

CHUPADERA MESA

CASE STUDY



ATOMIC AMERICA

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ABOUT

This collaborative case study was developed by students at the New Mexico Institute of Mining and Technology for the undergraduate class, “Atomic America,” taught by Thomas De Pree for the Communications, Liberal Arts, and Social Sciences (CLASS) Department, Fall 2020.

COVER PHOTO

AP Photo/Susan Montoya Bryan, File, 2007.

<https://apnews.com/article/3432ec5dd4fe4c929ce8204e3dc05e9c>

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1. SETTING



“The Chupadera Mesa Site consists of privately-owned open range land northeast of the White Sands Missile Range and the city of Bingham in New Mexico. The site consists of the fallout zone of the first nuclear weapons test, the Trinity test, conducted on July 16, 1945.”

Quote and map from <https://www.energy.gov/lm/chupadera-mesa-new-mexico-site>
[Collected by Cameron Steffensen, November 27, 2020]

To tag along with the picture above this is the description provided by the fact sheet of the area, “The Chupadera Mesa, New Mexico, Site is located approximately 28 miles northeast of the Trinity atomic bomb test site at the White Sands Missile Range (also referred to as Area 21). The area consists of open range and is used primarily for cattle grazing. The Trinity test took place approximately 60 miles north of Alamogordo, New Mexico. Quote from

<https://www.energy.gov/sites/prod/files/2020/06/f75/ChupaderaFactSheet.pdf>

(accessed by Roland Lassiter December 2, 2020)

In response to Cameron Steffensen It first brings to mind that the Chupadera Mesa Site was remediated by the United States under the Formerly Utilized Sites Remedial Action Program (FURSAP). We are told that the land is a privately owned open range that consisted of a fallout zone of the first nuclear weapons test. The United States Atomic Energy Commission (AEC) and any successor organizations kept an eye on the site for approximately forty years, between 1945 and 1985. The following year, DOE determined that any residual radioactivity and any radioactive materials were no longer of concern. As such, no more remediation was conducted. DOE then released the site for unrestricted use. The responsibility of the site was transferred to one of DOE's other offices. Since there is no need of remediation, there are no limits or institutional controls in effect for the site. Furthermore, the DOE does not require surveillance or monitoring. The site offers links to documents that go into further detail and offers a video to do a complete summary of the generic information within two minutes. It is good to know that there was action taken by the United States to handle the fallout of our nuclear weapon tests at White Sands. It is also good to know that it is no longer necessary for action to be taken here, meaning that the job is presumably done. (Adam Lopez)

“Neither oil, natural gas nor helium production have been established... The geology of the Chupadera Mesa area indicates favorable potential for oil and natural gas... The Chupadera Mesa project area also has favorable potential for helium. Uranium-bearing rock types favorable for the formation of radiogenic helium are present...”

This article discusses the potential of energy sources to be found in the Chupadera Mesa. It mentions multiple sources of energy and mentions how promising the mesa could be.

Oil, Natural Gas and Helium Potential of the Chupadera Mesa area, Lincoln and Socorro Counties, New Mexico **Ronald F. Broadhead**, 2005

<http://www.searchanddiscovery.com/documents/abstracts/2005swsection/abstracts/broadhead.htm> (Accessed by Adam Lopez, November 29th, 2020)

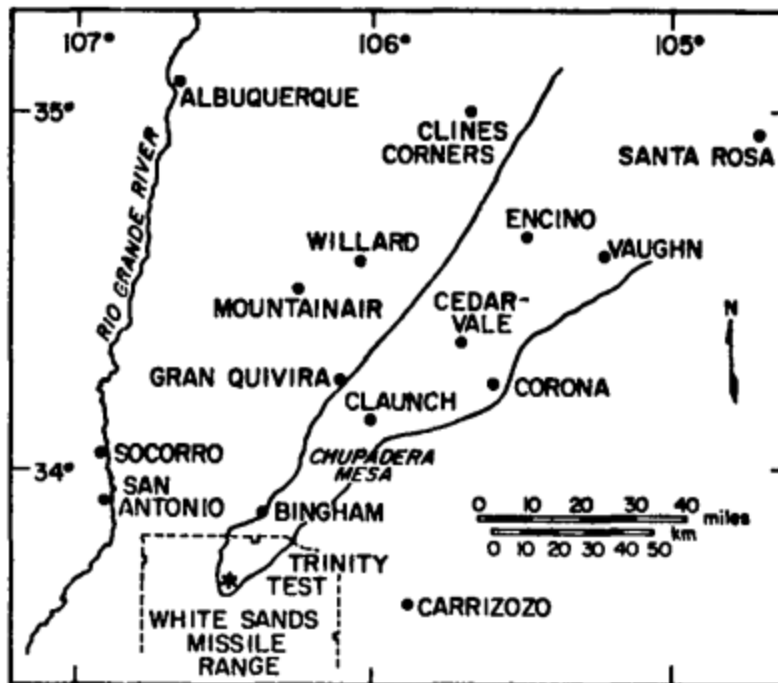


Figure 1. 1945 illustration of the Beta Scan Fallout Zone and Chupadera Mesa

FUSRAP Considered Sites

Location: NM.04-5

This document was published in 2008 and contains a brief historical summary of the Chupadera Mesa site and the aftermath of the Trinity test. In particular, the document contains a diagram that illustrates the spread of fallout that was produced by the Trinity test along with several letters from the Los Alamos Laboratory, The Aerospace Corporation, and the University of California starting on page 5. Focusing more on the fallout, the document briefly references a radiological survey of the surrounding fallout published in 1985 (NM.04-3) on page 2.

(accessed by Zack Parral, December 1, 2020)

<https://www.energy.gov/lm/chupadera-mesa-new-mexico-site>

This video explained the history of the Chupadera Mesa area. In the video it explains that Windblown fallout from the Trinity test had drifted over the White Sands Missile Range area and many other ranching areas. Studies and tests were done by the University of California and the U.S. Environmental Protection Agency, that day and many days after and concluded that the residual radioactive contamination was not a risk to human health and the environment. Because

of the studies, the DOE decided that no remedial action was needed for the site of Chupadera Mesa. Shortly after, on April 22, 1986, the cleanup of the site was certified.

