

**CENTERS FOR DISEASE CONTROL AND PREVENTION
National Center for Environmental Health**

**Summary of an
Informational Meeting with Discussion Sessions
Regarding the Draft Final Report of CDC's
Los Alamos Historical Document Retrieval and Assessment Project
January 28, 2010
Ohkay Owingeh, New Mexico**

The Centers for Disease Control and Prevention's (CDC's) National Center for Environmental Health (NCEH) convened a meeting at the Ohkay Owingeh (Ohkay Pueblo) in New Mexico on January 28, 2010. At this meeting, the draft final report of the Los Alamos Historical Document Retrieval and Assessment (LAHDRA) project was described and discussed. The ten-year LAHDRA project was an information gathering effort conducted to retrieve, examine, and assess the usefulness of the historical documents relevant to off-site releases or health effects from Los Alamos National Laboratory (LANL). The draft final report, which was issued in July 2009, contains information that will support evaluation of the need for, and adequacy of data to support, a historical dose reconstruction study.

Process. Those attending represented federal agencies, the LAHDRA project team, elected officials, community and advocacy groups, and the pueblos of the Los Alamos area. Of particular interest to those attending was the presence of representatives of the New Mexico congressional delegation, in response to the communities' interest in funding follow-up work to the LAHDRA study. Two facilitators guided the plenary presentations and discussions, Ms. Martha Quintana and Ms. Doryn Chervin.

The agenda included time for:

- presentations of community perspectives of LANL's operations and health and emotional effects that could have resulted,
- comments on the LAHDRA study and follow-up work that could be undertaken;
- an historical overview of the LAHDRA project;
- a summary of key areas of interest from the draft LAHDRA report, and
- a question and answer session.

A lunch was sponsored by community groups. Before and after the lunch, attendees were able to participate in discussion groups focused on seven technical topics during two breakout sessions. The topics, which were suggested by community groups, were beryllium, plutonium, tritium, uranium, the Trinity test, chemicals, and explosive testing. Fact sheets on each of these topics were distributed. The plan was to reconvene after the breakout sessions, report back to the full group, and discuss next steps for the project. The closing discussions were cut short due to an impending winter storm. The meeting adjourned early to allow the participants to return home safely. In place of providing oral summaries, the breakout group leaders provided their notes that document key points from the discussions. Those key points are incorporated in this summary as Attachment 2. The plenary portions of the meeting were video recorded by Luis Peña and Rosalia Triana from Tewa Women United's Environmental Health and Justice Group and by Robert T. Chavez, Youth Coordinator of Honor Our Pueblo Existence (HOPE). An audio recording produced

by Robin Collier for Cultural Energy is also available (under postings for the week of February 8, 2010) at <http://www.culturalenergy.org/listenlinks.htm>.

Opening Comments

Ohkay Owingeh Governor Marcelino Aguino welcomed those attending, joining together to educate and learn, discuss future work options, and decide the best way to proceed. The ultimate goal as described was to protect the people and to preserve their lands. Whatever the conclusions of this meeting, he stressed the paramount importance of maintaining and preserving Mother Earth, a goal that must not be compromised. Governor Aguino blessed the proceedings, hoping that the discussions would proceed in a spirit of love, respect, and unity among the respective organizations, agencies, and individuals present.

Community Perspectives

Presenter: Ms. Beata Tsosie-Peña, Tewa Women United.

Ms. Tsosie-Peña read a poem she had written to describe the effects on herself and her people from the atomic age and the work done at LANL. Her poem is appended in full to this document as Attachment 1.

Presenter: Ms. Kathy "Wan Povi" Sanchez, Tewa Women United

Ms. Sanchez discussed the perspective of community women. She spoke from the construct of affirming "beingness, being on a wellness path," and "speaking the truth from the heart." She brought items representative of the Earth (including water, earth, and sage) to support the participants' work in the course of this day.

Ms. Sanchez focused on the effect of historical trauma on the area's native people. She symbolized that trauma, through the past six generations of her family, using rocks to physically represent the damage at the personal, family, and community levels. Her grandmother recounted stories passed down from the 1700s of hidden domestic violence, often blamed on the woman herself; of family violence similarly not discussed, and the related shame. As each generation learns and conveys this to the next, it may well become a genetic, body memory. The personal issues were and are compounded by the community trauma of being barred from their own ancestral lands by LANL and of the shame of being excluded from any but the most menial tasks due to their lack of education. Ultimately, she said, communication between men and women stopped, and the "leaders did not hear their own people."

The burden of these three factors alone (anger, shame, little education) can cause harm to subsequent generations. This was represented by the exponentially added weight and pressure of pebbles added to a bag. This became vivid when she envisioned that weight being carried by a child going to kindergarten and growing up ashamed, tired, angry, believing they are lazy, and wanting to escape. As the trauma increases, the escape solutions grasped are either physical and/or emotional (by drug/alcohol abuse, or "getting mean and strong"). The stones represented the emotional cancer of trauma, which like its physical counterpart, can spread rapidly to infect other "cells" in a societal context.

Ms. Sanchez described how the answer is to remove the rocks, one by one, to cumulatively reduce the weight, aided by the natural elements she had brought. The effect of the hidden legacy of generational trauma must be known, including those that are physical (such as seen after Chernobyl, with mortality that surpasses the birthrate and rising sterility).

Presenter: Ms. Joni Arends, Co-founder, Concerned Citizens for Nuclear Safety (CCNS)

Ms. Arends expressed the need to continue this project. In the next steps, the CCNS urged the establishment of a community-based expert panel aid the interface between CDC and its contractors with the community. She named a portion of the community expertise available for such a panel, in introducing some of the area's women leaders: Marian Naranjo of HOPE; Sheri Kotowski of the Embudo Valley Environmental Monitoring Group; Clarissa Duran of the Community Service Organization Del Norte; Holly Beaumont of the New Mexico Conference of Churches; and although absent due to other commitments, Paula Garcia and Quita Ortiz of the New Mexico Safety Association.

Ms. Arends thanked Charles Miller, Tom Widner, Joe Shonka, and Susan Flack for their persistence in bringing this project forward through the many obstacles encountered. Noting Dr. Miller's comment that LANL is the last site to go through this process, she urged use of the lessons learned at all the other sites where this work was undertaken. Among those is the difference that community input can make, which could be gain through the proposed community-based panel.

The important contribution of participatory research is the reach it provides to new data from people documenting their exposures to radionuclides, toxic materials, etc. through, for example, rainwater-collecting cistern systems, hunting, fishing, or growing crops and saving seeds. All that information aids understanding of potential exposures and could be of great value, given LANL's lack of monitoring data. She asked those present to fill out the comment cards at the tables and to volunteer with organizations such as Las Mujeres Hablan to participate in the study process. Such local organizations can harness the communities' local expertise to organize and collect health surveys and otherwise contribute. She urged the congressional delegation to promote funding of CDC's continued work and the community-based expert panel.

One option for such continued work, among the many issues of concern, could be to select and pursue a single issue. For example, fallout from the RaLa experiments was rarely monitored past Española. Soil and water studies may indicate deposition of radionuclides such as tritium, beryllium, uranium, and chemicals. The community-based experts willing to take on one such topic could work with and follow through with the scientists.

The main focus, Ms. Arends said, must be to ensure that the LADHRA report results in a complete history that is available for future generations, with no gaps, to allow the healing to begin in a real and meaningful way.

Presenter: Ms. Tina Cordova, Tularosa Basin Downwinders Consortium

Ms. Cordova discussed experiences and health concerns of people in the Tularosa Basin after the Trinity test. Her statement is included in its entirety as Attachment 3 to this summary.

CDC Overview of the LAHDRA Project

Presenter: Dr. Charles Miller, CDC, NCEH, RSB

Dr. Miller provided a brief historical perspective of CDC's work to understand the issues relative to LANL and to help the community understand them.

CDC Activities at Los Alamos – Past, Present, and Future

Charles W. Miller, PhD
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Memorandum of Understanding Between the Department of Energy (DOE) and the Department of Health and Human Services (HHS)

- Signed in 1990 and renewed in 1995, 2000, 2005, & 2009
- Transferred energy-related epidemiologic research program from DOE to HHS
- Funding supplied by DOE



Memorandum of Understanding Between DOE and HHS Continued

- Centers for Disease Control & Prevention (CDC) designated lead agency for HHS
 - National Center for Environmental Health (NCEH) coordinates program and conducts environmental health studies
 - National Institute of Occupational Safety & Health (NIOSH) conducts worker health studies
- Agency for Toxic Substances and Disease Registry (ATSDR) doing Superfund-related activities at DOE sites



1994: CDC staff began conducting exploratory investigations at Los Alamos National Laboratory (LANL)

- Records suggested that off-site releases may have occurred
- Large repositories of records exist at LANL
- Most of these records classified
- Ability to review records and number of records needing review largely unknown



A 1990 Memorandum of Understanding (MOU) transferred the conduct of energy-related epidemiological research from the Department of Energy (DOE) to the Department of Health and Human Services (DHHS). This work was funded by DOE and conducted by CDC. Within CDC, NCEH is responsible for the environmental health studies and the National Institute for Occupational Safety and Health (NIOSH) is responsible for worker studies. The LANL records reviewed were divided between NCEH and NIOSH accordingly. CDC's sister agency, the Agency for Toxic Substances and Disease Registry (ATSDR) is responsible for health studies at all Superfund sites, which include LANL, but that was not related to this historical dose reconstruction.

The LAHDRA historical record review was done to gather information relevant to releases from LANL. When CDC began exploratory investigations at LANL in 1994, the number of records at the site and how readily they could be reviewed was unknown.

