrote to the *LA Weekly* that the, "DTSC has not yet concluded this evaluation, and will make no final decisions or interpretations of the data until

¹⁷³ Ibid.

¹⁷⁴ Ibid.

¹⁷⁵ Ibid.

this issue is satisfactorily resolved."¹⁷⁶ Many in the area, including local resident and Radiation Ranger, Patty Coryell, believe that, "they've shown in the best, biggest and flashiest way possible that they just don't care."

Local fears were not limited to only the new residents of Runkle Canyon, but of current residents in southern Simi Valley. Michael Collins reported that during construction upwards of one hundred tons of dust would be launched into the air.¹⁷⁷ Residents remain concerned that this dust could contain traces of radioactive materials and be hazardous to the local populace. Within the Runkle Canyon websites FAQ's page one question asks, "I hear from neighbors that dust from the site is unhealthy... how can you construct homes without generating dust?" In response the site states:¹⁷⁸

Runkle Canyon will have a dust control plan in full compliance with the Air Pollution Control District that will require, in part, using a water truck to wet down the dirt on the construction site, wash down the street, namely Sequoia Avenue, which is where all construction traffic will enter the site, and truck tires will be washed as they leave the construction site. As for the concern raised by some individuals that the dust is unhealthy, all independent testing has concluded that the levels of dust that can be generated are within acceptable health and safety guidelines.

The conclusions are strikingly different than those of the Foster and Wheeler and Radiation Rangers. Two arguments have emerged from the Runkle Canyon discussion. Many organizations including the DTSC and DOE feel that claims of hazards are exaggerated and that the area is being cleaned to standards suitable for the situation. On the other hand, many activists and local residents feel that regulatory groups are not being truthful and continuing their negligent and irresponsible actions. These conflicting viewpoints, at least for now, seem both irreconcilable and unresolved.

¹⁷⁶ Ibid.

¹⁷⁷ Ibid.

¹⁷⁸ Runkle Canyon LLC. *Runkle Canyon*, 2012. www.runklecanyon.com/faqs.

John Pace's testimony, helps explain longstanding doubts between local residents and regulatory agents. Pace firmly believes that current employees at the site do not have a clear picture of what happened at the SSFL. He remains convinced that due to his time with Atomic International he has a precancerous skin condition, lung issues, as well as seven years sterility following his work at the site. Upon returning to the SSFL, the on-site manager of health, Phil Rutherford, argued that Pace suffered only a minor level of exposure based on his "dosimetry report" and yet Pace contended that the readings were faulty because many times he was encouraged not to wear his film badge.¹⁷⁹ Such interactions are continuing proof that there is a disconnect between the Atomic International of 1959 and the regulators currently on-site. Pace explained that he does not see eye to eye with current officials at the SSFL, but that he has, "no ill feelings towards them because they were not there... they can only go on the records they have."¹⁸⁰ Testimony such as John Pace's aids in filling the gaps between incomplete documents and at the same time can appropriately identify the disconnect between the SSFL of past and present.

As recently as April, 2010 Boeing remained embroiled in lawsuits when it agreed to pay fines totaling five hundred thousand for "repeatedly exceeding permitted pollution limits" in water runoff from the SSFL.¹⁸¹ The ruling filed in Ventura County Superior Court charged that Boeing had accumulated "at least 40 runoff violations" causing pollution to enter the Los Angeles River and Calleguas Creek via the Arroyo Simi. Within the ruling, investigators discovered that radioactive material was one of many contaminants found in the runoff. Boeing

¹⁷⁹ *ibid.*

¹⁸⁰ *Ibid.*

¹⁸¹ Teresa Rochester, "Boeing Agrees to pay \$500,000 - Company fined for runoff pollution." *Ventura County Star* 23 April 2010, http://infoweb.newsbank.com/iw_search/we/InfoWeb?p_product=NewsBank&p_theme=aggregated5&p_action=doc&p_docid=12F4B04E84825BA0&p_docnum=27&p_queryname=3, 8 Feb. 2012.

had previously been ordered to remove contaminated soil from potential runoff locations but could not continue when during that same month state officials discovered that the soil, containing radioactive cesium, was designated to be dumped in an Idaho landfill not qualified for radiological waste.¹⁸² Boeing assured local residents of its commitment to "full compliance with water quality laws" but continued to be plagued with issues when the company was denied soil removal requests at a San Joaquin Valley landfill. Boeing remains consistently plagued with health and safety issues at the same time that it is attempting to reinstate federal oversight at the SSFL.

