

New Mexico Environment Department
Responses to Public Comments on the Draft 2018 Strategic Plan
Kirtland Air Force Base Fuel Leak Cleanup
July 6, 2018

The New Mexico Environment Department (“NMED”) provides the following responses to the public comments it received on the draft 2018 Strategic Plan (“Plan”) for the Kirtland Air Force Base (“KAFB”), aviation fuel leak cleanup.

I. Nancy Bearce Comments dated April 4, 2018 (Appendix A)

NMED Response: NMED agrees that the rising water table increased the complexity of an already complex project. As the parties have done in the past, groundwater data gaps will be filled in a phased, data-driven process. We wish to thank the neighborhoods in advance for their continued understanding and patience as well drilling rigs will once again be at work in the communities to install additional monitoring wells.

NMED also agrees that the goal of protecting Albuquerque’s aquifer and drinking water supply wells remains constant. Towards that goal, the strategy of continuing to collapse the EDB contamination plume with the groundwater extraction and treatment system will be specifically identified in the final Strategic Plan for 2018.

NMED appreciates the suggestion of working with Albuquerque Public Schools (“APS”) and college (e.g. New Mexico Tech) students to educate and promote STEM and other learning opportunities created by the KAFB cleanup project. A plan to reach out to and engage students has been added to Strategy 4. This will be accomplished by:

1. Making presentations to schools and colleges;
2. Encouraging students to create original papers, slide presentations, physical models, animations, poetry, and musical compositions based on cleanup of the aviation fuel leak; and
3. Providing opportunities for students to present their original work at public meetings.

NMED welcomes the suggestion of a multi-jurisdictional recommitment to meeting the goals of the project, and hopes to participate in such an event later this year. NMED will also continue to strive to provide the most accurate and relevant information to the public and media sources to facilitate educated awareness of this on-going clean-up action.

II. Albuquerque Bernalillo County Water Utility Authority (“ABCWUA”) Comments dated March 20, 2018 (Appendix B)

ABCWUA comments raise the following concerns which will be addressed in the NMED responses below:

1. The Plan proposes a shift from active to passive cleanup measures, and proposes a “presumptive remedy of monitored natural attenuation”.
2. The Plan does not include additional characterization of LNAPL source area.
3. The Plan equates a cone of depression in the potentiometric surface with plume capture.
4. The Plan omits the requirement for a robust capture zone analysis.
5. The Plan omits the requirement for a RFI addendum or Phase 2 RFI.

1. NMED Response: The Plan does not propose a shift from active to passive cleanup measures, and does not propose a “presumptive remedy of monitored natural attenuation”.

ABCWUA made repeated comments and objections alleging that the draft 2018 Strategic Plan “allows for no active remediation...” To the contrary, Strategy #3 is to “[d]eploy multiple engineered cleanup technologies, simultaneously and sequentially.” Engineered cleanup technologies, such as those deployed as interim corrective measures, represent active, not passive, remediation strategies.

Monitoring for natural attenuation parameters is a standard industry practice, even if active remediation is occurring, especially at sites contaminated with petroleum products like gasoline and jet fuel. The Air Force, therefore, has been required to monitor for natural attenuation parameters for many years pursuant to its Hazardous Waste Permit administered by NMED. The monitoring data for natural attenuation parameters such as dissolved oxygen, nitrate, manganese, iron, sulfate, and alkalinity, are presented in KAFB’s quarterly progress reports.

The Plan identifies naturally occurring contaminant degradation mechanisms that have been observed at the site, including hydrocarbon oxidation, reductive debromination of EDB, and hydrolysis of EDB. Substantial evidence exists in the administrative record for the site that

these degradation mechanisms have been occurring. Indeed, some of the engineered interim corrective measures have been designed to enhance the natural degradation that has been occurring at the site in accordance with Strategy 2 of the Plan. However, the Plan does not contemplate that degradation rates will achieve site-specific remediation objectives within any time frame, and does not propose that passive monitored natural attenuation (“MNA”) be employed at the site as a remediation methodology. Strategy 2 of the Plan proposes, instead, to monitor natural degradation processes and to identify opportunities for enhancement of these process with active engineered cleanup technologies.

In any case, Strategy 2 has been revised to more broadly address all physical, chemical and biological processes in the context of maintaining a conceptual site model.

2. NMED Response: The Plan specifically includes additional characterization of LNAPL source area.

In its comments, ABCWUA states that, “[t]he Plan no longer acknowledges the remaining, uncharacterized LNAPL source and is instead shifting to a presumptive remedy of monitored natural attenuation”. Slide #8 of the Plan specifically mentions LNAPL coreholes that will be drilled to fill data gaps. Additional information can be found in NMED’s February 23, 2018 approval letter, on which ABCWUA was copied, for the Air Force workplan to fill LNAPL data gaps. The approval letter states:

“The data collected under the Work Plan will provide critical data to address the existing data gap which is complicating efforts to define the nature and extent of light non-aqueous phase liquid (“LNAPL”) at the Site along with allowing the Permittee to estimate the remaining mass of LNAPL.”

3. NMED Response: The Plan does not equate a cone of depression in the potentiometric surface with plume capture.

Slide #7 of the Plan does not equate the observed cone of depression in the groundwater extraction area with plume capture analyses that have been submitted by the Air Force in its quarterly reports. In fact, these two issues are addressed in Slide #7 as separate bullets.

4. NMED Response: The Plan does not omit the requirement for a robust capture zone analysis.

ABCWUA states in its comments that a capture zone analysis was omitted from the Plan. The third bullet on Slide #7 of the Plan states, “EDB plume capture analysis will be rigorously updated.”

5. NMED Response: The Plan does not omit the requirement of a RFI Addendum or Phase 2 RFI.

The Air Force submitted the current RFI in January 2017, and it has been understood by stakeholders that additional RFI work is needed to fill remaining data gaps. Slide #18 of the Plan shows the RFI timeline extending through the end of 2019 to allow for additional well drilling, and monitoring of groundwater, soil vapor and LNAPL, as shown by individual timelines for those activities. The Plan does not specify whether these additional activities will be described as a RFI Addendum or Phase 2 RFI. However, the Plan is clear that this work will be conducted.

Other responses to ABCWUA comments.