1998: ENSR International (now ChemRisk) selected to begin Los Alamos Historical Document Retrieval & Assessment (LAHDRA) Project

- The original term of contract was 3 years
- The contract term was extended an additional 5 years in 2001
- A new contract was signed in 2004



Goals of the LAHDRA Project

- Retrieve historical documents and evaluate them for their usefulness for off-site dose assessment
- Declassify (if necessary) relevant documents and make them available to the public
- Enter relevant documents into an electronic database
- Develop a prioritized list of contaminant releases from the LANL site



Late in 1998, ChemRisk won the bid to conduct the LAHDRA project and, in early 1999, CDC presented the goals of the project to the public: 1) retrieve the historical documents and evaluate their usefulness to explore offsite exposure assessment; 2) declassify documents as necessary to be publically available; 3) put the data in an electronic database; and 4) develop a prioritized list of LANL releases. A second contract was competed and issued in 2004 and ended in 2009. ChemRisk released the draft final report in July 2009, and the final report will be issued later this year.

Status of the Project

- ChemRisk has released the DRAFT Final Report for the LAHDRA Project
- Review comments on this DRAFT are being received through today
- CDC and ChemRisk will review ALL comments received and ChemRisk will issue the completed Final Report
- The Final Report will be available to the public and transmitted to DOE



What is next for the LAHDRA Project?

- The goal of today's meeting is to receive final comments on the DRAFT Final Report
- Once the Final Report is completed, CDC will return to New Mexico to present it to the public
- This report will NOT be able to address all of the issues that are of concern to the public
- Funds are NOT currently anticipated for CDC to do any further analysis of Los Alamos releases

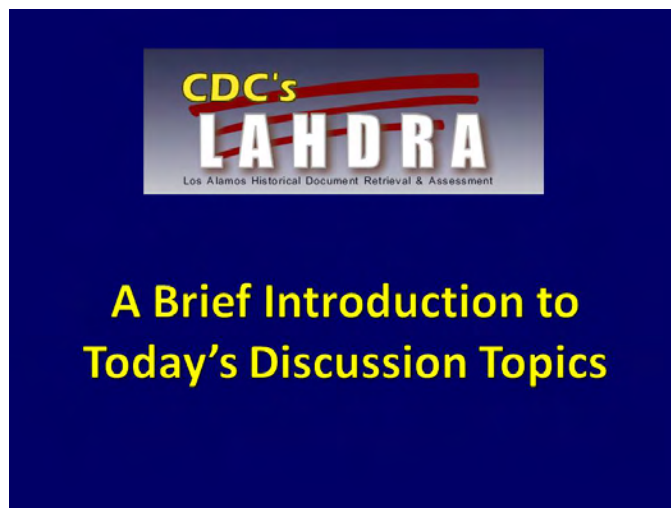


Dr. Miller emphasized that the objective of this meeting, to get final public comments on the draft report, was very important to CDC. Some comments had already been received. Once finalized, CDC will return (perhaps this summer) to present the final report, hopefully including a short summary. While the report will not address all the issues of concern, all comments will be considered in the revision process. Dr. Miller added one caveat; there is currently no funding in place to support further work on this project. CDC would have to work with the Department of Energy and Congress if further work is recommended.

Introduction to the Discussion Group Topics

Presenter: LAHDRA Project Director, Thomas Widner of ChemRisk, LLC

Mr. Widner noted that the LAHDRA project was almost exclusively an information gathering effort. Even though 25-30 scientists and engineers had gathered relevant information at LANL over a ten-year period, they have only been able to “scratch the surface” in interpreting and evaluating that information. Historical releases were listed and prioritized. Upon ChemRisk’s request, CDC also allowed simple screening calculations to be done for a handful of releases. Based on topics suggested by local community groups, ChemRisk subject matter experts prepared to lead discussion groups on seven topics of particular interest. Fact sheets prepared for these topics were distributed at the meeting, copies of which are included in this summary as Attachment 4. A number of attendees submitted comments on the cards that were made available for that purpose on each table in the main meeting room. These comments are presented in Attachment 5 to this summary.



Tritium

Mr. Widner indicated that the discussion group on tritium would be led by Dr. Joe Shonka. Tritium is the only radioactive form of hydrogen. Beginning in 1944, it was imported from Oak Ridge, Tennessee to boost weapons (to increase the power that could be obtained from a given quantity of plutonium) and as a “fuel” in hydrogen weapons. It was also used in fusion research, to produce neutrons in LANL’s accelerators, and some was produced in LANL’s reactors.

Screening for tritium exposures, done using the method of National Council on Radiation Protection and Measurements (NCRP) Report 123, revealed that exposures from Technical Area 35 (TA-35) releases during 1970 exceeded the screening limit based on 1 in 100,000 added risk of cancer. ChemRisk expected that the importance of cumulative releases could be significantly higher if releases before 1967 and accidental releases were accounted for.

Data gaps include the lack of effluent data to assess tritium releases before 1967 and from accidents and “off-normal events” that are documented in scattered documents but have not been compiled.

Tritium



- Has been used to “boost” weapons and as “fuel” in hydrogen bombs
- Also used in fusion research and to produce neutrons in accelerators
- Most has been produced at other DOE sites
- Use at LANL began in 1944, but effluent data compilations include no data for 1944-1966
- Accidental releases are not accounted for

Tritium

- We performed simple, “screening level” calculations of public exposures from documented tritium releases.
- Releases from TA-35 (“Ten Site”) during 1970 exceeded the screening limit (based on 1 in 100,000 added risk of cancer).
- If releases before 1967 and accidental releases were accounted for, the significance of tritium releases would likely rise.

Uranium

Mr. Widner indicated that the discussion group on uranium would be led by Jack Buddenbaum. Uranium was used in gun-type weapons, including the “Little Boy” bomb dropped on Hiroshima. It was also used in a variety of reactors; for example, Omega Site in Los Alamos Canyon hosted operations of 4-5 different reactor designs. Some uranium reactor fuel was used in liquid form. In some cases, irradiated fuels were brought back to LANL from other sites for study in hot cells. The highest level of radiation work was done in hot cells. A significant amount of uranium, especially depleted uranium, was also used in explosive tests.

Screening indicated that enriched uranium releases do not appear to warrant high priority. Releases of depleted uranium, however, do appear to warrant a closer look.

Data Gaps: The lack of effluent data compilations for years before 1970 prevented comprehensive evaluation of potential exposures to the public.

Uranium



Uranium

- Like for tritium, we performed preliminary screening calculations of health risk.
- Enriched uranium releases *do not* appear warrant high priority.
- Releases of depleted uranium *do* appear to warrant a closer look.
- *However*, these evaluations don’t reflect uranium releases before the 1970s.

Explosive Testing

Mr. Widner indicated that the discussion group on explosive testing would be led by Bob Burns. The earliest forms of explosive testing occurred in the radioactive lanthanum (RaLa) shots that were done to study the implosion process. Other tests included open air explosive testing of materials including uranium, tritium and some exotic metals at firing sites across LANL. A photo was shared of one site (PHERMEX) at which high-speed X-ray photos of explosions were taken; another showed an explosion cloud from the town of Los Alamos.

Data Gaps. Materials of concern include the radioactive lanthanum imported from Oak Ridge; strontium-89 and -90, which were contaminants in the lanthanum; uranium; various metals; tritium; and polonium. But there is little documentation available of early explosive tests. While files are available for most of the more recent explosive tests, they are scattered and not compiled. Other gaps include the unknown fraction of the explosive materials expended in these events that could have been aerosolized in respirable forms.

Explosive Testing



Explosive Testing

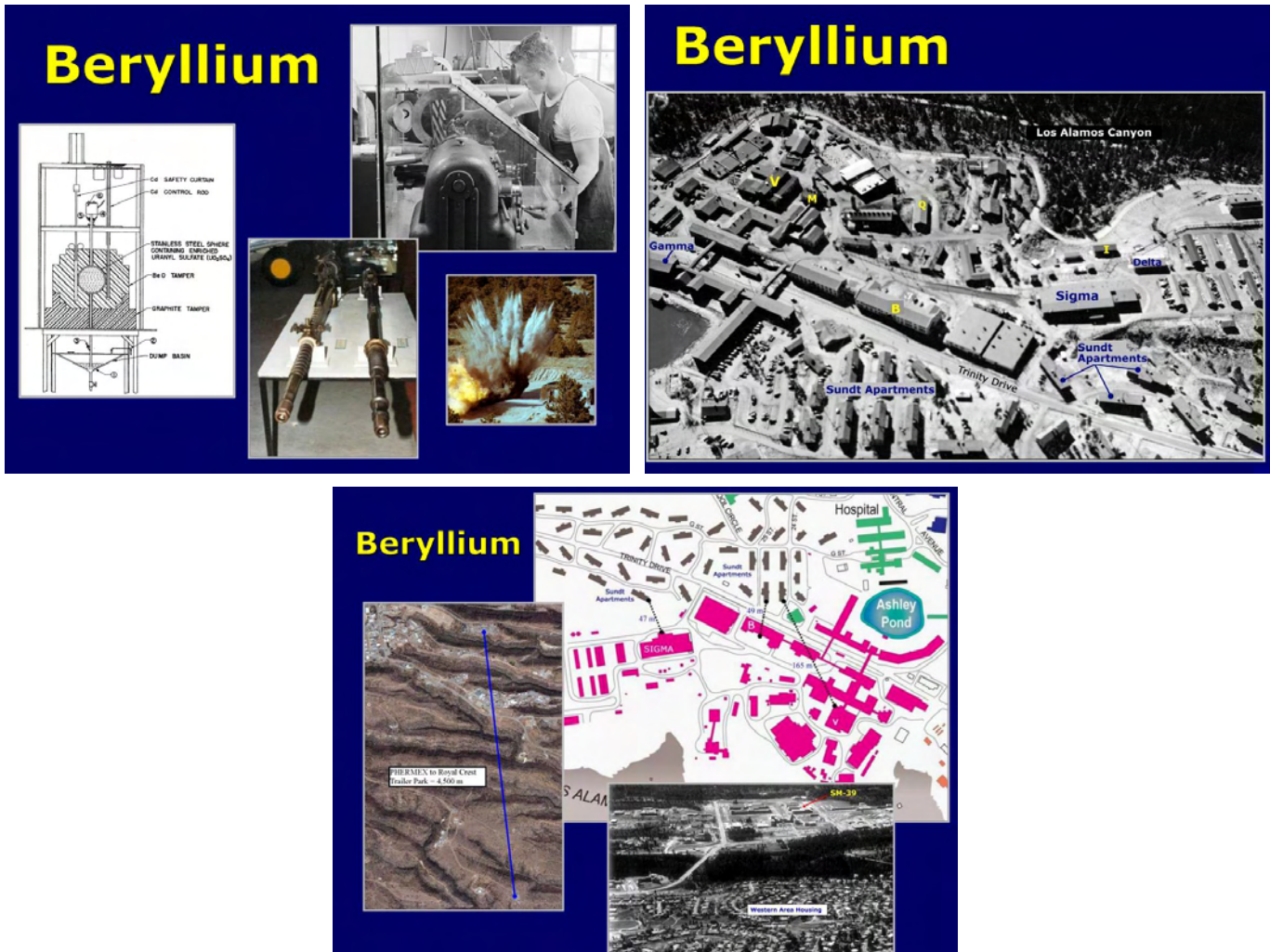
- Materials used included “RaLa,” strontium-89/90, beryllium, uranium, various metals, tritium, and high explosives.
- Except for the RaLa program, there is little documentation of early dynamic testing.
- More recent shot records exist but are scattered and not summarized.
- Fractions of materials that became airborne are a key source of uncertainty.