(Accessed by Xavier Romero, 12/1/2020)

The Chupadera Mesa was one of six regions that was studied and sampled to evaluate the presence of residual radioactivity contamination. Radioactive decay after the Trinity test has resulted in substantial reductions of fallout levels at the Chupadera Mesa site, leaving only longer lived radioactive materials.

“Chupadera Mesa, New Mexico, Site,” November 2018.

<https://www.energy.gov/sites/prod/files/2019/11/f68/ChupaderaFactSheet.pdf>. (Accessed by anonymous, 12/2/2020)

This pdf is an updated version of the pdf from [anonymous] above. This source accomplishes two important things. First it gives a bit of background information of the area, just as [anonymous] version has. More importantly, it gives an explanation of the current site conditions. It describes how the site is within DOE standards and why it isn't a site that is required to have regular inspections. A portion of the pdf describes governmental transfers of ownership of the area, from AEC to the AEC created FUSRAP to the DOE to the DOE subsection legacy management. It is interesting to note the legacy management's responsibilities for this site. Since no monitoring, maintenance, or surveys of any kind are required for the site, all the LM essentially does is manage records and talk to stakeholders. Through reading this pdf, it seems like the hypothetical 13 millirem dosage per year is the primary reason for the lack of requirements to the area. It seems like the hypothetical 13 millirem is not actually low enough to cause harm, since we are doing a report on the area.

<https://www.energy.gov/sites/prod/files/2020/06/f75/ChupaderaFactSheet.pdf>

I also am including an interesting map that I found in regards to the immediate fallout from the trinity test. It shows the level of immediate fallout from the explosion through a color coded system, and is quite a helpful visual representation of the area in question.

<https://www.atomicarchive.com/media/maps/trinity-fallout.html> (Accessed by Tazler Smith 12/2/20)

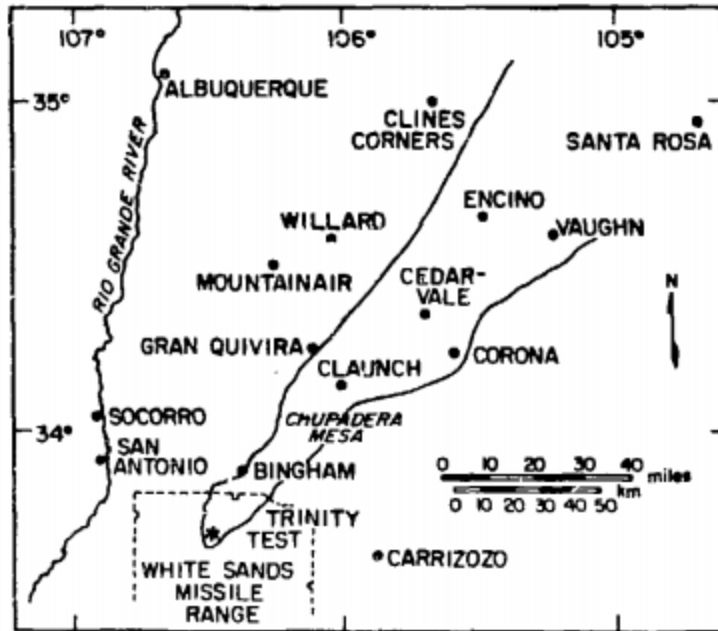


Fig. 5. The fallout zone from the Trinity test as determined by a 1945 beta-gamma survey.

“Following the test, measurements were made to establish the trajectory of the fallout cloud and the deposition pattern over Chupadera Mesa and areas northeast of GZ. Measurements during 1945 were made across the fallout pattern to outermost edges of the fallout zone. Figure 5 is a depiction of the fallout zone based on beta-gamma surveys of the soil surface following the test” <https://inis.iaea.org/collection/NCLCollectionStore/Public/17/009/17009292.pdf?r=1&r=1> (accessed by Owen King 12/2/20)

2. ENVIRONMENTAL THREATS

<https://www.energy.gov/sites/prod/files/2019/11/f68/ChupaderaFactSheet.pdf>

“Chupadera Mesa, New Mexico, Site Fact Sheet”[collected by Cameron Steffensen November 27, 2020]

This artifact is the U.S Department of Energy’s fact sheet about the Chupadera Mesa site in New Mexico. The current site conditions section of this facts sheet states “Radiological survey data indicate that the radiological condition of the Chupadera Mesa site is in compliance with applicable DOE standards and guidelines for cleanup of residual radioactive contamination. A release survey and evaluation was conducted by the Los Alamos National Laboratory. The evaluation indicated that the incremental dose of 13 millirems per year for a hypothetical individual using the area as a residence is below the 25 millirems per year criterion for unrestricted use and well below the 150 millirems per year estimate for background in the area. Therefore, DOE released the site for unrestricted use.”¹. According to this quote the government has deemed the radiation levels at the site safe enough for unrestricted use and the area no longer seems to be monitored for radiation levels. These previous studies showed that the radiation levels at the site were well under the DOE standards for what is acceptable but since the area is no longer being monitored I wonder what would happen if it was subjected to more modern and scrupulous testing. I believe that it is still important to look closer at how the fallout from the trinity site has impacted the environment as well as the individuals exposed to the fallout.[added by Cameron Steffensen. November 27, 2020]

Office of Legacy Management. (2018, November). *Chupadera Mesa, New Mexico, Site Fact Sheet* [PDF]. U.S. Department of Energy. From

<https://www.energy.gov/sites/prod/files/2019/11/f68/ChupaderaFactSheet.pdf>

“The Trinity test device contained about 6 kg of plutonium as its fission source, resulting in a fission yield of 21 kT. However, only about 15% of the ^{239}Pu actually underwent fission. The remaining unfissioned plutonium eventually was vaporized in the fireball and after cooling, was deposited downwind from the test site along with the various fission and activation products produced in the explosion. Using data from radiochemical analyses of soil samples collected postshot (most many years later), supplemented by model estimates of plutonium deposition density estimated from reported exposure rates at 12 h postshot, we have estimated the total activity and geographical distribution of the deposition density of this unfissioned plutonium in New Mexico. A majority (about 80%) of the unfissioned plutonium was deposited within the state of New Mexico, most in a relatively small area about 30–100 km downwind (the Chupadera Mesa area).”