- NMED shares the concerns expressed by ABCWUA that passive diffusion bags be used for well sampling in accordance with industry standards and guidelines. The KAFB Hazardous Waste Permit provides the authority to require that this sampling be done properly.
- NMED agrees with ABCWUA on the need for an additional groundwater monitoring well to be installed at the northernmost end of the EDB plume. As NMED, ABCWUA, and the Air Force discussed during the February 6, 2018 meeting, data gap well KARB-106240, originally located in the northeastern plume area, was relocated to a position east of the Veteran’s Administration Hospital as a matter of priority. NMED has communicated that installation of a monitoring well in the northeastern plume area will be a top priority in the next phase of data gap well drilling.
- NMED agrees with ABCWUA that the 2013 compound-specific isotope analyses (“CSIA”), and the slug tests of monitoring wells, were not properly performed. For the purpose of public transparency, these testing activities will be acknowledged in the RFI, but will not be used to draw any conclusions in the RFI or in the Plan. CSIA testing was repeated in 2015, and the data was used to identify the occurrence of hydrolysis as a natural attenuation mechanism at the site.
- NMED agrees with ABCWUA that additional aquifer testing, and re-evaluation of test results for extraction well KAFB-106228, are needed for the purpose of evaluating aquifer properties, and this issue was discussed at the recent modeling Technical Working Group meeting on April 12, 2018 at which ABCWUA was present.

III. Citizen Action New Mexico Comments dated March 22, 2018 and April 6, 2018 (Appendix C)

Citizen Action Comments of March 22, 2018

1. **Citizen Action Comment:** The 2018 Strategic Plan should present EDB and contaminant health dangers.

NMED Response: NMED appreciates this suggestion and has added the following hyperlink in the Strategic Plan to health risk information on EDB in the U.S. Environmental Protection Agency, Integrated Risk Information System (“IRIS”), https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0361_summary.pdf.

2. **Citizen Action Comment:** The 2018 Strategic Plan should be written to the level of detail set by the 2017 Strategic Plan.

NMED Response: One of the challenges in public outreach and communications on this project is finding the appropriate level of technical detail for public presentations and for the annual Strategic Plans. Highly technical documents such as workplans, engineering specifications, and progress reports are posted on NMED’s project website, <https://www.env.nm.gov/kafbfuelplume/> for anyone wishing to review these materials. NMED, however, has been repeatedly criticized for providing information that is too technical, and sometimes intimidating, for the lay public. Since highly technical information is already available to the public, and since the purpose of the Strategic Plan is to present NMED’s vision of what should be accomplished during each calendar year, the 2018 Strategic Plan has been reduced to the sufficient volume of information provided.

3. **Citizen Action Comment:** Critical data gaps remain that must be addressed by the 2018 Strategic Plan.

NMED Response: As has been discussed in NMED’s responses to previous Strategic Plan comments, sufficient data do not exist to support a reasonable estimation of contaminant mass in the subsurface, and of the total volume of fuel that had been leaked. Information on groundwater flow direction and velocity is contained in the quarterly reports and in the RCRA Facility Investigation (“RFI”) report that the Air Force submitted in January 2017. Potential plume movement caused by pumping wells will be addressed in the modeling efforts that are now underway. NMED expects that the detailed modeling results will be presented at the November 15, 2018 public meeting. A summary of potential EDB remediation technologies was prepared by an NMED

contractor and is posted on the project website at this location <https://www.env.nm.gov/kafbfuelplume/>. NMED does not have capital and annual operating cost information for remediation of the EDB contamination, and suggests that Citizen Action request this information from the Air Force. With regard to the likelihood of EDB reaching the Ridgecrest or other municipal wells, both the Air Force and NMED have committed to preventing EDB from adversely impacting any drinking water well. A comprehensive total cleanup plan for the site will be prepared in the future pursuant to the Corrective Measures Evaluation (“CME”), which cannot be initiated until the Phase 2 RFI is approved. NMED and the Air Force anticipate that the CME will commence in 2020.

4. **Citizen Action Comment:** Is the Air Force planning for no further active treatment for aquifer cleanup?

NMED Response: The groundwater extraction and treatment system will continue to be operated as an interim measure. In fact, Strategy 3 of the Strategic Plan calls for the continued deployment of “multiple engineered technologies, simultaneously and sequentially, to cleanup soil and groundwater.”

5. **Citizen Action Comment:** How will the strategies advance aquifer cleanup? Where is a full list of all strategies and how do they move forward to an RFI?

NMED Response: NMED appreciates the suggestion and has clarified Strategy 1 to clearly indicate that the term “wellhead protection” applies to drinking water wells.

The groundwater extraction and treatment system will continue to be operated as an interim measure. NMED never intended that Strategy 2 would be interpreted as an endorsement of switching from an active to a passive remediation strategy. Strategy 2 has been rewritten to clarify these issues.

With regard to Strategy 3, it is important to note that pilot tests are intended to test whether or not specific technologies might work at this site. If so, the pilot test results will be used to inform the CME. Technologies are not selected randomly for pilot testing. Instead, as explained in the Air Force work plans and NMED approval letters posted on the project website, the technologies all have some potential to clean up soil or groundwater, and were selected at the pilot test scale to see how they would perform.

As explained in NMED’s March 8, 2018 letter, <https://www.env.nm.gov/wp-content/uploads/2016/05/KAFB-BFFS-2018-3-6-NOD-response.pdf>, the Air Force has

adequately addressed the issues identified in NMED's November 16, 2017, Notice of Deficiency.

The two RFI reports that the Air Force submitted in 2014 were rescinded by the Air Force and are no longer germane. NMED and the Air Force are in the process of resolving areas of disagreement in the 2017 RFI report, including some of the issues that the INTERA report identified. This iterative process for completion of the investigation phase is consistent with the RCRA process. We believe that submission of Phase 1 and Phase 2 RFI reports, as has been done with other sites in New Mexico, will be in the best interest of moving the project forward.

6. **Citizen Action Comment:** Flawed, defective and inadequate groundwater monitoring.

NMED Response: The Air Force and NMED initially responded to the water level rise by installing well screens above the current water table in anticipation of continued rise, so that the presently dry well screens would eventually monitor the water table zone. The accelerated water level rise has necessitated the installation of additional monitoring wells, as explained in Strategy 1. As the parties have done in the past, data gaps will be filled in a phased, data-driven process.

7. **Citizen Action Comment:** Meaningful public participation for technical groups.

NMED Response: As NMED has informed Citizen Action previously, technical working group meetings include settlement discussions intended to:

- resolve violations of the N.M. Hazardous Waste Act, the N.M. Water Quality Act, and associated regulations; and
- prevent violations of state and federal drinking water standards.

In the interest of finding middle ground on this issue, NMED has begun to post technical working group meeting summary notes on its webpage at this location <https://www.env.nm.gov/kafbfuelplume/kafb-fuel-plume-public-outreach/>.