Beryllium

Mr. Widner indicated that the discussion group on beryllium would be led by Susan Flack. Beryllium was machined at LANL. Large quantities were used in the 1940s and early 1950s before anyone fully appreciated its hazards. In addition to machining, beryllium oxide powder was hot pressed to make components such as the beryllium oxide bricks that surrounded the Water Boiler reactor. Additionally, scaled-down models of atomic bomb initiators were fired from a cannon in an annex to B Building in the original Technical Area. That operation was an unmonitored release point for polonium and beryllium. Beryllium was also expended in explosive testing at LANL.

The concern about operations in LANL’s original Technical Area is heightened due to its proximity to housing. The B Building annex was about 50 meters from the Sundt apartments across the street and the D-Building plutonium processing was only about 200 meters from the nearest residences.

Screening calculations were done for beryllium using the NCRP Report 123 dispersion estimation procedures. Areas of interest included those residential areas, a trailer park about 4.5 kilometers away from the PHERMEX facility, and the Western Area housing located closest to the new beryllium shop. The results indicate that airborne beryllium concentrations in public areas could have exceeded OSHA's eight-hour time-weighted-average limit for workers, a short-term OSHA exposure limit, and a 30-day average ambient air limit from the National Emission Standards. While the worker limits are not applicable to members of the public, there is an expectation that exposures to members of the public should be *lower* than those to workers. It was concluded that beryllium operations and releases warrant further study.



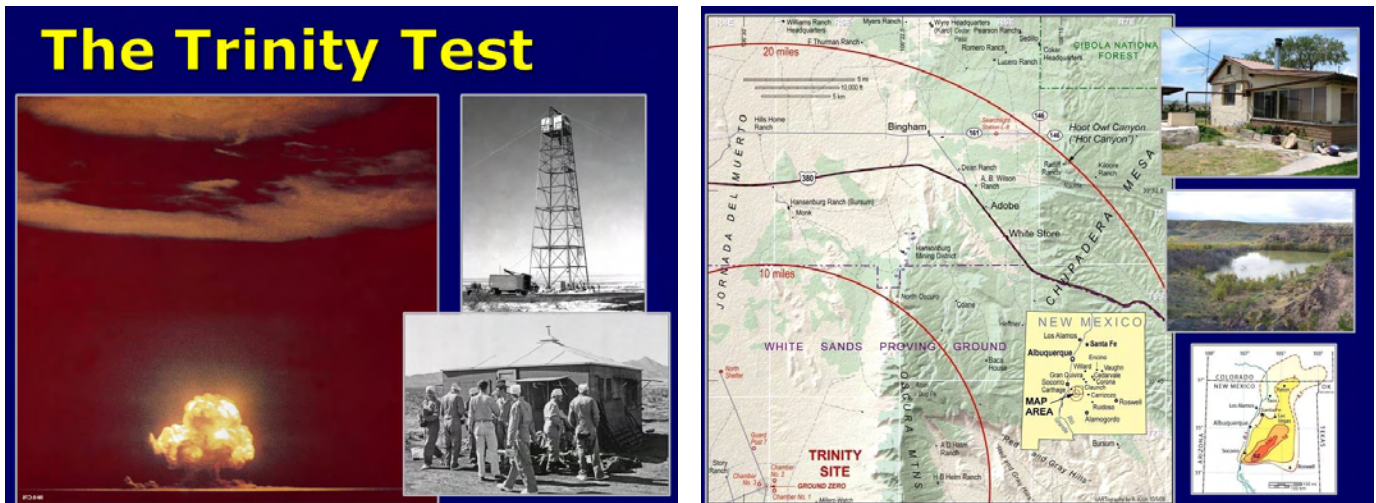
The Trinity Test

Mr. Widner indicated that the discussion group on the Trinity test would be led by Matthew Le. ChemRisk's charge for the LAHDRA study covered operations by LANL scientists within New Mexico. As part of that, the investigators found many interesting records about the Trinity test conducted in south central New Mexico in 1945.

Field monitoring instruments were crude at the time of the test, poorly suited to detect or measure the 4.8 kilograms of plutonium that remained unfissioned and was dispersed. Most of the fallout went to the northeast, toward Hoot Owl Canyon, which was referred to as "Hot Canyon" by Trinity test workers.

Concerns about the Trinity test include internal exposure to members of the public through several routes: inhalation of contaminated air, drinking of rainwater collected off of metal roofs into cisterns (it rained the night after the Trinity test), and drinking milk from dairy cows. The Trinity test cloud was the first airborne nuclear blast plume to be tracked by airplane. It was followed over Iowa, Kansas, Indiana, and upstate New York before it went out to sea.

Data Gaps: All assessments of Trinity test exposures published to date have not included internal doses received following breathing of contaminated air or ingestion of contaminated food and drink.



Plutonium

Mr. Widner indicated that he would lead the discussion group on plutonium. LANL's D Building was the first building in the world in which plutonium was handled in visible quantities, purified, converted to metal, and fabricated into atomic bomb parts. The building had 85 rooftop vents that were not monitored or filtered. Operations were largely uncontained. Plutonium was transferred manually through open rooms from one process to the next. Workers wore respirators, but the building and its roof were the most contaminated areas on the site.

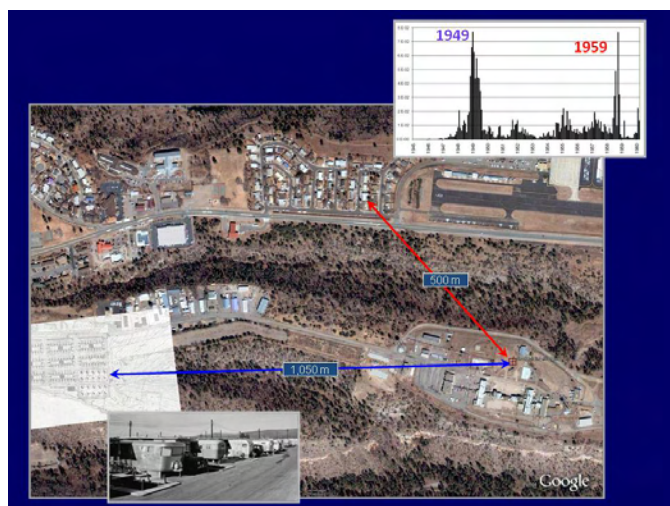
D Building housed main plutonium production operations from 1944 through most of 1945. In late 1945, the better-designed DP West facility opened, but D Building was still used up to 1953. DP West contained a series of buildings that housed the different plutonium processing steps. These buildings had exhaust treatment and sampling systems, and most plutonium was released through Building 12's central stacks.

Data Gaps. Some stack sampling was done, but was incomplete until 1949. Lab releases of 1.2 Curies were reported through 1972, but that number only included the Building 12 central stacks.

Screening addressed two reported spikes of airborne plutonium releases from DP West Building 12 stacks in 1949 and 1959. Initial screening done for 1949 was based in part on data from several LANL documents that LANL now says contain a mathematical error. That screening estimated exposures to residents of a trailer park roughly 1 km west of the central stacks. ChemRisk added a second screening for releases in 1959. By 1959, housing was built to the west of the airport, about a half-kilometer away from the central stacks. In both cases, preliminary screening yielded results that exceed the limiting value (based on 1 in 100,000 added cancer risk) by over a factor of 1,000.

ChemRisk concluded that plutonium warrants further study, especially since the data compiled to date only include the central stacks, not other individual buildings at DP West, D building, any accidental releases (which have been shown to be important at other sites), fires in the burial grounds, or incineration of contaminated oil and other fluids. If the limited data yielded results that exceeded the limiting value by factors of over a thousand, a closer look seemed warranted.