“Accounting for Unfissioned Plutonium from the Trinity Atomic Bomb Test”,

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7497481/>, (Accessed by Robert Staub 12/2/2020)

“Pu 239 has a half-life of 24,100 years”

<https://www.nrc.gov/reading-rm/doc-collections/fact-sheets/plutonium.html#:~:text=Pu%2D239%20has%20a%20half,isotopes%20transform%20when%20they%20decay.>

(Accessed by Robert Staub 12/2/2020)

“The highest radiation levels from the Trinity Test were measured in a swath 12 miles long and one mile wide that started near an area known as White Store, about 16 miles northeast of ‘ground zero,’ and stretched across Chupadera Mesa. Around nearby ranches, exposure rates around 15 Roentgen per hour were measured just over three hours after detonation. Fallout was measured as far away as Indiana.” This article highlights how far the nuclear fallout spread across the Chupadera Mesa had gone after the Trinity Test in 1945. The article also talks about how the external radiation sources should only amount to 0.002 Roentgen, while after the Trinity Test the Chupadera Mesa “exceeded this level by more than a factor of 10,000”.

([https://www.science20.com/news/first atomic bomb test exposed new mexico residents to radiation](https://www.science20.com/news/first_atomic_bomb_test_exposed_new_mexico_residents_to_radiation) accessed by Aubrey Zimmer, December 2, 2020)

Environmental threats that were in the area included soil contamination as well as air pollution. Tests done by the Los Alamos National Laboratory and Environmental Protection Agency came up with these findings. “These early studies indicated that essentially all of the plutonium inventory was located in the top 5 cm of soil. Studies by LASL (now LANL) in 1972 indicated that about 50 percent of the plutonium in the fallout zone was at the 5 to 20 cm depth. A 1973 and 1974 study by EPA was consistent with the other studies. It identified the highest concentrations of plutonium near ground zero and indicated that concentrations decreased with increasing distance from the site and laterally with increasing distance from the center line of the direction of travel of the fallout.”

[https://www.lm.doe.gov/Considered_Sites/Chupadera Mesa NM Site - NM 04.aspx](https://www.lm.doe.gov/Considered_Sites/Chupadera_Mesa_NM_Site_-_NM_04.aspx)
Eligibility Determination: NM 04-2 Roland Lassiter (Accessed December 2, 2020)

“When a nuclear detonation occurs, people, plants, and animals can be exposed to the fallout in several ways. Livestock may eat contaminated plants or drink contaminated water. People who then eat this livestock will then still experience internal contamination, in which radioactive material ends up inside of our bodies, despite not consuming contaminated plants or water directly. Radionuclides that are inhaled or ingested are not blocked by an external shield. These radionuclides interact with internal cells and tissues, which increases the risk of harmful health effects. When radionuclides are ingested, they can change the structure of cells, which is one of the ways people can develop cancer.”

<https://www.epa.gov/radtown/radioactive-fallout-nuclear-weapons-testing>
(Accessed by Owen King 12/2/2020)

(<https://www.atomicheritage.org/history/trinity-test-1945>) accessed by Sorcha Sterritt December 4, 2020)

The health of the communities that lined downwind of the trinity test were named the downwinders. As previously stated in responses, the downwinders experienced “the negative impacts include increased rates of cancer, other diseases that have caused financial and social stress, and death.” Which would be likely and problematic to the government and stakeholders that documented lower than deadly radiation values in the 80s and no current documentation of the radiation level of the area downwind had been taken after which worried the peoples of the potentially contaminated area. “The full impact on the Tularosa Downwinder community is difficult, if not impossible, to gauge. Little was done immediately to assess the health of central New Mexicans, and seventy-plus years have passed since Trinity. However, individuals in the area were almost certainly exposed to dangerously high levels of radiation. Fallout landed on vegetables and animals, food sources that would be consumed by the local population.” Since there was no immediate evacuation of the areas downwind of the trinity site many people, animals, plants, soil, and water were contaminated by an unknown amount of Plutonium. Local and federal agencies should allow third party research in the possible contaminated areas to determine if further decontamination of Plutonium is needed if inhabited areas.

3. COMPOUND VULNERABILITIES

“The Chupadera Mesa and Near-by Areas were eliminated from the program because the radiological data collected by Los Alamos National Laboratory indicates DOE guidelines for remedial action are not exceeded in the areas. The review of the Los Alamos County Industrial Waste Line site indicates that Albuquerque Operations Office has the authority for the remedial action in these areas and, through the Los Alamos Area Office, is adequately carrying out all necessary actions. Therefore, the site is being eliminated from further consideration under FUSRAP”.

“Office of Legacy Management *DOE Letter Elimination of Chupadera site and Los Alamos and Los Alamos industrial waste* [PDF]-- Chupadera Mesa NM Site - NM 04.”
DOE, www.lm.doe.gov/Considered_Sites/Chupadera_Mesa_NM_Site_-_NM_04.aspx.

(accessed by Diego Fristoe 11/29/2020)

[Please post your artifact FUSRAP.cts and analyses here]

“Among the 396 Trinity participants, 319 (or 81%) had died, and the all cause of death SMR was 0.71 (95% confidence interval [CI]: 0.63–0.79) (Table 2). Cancer mortality also was below expectations but not significantly so (SMR 0.95; 95% CI: 0.77–1.16). The dose distribution of Trinity participants was similar to that of all 113,806 participants”

The data shows that the majority of deaths in participants caused by SMR. The Trinity participants showing similarity shows that there is a large injustice that is taking place. The Trinity sight is causing health problems to those who were involved.