8. **Citizen Action Comment:** There should be an organizational chart.

NMED Response: NMED appreciates the suggestion and has posted an organizational chart on the project webpage <https://www.env.nm.gov/hazardous-waste/kafb/>.

9. **Citizen Action Comment:** There needs to be an independent oversight panel of experts to issue an annual report for a remediation project of this size and expense.

NMED Response: NMED funded an independent panel of experts to review potential technologies that might be applicable as interim measures for LNAPL remediation in 2015. Funding does not exist for continuation of this panel.

10. **Citizen Action Comment:** The 2018 Plan should provide discussion of proposed pilot tests and identify “engineering remedies” in relation to an RFI.

NMED Response: Highly detailed descriptions of the pilot tests are contained in the Air Force workplans submitted to NMED, and are posted on the NMED project website along with NMED approval letters: <https://www.env.nm.gov/hazardous-waste/kafb/>. The identification of engineering remedies is not an appropriate subject for the RFI. Engineering remedies will be identified and evaluated in the CME that is expected to commence in 2020.

11. **Citizen Action Comment:** Pump and treat extraction wells.

NMED Response: The extraction wells and treatment system were installed in response to demands from local stakeholders, and the community, that measures be taken to protect municipal drinking water wells from EDB contamination. Pump and treat technology also was suggested by the ABCWUA, and by Citizen Action teach-in expert Dwight Patterson.

Since it was necessary to intercept the distal area of the EDB plume, where only part-per-billion concentrations of EDB exist, the groundwater extraction system was never expected to recover a large mass of contamination. The extraction system, however, is recovering EDB that is closest to the ABCWUA drinking water wells. NMED has directed the Air Force to perform a plume capture analysis in accordance with the EPA guidance.

The success of the groundwater extraction and treatment system will not be measured by how many grams of EDB are recovered, but by how effective the system is in capturing the EDB that is closest, and poses the greatest threat, to drinking water wells. The largest mass of contamination remains in the source area, and engineered corrective measures have recovered significant amounts of contamination from those areas. NMED has

12. **Citizen Action Comment:** Where is the RCRA Facility Investigation?

NMED Response: As discussed above, the January 2017 RFI is posted on the NMED website at this location <https://www.env.nm.gov/hazardous-waste/kafb/>. NMED and the

Air Force are in the process of resolving areas of disagreement in the 2017 RFI report, which will be resubmitted as a Phase 1 RFI.

13. **Citizen Action Comment:** The Site History is inaccurate and serves KAFB efforts to minimize public perception of the problems.

NMED Response: KAFB provided NMED with regulatory notification of a discharge from the bulk fuel facility, as required by N.M. Water Quality Control Commission regulations, in 1999. This notification was provided as a result of pipeline failures discovered during hydrostatic testing.

Prior to 1999, a number of unrelated fuel releases at the Albuquerque Sunport and at Kirtland AFB were reported to NMED during the 1970s through the 1990s. These releases were abated under existing NMED regulatory authority. An example of one such release at ST-341 was reported to NMED in 1992. This release was associated with the standpipe for a 300-gallon underground storage tank (UST) for condensate (a mixture of fuel and water) generated by the fuel pump water condensers near Building 1033 at the KAFB Bulk Fuel Facility. Soil investigation was conducted, and a groundwater monitoring well (KAFB-3411) installed to monitor this release did not contain aviation fuel contaminants exceeding regulatory standards. Corrective actions were completed at ST-341, and regulatory closure was granted by NMED on September 21, 2005.

NMED stands by its statement that the regional direction of groundwater flow is shifting.

LNAPL was discovered in monitoring wells in 2007, not in 2006 as Citizen Action has suggested. LNAPL skimmer technology was utilized during 2007-08, and LNAPL bioslurping technology was utilized from 2008-11.

The success of the soil vapor extraction interim measure is demonstrated by the cumulative removal/degradation of approximately 750,000 gallons of fuel (see RFI Report, Figure ES-5, <https://hwbdocuments.env.nm.gov/Kirtland%20AFB/KAFB4479/>), and by the significant decrease of soil vapor contamination concentrations (see slides 12-17 in the March 12, 2015 public meeting presentation <https://www.env.nm.gov/NMED/Issues/KirtlandFuelPlume/documents/2015.03.12.quarterly.meeting.pdf>).

The groundwater extraction and treatment interim measure is designed to collapse the EDB plume away from drinking water wells, a process that is going to take many years. The 2018 Strategic Plan does not claim that such a collapse has yet occurred. The cone of depression that has been observed around the extraction wells provides important

hydrogeologic information, but does not demonstrate plume capture. As stated in Strategy 1, a rigorous analysis of plume capture will be conducted during 2018.

Citizen Action Comments of April 6, 2018

Several of Citizen Action's comments in its April 6, 2018 document also were raised in the March 22, 2018 document. These comments are addressed above, and will not be further discussed below.

The estimate of 24,000,000 gallons of fuel was calculated using the outdated "pancake" model of LNAPL and has since been discredited.

One of the goals of deploying interim corrective measures is to find out what technologies may, and may not, work at the site. Under the RCRA corrective action process, interim measures can be deployed before the RFI report is finalized. As discussed above, some of the interim corrective technologies deployed at this site successfully removed significant amounts of fuel contaminants, and will be further considered during the CME. Interim measures can include pilot tests.

Citizen Action's assertion that, in situ anaerobic bioremediation is an "unproven technology" is incorrect. A simple Internet search for the phrase "in situ anaerobic bioremediation" will identify numerous case studies and papers on this subject. Within New Mexico naturally occurring anaerobic biodegradation has been observed at many groundwater petroleum contamination sites, some of which also involve reductive dehalogenation of chlorinated and brominated contaminants. Monitoring data at the KAFB site clearly show that petroleum hydrocarbons are naturally biodegrading under anaerobic conditions, and that EDB is undergoing reductive debromination in the presence of these biodegrading petroleum hydrocarbons. It is therefore prudent to conduct a pilot test to see if these naturally occurring degradation processes can be enhanced with engineered technologies that include chemical amendments and augmentation with dehalogenating bacteria. If the anaerobic biodegradation pilot test is successful, then the feasibility applying scaling up this technology to a larger plume area will be evaluated.