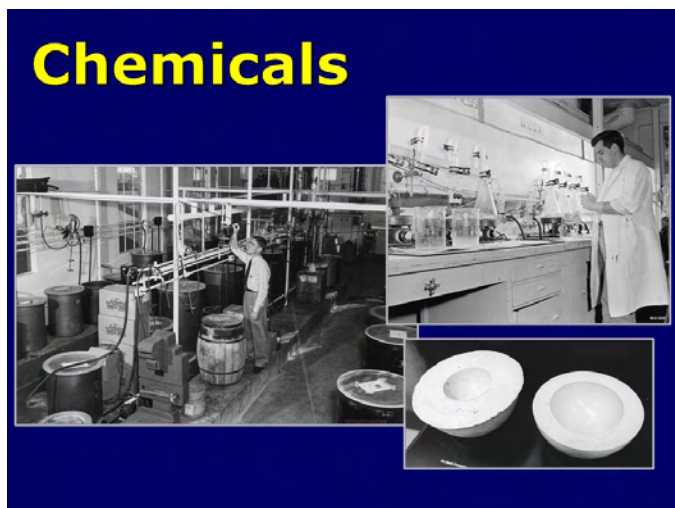
Chemical Releases

Mr. Widner indicated that the discussion group on chemicals would be led by Ellen Donovan. Assessment of potential chemical exposures is difficult, as relevant information on usage and releases of chemicals is limited and very scattered. Before 1970, the level of concern about documenting and limiting chemical use was very low compared to that for radionuclides.

Photos were shared of an early chemical laboratory, where chemicals were used in small quantities. However, other operations such as the reagent mixing room at DP West channeled much larger volumes of chemicals for use in processes there. The evaluation of chemical usage included high explosive compounds.

The study team prioritized chemicals based on estimated annual usage, applicable cancer potency factors (also termed “slope factors”) and USEPA reference doses for non-carcinogens.

Based on the information seen, ChemRisk identified trichloroethylene (TCE), uranium as a heavy metal, TNT, tetrachloroethylene, and carbon tetrachloride as the chemicals that warranted highest priority in terms of potential health effects.



Chemicals

- Cancer-causing chemicals were ranked based on estimated annual usage and the applicable cancer potency factors.
- Other chemicals were ranked based on estimated annual usage and applicable USEPA Reference Dose.
- The top ranked chemicals were trichloroethylene, uranium as a heavy metal, TNT, tetrachloroethylene, and carbon tetrachloride.

Coming soon.... Discussion Groups

- Beryllium
- Chemicals
- Explosive Testing
- Plutonium
- Trinity Test
- Tritium
- Uranium



Question/Answer Session

- *Is it true that there are no monitoring data, especially for LANL's early years? Could they have been lost or destroyed, or could they still be secret?*

Mr. Widner attributed the data gap to the fact that stack monitoring was not a priority in wartime. However, while there were no airborne plutonium effluent measurements found for earliest operations, the study did find indoor air measurements. There are over 1,600 measurements of room air from D Building. Coupling those data with knowledge of ventilation rates from the different rooms allows a rough calculation of what could have been released from the building. The study team also documented the details of the plutonium processing procedures used in D Building and, using release fractions determined in DOE-sponsored research, estimated possible releases. The caveat was that these release estimates represent conditions when everything went as planned, which was frequently not the case. For example, large fractions of the world's supply of plutonium were dropped on the floor in D Building several times.

- Ms. Carol Miller, an occupational and environmental health professional, commented that those data still would not provide all the information needed, for example, to address the potential synergistic effects between chemicals and elements. Terming the weapons complex "a tumor on the state of New Mexico," she noted that the Radiation Exposure Compensation Act's \$150,000 does not pay for all medical expenses related to the health effects of exposure. She asked the congressional delegation representatives present to seek universal access to healthcare for all in the state, in fact, for all U.S. citizens.
- *How many people lived in the Nevada Test Site area and what do they most need for their wellbeing?*

Ms. Cordova estimated that the four counties surrounding the test site had approximately 19,000 residents. She wished for those communities to be granted "Downwinders" status, which would provide screening for diagnosis and follow-up, as done in Utah, Idaho, and Nevada. The Las Mujeres Hablan organization is also trying to get healthcare with diagnosis.

- Mr. Gilbert Sanchez formally requested, as an outcome of the LAHDRA project, that CDC hold a workshop on how to get the community involved in and to clarify the health study petition process. A former member of ATSDR's Board of Scientific Counselors, he had petitioned for a health study for Pueblo San Idelfonso in the early 1990s. Such petitioning in an area of health impacts from facilities such as LANL is not a difficult process, and that work "has been denied for too long." He cited a precedent for CDC

and the congressional delegation, of Congress' mandated re-review of all studies done before the U.S. returned to Vieques, Puerto Rico. Second, he disagreed that the government "didn't know" what the effects of radiation on humans might be. They did; an assessment was done before LANL was created. That needs to be addressed through the U.S. Congress. Finally, he asked why no baseline health study had been done, such as within 25 miles of all sites of nuclear weapons construction and nuclear energy plants. Dr. Miller did not know if any such a baseline studies were ever done.

- *How can the report be near finalization, given the limitation of the data, especially as regards correlating health issues to what this study found? And how likely is it that this study will receive further funding?*

Dr. Miller reiterated that LAHDRA was designed to first determine the availability data and then to decide on further work. Future work funding is uncertain and nothing is immediately planned.

- *Why and who decided that epidemiological studies would not be included in this report ("because it's kind of a no-brainer")?*

Dr. Miller answered that there are several types of epidemiologic studies. What CDC has tried to do at sites like LANL is to determine what types of releases occurred, so that they know what they are looking for. One could do a general epidemiologic study. But to be able to determine if there is any relationship between the fact that a person has cancer and what they were exposed to, you have to know what they might have been exposed to. This project was designed to be the first step in a much longer process, as CDC has done at other sites. Sometimes CDC gathers enough information to support an epidemiologic study, but sometimes they don't. This was only designed to be the first step. It was never designed to be the end-all and be-all. It was a first step, so that CDC could see where they go from here. What was released from the site? Was there enough to even think about going forward? "Moving forward" could include a dose reconstruction, but there are a lot of "holes" in the available data. This report and the review that it has received were designed to help CDC determine if those holes can be filled in a scientifically valid way to give you the information that you need, and give us the information we would need to do a dose reconstruction. And depending on what it says, whether there would be an epidemiological study to follow.

- *When is the deadline for comments?*

Dr. Miller stated that the deadline goal was for this day. However, since the RSB staff would not be back in the office on the following day, comments sent over the weekend to RSB's Project Officer, Mr. Phil Green (pgreen@CDC.gov), would be accepted.

Closing Comments

Given the weather, closing comments were brief. The meeting information will be posted at www.LAHDRA.org and the breakout session recorders committed to provide their notes to CDC/ChemRisk for incorporation to this report (see Attachment 2).

Dr. Miller thanked the participants for their work. He discussed how he had heard a number of calls during the day for dose reconstruction and possibly epidemiology. Others had advocated more community screening and healthcare. He emphasized that, if funding is limited, the communities may have to decide which is the priority if both can't be done. He said that he looked forward to returning this summer with the final report.

Finally, Mr. John Harvey, a former LANL employee, spoke. He has an acoustic neuroma (brain tumor), as he indicated four of his lab co-workers have also developed. Two of these coworkers had died. He had contacted individuals at LANL, asking for information on brain cancer clusters, but had not received it. He suspected that LANL is reluctant to discuss any of this because of a related lawsuit that is underway. He said that it was too late for him, but those near the weapons office, director's office, etc., were also at risk, and he asked for the help of all present to get that information released.

With thanks to all, the meeting then adjourned.

Attachment 1

Poem by Beata Tsosie-Peña, Tewa Women United

Growing up I was disconnected
Some things were not discussed
Among people who valued hard work and employment
One-sided silence through years of schooling
I learned about the nuclear age
From movies and propaganda and Bradbury field trips
The glorified versions of a history that happened in my own back yard
In our state of Enchantment
Pristine open spaces and a population
Not respected by a higher nation
Still living off the land as the industrial age passed them by
Only to get thrust into nuclear realization
Beneath a mission
Urgent and thick with intensity
Beneath a shroud of secrecy
I was not yet born
The day scientists feared for our sky
Thoughts of atmospheric ignition
And that everyone would die
I was not yet born when the Jemez was taken
Homesteaders relocated, not of their volition
Uranium miners on the road to perdition
Beloved mountains, occupied before I could praise them
Disconnected from ancestral knowledge
In three generations
Clan animals vanished
Even as the jobs began to appear
Unprotected hired hands from the valley
A job was nothing to fear
It was a welcome exchange in hard times

I wasn't yet born
The day silver ash rained down for days
And a plume of poison drifted over state lines
Radioactive fallout, on cisterns of drinking water
On crops and livestock, who all miscarried that year
The people were lied to
And went about life as usual
While the truth fled
With bread over their mouths
To keep from breathing air they knew was foul
And the world was changed forever
A month later, 80,000 people were killed instantly
Justified atrocity named enemy
And the book was closed on Trinity
Even though it was our own citizens who were bombed
Children born into an experimental population
With a cancer rate way higher than the average nation
Entire families still sick and dying
Still crying, for the elders they lost too soon
I- was born into military healthcare, mixed blood and desert beauty
Free from the shame of colonized blame
My grandfather employed by Sandia
My down-winder grandmothers who birthed babies and taught me songs
While washing tainted laundry and making pots from local clay
I wonder now, can earth decay?
Eating the elk my uncles brought down
Breathing fire smoke from trees that drank
From discarded waste placed... anyplace
Today- my daughters are born
Into single car driver twice daily parades
Dependence on industrial weapon economic charades
The sound of bombs exploding
As we pray to the sun in mornings
Will my cornmeal prayers

Protect them as they play in ditches
Carrying water from a source three miles away from tritium releases?
What did my oldest get exposed to?
As I breathed in smoke from a tech area burned 3 times over
What kind of poison
Can penetrate the walls of my womb?
What stories were silenced, and why and from whom?
The truth must be told
From the people who lived it
Who dwell in this place that houses our spirit
Respectfully, I pray, for past, present and future souls to be at peace someday
For clean earth, air and water
So my children can play
Splashing and laughing as we tend to our gardens
Beneath the loving gaze of our sacred mountains
Free of fear from invisible poison
Free to hear, undisturbed and clear, the birds sing in the morning
As we continue to question
And speak our points of view
Let us share the stories anew that have never been told
And release the pain not even a century old
No longer shamed by accusations of ignorance
Let our diverse voices be our deliverance
No breath here is unimportant
We are free to pray
Each in our way
For justice, strong leaders, and supportive institutions
A foundation for our expectations
As we welcome in this time of healing
For the good
Of all future generations