“The Likelihood of Adverse Pregnancy Outcomes and Genetic Disease (Transgenerational Effects) from Exposure to Radioactive Fallout from the 1945 Trinity Atomic Bomb Test”
(Accessed by Karl Berni 11/30/2020)

“While Manhattan Project scientists were able to study the effects of radiation on the cattle they bought, accurate observations on humans were more difficult to measure. The Trinity test was top secret. Scientists were unwilling to approach ranchers or other individuals living in the area with dosimeters without giving the impression that something was awry. Consequently, Manhattan Project scientists gathered no data on civilian exposure, a fact that has plagued the Tularosa Downwinder community in its fight for compensation.”

This article talks more about the effect of the blast on the Tularosa Basin, but is still relevant to this discussion as it is close to the Chupadera Mesa and was treated similarly. (<https://www.atomicheritage.org/history/tularosa-basin-downwinders>, Accessed by Wesley Camphouse, November 30, 2020)

John Leonard reacting to Wesley Camphouse:

I think it is very interesting that the scientists bought cattle to study the effects. I understand that this whole ordeal was top secret, but I think if they also took measurements of the surrounding area, in addition to studying plants they would have been able to get more data. In addition, I think that it could be possible to study humans, even with this extreme secrecy, but they may have been more focused on the actual testing rather than it's impacts. In addition, they could at least acknowledge that it was probably harmful after the fact, and that would have helped the residents all around with their battles for compensation. I also don't know too much about how similar the cow's system is to humans, but I think it would have been more helpful to do a longer term study over the course of years or decades, and in addition use a variety of plants and animals, to better gauge the impact. In addition, they could have had the animals graze over a larger area, or even smaller groups of them grazing in the smaller individual areas. Basically, my reaction is that they could have done more, (but this is also skewed because you can always say we should have done more), but I do understand they had to work with top secrecy on a limited budget in a limited timeframe, so I understand why they chose this.

“Evidence collected by the New Mexico health department but ignored for some 70 years shows an unusually high rate of infant mortality in New Mexico counties downwind from the explosion and raises a serious question whether or not the first victims of the first atomic explosion might have been American children.”

(<https://thebulletin.org/2019/07/trinity-the-most-significant-hazard-of-the-entire-manhattan-project/>, Accessed by Robert Staub, December 2,2020)

The testing of the atomic bomb “Gadget” was, for good reason, a highly secretive government project. At the time, several countries were in a race to build such a weapon and so the details of the project were kept as quiet as possible. However, in doing so, the government put a large number of people who lived near the testing site, “Trinity”, in danger. “Communities nearby and downwind from the Trinity test were not informed about what would occur on the morning of July 16, 1945. The Gadget was loaded with 13 pounds of plutonium, but only 3 pounds fissioned. The blast, along with westerly winds, spread the remaining 10 pounds of radioactive plutonium into the countryside. Communities downwind from the test suffered detrimental health effects”.

(<https://www.cabq.gov/trinity-exhibition/trinity-test/trinity-test>, Accessed by anonymous December 2, 2020)

This artifact describes the reasons for a study to be conducted in 2008 in the fallout area of the Trinity Test. This study was meant to discover the long term health effects of the plutonium based fallout in the Chupadera Mesa region. There seems to be two main reasons that this study was started. The first reason is that the area was deemed safe at a time when the long term effects of fallout were not yet known. The area was deemed safe in ‘85 which was only 40 years after the test. While 40 years might not be ample enough time to learn the long term effects, 60 years probably will be enough time. The second reason that the study was conducted is the agricultural effects that the fallout could have on the area. The most specific and concerning effect is that milk from cows that grazed in the area could have Iodine-131 in it. Iodine-131 is one of the several byproducts of nuclear explosions, and has been shown to be radioactively harmful to humans. Milk is a

product that can easily be contaminated by the isotope, which is especially harmful to children's development. In addition to milk there are several other agricultural concerns with the fallout in the area. Along with various kinds of meats and vegetables produced in the area, there are fresh water sources that could be contaminated. This artifact describes the procurement of a study that was conducted in 2008. It does not contain the results of the study, but the information it has is quite helpful nonetheless.

https://www.researchgate.net/publication/273381171_Chupadera_Fallout_1945_Torrance_County_Trinity_Fallout_Reinvestigated

I also found a fascinating paper from LANL about the fallout from the Trinity Test. The paper was so dense and had so much information that I was too overwhelmed to write about it. It really seems to be an artifact that fits into this study exceptionally well.

<https://www.osti.gov/servlets/purl/5647219> (Accessed by Tazler Smith 12/2/20)

In response to Tazler Smith -

While researching the effects nuclear fallout can have on life and the environment in general, I found that an interesting chain can form in the surrounding area. This chain starts with nuclear fallout affecting the plant life of an area. Afterwards livestock or other animals in the surrounding area may eat the affected plant life, therefore “carrying” it. If this livestock is eaten, the radioactive material from the fallout, which affected the plant life, then the livestock, would start affecting the humans who ate the livestock or a product that the livestock had produced. This ingestion of nuclear materials has been linked to cancer and other health detriments. I wonder how Iodine-131 specifically affects the human body, and if it’s half-life is long enough for it to stay with the plant life, then the livestock, and lastly the humans, if it follows this “chain”. This website (<https://www.epa.gov/radtown/radioactive-fallout-nuclear-weapons-testing>) has some very useful information regarding the general effects of nuclear fallout in regards to nuclear weapons testing. (Owen King, 12/2/20)

I have discovered that there are six regions that have residual radiation readings. For radiation to be present is an issue but for it to just stick after decades have past is an issue. This begs the question how much residual radiation has affected the six regions near whitesands? How much damage has been done to these lands?

<https://www.energy.gov/sites/prod/files/2020/06/f75/ChupaderaFactSheet.pdf>

(

Accessed by Zachary Hopkins, 12/05/2020)

4. STAKEHOLDER ANALYSIS

“Was the site or operation owned by a DOE predecessor or did a DOE predecessor have significant control over the operations? Though not owned by any DOE predecessor, the Chupadera Mesa and surrounding areas were contaminated as a result of the Trinity Atomic Bomb test which was conducted by the Manhattan Engineer District (MED) a DOE predecessor. The MED had complete control and responsibility for the test”.