At the turn of the century, the battle to discover what really happened at the SSFL only intensified as more and more participants joined the investigation. State and Federal governments sparred over control at the same time that regulatory bodies squabbled over regulations. The SSFL is just as significant a symbol of western nuclear denigration as Hanford, Washington or Los Alamos, New Mexico. The secrecy of the SSFL has just now begun to deteriorate as federal and state investigations and litigation continue today. Within days of the Three Mile Island disaster and among a slew of media attention, President Carter personally inspected the site and the cleanup process to ensure the safety of employees and the local environs. Regardless of its proximity to Los Angeles, the history of the SSFL contained confidentiality and cover up. The legacy of Atomic International's secrecy has left an aura of distrust that permeates the actions of current participants at the SSFL. As an issue either forgotten or skewed by historical memory, it appears that at the SSFL, banditry and lawlessness the likes found in stories of a long dead "Wild West" still exist in various forms and function today.

¹⁸² Ibid.

CONCLUSION

The ever changing and evolving history of the SSFL is constantly being adapted by both the results of investigation as well as new policy involving the area. Between the various eras of development and discovery the SSFL has drastically changed from the days of its inception as a location of hope and technological progress to a hotbed of government and corporate distrust. The actions and responses of Atomic International and the AEC also serve as a microcosm for how America perceives nuclear technology. At first, nuclear power presented the hope of a new technological frontier, and in the West it proved to extend preexisting notions of conquest already prevalent. As nuclear technology proved dangerous in the hands of cavalier and irresponsible parties, secrecy and distrust replaced the previously transparent relationship between privatized nuclear programs and the public. Lastly, as nuclear programs came into contact with modern, urban sprawl (none more prevalent than the SSFL and Los Angeles) the demand for professional and safe nuclear technology no longer held any room for nuclear cowboys or dated Cold War governmental policies.

The most recent KB Homes development plan remains on hold. As of July 2011, the EPA had completed its background study report that will provide a contrast to the findings of the Gamma scan as well as soil testing reports that are still underway at Area IV. NASA continues to assess its area of control and as per the Administrative Order on Consent, works with as much transparency as possible. As part of continued efforts at public outreach, on February 22, 2012 the EPA, DOE, and DTSC held a stakeholder meeting to discuss the current status of sampling efforts in Area IV, and the DTSC will continue to provide monthly updates of the site.

The first step in dispelling the preconceived attitudes of the West that have allowed groups such as Atomics International and the Atomic Energy Commission to abuse the region is informed understanding. In an attempt to not “beat a dead horse,” it is hard to ignore that secrecy is not the only benefit of working in a top secret plant. In the American West, attitudes of lawlessness persist even into the twenty-first century. In reality, the concept of Wyatt Earp taking the law into his own hands is both dated and dangerous. The West is no longer a frontier, and no one is above the law. Not only must the federal government realize and understand that the West is no longer a location of conquest, but perceptions of Westerners must also change. Stories of outlaws are much more entertaining far from home, but because of urban sprawl, the SSFL is located at Los Angeles' back porch. In a continuing dialogue of the West, the region will be defined not only by these new problems, but also by the solutions created to solve them.

There remains hope that with discoveries at the Santa Susana Field Laboratory that the legacy of the American West can be corrected. The West is no longer remote, and American Western history and culture should no longer be a novelty. The image of the West as an untamed and lawless land can no longer pervade American culture. Current tests at the Santa Susana Field Laboratory look to discover the level of radiation exposure to the surrounding environment. Unfortunately, the attempt seems to be a tongue in cheek gesture when the radioactive lives of all potentially leaked gases was spent years ago. The attempt must be made to place the SRE nuclear incident in its proper historical context, however, in hopes of redefining the meaning of the phrase, “how the West was won.” To do so, the Sodium Reactor Experiment and the events at the Santa Susana Field Laboratory can no longer be hidden from historical memory. For the first time, events at the secret test site are relatively transparent and only require that people listen. Once the SSFL can be considered a valuable addition to local history, it can also tell the

story of Western nuclear conquest and mismanagement at the hands of privatized corporations and the federal government and potentially signify a new frontier of equality across the entire nation.

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