Beata Tsosie-Peña (2010)

Attachment 2

Summaries of Key Points Raised in the Discussion Groups

Key Points from the Beryllium Discussion Group

- Communities were not told about past hazards at LANL
- Questions on the relevancy of testing procedures used to diagnose beryllium sensitization
- High priority of beryllium compared to plutonium for further study due to the unknown hazards of beryllium
- There should be community health meetings, health testing, and soil sampling in the area north of Española
- Connections should be made between job tasks and work locations provided in EEOICPA claims with LANL employment records to identify potentially affected persons who haven't filed claims and don't know about the potential for exposure to beryllium
- LAHDRA report should proceed to full dose reconstruction and to epidemiology studies
- Further studies should be at the community level especially in the Española Valley

Key Points from the Chemicals Discussion Group

- Is there a mechanism for incorporating anecdotal evidence from the community into the information gathering and dose reconstruction process? Specific examples that were put forth during the group session included: knowledge regarding illegal waste disposal; take home exposures in the early years (i.e., recollections of family members wearing their work clothes home, particularly in the early years); unusual dietary practices that could be possible exposure pathways, such as eating piñon nuts directly from the trees (several people recalled doing this)
- Will there be any future environmental sampling efforts to support a dose reconstruction? If so, would CDC consider including a community liaison to assist with these efforts?
- Can we revisit old dose reconstructions done at the other DOE sites to specifically evaluate how community involvement efforts could have been improved (and incorporate what is learned into the current effort at Los Alamos)?
- Will CDC be looking at the groundwater monitoring system in place at Los Alamos (historical and current) in more detail and specifically take into consideration the report published by the National Academy of Sciences?
- What is known about historical chemical waste disposal/transfer/storage practices on LANL property?
- Regarding the chemical inventory, how does CDC plan to account for inaccuracies that are known to exist in the current inventory (based on 2007 report)?
- Have there been health studies related to chemical exposures in the surrounding communities or on former LANL workers? If so, did they involve any biomonitoring?
- Have there been any studies of take home exposures?
- Will the dose reconstruction address multiple chemical exposures? Will there be a way to include information about genetic susceptibility to some chemicals?

- It will be very important to consider how this report should be used to educate the community. This is particularly important for the younger generations
- It is critical to relay the importance of this report and what has been learned about Los Alamos to our government so that future work can be secured. It was noted by several group members that while the LAHDRA report is useful, no one has received any help in the form of screening, health care or compensation by the government
- Several group members commented regarding the availability of environmental sampling data from sources such as New Mexico Environmental Department (soil, surface water). It was also mentioned that recent groundwater samples collected in White Rock near the Pajarito Plateau contained high levels of chromium.

Key Points from the Explosive Testing/Dynamic Testing Discussion Group

- What are the impacts of residual surface contamination from dynamic tests that is resuspended by wind or carried by surface water (runoff) to downwind/downstream populations such as San Ildefonso Pueblo? What is the environmental signature from the depleted uranium (DU) expended in dynamic tests?
- Is there adequate oversight of LANL's dynamic testing activities (and associated releases) by NMED or other agencies?
- There should be additional investigation and follow-up for the native workers involved in the initial cleanup activities at Bayo Canyon (TA-10). The commenter stated the native workers were not issued any sort of protective gear, in contrast to the Zia workers whom were. Further, the native workers could have tracked contamination to their homes, thus affecting other family members.
- Concerns were expressed about the long-term stewardship of Bayo Canyon and the issue of legacy materials in recreation areas (such as hiking trails).
- What are the impacts of the testing activities and resulting residual contamination on local wildlife?
- There is a sacred site at DARHT.
- Any health assessments performed for the areas surrounding LANL must include/address traditional uses of the land by indigenous groups. In many cases, these activities will not be shared by the groups concerned, but collection of pollen from impacted mesa tops was mentioned as one such activity.
- If there's no further work stemming from the LAHDRA project, then what are the stakeholders supposed to do with the assembled information?
- How much contamination exists in people's homes from their bringing home items from the Lab over the decades (e.g. tools and such)? What's been migrating down the hill all these years?

Key Points from the Plutonium Discussion Group

- Residual plutonium contamination in the environment should be more closely examined. Look at the potential "environmental footprint" in soil and animals around the key process buildings. Were wild animals sampled near DP Site prior to the 1970s? Human tissue samples collected 1958-1980 should be further evaluated to check release estimates.
- Should use local, site-specific meteorological data in the dispersion modeling that is done in follow-up work. Reflect the diurnal variations of local wind patterns.

- Don't just focus on the residents who lived closest to the key facilities. You should also consider the Española and Pojoaque Valleys and contamination they received from run-off following deposition of particles from the air. You need to go beyond five miles, find undisturbed soil for estimating releases, proper locations for estimating background from global nuclear testing.
- Must address exposures to multiple contaminants, say what is known about possible health effects of combined exposures.
- Should consider information from janitors, possibility of contact with work clothes that were worn home, recollections from downwind residents and healers, experiences of workers in earth moving and other jobs.
- Waterborne releases should be evaluated just as much as airborne releases. Look at surface water runoff and episodic snow melt (high flow) events.
- The data gaps you have described— how bad are they? Are they fatal gaps, or can we use available information to place defensible bounds on releases?
- Is a material accountability approach workable for D Building or DP West? Would have to consider material receipts, products fabricated, wastes, and effluents.
- What is the basis for the “1 in 100,000 added cancer risk” criterion used for screening?
- What assumptions are made in the NCRP screening regarding the age, gender, or body type of the exposed individuals?
- Have the legacy radioactive waste burial grounds ever been cleaned up? If so, were the cleanups complete, and where did the soil go?
- What does DOE have to say about the draft LAHDRA assessment? They are waiting on recommendations from CDC.
- What would “the next phase” cost, and how long would it take?

Key Points from the Trinity Test Discussion Group

- Initially, what were the major goals of the LAHDRA project regarding the Trinity Test and did this include a dose reconstruction phase?
- Have there been any major epidemiological studies of the people around the areas affected from the Trinity Test? It was understood that the National Cancer Institute (NCI) began work on assessing the impact to the public from the Trinity Test, but nothing has been publicly released.
- (In regards to President Obama's speech the same week on declassifying documents) Is there a possibility that there are more classified data available on Trinity?
- How can the community work with the CDC to fund the next phase of the project and include the Trinity Test as a part of the next phase?
- How is plutonium used in a “fingerprinting analysis” to reconstruct the potential environmental and human health impact of all fission products created in the blast?
- In what ways has health impact from the blast been correlated with monitoring data available?
- The “Reference Man” does not represent the local community.

- Parts of the blast tower were reportedly collected by individuals present at the test site and given to some of these individuals' children. Some of these children may have gone to school with these parts. This is a potential exposure pathway that must be reviewed.
- Current environmental monitoring should be taken in the area surrounding the Trinity Site. Samples should be taken from the wells at the Ratliff Ranch.
- Dispersion of unfissioned plutonium around the blast site needs to be researched. Furthermore, the local hydrology and its impact on the distribution of unfissioned plutonium need to be better understood. How well does plutonium bind with sediment?

Key Points from the Tritium Discussion Group

- Can the report include a discussion about what the biological effects of tritium are versus other radionuclides? There was concern about long term effects of tritium, and a discussion highlighting the 10 day biological half life of tritium resulting in the elimination of tritium (after intake stops) is needed.
- How can you tell if there has been a tritium exposure after many years? It was discussed that radiation exposure from high levels of tritium could cause increased risks of some cancers. The participants desired a (NCI like) table of which cancers are radiogenic and could be linked to tritium exposure, and which are not likely.
- What is the continuing impact of tritium releases from ongoing LANL operations? Can a screening table be added to compare with historical releases?
- The releases listed for tritium differ in Chapter 7 and Chapter 17. Can this difference be explained or eliminated?
- There was discussion of the water pathway (surface, shallow groundwater, deep groundwater. Apparently LAHDRA did not feel the pathway represented a concern. Justification for this position was not given. Can a screening calculation be done to show it is not of concern?
- Should the screening be in units of Sieverts or Sieverts per year?
- The liquid release numbers appear to be censored, in that the values per year always are 2, 3 or 5 Ci/y for the 1945 to 1967 time period. This is not expected unless the releases are either diluted to MPC in a batch process or the releases are stated as "less than MPC." If either of those reasons is correct, it should be stated why the releases are always the similar number. If either of those two explanations is not correct, LAHDRA should state it so that LANL would be required to explain why their data has been censored.
- The screening should differentiate between episodic events (large releases in short times) and chronic releases, especially as they do not have the same dilution?
- One participant served on the LANL Citizen's Advisory Board (CAB) and reviewed water quality data from wells. The LANL database on wells has many tritium anomalies. For example, a well near Omega West rose rapidly and spiked from year to year, perhaps depending on rainfall from 1970 to 1995. When Omega West was shutdown and decommissioned, several years later (1995) the releases fell back to near zero. These releases, which were as high as a million pCi/L, were found to be from a leak in the primary coolant piping to the cooling towers. Were these releases (from 1970 to 1995) significant?

Key Points from the Uranium Discussion Group

- Uranium operations need to be more fully characterized during any future dose reconstruction study of LANL.
- Uranium releases need to be fully characterized with a complete review of existing monitoring data and supporting technical documents. Efforts should include characterization of uranium isotopic mixtures associated with historical releases, amounts released during explosive tests, correction factors used with effluent monitoring data, etc.
- Characterization of natural uranium levels in soil and water in Los Alamos and in surrounding New Mexico areas needs to be completed.
- Environmental monitoring data needs to be more fully characterized as part of any future study of LANL.
- The LAHDRA report (including executive and citizen summaries) should clearly state the project's scope of work (project end point). It needs to be written so that it's clearly understood by the public. Many discussion group participants thought that LAHDRA results are currently tied to health effects observed in surrounding communities.
- Recommendations in final report should consider new issues raised from focus group discussions.
- Funding must be secured for a future dose reconstruction study— the logical next step to build on the LAHDRA work.