“Office of Legacy Management *FUSRAP History of the Chupadera Mesa NM site* [PDF]--
Chupadera Mesa NM Site - NM 04.” DOE,
www.lm.doe.gov/Considered_Sites/Chupadera_Mesa_NM_Site_-_NM_04.aspx.

(accessed by Diego Fristoe 11/29/2020)

(<https://www.bizjournals.com/albuquerque/stories/2004/03/29/story1.html>) Accessed
by anonymous 12/2/20

One stakeholder of the area could be the helium gas industry. This area is rich with Helium, and that could provide a large source of profit for these companies. This industry may be conflicted, because on one hand, they will be wanting their workers to have a safe environment to work and live, but on the other hand, they have an incentive to not get this dealt with. This is because one of the easiest solutions could be to fence off the area, and buy up all the land from the current owners. If this happens, it will make it much harder or impossible for them to continue their operations, so they will not support that outcome.

(<https://www.energy.gov/lm/doe-history/manhattan-project-background-information-and-preservation-work/manhattan-project>) accessed by Sorcha Sterritt December 4, 2020)

The current stakeholders of the trinity site are those wanting to preserve it. Therefore, by having someone interested in the preservation of a site they will also have the money to do so. The main stakeholders are the DOE and National Park Service, in cooperation with other federal agencies, state and local governments. With this in mind if there are any health, environmental, ect issues that have occurred because of the experiment there will be many people to hear concerns from the afflicted areas. But on the other hand, if the government is the main voice of the group, cover-ups will be bound to happen. So a balance of federal and local powers should be upheld in order to provide the best possible outcome for the locals, environment, and historians. "The agreement included provisions for enhanced public access, management, interpretation, and historic preservation."

5. STAKEHOLDER ACTIONS

Although the Manhattan Engineering District (MED), a DOE predecessor, had complete control and responsibility for the fallout caused by the Trinity Test, they did not do much in response to the contamination. “Radioactive decay since the Trinity test has resulted in substantial reductions of fallout levels at the Chupadera Mesa site and has left only longer-lived radioactive materials, including cesium-137, strontium-90, and plutonium-239 (with traces of europium-155). However, based on these extensive studies and sampling data, the U.S. Department of Energy (DOE) determined that the dose from the residual radioactive contamination for an individual living in the fallout area and consuming food produced there was less than the U.S. Nuclear Regulatory Commission (NRC) criterion of 25 millirem per year for unrestricted use. Therefore, DOE concluded that no remedial action was needed at the site.” They went through with extensive studying and sampling data, but did not push further on clearing the fallout away. (<https://www.stephensstephens.com/areas-of-practice/eeoicpa/eeoicpa-facility-list/chupadera-mesa/> accessed by Aubrey Zimmer, November 30, 2020)

(Britney Green, responding to Aubrey Zimmer above):

This article is very telling about the condition of the Trinity site. In reading this, I thought it was peculiar that there was no action taken by the U.S. Department of Energy until the year 2000. It wasn't until they further discussed that the responsibility of testing the site was transferred from the University of California in the late 1940s and early 1950s to the U.S. Environmental Protection Agency and Los Alamos National Laboratory in the 1970s that a broader picture of the condition was understood. Personally, I believe that the transfer of responsibility was a calculated move by the government. It is more difficult to

persuade data or information from a third-party organization. Since the University of California was no longer involved in the data collection, it was easier for the Department of Energy to dictate that the contamination was “less than the U.S. Nuclear Regulatory Commission criterion” without much dispute. If a third-party agency was responsible for the testing, it could be disputed or further investigated. However, with those individuals removed from the project, the remaining stakeholders were allowed to sweep the contamination and dangers of radiation under the rug. This is most likely why there was no action taken by the government until 2000.

(<https://www.env.nm.gov/doeob/#> accessed by Shane Risolio, December 3, 2020)

This short welcome to the DOE’s Oversight Bureau on environmental revitalization and remediation of compromised land allows insight into how they are taking actions to help save land that has been intoxicated by harmful radioactive waste and what corporations they have paired with in the New Mexico area in order to keep the tarnished environment safe from further contamination. Many companies such as Los Alamos National Laboratory (LANL), Sandia National Laboratories (SNL), and the Waste Isolation Pilot Plant (WIPP) have been tasked with moderation of the environment in with joint projects led by the Oversight Bureau, who also undergo their own, independent projects to moderate the New Mexican terrain.

6. ROLE OF MEDIA AND BIG ENVIRONMENTAL ORGANIZATIONS

[\("https://www.santafenewmexican.com/news/local_news/new-health-survey-at-nuclear-test-site-details-decades-of-illnesses-deaths/article_4cfc0b66-67ae-5a5d-a542-6977b5164e7d.html"](https://www.santafenewmexican.com/news/local_news/new-health-survey-at-nuclear-test-site-details-decades-of-illnesses-deaths/article_4cfc0b66-67ae-5a5d-a542-6977b5164e7d.html)

Accessed by Britney Green, November 29, 2020)

“The health impact assessment, titled “Unwilling, Unknowing and Uncompensated,” focuses on four main ways that families have been affected by the Manhattan Project blast in 1945: generations of illnesses and deaths, lack of access to health care, economic struggles and fears of severe health problems for future generations.”

The main goal was to show how the environmental issues from the bomb resulted in the poor health of the individuals living in the area. Individuals describe their fear of having children, putting damp sheets in windows to keep dust out, and other community members who hunted animals in the area passing away. These accounts were used as a way for the reader to understand the severity of the environmental standard that the community members are living in. Therefore, the media coverage focused less on environmental statistics and rather discussed the implications on a humane level.

The short article found in the link below is an example of a news article published by a large New Mexico news organization. The article focuses on a study into the likelihood of developing cancer after the radioactive fallout blew into the area.

<https://www.krqe.com/news/albuquerque-metro/reports-on-trinity-test-fallout-cancer-cases-to-be-released/>, accessed by Wesley Camphouse, November 30, 2020)

The only media coverage I could find about the Chupadera Mesa radioactivity was an article published by the *Albuquerque Journal*. In this article, Charles Potter, an adjunct professor at UNM, mentions that the dose of radiation based on the data from an article written by the Department of Energy, determined that radiation levels weren't much different from a banana.