Citizen Action's assertion that, "No Work Plan for the project appears to have been submitted and approved by the NMED for the Pilot Test," is incorrect. KAFB's workplan for the in situ bioremediation pilot project is posted on the NMED website at this location, <https://hwbdocuments.env.nm.gov/Kirtland%20AFB/KAFB4462.pdf>, and NMED's letter conditionally approving the work plan is posted here <https://www.env.nm.gov/wp-content/uploads/2016/06/Colonel-Eric-H.-Froehlich-John->

[Pike-Letter-12-12-16-SIGNED.pdf](#). Many of the site specific technical issues raised by Citizen Action are either provided in the work plan, or will be determined experimentally as the pilot test proceeds.

Citizen Action's assertion that, "There is no lead biochemist," for the in situ bioremediation pilot test is incorrect. Section 4 of the KAFB work plan identifies Dr. Paul Koster van Groos and Dr. Paul Hatzinger, as Principal Investigator and Co-Principal Investigator, respectively. Dr. Koster van Groos and Dr. Hatzinger, whose qualifications are described in Section 4.2, are both experts in the field of bioremediation.

Citizen Action's assertion that, "The necessary anaerobic environment for growth of the bacteria does not exist for most of the groundwater plume of contamination at Kirtland," is incorrect. The area of the fuel plume that is anaerobic, and potentially amendable to in situ bioremediation, is identifiable on the maps of dissolved oxygen concentrations that are provided in KAFB's quarterly monitoring reports. Dissolved oxygen maps have shown for years that groundwater in the area of the petroleum hydrocarbon plume is anaerobic.

NMED is going to issue a draft Public Involvement Plan for public comment no later than by June 30, 2018 with the intention of improving interaction with public stakeholders.

IV. Nancy and Roger Harmon Comments dated April 3, 2018

Dear Mr. Mcquillan,

I read the recent article in the Alibi about the jet fuel spill with grave concern. I honestly can't believe that, instead of ongoing cleanup, there is disagreement about how it should be handled, 20 years after its discovery and many more decades since the spill began. In the meantime, the plume keeps up its steady progress to our drinking water. Thanks to the Alibi, the public has been reminded of this situation.

There certainly IS interest in this issue among Albuquerque's citizens, and a citizens advisory board is necessary. Let's use the opportunity of a new city administration and an upcoming state election in November to keep this issue in front of the public and to create such a board to tackle the problem immediately. We can not afford to waste any more time!!

Thank you for your attention to this letter.

Sincerely,

Nancy and Roger Harmon

NMED Response:

Dear Nancy,

Thank you so very much for your thoughtful and constructive comments. I want to make sure you are aware that interim corrective measures have been underway for many years to clean up soil and groundwater. In fact, there will be an open house at the groundwater treatment system on Saturday, April 14, on Kirtland Air Force Base. I will send you the invite and directions by separate email. The purpose of this cleanup system is to intercept the pollution, extract it, and keep it away from the drinking water wells. Other interim corrective measures include soil vapor extraction and several bioremediation pilot tests that will be conducted during 2018 to stimulate natural bacteria into doing a better job of eating the hydrocarbon pollutants.

We have a website with lots of technical and regulatory information at this location <https://www.env.nm.gov/kafbfuelplume/>. You can also sign up for our listserv by clicking the “Email Updates” button.

The final corrective remedy for this site will be selected in the next few years after a rigorous analysis of cleanup technologies and a public hearing.

I hope you can visit the open house on April 14. If so, please introduce yourself to me so that we can discuss the cleanup.

Best regards,

Dennis McQuillan
Chief Scientist
New Mexico Environment Department

V. Anne-Marie Sekula Comments dated April 5, 2018

Dear Mr McQuillan:

What is being done to clean up the Kirtland jet fuel spill from the United States Air Force in Albuquerque New Mexico? We really need to protect our water and this jet fuel could be polluting our water. Is it polluting our water in the City of Albuquerque? Can you please put me on an email list concerning this matter. I think the New Mexico environmental department and the City of Albuquerque Water Department and the City of Albuquerque environmental department and the u.s. Air Force and Kirtland must all work together to get this cleaned up

soon. What are the timelines on this? Is fuel still being spilled? This should not be happening in our country.

I look forward to hearing from you.

Sincerely yours,
Anne-Marie Sekula, RN

Anne Marie

"Your heart is the softest place on Earth. Take care of it." Nayyirah Waheed

NMED Response:

Hello Anne Marie,

Thank you so very much for your thoughtful questions and comments.

The aviation fuel has reached groundwater, and created a contamination plume about 7,000 feet long, but it has not hit any drinking water wells. We test the drinking water wells monthly, and have sentinel wells located between the contamination plume and drinking water wells to provide early detection of any migration in those directions.

We have been cleaning up the plume at locations in soil and groundwater with multiple engineered technologies, deployed both simultaneously and sequentially, as interim corrective measures under the Air Force's Hazardous Waste Permit. The final remedy will be selected after the Air Force completes a Corrective Measures Evaluation, and after a mandatory public hearing. The fuel leak was discovered and shut off in 1999, and the fuel system was replaced with modern technology, so there is no ongoing leakage.

We have lots of information about this project on our website at this location <https://www.env.nm.gov/kafbfuelplume/>. You can also subscribe to our project listserv by clicking the "Email Updates" button on our webpage.

NMED and the Air Force are hosting an "open house" of the sophisticated groundwater treatment system that has purified more than 370 million gallons of groundwater to less than detectable levels of contamination. This event is Saturday, April 14, from 10 a.m. until 2 p.m. and I hope you can come out and visit with us to learn more about the project. If you do, please introduce yourself to me. I will forward the open-house invitation to you by separate email.

Please let me know if you have any other questions or comments.

Best regards,

Dennis McQuillan
Chief Scientist
New Mexico Environment Department

VI. J'aime Sirgany Comments dated April 3, 2018

I care about polluted water reclamation.

What can I do as a private citizen. To help find a solution.

NMED Response:

Dear J'aime,

Thank you so very much for your interest in this pollution problem, and for your generous offer to help find a solution.

We have a website with a large amount of technical and regulatory information that you might be interested in. <https://www.env.nm.gov/kafbfuelplume/>. This website also contains an "Email Update" button that you can use to join our listserv for news and announcements on the project. We hold periodic public meetings, deep dives and field trips where you can have direct access to the experts working on this project. In fact, we are having an open house at the groundwater treatment system on Saturday, April 14, at Kirtland Air Force Base. I hope you can drop by and, if you do, please introduce yourself to me so that we can talk.

A number of interim corrective measures to clean up soil and groundwater have been implemented and some are ongoing. In the next few years, after the Air Force completes their Corrective Measures Evaluation, public outreach efforts will be ramped up and will include a public hearing before the final remedy is selected.