Attachment 3

Statement by Tina Cordova of the Tularosa Basin Downwinders Consortium

At 5:29 am on July 16, 1945 the first plutonium based atomic device was detonated at Trinity site in the Tularosa Basin of Southern New Mexico. At the time it was unknown exactly what the blast would produce and some of the physicists working on the project thought the atmosphere would be ignited. What is certain is that a cloud of radioactive debris stretched far into the atmosphere and from first hand accounts settled out days later in the form of ash that coated everything in the communities that surrounded the test site and in every direction. Life was forever changed for the people living in these communities.

To maintain secrecy the government had no plans to evacuate the people living in proximity to the test site. The government had only unsophisticated means for measuring and evaluating the fall out. The placement of their survey teams was I believe strategic in nature in that none of the teams were placed near the communities of any population. The idea that the plume somehow only extended in a northeasterly direction over unpopulated areas of New Mexico missing all the surrounding communities is absurd and beyond comprehension.

I was born 50 years ago in one of those communities. Tularosa as the crow flies is about 40 miles from ground zero. Me, my family and all the other members of my village were unknowing, unwilling, uncompensated participants in the world's largest scientific experiment with devastating consequences.

I developed thyroid cancer 12 years ago and my father has had both oral cancer and prostate cancer. Most of the women in my family have thyroid disease and so do most of the women from my community. The numbers of cancers, rare tumors and auto immune diseases in Tularosa is unprecedented. Many people there are working class and either underinsured or uninsured. When they get sick many of them do not have the means to receive the necessary care. There is little to no opportunity for screening so often times the cancers are advanced when diagnosed. Once diagnosed, many are sent home to die.

We know that we were exposed to radiation and people continue to suffer the effects. Studies show that the cancer rates in the counties surrounding the test site are as high as 8 times the national rates. It will be 65 years this summer and the US government has never undertaken an epidemiological study of what happened subsequent to the test. The US government, our government has been negligent in its responsibility to the people of the Tularosa basin and New Mexico.

In 2005 and in conjunction with other residents of Tularosa the Tularosa Basin Downwinders Consortium (TBDC) was founded. Our express goal was to compile data on the cancers people were being diagnosed with. We developed a health survey and held town hall meetings where we asked community members to come forward and report their cancers and the cancers of their deceased family members. We have hundreds of surveys and have only scratched the surface.

What we found were large numbers of cancers in those who were children at the time and in their children. The first hand reports from those who were alive at the time were profound. One man reported that he was a young teenager at the time and actually witnessed the blast as he was driving with his mother to work that morning. He said his eyesight and his mother and brother's eyesight were permanently affected.

One lady told us how her family were ranchers and that when the cows were taken to market that year everyone was dumbfounded about why so many of the cows were white or half white. These cows went into the food chain without hesitation because there was no warning given by the government that they might be contaminated. She also said there were many members of her family who had cancer as well as their livestock.

The water, the animals and the crops were all dusted and contaminated by the radiation and we drank the water and ate the food. Radiation settles in the mammary glands of cows and we drank fresh milk from the local dairy. We were all exposed.

Another woman reported that her mom was pregnant at the time and miscarried soon afterwards. Her father was walking to work the morning of the blast and he witnessed the entire thing. He died soon after of a degenerative muscle disease of unknown origin. This woman has lupus and fibromyalgia.

The stories go on and on. The number of brain tumors, breast cancers, thyroid cancers, bladder cancers, lung cancers, liver cancers, stomach cancers, leukemias and other cancers is very high.

I am here today to passionately support the efforts of Las Mujeres Hablan and express to Dr. Miller of the CDC that the time has come for the US government to adequately fund and undertake an appropriate epidemiological study of how the populations have been affected by the immediate dose radiation and subsequent radiation exposure as the result of the Trinity test.

When we had the town hall meetings I listened and I heard the voices of the people who cry out for recognition. It is time for the US government to recognize and acknowledge the sacrifices made by the people in these communities. I guess in some ways I can excuse that 65 years ago with so little known about the effects of radiation our government looked the other way. I hate to believe that our government considered the people living in the Tularosa basin as insignificant. Regardless, today 65 years later and with all that is known about radiation exposure and its significant negative health effects it is high time that the US government return to screen and treat people for cancer and compensate them for the suffering that they have endured in silence because no one has had the decency to return and to listen to their cries for help thus far.

Attachment 4
Fact Sheets Prepared by the LAHDRA Project Team
for the Seven Discussion Group Topics

Beryllium

Main Forms Used	Beryllium metal, beryllium oxide powder
What did LANL do with beryllium?	LANL manufactured and tested beryllium components for reactors and atomic weapons. The manufacturing involved machining of metal and the hot pressing of beryllium oxide powder.
Is there a period of most concern for releases?	Los Alamos used significant quantities of beryllium in the 1940s and early 1950s before its health hazards were fully appreciated. The metal was processed unusually close to residential areas. Beryllium use in outdoor explosive tests was highest from the mid-1950s to around 1970. Beryllium shop exhausts were not treated with high efficiency filters until 1964.
Through what pathways was the material released and transported?	Beryllium used in explosive tests would aerosolize and become airborne. Beryllium not aerosolized was deposited on the soil, from which it could be transported by surface water and wind. Beryllium also became airborne from machining and oxide pressing. Exposure of non-beryllium workers and family members to beryllium dust likely occurred in the 1940s when workplace clothing could be taken home.
How can beryllium affect the human body?	<p>Acute beryllium disease is observed at high beryllium exposure levels. It is an inflammatory response that affects most regions of the respiratory tract and is usually resolved a few months after exposure ends.</p> <p>Chronic beryllium disease (CBD or berylliosis) is an immune reaction to inhaled beryllium that mostly affects the lungs and has generally been confined to workers exposed to beryllium metal and low-solubility compounds such as beryllium oxide. Individuals who become sensitized often develop lung granulomas and fibrosis.</p>
Are there important data gaps that make it hard to assess potential health effects?	<p>Beryllium use and release data were not located for many years of beryllium operations, and most of the available data are in the form of annual totals. Because of these data gaps, the LAHDRA team used the following methods to estimated releases so that preliminary screening was possible:</p> <ul style="list-style-type: none"> • Measured annual releases from beryllium shops for the years after 1963 were adjusted and used to estimate release rates for 1943-1963. • Releases from hot pressing of beryllium oxide powder were estimated using the quantity of beryllium oxide procured in 1944. • Releases of beryllium from explosive tests at PHERMEX were based on reported peak beryllium use in tests of that type in 1964. • Episodic releases of beryllium from destructive testing of atomic weapon initiators were approximated based on the estimated beryllium content of each fired projectile and the expected amount of aerosolization. • The relationships between daily, weekly, monthly, and annually averaged airborne <i>plutonium</i> measurements from DP West stacks in 1956 and 1957 were used with annual beryllium release data to estimate peak <i>beryllium</i> release rates for averaging periods less than one year.
Where in the draft final LAHDRA report can I find more information on beryllium?	See Chapter 11 (Beryllium Use at Los Alamos), Chapter 20 (A Screening-Level Evaluation of Airborne Beryllium Releases from LANL Operations), and the Executive Summary (pages ES21-ES23).

Toxic Chemicals



<p>Types of chemicals used</p>	<p>Operations at Los Alamos involved many non-radioactive materials, including metals, inorganic chemicals, and organic chemicals such as solvents.</p>
<p>How did Los Alamos use chemicals?</p>	<p>A wide variety of chemicals were used at Los Alamos over the years; nearly 100 different chemicals were named in the documents reviewed by the LAHDRA team. Chemicals were used in explosives, as solvents, in water treatment, and for chemical analyses, among other things.</p>
<p>Is there a period of most concern for chemical releases?</p>	<p>There are data regarding both the routine use of chemicals and spills/incidents. Because chemicals were widely used in many different operations, it is difficult to identify a specific time period or single operation that would be of much greater concern than the others. Controls, monitoring, and reporting of chemical usage and releases improved significantly after approximately 1970.</p>
<p>Through what pathways were chemicals released and transported?</p>	<p>Chemicals could be released and transported through many pathways, including dispersion in air and settling on soil (explosives), seepage into the ground and transport through groundwater (solvents) or discharge into waste streams and effluents from the laboratory.</p>
<p>How can chemicals affect the human body?</p>	<p>Chemicals were prioritized based on toxicity criteria and estimated annual usage. The top five ranked chemicals were: trichloroethylene (TCE); uranium; 2,4,6-trinitrotoluene (TNT); tetrachloroethylene; and carbon tetrachloride.</p> <ul style="list-style-type: none"> • <u>TCE</u> was a commonly used solvent. In 2001, USEPA reported that TCE exposure is associated with several adverse health effects, including neurotoxicity, immunotoxicity, developmental toxicity, liver toxicity, kidney toxicity, endocrine effects, and several forms of cancer • <u>Uranium</u> is a naturally occurring radioactive heavy metal. Natural and depleted uranium are controlled based on their toxicity to the kidneys more so than their radioactive properties • <u>TNT</u> is an explosive material that is poisonous. Contact can cause the skin to turn a bright yellow-orange color. Long-term exposure can cause anemia and abnormal liver functions. TNT is a probable human carcinogen. • <u>Tetrachloroethylene</u> was widely used as a solvent. It can penetrate the skin or be inhaled and cause depression of the central nervous system. It is also classified as a probable human carcinogen. • <u>Carbon tetrachloride</u> is a solvent that was commonly used as a refrigerant or cleaner. Chronic exposure has been linked with liver and kidney effects.
<p>Are there important data gaps that make it hard to assess potential health effects?</p>	<ul style="list-style-type: none"> • Many documents discuss the presence of numerous metals, solvents, and acids in various LANL divisions. However, details regarding building locations, quantities used, or the operations involved are rarely provided. • Much of the early documentation pertains to spills and indoor exposures to workers rather than releases to the off-site environment. • Earlier data also tended to focus more on unusual incidents rather than day-to-day operations.
<p>Where in the draft final LAHDRA report can I find more information on chemicals?</p>	<p>See Chapter 12 (Processing and Testing of High Explosives at Los Alamos), Chapter 13 (The LANL Health Division), and Chapter 19 (Prioritization of Chemical Releases from LANL).</p>