Potter, Charles. "It's Time to Get Real about Radiation Risks." *Albuquerque Journal*, April 12, 2019.

<https://www.abqjournal.com/1303332/its-time-to-get-real-about-radiation-risks.html>.

(Accessed by anonymous, 12/2/2020)

"The highest radiation levels from the Trinity Test were measured in a swath 12 miles long and one mile wide that started near an area known as White Store, about 16 miles northeast of "ground zero," and stretched across Chupadera Mesa"

This article I found from the site News Wise talks about the testing that happened at white sand, they talk about what it affected in the surrounding areas of the test site.

They have even included a map of the affected areas in a range of about 30 miles out.

<https://www.newswise.com/articles/worlds-first-atomic-bomb-test-exposed-new-mexico-residents-to-radiation?channel=> Accessed By logan Birdsong Dec 2 2020)

7. RECOMMENDED LOCAL ACTIONS

(<http://nuclearactive.org/the-first-dirty-bomb-trinity-presentations-in-nm/>) Accessed by Britney Green, November 29, 2020)

“Following the test, tens of thousands of people living within a 50-mile radius of the test site, were not notified or evacuated. They continued their sustainable lifeways - drinking, bathing, irrigating their gardens and fields, and putting up the harvest with the contaminated water, breathing the air, and celebrating their lives.”

Due to the individuals living near the Trinity testing site not being notified of the bomb being detonated, the individuals were not able to take action to protect their own health. Therefore, once knowledge of the bomb and radioactive materials were released, the public outcry was vast. This article comes from a group who highlight individuals within New Mexico who are fighting for justice for those affected as well as educating the public further about the Trinity site bomb. Further education and awareness of the bomb's damage is warranted to take further environmental and social action to mediate the effects of the bomb.

Wesley Camphouse, responding to Britney Green,

After reading the article, it is horrible to realize that, due to the secrecy of the project, nobody who resided in the fallout area was notified that they were in any sort of danger, even as their cattle were burned by the high levels of radioactivity. While I understand that they did not want to cause suspicion about the project, it is still blatantly wrong to not at least come up with a lie as to why everybody had to evacuate. The lack of warning meant that they essentially sacrificed the health of towns of people for a bomb test. While a test was necessary before the bomb was actually used, it was not worth the damage it caused to communities, especially those with high concentrations of material like the Chupadera Mesa. This is all reason to have a more thorough investigation into

what sorts of damages the bomb caused to affected communities, not only so they can hold who they need to accountable, but also so that people who may have been affected know what that means. I do feel that this article would have been more appropriate answering the extra-local portion of what could have been done, but I also understand that an understanding of the risks would have allowed for local action.

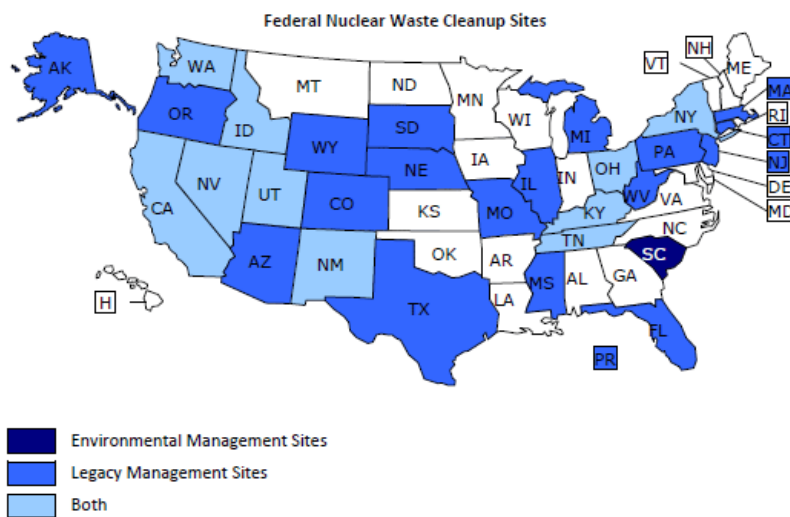
(<https://www.newswise.com/articles/worlds-first-atomic-bomb-test-exposed-new-mexico-residents-to-radiation?channel=> Accessed by Logan Birdsong Dec 2)

I found this article in News Wise, the article goes into detail of how the government tested the nuclear device as well as how there was a large amount of areas that were affected by the radiation. They even included a map of the affected zones from the epicenter. "The highest radiation levels from the Trinity Test were measured in a swath 12 miles long and one mile wide that started near an area known as White Store, about 16 miles northeast of "ground zero," and stretched across Chupadera Mesa.

8. RECOMMENDED EXTRA-LOCAL ACTIONS

The map below is a map of what the Government is doing to support the clean up of radioactivity. As seen in the map New Mexico has both Environmental and legacy management sites. One of the sites is the Chupadera Mesa site. The Federal government could provide another clean up site at the Trinity sight.

<https://www.ncsl.org/research/environment-and-natural-resources/federal-nuclear-facility-cleanup-sites.aspx> (Accessed by Karl Berni 11/30/2020)



There are a lot of actions the government, both state and federal, could have taken to reduce environmental vulnerability and injustice. While the government chose the Trinity site because it was far away from most populated areas, they severely underestimate the power of the bomb and its radiation. They also carelessly missed several families that lived close by and were almost killed from the after effects of the bomb. "Within an hour, the

cloud had largely dispersed toward the north-northeast, all the while dropping a trail of fission products. Offsite fallout was heavy. Several ranch families, missed by the Army survey, received significant exposure in the two weeks following Trinity... Livestock were not as fortunate, suffering skin burns, bleeding, and loss of hair". Though the families were lucky enough to not be seriously injured, their livestock had been seriously harmed by the radiation and there were probably long term health effects on anyone in the area.