This is a complicated and challenging site, and we highly value any and all input from the public.

I hope to meet you and visit with you soon. Best regards,

Dennis McQuillan
Chief Scientist
New Mexico Environment Department

VII. Cody Slama Comments dated April 6, 2018

Kirtland Jet Fuel Spill Comment

In this comment I would like to point out a few concerns about the current plan and what is not in the plan. I am concerned that the current monitoring of the wells is not adequate. As the aquifer has been rising it has made many of the wells ineffective. Even though the new plan

explains that new monitoring will be put in place, the old wells were ineffective since 2013 when the water table was known to be rising. This shows me that ineffective monitoring has happened and can happen again. The public needs to be aware of ineffective monitoring. With this said a plan needs to be put into place to inform the public when any danger of EDB could be in the drinking water. Having ineffective monitoring is one example of when the public needs to be notified. Emergency public meetings need to be included in the plan, so the public can be informed about any dangers. Also the plan must include a back up plan, if EDB does ever reach the drinking water and we the public needs to know what this plan is. This is very important because we need to have access to uncontaminated water for drinking, cooking, and cleaning. A clear distribution process needs to be put into place and talked about now, so we can be prepared in the future.

I appreciate all the work that is being done to protect my communities drinking water and hope that you will consider adding a back up plan to the current plan.

Best wishes,

Cody Slama

NMED Response:

Cody,

Thank you so very much for your thoughtful and constructive comments. We will add language in the final Strategic Plan to address the issues you raised about drinking water protection. It is ironic that, in many contamination sites in NM, we typically see a declining water table and monitoring wells drying up. At the Kirtland site, however, we have had data gaps created by the rising water table and flooding of well screens.

Cleanup of the fuel contamination is being required and overseen by the NMED Hazardous Waste Regulations. Protection of drinking water, and compliance with the federal Safe Drinking Water Act, is overseen by the NMED Drinking Water Regulations. The latter program includes activities like Wellhead Protection, Emergency Planning and Response, and Public Notification requirements when there is an exceedance of health standards in drinking water. You may have seen the public notices, and boil water orders, NMED issues when there have been detections of coliform bacteria in public drinking water. I would like to discuss these subjects with you further.

I hope that you can stop by for the open house next Saturday, April 14, so we can discuss these issues further. I am going to forward the location, and details to you by separate email.

Best regards,

Dennis McQuillan
Chief Scientist
New Mexico Environment Department

Appendix A

Nancy Bearce Comments dated April 4, 2018

I am writing to provide a few public comments for the above referenced KAFB 2018 strategic plan.

While being one the longest community persons monitoring the remediation of the jet fuel plume, I understand and respect the complexity of this remediation project. This longevity provides a unique perspective as well.

The past year or two has seen dramatic changes in personnel for the project, including the loss of NMED's Mr. McQuillen to another project with his replacement being Ms. Diane Agnew; change of KAFB commanders; change in KAFB's science experts and finally the return of Mr. McQuillen. In my opinion, these changes shook the stability, productivity, and partnership buy-in for the project team. To quote the change phenomenon in the sports world, we are experiencing a 're-building year(s) in the team'.

To add more challenge to the changing team members to the remediation was the changing conditions of the aquifer created by resident's successful water conservation and the full impact of the San Juan Chama water project. No water expert from NMED to the ABCWUA foresaw the speed of which the aquifer recharged and the rise of its water level. Higher water levels fowled many of the monitoring wellheads as well as extraction wells when known data gaps were trying to be addressed by installing more wells. What a change in the complexity of this project, as if it wasn't already a challenge!

None of this was news to me. The quarterly project meeting updates informed the public, if the public attended. But for the remediation team, the changes would cause delay as new responses had to be drafted, reconfiguring of the strategies, and partnering team dynamics had to be re-established to continue or at least to get back to the working partnership that hit its full stride and momentum in 2015 and 2016.

How do the above noted dynamics relate to the strategic plan, is the question. For me, I found the 2018 strategic plan unremarkable, flat and with a sense of going through the motions. And I stated that in my public meeting comments saying I was not surprised by anything in the plan. The goal of protecting Albuquerque's aquifer and drinking water supply wells remains constant. The lack of the stated goal to continue the fuel cleanup was noted in ABCWUA response and needs to further discussion.

What is missing in the strategy is a sense of proactive work in the remediation project. As I discussed in comments, there's no listed continued strategy of working with APS and college (NM Tech) students to educate and promote STEM and other learning opportunities created by the project. This is a win-win for New Mexico in addressing perceived 'brain drain' and unprepared work force education and skills. The purpose is to ensure adequate project personnel to oversee this and similar contaminations into perpetuity.

Proactive media and community outreach must be encouraged and stay engaged. An example is the March 29th Alibi article that is full of inaccuracies including the flagrant use of 2-3-year-old photographs that misrepresent the status of the project. But if NMED doesn't address the microrotations, the public will remain in the dark and worse yet, have ERRONEOUS information about the project and the safety of their water.

Perhaps what is called for is a project re-commitment meeting to the goals, expectations and outcomes by not only the team but to include our elected officials for public representation and newly installed Air Force Secretary Wilson. If any other issues need to be voiced, that would be the time to clear the air and re-engage in the project collaboration.

A quick re-hash of my 2016 suggestions are still applicable to long term and sustainable success of this project:

- Continue expanding community input by using existing city neighborhood associations/coalitions **and** the new Mayor Keller administration for a renewed community information campaign;
- Actively continue outreach and input from area church groups, STEM schools and teachers, public charter schools, professional health organizations, KAFB 344th Medical Wing, VA Hospital Staff, etc.;
- Continue to provide new and different presentations inclusive of adult learning styles, experiential learning, including field trips, while minimizing scientific lingo and acronyms.

Thank you for your continued work on the KAFB jet fuel plume remediation project and the safety of our water.

Sincerely,

Nancy Bearce/via electronic mail

Nancy Bearce
La Mesa Community Improvement Association, Board Chair
La Mesa Community Land Trust, Co-founder and Board Member

Appendix B

Albuquerque Water Utility Authority Comments Dated March 20, 2018

The Water Authority appreciates the opportunity to provide comments on the 2018 Kirtland Air Force Base (KAFB) Bulk Fuels Facility (BFF) leak Strategic Plan (the Plan). We have completed our review and this memo includes comments compiled by the Water Authority and our contractor. In summary, the Water Authority is alarmed at the proposal of a strategy that allows for no active remediation given the proximity of water supply wells and the limited network of groundwater monitoring wells. In addition, the strategies in the Plan are disconnected from the stated goal of protecting drinking water and the aquifer and undermine Water Authority's ability to ensure the safety and quality of drinking water. Furthermore, the 2018 Plan no longer includes a strategy or emphasis on characterizing the remaining source at the site, a critical data gap for protecting drinking water and the aquifer. The prior three strategic plans have been more encouraging, and frankly, more representative of the stakeholders' consensus on the site's status. The Water Authority is unclear on what data is being used to justify the downshift to the passive monitoring for natural attenuation.