Explosive Testing, Dynamic Testing



<p>Materials of Interest</p>	<p>Materials expended in dynamic testing activities included RaLa, Sr-89/90, beryllium, uranium, various metals, and tritium.</p>
<p>How did Los Alamos perform dynamic testing?</p>	<p>Dynamic testing served a number of purposes, but they all centered on gaining detailed understanding of how specific materials or systems behaved under the influence of detonation waves from high explosives. The materials involved in such tests would be dispersed by the explosion, becoming airborne and widely distributed about the vicinity of the firing site.</p>
<p>Is there a period of most concern for releases?</p>	<p>Tests were more numerous in the early years of LANL operations and were performed outdoors. More recently (starting around 1965) some dynamic tests were performed in the PHERMEX or DARHT facilities, or were otherwise better confined or contained.</p>
<p>Through what pathways were materials released and transported?</p>	<p>Materials would be aerosolized by the explosion and made airborne. Material not made airborne would be deposited in the local soil where it could be transported by surface water and wind.</p>
<p>How can these materials affect the human body?</p>	<ul style="list-style-type: none"> • Radioactive lanthanum (RaLa) is a short-lived, high-energy gamma emitting radionuclide and is primarily an external dose hazard. • Sr-90 is a long-lived, bone-seeking radionuclide and is primarily an internal dose hazard. • Beryllium is a toxic metal that can affect the body through acute reactions to high exposures or from chronic conditions resulting from exposure to lower concentrations. • Uranium is a naturally occurring radioactive heavy metal. Natural and depleted uranium are controlled based on their toxicity to the kidneys more so than their radioactive properties. • Other metals, such as cadmium and lead, have varying degrees of toxicity and in some cases can be considered carcinogens. • Tritium is a radioactive form of hydrogen. In the form of water vapor it is an internal dose hazard.
<p>Are there important data gaps that make it hard to assess potential health effects?</p>	<p>With the exception of the RaLa program, there is little documentation of early dynamic testing activities. Thus, the LAHDRA team has relied on wide-ranging estimations of quantities of materials expended for prioritization.</p> <p>Likewise, estimates of the fraction of materials expended that became airborne are a source of uncertainty.</p>
<p>Where in the draft final LAHDRA report can I find more information on dynamic testing?</p>	<p>Chapter 12 discusses processing and testing of high explosives. RaLa shots and the use of uranium in dynamic tests are discussed in Chapter 9. The use of beryllium in dynamic tests is addressed in Chapter 11.</p>

Plutonium



<p>Forms Used</p>	<p>Los Alamos handled and processed ²³⁹Pu for production of atomic weapon components and ²³⁸Pu for use in heat sources for powering spacecraft and artificial organs.</p>
<p>How did Los Alamos use plutonium?</p>	<p>Plutonium was received from other Manhattan Project/AEC sites, mainly Oak Ridge and Hanford. It was purified, converted into metal, and fabricated into weapon parts. Main production activities took place in D Building from 1944 to 1945, at DP West Site (TA-21) from late 1945 to 1978, and at TA-55 from 1978 to present.</p>
<p>Is there a period of most concern for plutonium releases?</p>	<p>The period of most concern for plutonium emissions extends from May 1945 , when kilogram quantities of plutonium began to arrive at D Building, through late 1959, when high-efficiency filters were first installed in the process exhaust system at DP West Site. Releases from the crude D Building facilities were via 85 rooftop vents that were unmonitored and for the most part unfiltered. Some plutonium was used in underground hydronuclear test shots conducted at TA-49 in the early 1960s.</p>
<p>Through what pathways was plutonium released and transported?</p>	<p>Airborne plutonium releases from chemical processing of plutonium and fabrication of weapon components occurred through exhaust vents, stacks, and fugitive emissions and were available for air transport to nearby public areas. Plutonium was also contained in liquid wastes that were discharged to local canyons (untreated 1944-1950) and in solid wastes that were disposed of in local burial grounds.</p> <p>Los Alamos is quite unusual in that residential areas were located quite close to main production facilities. As an example, the Sundt apartments were roughly 200 meters from D Building.</p> <p>The LAHDRA team’s preliminary screening assessments using the NCRP Report No. 123 methodology indicate that releases from DP West Site’s Building 12 stacks during 1949 and 1959 both exceed limiting values for exposures to the nearest residential areas based on 1 in 100,000 added cancer risk.</p>
<p>How can plutonium affect the human body?</p>	<p>Plutonium is a radioactive material and as such a known carcinogen. Inhalation is the primary health concern because particles that can become imbedded in the lungs emit alpha particles and some gamma rays with a half-life of 24,000 years. About 0.1% of ingested plutonium enters the bloodstream. About 80% of the blood burden deposits in the liver and skeleton, with elimination half-lives of 20 and 50 years, respectively. The main concern at low exposures is increased risk of cancer from irradiation of cells.</p>
<p>Are there important data gaps that make it hard to assess potential health effects?</p>	<p>There are no monitoring data for D Building operations 1943-1953, and DP West Site central stack monitoring was spotty before 1949. LANL’s estimates of historical plutonium releases include none of the contributions from D-Building stacks, DP West central stacks before 1948, DP Site building vents, accidents and incidents involving plutonium, waste disposal and incineration activities, or burial ground fires.</p>
<p>Where in the draft final LAHDRA report can I find more information on plutonium?</p>	<p>See Chapter 4 (Plutonium Processing at Los Alamos), Chapter 5 (Reactor Development and Operations at Los Alamos), Chapter 8 (Hot Cell Facilities and Operations at LANL), Chapter 10 (The Trinity Test), Chapter 17 (Prioritization of Radionuclide Releases), and Chapter 18 (Screening-Level Evaluation of Airborne Plutonium Releases from DP West Site).</p>

The Trinity Test



<p>Event Description</p>	<p>The Trinity Test, the world's first detonation of an atomic weapon, occurred on July 16th, 1945 at approximately 5:29 am on the Alamogordo Bombing Range approximately 30 miles southeast of Socorro, NM. The amount of energy released from the blast was equivalent to 21,000 tons of TNT.</p>
<p>What was the purpose of the test shot?</p>	<p>The atomic bomb itself, referred to as "The Gadget," was an implosion-type design that used a chain reaction of plutonium as its source of its energy. This design had advantages over other assemblies, but was complicated to build. A test of an implosion-type nuclear weapon was considered necessary due to the enormous step from theory and experiments to the production of a weapon.</p>
<p>Is there a period or location of most concern for releases?</p>	<p>Weather, air flow patterns, and the terrain around the Trinity test site had a large impact on where radioactive fallout from the blast deposited. The highest exposure rates were found east-southeast of Bingham, where Road 146 runs through a steep gorge that became known as "Hot Canyon." The highest gamma intensities were found there, reaching "the vicinity of 20 R/hr" about three hours after the blast. Table 10-1 in the LAHDRA report documents recorded exposure rates greater than 0.1 R/hr, their location, and time after the blast.</p> <p>On a larger scale, airplanes equipped with filters followed the Trinity cloud across Kansas, Iowa, Indiana, upstate New York, New England, and out to sea.</p>
<p>Through what pathways was the material released and transported?</p>	<p>The main exposure pathways for members of the public included:</p> <ul style="list-style-type: none"> • Direct irradiation from the blast, from immersion in the radioactive cloud, or from the cloud passing overhead or near by • Direct, external radiation from contamination deposited on the skin, hair, or clothing of an individual or from contamination deposited on the ground • Internal dose from breathing airborne contamination or re-suspended particles from the fallout • Internal dose from ingestion of contaminated water and food products
<p>What exposure monitoring was performed?</p>	<p>Field monitoring teams measured direct beta/gamma radiation across the countryside downwind of "ground zero." Their instruments were primitive and not well suited to use in the field or to measurement of alpha-emitting radioactivity. The monitoring teams were unaware of several residences that were located in areas of highest exposure rates.</p>
<p>Are there important data gaps that make it hard to assess potential health effects?</p>	<p>Monitoring teams could not measure or assess alpha-emitting radioactivity in the environment from the dispersal of about 4.8 kilograms of plutonium that remained unfissioned.</p> <p>No measures were taken to detect or assess internal deposition of radionuclides within members of the public from inhalation of radioactive particles or ingestion of contaminated water or food products.</p> <p>All studies of Trinity fallout published to date have not reflected internal radiation doses and have been based on field measurements that have not been subjected to the processes used in modern dose reconstruction studies for quality checking, cross-checking against other data sources, application of appropriate adjustments or corrections, and uncertainty analysis.</p>
<p>Where in the draft final LAHDRA report can I find more information on the Trinity test?</p>	<p>See Chapter 10, The Trinity Test.</p>

Tritium (^3H , radioactive hydrogen)