(https://www.osti.gov/opennet/manhattan-project-history/Events/1945/trinity_safety.htm, Accessed by anonymous, December 2, 2020)

This article I found talks about the Tularosa downwinders, how they have been affected and gives a general background on what happened to them and the testing that happened at trinity site. What's really interesting is the last part of the article where it talks about how the tularosa downwinders are trying to get into the RECA act which helps those affected by radiation. This is what they have been fighting for.

(<https://www.atomicheritage.org/history/tularosa-basin-downwinders> Accessed by Logan Birdsong Dec 2 2020)

(Aubrey Zimmer responding to Logan Birdsong above)

The article above provided useful insight on who and how the Tularosa downwinders are and what happened to them. I had never heard of the term Tularosa downwinder before reading this article but had some general idea that they were people downwind of the Trinity Testing. After reading the section titled "Health, Social, and Economic Impact," and reading that little was done to make sure that southern New Mexicans were okay after the Trinity Test is horrific. Just because nuclear fallout happens to travel more towards the northeast part of the state does not mean it does not affect other parts of the state as well. Not only that, but after these people had been affected by the nuclear fallout, they were not compensated by the Radiation Exposure Compensation Act (RECA) because it did not include Tularosa downwinders. RECA only compensates "Nevada Site Downwinders, certain groups of uranium miners, and workers who participated in atmospheric tests". It wasn't until 2018 when elected officials had attempted to get a vote

in Congress that allowed the RECA to be expanded to others like the Tularosa downwinders. I feel absolutely horrified and saddened that these people were not warned about what would happen to them, and even more disgusted that they are not allowed to be compensated for the hardships they have endured.

(<https://www.kob.com/kobtvimages/repository/cs/files/TBDC%20HIA%20final%20report%202-8-2017.pdf> accessed by Shane Risolio, December 3, 2020)

Page 74 of this document outlines what actions could be taken to aid the downwinders of the atomic testing sites in receiving compensation for the generational effects seen by the radiation from the Trinity site. I believe acknowledging their mistakes and allowing for a wider range of people to receive compensation would aid in the remediation process of the environment and reduce the injustice seen around many of these test sites.

9. RECOMMENDATIONS FOR FUTURE RESEARCH

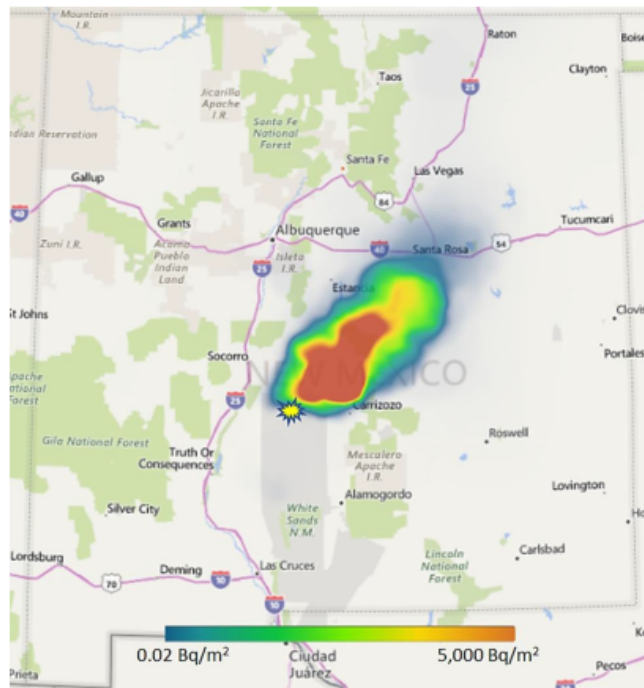


Fig. 6. Calculated deposition density of $^{239+240}\text{Pu}$.

Data and research such as the 2020 paper about accounting for unfissioned plutonium would be useful in determining environmental threats and health vulnerability in the Chupadera Mesa, as it looks at things such as how far and how deep the leftover plutonium from the Trinity test travelled, as well as how the density of that plutonium changes as distance from ground zero changes. This map shows the calculated density of plutonium radiating out from ground zero. In the paper, the potential health implications stemming from such a fallout are discussed as well, and the point is made that it is possible

that inhalation could still occur and prove to be a health hazard, but that the authors believe that all unfissioned plutonium is accounted for.

(Beck, H.L., et al. 2020. *Accounting for Unfissioned Plutonium from the Trinity Atomic Bomb Site* [PDF]. Health Physics. Accessed by Hannah Lambertson 11/28/2020).

This is an article that goes over multiple regions and it includes the Chupadera Mesa. The study goes over possible radioactivity in the areas. The study even goes so far as to study the water and the geology of the various areas in order to find radioactivity.

<https://pubs.usgs.gov/pp/1370c/report.pdf>

(Accessed by Adam Lopez, November 29th, 2020)



Fig. 3. Range after test.

Radiological Survey and Evaluation of the Fallout Area from the Trinity Test:

Wayne R. Hansen's and John C. Rodgers' evaluation of the fallout from the Trinity Test goes into heavy detail about the surrounding area, the levels of radiation they encountered, and its effects on the human body. Most of the presented data primarily comes from a slew of other studies that they use to compliment their own analysis of the surrounding soil and vegetation. What I found interesting is the type of information they paired with their own for this analysis. In particular, The first table introduced on page 3 gets straight to the point and compares the risks of obtaining different types of cancer at different locations. Given that this survey was published in 1985, I believe the data might be slightly outdated. However, What would take full advantage of the given information would be a full comparison to the fallout area's current condition. (Accessed by Zack Parral, November 29, 2020)

(https://inis.iaea.org/search/search.aspx?orig_q=RN:17009292) Accessed 12/2/20 By anonymous

"In 1973 and 1974, the EPA sampled and analyzed soils from across the region of the Trinity fallout field for ^{239}Pu and ^{240}Pu in the top 5 cm of the surface soil." Before publication, the results of the survey and the field notes from the sampling were forwarded to Los Alamos by the EPA. The highest surface plutonium level was observed on the White Sands Missile Range. The GZ sample contained 1100 nCi of ^{239}Pu (1pu per square meter of soil surface. A soil sample taken approximately 3.2 km (2 miles) north of GZ contained 100 nCi per square meter, but neighboring sample locations gave plutonium value factors of 4 to 10 times lower."