Inclusion of the Water Authority's logo on the final page of the Plan implies our endorsement of the strategies and project timeline. It also overstates our involvement in the development of the path forward for the BFF site. The Water Authority comments and staff have been sidelined in the stakeholder and technical working group process, which represents a breakdown of the partnership success that has been touted for the site since 2015.

The following summarize our more detailed comments which we are willing to discuss you are your earliest convenience.

1. The updated Strategy 2 implies that the site is moving from an active remediation strategy to a passive remediation strategy via MNA. The Water Authority is fundamentally opposed to the application of MNA, as it extends the damages to water resources and places liabilities on the water users and utilities, while allowing the responsible party to take minimal efforts towards corrective action.

This is most prominent for the BFF site that continues to have increasing concentrations of benzene and ethylene dibromide (EDB) and that is in close proximity to drinking water supply wells. To date, the Water Authority has not seen any information or data that demonstrates that degradation rates at the site will "achieve site-specific remediation objectives within a time frame that is reasonable compared to that offered by other more active methods" (EPA, 1999). As such, it is the Water Authority's view that discussion of MNA at this time is irresponsible and represents a disappointing shift in NMED's expectations for the responsible party and future of the remediation of this site.

2. The 2018 update to the Plan makes a significant shift in Strategy 2 for the BFF fuel contamination. For the past three years the New Mexico Environment Department (NMED) has maintained that completing characterization of the light non-aqueous phase liquid (LNAPL) at the site is an important strategy to protect Albuquerque's drinking water supply. The 2018 version of the Plan no longer acknowledges the remaining, uncharacterized LNAPL source and is instead shifting to a presumptive remedy of monitored natural attenuation (MNA). To date, the Water Authority has not seen a presentation or is aware of a document that demonstrates the delineation of LNAPL in the soil and groundwater.

It is our position that the NMED maintain complete characterization of LNAPL as a top-most strategy as remaining LNAPL is a potential source for continued contamination of groundwater, especially as the water table continues to rise. If the full extent of the LNAPL is not identified, then the public and other stakeholders should expect a much longer duration for and less probability of a successful cleanup at this site.

3. Page 7, Strategy 1, 2nd Bullet: The NMED references a cone of depression that persists within the groundwater extraction area. The Water Authority would like to note that an observed cone of depression in the potentiometric surface does not equate to plume capture and therefore is not a reliable metric for determining the effectiveness of the interim pump and treat system. The Water Authority has noted this several times during technical meetings.
4. Page 7, Strategy 1, 3rd Bullet: The bullet references that plume capture analysis will be "rigorously updated" but there are no specific statements on what the analysis will be. Moreover, this bullet combined with the March 6, 2018 NMED letter to the Air Force regarding the November 16, 2017 Notice of Deficiency implies that the NMED is relaxing the emphasis on the need for a robust plume

capture analysis. The Water Authority maintains that the Air Force must use a groundwater model that can be easily updated to adapt to changing site conditions and that an uncertainty analysis is critical for evaluating the results of the analysis given the range of known unknowns at the site.

5. Page 7, Strategy 1, 4th Bullet: The Water Authority appreciates the approach to utilize existing well infrastructure for monitoring LNAPL and groundwater concentrations at the BFF site. However, an outstanding technical concern raised by the Water Authority and other stakeholders at the September 2017 technical working groups is the sampling method for the previously dry soil- vapor wells. At the time, the Air Force was proposing the use of passive diffusion bags for the soil-vapor wells. Many of the wells could have floating LNAPL due to their location within the source area. Both the Interstate Technology and Regulatory Cooperation (ITRC) (ITRC, 2002) and United State Geological Survey (USGS) (USGS, 2001) clearly state that passive diffusion samples should not be in contact with LNAPL because it can clog the pores of the bag and bias results. The Water

Authority reiterates its concern for applying this sampling technology at wells with the potential for LNAPL to be present.

6. The map on page 8 of the Plan shows the NMED approved network of new groundwater data gap wells and the current monitoring well network. In the September 2017 technical working group meetings, the Water Authority highlighted the fact that there are currently no groundwater monitoring wells screened at the appropriate interval at depth to verify the deep EDB trends observed at wells KAFB-106037 and KAFB-106058. At those meetings, NMED and the Air Force agreed to the placement of a down-gradient, deeper groundwater monitoring well to fill this data gap but the current approved work plan no longer has this well. The Water Authority maintains the need for a deep groundwater monitoring well at the northernmost end of the EDB plume to ensure that the vertical extent of the plume has been defined.
7. Pages 9 and 10 provide insight into the strategy being presented by NMED for monitored natural attenuation of groundwater contamination. The graphic points to three degradation processes for the groundwater plume: hydrocarbon oxidation, EDB hydrolysis, and reductive debromination. To date, the Water Authority has not seen a presentation or been privy to any report or documentation that provides evidence of these processes occurring at BFF or an estimate of the rates based on site-specific data. Data presented at earlier technical working groups indicated that reductive debromination is occurring at a very localized scale at the BFF site and is not likely a plume-wide degradation process. Additionally, there is no discussion of how these degradation processes may be impacted with the rising water table as formerly dry soil in the vadose zone becomes saturated and dormant populations of bacteria are activated.
8. Page 9 includes a statement that EDB hydrolysis is occurring at the site. The 2017 Resource Conservation and Recovery Act (RCRA) Facility Investigation

(RFI) Report included an analysis of compound-specific isotope analysis (CSIA) but used 2013 CSIA data that NMED, the Air Force, and stakeholders agreed had substantial quality issues and was not a usable dataset. The Water Authority would like to request that the analysis to evaluate degradation processes, including hydrolysis, be recompleted using the more current CSIA dataset collected in 2015 and that the results be made available.