<p>Forms and Properties</p>	<p>Tritium is the only radioactive isotope of hydrogen. The most common forms of tritium are tritium gas (HT) and tritium oxide, also called “tritiated water.” It can also be encountered as organically bound tritium (OBT). In tritiated water, a tritium atom replaces a hydrogen atom, so the chemical form is HTO rather than H₂O. The chemical properties of tritium are essentially the same as those of ordinary hydrogen. It decays with a half-life of 12 yrs by emitting a beta particle.</p>
<p>How did Los Alamos use tritium?</p>	<p>Tritium is an important material for nuclear weapons. When reacted with other light elements, it fuses to release large amounts of energy. It is used in atomic bombs to increase yield without adding more plutonium (“boosting”) and is used in hydrogen bombs to attain high yield. LANL used tritium to produce and test materials for nuclear weapons, in research into fusion energy, and in a method to produce neutrons in accelerators. Most tritium handled or used at LANL was produced at other DOE sites. Tritium was also produced in smaller quantities in reactors and accelerators at LANL.</p>
<p>Is there a period of most concern for tritium releases?</p>	<p>LANL effluent summaries do not address tritium releases before 1967, and LANL has not included numerous accidental losses in its reports of releases after 1967. Accident reports issued before 1967 show that releases in single accidents exceeded some post-1967 annual release totals. Some of these accidental losses are reflected in classified DOE material accountability reports that the LAHDRA team has reviewed and obtained in heavily redacted forms.</p> <p>The early years and these accidental releases are of most concern.</p>
<p>Through what pathways was tritium released and transported?</p>	<p>Tritium has been released to the air, surface waters, and ground water from its uses in research and development, production in reactors and accelerators, and after disposal of associated wastes. The air pathway is likely the most important for off-site doses.</p>
<p>How can tritium affect the human body?</p>	<ul style="list-style-type: none"> • Tritium can be taken into the body by drinking water, eating food, breathing air, and absorption through the skin. • Nearly all inhaled tritium oxide can be taken into the body from the lungs, after which the blood distributes it to all tissues. Most inhaled tritium gas (HT) is exhaled back out again. • Ingested tritium oxide is also almost completely absorbed, moving quickly from the gastrointestinal tract to the bloodstream. • Skin absorption of airborne tritium oxide can be a significant route of uptake because of the normal movement of water through the skin. For someone immersed in a cloud of airborne tritium oxide, uptake by absorption through the skin would normally be about half that from inhalation. • No matter how it enters the body, tritium is uniformly distributed through all biological fluids within one to two hours. • Like water, tritium is eliminated from the body with a half-life of 10 days. • While in the body, a small fraction of tritium is incorporated into easily exchanged hydrogen sites in organic molecules.
<p>Are there important data gaps that make it hard to assess potential health effects?</p>	<p>Estimates of tritium releases before 1967 and accident/incident related releases since then.</p>
<p>Where in the draft final LAHDRA report can I find more information on tritium?</p>	<p>See Chapter 17 (Prioritization of Radionuclide Releases) and Chapter 7 (Tritium Processing at Los Alamos and a Screening Assessment of Public Exposures).</p>

Uranium



<p>Forms Used</p>	<p>Los Alamos used uranium metal and compounds in a variety of ^{235}U enrichments, from depleted to highly enriched.</p>
<p>How did Los Alamos use uranium?</p>	<p>Uranium was used to make atomic weapon components (such as the projectile and target for the gun-type “little Boy” weapon) and reactor fuels. Some reactors used solid fuels and others used uranium solutions.</p> <p>Relatively large quantities of natural and depleted uranium were expended in explosive tests conducted at firing sites including TA-15.</p> <p>Uranium processing and use at LANL included the original Technical Area (Buildings C, D, M TU, and Sigma), TA-3’s CMR Building and Sigma Complex, and at TA-21 (DP West and DP East).</p> <p>Fissile forms of uranium were used for weapon R & D and test devices. Non-fissile forms were use as “tamperers” to confine explosions and reflect neutrons in weapon assemblies. Other activities included testing new reactor designs and evaluation of irradiated uranium fuels.</p>
<p>Is there a period of most concern for uranium releases?</p>	<p>Good effluent monitoring data were not located for the period during which the LAHDRA team believes that airborne uranium releases were the highest (before the 1960s).</p> <p>Explosive tests were conducted (such as at TA-15) from 1949 beyond 1996. LANL has estimated that explosive tests 1949-1970 expended 75,000 to 90,000 kg of uranium.</p> <p>Liquid radioactive wastes were discharged without treatment to Acid Canyon from 1941 through 1950.</p>
<p>Through what pathways was uranium released and transported?</p>	<p>Airborne uranium releases from machining and other processing of uranium occurred through exhaust vents, stacks, and fugitive emissions and were available for air transport to nearby residential areas.</p> <p>Uranium expended in explosive testing was to some extent dispersed to residential areas directly or through resuspension of contaminated soils.</p> <p>Uranium was also contained in liquid wastes that were discharged to local canyons (untreated 1944-1950) and in solid wastes that were disposed of in local burial grounds.</p>
<p>How can uranium affect the human body?</p>	<p>Uranium is a radioactive material and as such a known carcinogen. Enriched uranium has a higher dose coefficient than natural or depleted uranium. It takes a smaller intake of enriched uranium to deliver the same internal radiation dose as from natural or depleted uranium.</p> <p>High exposures to uranium, as a heavy metal, can damage the kidneys. If the exposure ends, the kidneys can often repair and return to normal function.</p>
<p>Are there important data gaps that make it hard to assess potential health effects?</p>	<p>There is a need to more definitively compile historical release estimates from scattered monitoring records and operational data. Much of the effluent data used in LAHDRA prioritization calculations were reported by LANL as uranium or total uranium. Early stack releases from uranium facilities were reported in counts/minute or disintegrations/minute of alpha-emitting radioactivity, assumed to be uranium. Correction factors for sample line loss and filter paper burial loss should be more firmly established, as should release fractions for explosive testing.</p>
<p>Where in the draft final LAHDRA report can I find more information on uranium?</p>	<p>See Chapter 5 (Reactor Development and Operations at Los Alamos), Chapter 8 (Hot Cell Facilities and Operations at LANL), Chapter 9 (Operations with Other Radionuclides), and Chapter 17 (Prioritization of Radionuclide Releases).</p>

Attachment 5

Comments Received on Cards Made Available on the Tables at the 28 January 2010 LAHDRA Public Meeting

1. "Re: Toxic chemicals and hazardous waste: Please include a summary of anecdotal stories of how waste was dumped, buried, and transported offsite. Among those locals who worked at the site, there are numerous stories of documents burned, wastes dumped in various ways and places "off the side of the road," "into canyons," and "down by the river on the way home."
2. "Clearly this is just the beginning. Please fund additional research into environmental health impacts. The lack of data is disgraceful and I hope there is real consideration of the loss to compensate families whose health has been impacted in the area- because it's not their fault that records weren't kept, screenings weren't done, and records were lost, ruined, never kept, etc."
3. "More funding for continued research concerning community health and environment."
4. "Extend funding be imperative to continue this research and set up a community expert panel, particularly in relation to health issues because of the direct results from this data regards environmental pollutants released from LANL! REFUND PROJECT."
5. "Recommendations on Report: Extend Funding to continue research- (limited data!) Acquirement data re dose reconstruction."
6. [Submitted by Beata Tsosie] "If a dose reconstruction is going to happen, it needs to be inclusive of more than two references. It needs to include Females, fetus/infant as a priority because this is the most vulnerable population. Reference "Man/Models" need to be discontinued."
"The CDC needs to recommend immediate clean up of all documented sites that disposed of plutonium/uranium. The description of plutonium disposal in burial grounds deserves attention & clean up."
"What disposal sites were affected by the Cerro Grande fire, concerning erosion & runoff into the rivers. There needs to be further studies done concerning releases from this fire."
"I support the establishment of a community panel comprised of members of the impacted populations. There needs to be in depth health studies, surveys, & funding for these."
"Recommendations need to be made for extensive ongoing cleanup."
"Restitution for trinity site populations!"
"Funding for oral histories."
"We need more trainings, what can a comm. panel do in detail? On these toxin issues, information gathering."
7. [Submitted by Erich Kuerschner, "Children of Paperclip Scientist"] "Thanks to all who participated. I am concerned that people understand what I believe Kathy Sanchez tried to say. The focus from others was primarily on physical impacts. To me, the main impact of generations of allowing killing to occur is what it does to the mind & soul. To me the mental disease resulting from secrecy & isolation is to develop a culture that is mentally sick, that has pervaded our society as a whole."

8. [Submitted by Jeanne Green] “1) Begin epidemiological study to follow up this study. Use a model for small populations so that numbers are not skewed. Include all NM Pueblos going back generations for cancer & disease statistics. 2) Do environmental sampling today at the Trinity Site and other sites that have historically been contaminated. 3) Complete gaps in historical document retrieval since Obama has ordered documents declassified.”
9. [Submitted by Jeanne Green] Close Los Alamos. We don't need any more nuclear weapons. The \$ saved can be used to treat people here who are dying from the labs.”
10. “Why is chromium (released from cooling towers) not included in your study?”
11. “Once LANL departs or stops use of area(s), planning to clean sites so Natives can re-establish their traditional uses of the area and/or site? (Drink, eat and touch).”
12. “How is Native traditional use of land integrated into studies and research? Health & clean-up studies/research.”
13. “Please continue “to ask”– to demand access to gaps in data from the LANL & other sub contract workers data like clean-up workers, janitorial, etc. Childcare services, midwifery service providers– DATA health impacted on Children!! Please continue the process.”
14. [Submitted by Pete Green] “I think we need to have more meeting. We learned a lot. We need to talk about that we need have enghone [?] time. What we learned a lot today. Thank you for all the information you gave us today.”
15. [Submitted by Rosalia Triana] INVOLVE THE COMMUNITY! Surveys. Door-to-door (almost) interviews. ‘On the ground’ exploration of exposure issues (my video/oral histories!)

Re-examine the Trinity Site! What are current data? What remains? Where has it dispersed? Epidemiological study of the communities.

Mescalero population @ Trinity. Pueblo population downwind of LANL. Hispano population downwind of LANL. GET CURRENT DATA (at least!).

Current data collection, from health care facilities, that possibly correlate specific cancers to specific areas (site specific). E.g., found ↑thyroid problems around ‘Trinity?’ Are a lot of N. A. (Mescalero) near Trinity found to have special illnesses?”