This goes into a lot of detail on a radiological survey that was performed in the 70's, what it's outcomes are, and how it can affect people.

10. INJUSTICE ANALYSIS

https://www.santafenewmexican.com/news/local_news/new-health-survey-at-nuclear-test-site-details-decades-of/article_4cfc0b66-67ae-5a5d-a542-6977b5164e7d.html

Descendants of people living downwind and downstream of the Trinity blast can trace the health problems of later generations. The Radiation Exposure Compensation Act ensures that the people who are affected (downwinders, scientists and other personnel on the site) are compensated 150,000 dollars and health benefits. However, the law doesn't provide compensation for the people who were living on Southern New Mexico ranches and their descendants. This is unjust and ethically wrong since these people were also affected by the site and were not too far off. Having laws that prevent compensation for all who were affected essentially does not provide justice to those in the environment which include the people living on Southern New Mexico ranches and their descendants. The CDC says residents were never warned before or after the Trinity blast which is a clear lack of information to the public. This factor is also unethical since people had no prior knowledge about the events which precaution measures could have been taken to avoid or prevent it. (Accessed by Namir Hassan 11/27/2020)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7497471/>

The idea that not only the people who were present at or near the site were affected but also future generations with adverse health problems and diseases like cancer and deformities at birth highlight the unethical nature of how the government went about the entire process. The heritable effects pose a transgenerational mutation that should have been avoided initially. For the environmentally exposed populations, the link between the levels of exposure and cancer rate were clear that the radiation and environmental

contamination were responsible for the issues that the people suffered at the local level.
(Accessed by Namir Hassan 11/27/2020)

(Logan Birdsong Responding to Namir Hassan,)

It truly is a travesty what the governments have done to their people in the name of progress, and after reading the article I can see the effect it had on people and those lucky enough to have survived the ordeal, but from reading through and looking at the conclusion it seems like the argument of their being a cross generational problem wasn't found in the survivors of the radiation poisoning they were exposed too."it is not scientifically or biologically plausible that the low doses experienced from the Trinity fallout could result in transgenerational effects in the children of exposed residents near the Trinity site." This quote is taken from the conclusion of the article you have linked. Even though im a strong believer that there are problems for the people that are affected by the testing in giving birth or conceiving children, it seems like if the pregnancies of the survivors are successful there is little effect to the actual child of these survivors."the germ cells that produce sperm or ova are so damaged by radiation that the body's natural processes filter out any defective embryo, leading to only a low chance of children being born with birth defects" here is another quote I have found that would back up my claim from your article.

(Cahoon, E. K., et al. 2020. *Projected Cancer Risks to Residents of New Mexico from Exposure to Trinity Radioactive Fallout* [PDF]. Health Physics. Accessed by Hannah Lambertson 11/28/2020.)

This paper discusses the potential health risks to those living within New Mexico as a result of the Trinity test. In this paper, it is projected that 30 counties, including Socorro, had a much higher risk of cancers including and excluding thyroid as a result of the trinity site test. The fact that there are higher probabilities of cancer occurrence in counties near Ground zero is highly unethical, since the citizens in these communities were not warned

about potential fallout and were thus not given the chance to choose whether or not to assume such risks.

(Namir Hassan responding to Hannah Lambertson,)

The fact that there was no warning prior to the potential effects that the resulting test has caused is definitely unethical since it essentially left uninformed citizens to continue their lifestyle without the knowledge of known potential risks and dangers. It should be understood that the people within the radius and near Ground zero were not given enough information to make an informative decision and choice to either stay or circumvent the outcome they could face. By taking away that ability to leave the area or knowingly accept the risks, it leaves them with no options and with the associated health problems that come after. To ensure the safety of those individuals it would have been ethical to at least provide the basic understanding of knowledge and information which they would be responsible for the decision they move forward with. It is essentially forcing a test on a nearby population if that population does not understand the risks associated with the test. The population may know that the test itself will not kill them but the aftermath of the test would have prolonged effects that will detriment future generations as well.

https://nmgs.nmt.edu/publications/guidebooks/downloads/60/60_p0425_p0428.pdf

This paper explored the contamination of the area around the trinity site including the Chupadera Mesa. In the paper it explains that many of the grounds and ranches around the site had been contaminated and many of the ranchers and civilians were not aware that the tests were happening. "...residents of New Mexico were not warned before the blast or informed of residual health hazards afterward, and no residents were evacuated." This is ethically unjust because at this point in time, nobody knew what the effects of radioactive contamination would do to the human body. The scientists were on a mission to create the perfect bomb but they failed to take into consideration the people of New Mexico. The

“downwinders” of the trinity site experienced many unusual phenomena. The United States chose to keep the tests a secret “To preserve the secrecy of the atomic bomb mission and avoid claims against the Army...” This is unjust because the United States put their military before their citizens.

(Accessed by Xavier Romero, 12/1/2020)

Robert Staub in response to Xavier Romero

The paper you found is a great factual presentation of the overview of the downwinder experience. There were clearly unknowns that the government could not have known before the fact about the bomb and in the moment there was no way to tell exactly where the fallout would go. However, once the fallout had travelled the feds should have been proactive and moved the people impacted out of the areas hit by plutonium contamination, and made them whole financially. The fact that there was radio silence is unjust as you have pointed out. There should have been much more followup and care taken for those people in unincorporated areas throughout central and northern New Mexico that had to deal with the aftermath of the fallout.

Is it correct to call this ethically wrong or just inhumane? I say this because radiation is not something to take lightly and in the 1940”s we used the material not knowing all of its capabilities, weaponized it and released it out into the world. Yes, scientists knew of the harmful effects of uranium and of the radiation that came with it. But I bet if we asked them now if they knew about residual radiation they would have no clue what we were talking about. For example, look at Chernobyl no one can currently live there and we are soon to follow with the six regions that surround whitesands.

<https://aquila.usm.edu/cgi/viewcontent.cgi?article=1099&context=ojhe>

(Accessed by Zachary Hopkins, 12/05/2020)

BIBLIOGRAPHY

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