9. Page 18 is a revised project timeline that is dramatically different from what was presented to the Water Authority governing board and at the November 2017 public meeting. Of particular concern to the Water Authority is the removal of the RFI Addendum from the timeline, a document that was agreed to by the NMED, Air Force, and stakeholders at the September 2017 technical working groups. This addendum is needed to document the completed characterization of LNAPL at the BFF site and to address the existing concern with the submerged groundwater monitoring wells in the network. Many of the Water Authority's concerns were sidelined at the September 2017 meeting with the promise of addressing them in

the RFI Addendum. With the removal of this item from the path forward for the site it is not clear if or when the Water Authority's concerns will be addressed, flagging a breakdown of the stakeholder process.

10. The project timeline on page 18 includes arrows for the slug tests of groundwater monitoring wells and the aquifer test at the first groundwater extraction well KAFB-106228. When slug test data were originally presented to NMED and the project stakeholders it was decided that the analyses were flawed and therefore the parameters estimated were not usable. The Water Authority was informed that the NMED and Air Force had agreed to not proceed with that data but that a formal disapproval letter would not be sent. The inclusion of this data set on the timeline graphic indicates that the NMED has reversed its position on the usability of the slug test data. The Water Authority would like to express concern regarding the use of the flawed data analyses as it could create biases in the groundwater modeling and result in misguided decisions.
11. The project timeline on page 18 has been revised to include an arrow for the aquifer test at groundwater extraction well KAFB-106228. This aquifer test analysis is oversimplified, and the Water Authority provided detailed comment and feedback to the NMED and Air Force in January 2016. The NMED and Air Force agreed to complete additional aquifer tests at wells KAFB-106233 and KAFB-106234 to further evaluate aquifer properties to inform future groundwater modeling and plume capture analysis. As part of that effort, the results from the aquifer test at KAFB-106228 would be re-evaluated. Past and current groundwater modeling efforts have highlighted how sensitive models are to aquifer properties. This timeline does not include an arrow for these additional aquifer tests. The Water Authority would like to reiterate its request that additional testing and analysis be completed at the site to reduce the uncertainty in aquifer properties which will in turn result in more robust tools for site decision-making.
12. The rising water table, incomplete characterization of LNAPL and the source area, submerged groundwater monitoring wells, and inadequate degradation analyses completed to date all make it premature to take a passive, MNA approach to remediation of the BFF jet fuel leak. The October 2017 guidance from the EPA outlines the requirements for establishing MNA at a site and includes the following key components for selecting MNA:
 - Documentation of adequate source control;
 - Comprehensive site characterization, resulting in a detailed conceptual site model;
 - Evaluation of time frame for meeting cleanup objectives;
 - Long-term performance monitoring; and
 - A contingency plan.

13. The EPA guidance also states that monitoring of natural attenuation is not suitable for sites where receptors may be impacted. Given the proximity of water supply wells to the known contamination at BFF, acknowledging the data gaps in characterizing the LNAPL source, it can be reasonably stated that the potential impact to receptors is real and thereby negating the applicability of the MNA approach. The inclusion of the Water Authority logo on Pg. 20, "The Partnership for Success," implies that the strategies outlined by the NMED are endorsed and supported by the Water Authority. It also implies that the entities listed are working in partnership to make progress at the site. The Water Authority does not support a plan that endorses a switch from aggressive cleanup activities to MNA and passive remediation of the jet fuel contamination. Moreover, the omission of key requests from the Water Authority from the strategic plan and path forward for site (e.g., RFI addendum, downgradient groundwater monitoring well, capture zone analyses, etc.) indicate that comments and concerns expressed by the Water Authority are being dismissed during project decisions. The Water Authority therefore requests that our logo be removed from the strategic plan.

References

U.S. Environmental Protection Agency (EPA), 1999. Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites. Office of Solid Waste and Emergency Response. Directive 9200.4-17P. EPA, 2017. How to Evaluate Cleanup Technologies for Underground Storage Tank Sites, A Guide for Corrective Action Plan Reviewers. Land and Emergency Management. EPA 510-B-17-003, October.

Interstate Technology and Regulatory Council, 2002. Passive Diffusion Bag Samplers for VOC Sample Collection from Groundwater Monitoring Wells. Northeast Waste Management Officials' Association. Advisory Opinion, February 15, 2002.

United State Geological Survey (USGS), 2001. User's Guide for Polyethylene-Based Passive Diffusion Bag Samplers to Obtain Volatile Organic Compound Concentrations in Wells. Water-Resources Investigations Report 01-4060.

Appendix C
Citizen Action New Mexico Comments
Dated March 22, 2018 and April 6, 2018

2018 STRATEGY PLAN - THE KIRTLAND JET FUEL SPILL
Citizen Action New Mexico Comments
March 22, 2018

The strategies proposed in the 2018 Strategic Plan ("Plan") for the Kirtland Air Force Base 6-24 M gallon Bulk Fuels Facility jet fuel and aviation gas spill are unsupported by any technical data presentation. There is no proof that the toxic, carcinogenic plume of Ethylene Dibromide (EDB) is not continuing its northeasterly movement toward contaminating Albuquerque municipal drinking water wells. The goal of *aggressive cleanup of soil and groundwater* should be put back into the 2018 Plan. Aquifer cleanup was required under the Resource Conservation and Recovery Act (RCRA) by the NMED April 2, 2010 letter^l to Kirtland Air Force Base. The Plan should make clear that "Monitored Natural Attenuation" does not mean that KAFB will be allowed to devote minimal resources to cleanup of the aquifer from the jet fuel/aviation gas pollution. Monitored natural attenuation ordinarily is only used after all other technical remedies have been exhausted.

PLAN SHOULD PRESENT EDB AND CONTAMINANT HEALTH DANGERS

The Plan should set forth information about the extreme toxicity of the Ethylene Dibromide (EDB) and the chemicals contained in the Liquid Non-aqueous Phase Liquid (LNAPL).

EDB is highly toxic, a probable carcinogen, and causes both acute and chronic health effects. Acute effects can include damage to the liver, stomach, and reproductive system while chronic health effects include damage to the respiratory system, nervous system, liver, heart, and kidneysⁱⁱ. The current United States Environmental Protection Agency (USEPA) maximum contaminant level (MCL) for EDB, of 0.05 µg/L (ppb) [or 50 ppt], is the second lowest MCL for all drinking water contaminantsⁱⁱⁱ. People can be exposed to EDB through drinking water, dermal absorption while bathing, and inhaling it after it has been released from the water while cooking and bathing. ^{iv}The Massachusetts Department of Environmental Protection (MADEP) has set an even more stringent MCL of 20 ppt^v.

The 2018 Strategic Plan should be written to the level of detail set by the 2017 Strategic Plan. It is not an integrated plan and needs to show a pathway for cleanup of the aquifer. The Plan should explain why the strategies were chosen and will move cleanup forward to clean the entire aquifer. The Plan does not show how the pump and treat will accomplish a cleanup goal because of its minimal removal of EDB. The slide picture collection does not adequately inform the stakeholder as to how the strategic plan will accomplish cleanup. There should be a table of contents.

CRITICAL DATA GAPS REMAIN THAT MUST BE ADDRESSED BY THE 2018 STRATEGY PLAN

Citizen Action requested the 2016 Strategy Plan to contain the following items that still are missing from the 2018 Plan necessary to develop a Conceptual Site Model^{vi}:

1. Total estimated mass of EDB in each zone, i.e. vadose, LNAPL, and leading EDB GW plumes.
2. Total volume of fuel spilled (estimate) for aviation gas and jet fuel.
3. Flow direction and velocity at leading edge of the EDB plume.
4. Present effect on plume movement cause by pumping well/wells.
5. A summary of the various EDB remediation technologies.
6. The capital and annual operating cost for the remediation of the EDB.
7. Discuss the likelihood of EDB reaching the Ridge Crest or other municipal wells.
8. Discuss the comprehensive total cleanup plan for the Kirtland BFF spill (vadose, NAPL, EDB).

IS THE AIR FORCE PLANNING FOR NO FURTHER ACTIVE TREATMENT FOR AQUIFER CLEANUP?

In 2011 The Air Force assured Congressional Committees^{vii} that

Using a performance based acquisition approach, the current objectives for cleanup would stop the forward migration of the fuel plume by September 2014 and completely remove the fuel on the groundwater by September 2017. Removal of the fuel removes the source for the dissolved plume. However, dissolved constituents will still remain in the groundwater. *Using natural processes without further active treatment*, modeling indicates that the dissolved constituents would meet drinking water standards by 2025. (Emphasis supplied).

How will the strategies advance aquifer cleanup? Where is a full list of all strategies and how do they move forward to an RFI?

Strategy #1 should state what wellheads, what strategy.

Strategy #2 to “Monitor the natural attenuation of fuel contamination in soil and groundwater” plays into the 2011 Air Force statement of “natural attenuation” to walk away from the expense and cleanup of EDB and LNAPL contamination. EDB has been shown to be extremely persistent once it has reached the groundwater. There is no evidence that natural attenuation will accomplish protection of the municipal wells.

Strategy #3 should indicate why any of the engineered technologies would work. There seems to be a random pick of technologies for strategies. Narratives are needed for the 3 strategies as to why they’re chosen to justify their use. RCRA does not have “initiatives.”

The Plan makes should mention still unresolved issues that were identified in 1). The 2017 NMED Notice of Deficiency <https://www.env.nm.gov/wp-content/uploads/2016/05/KAFB-BFFS-Notice-of-Deficiency-11-16-2017.pdf> and 2). The 2017 Intera report (obtained by Citizen Action by a Public Records Request and should be made public on both the NMED and the Water Utility Authority websites).

The RFI that was introduced in 2014 was so defective for data gaps that it had to be withdrawn and no written critique or evaluation of that RFI was offered by the NMED to the public.^{viii} The 2017 RFI^{ix} has not received evaluation but likewise has numerous data gaps and misinformation. According to the INTERA Review, the January 2017 facility investigation report is so flawed that a conceptual model still cannot be made that would lead to remedial strategies for the fuel spill. NMED should address the INTERA review. Presenting a Phase I and then a Phase 2 RFI may be overly burdensome for review by the public.

FLAWED, DEFECTIVE AND INADEQUATE GROUNDWATER MONITORING

The problem of submerged groundwater well screens seems portrayed by the Plan as a recent event. However, the rising water table was identified at least by 2013 and nothing was done about it.^x Citizen Action identified a rising water table three years ago along with sampling contaminated with air bubbles in its Comments (1/30/2015) for the 2015 Strategy Plan.

NMED’s 11/2017 Notice of Deficiency was slow in coming and *ignored stakeholder concerns*. Five years passed without the Air Force taking action. NMED now agrees that degradation rates for contaminants of concern were overblown and could have been the result of a rising water table.

NMED should not let KAFB off the hook for the detailed concerns set forth in its 11/2017 NOD and the INTERA review with its March 6, 2018 statement that KAFB has “sufficiently addressed the deficiencies.” <https://www.env.nm.gov/wp-content/uploads/2016/05/KAFB-BFFS-2018-3-6-NOD-response.pdf> the concerns will supposedly be addressed by future reports and proposed actions by KAFB. There should be

a closely monitored performance goals and assessment on a set time table for the critical items listed above for an RFI report.

The 2018 Plan should explain how the new groundwater monitoring wells to be drilled by KAFB will be sufficient to replace fifty-three (53) of sixty-two (62) submerged shallow monitoring wells. Strategy #1 claims that there is “No detections of EDB in drinking water wells or sentinel wells.” At present, all but 9 of the 62 shallow ground water monitoring wells are submerged. The municipal drinking water wells have 800 ft. long screens drilled with mud rotary that hides evidence of contamination along with high levels of water sample dilution in municipal wells. The USGS monitoring wells are not standard size and were drilled with drilling muds that adsorb contaminants of concern, especially when monitoring at levels of parts per trillion for EDB.

MEANINGFUL PUBLIC PARTICIPATION FOR TECHNICAL GROUPS

The NMED and KAFB claim that there is a collaborative effort by groups that are shown on the Plan Chart at p. 20 (A Partnership for Success), but the public is cut out of any timely receipt of technical information. The public and news media are denied transparency in knowing the real facts about the jet fuel spill by being excluded from any technical meetings or reviewing minutes of such meetings that take place. There are no agendas, minutes or rosters of attendance at technical group meetings. NMED documents that are posted on its website cannot be searched and KAFB document search is problematic. The Plan uses terms that are not defined for stake holders

The 2017 INTERA Review was never shown to the public but was obtained by Citizen Action by a Public Records Request along with emails between the Air Force and NMED. The emails discuss how to minimize “backlash” about the July 2017 meeting cancellation and to “strengthen public trust.” The public was cut out of the loop about the real technical concerns. Transparency and furnishing honest technical assessments would enhance public trust.

There should be an organization chart showing the interrelationships between the AF and various regulatory entities and identifying the tasks and the co-ordination and members of any technical groups. List contact telephone numbers. The regulatory and Air Force management structure for overview, evaluation and remediation is in constant turnover with a management crisis.

There needs to be an independent oversight panel of experts to issue an annual report for a remediation project of this size and expense. Technical group meetings agendas, minutes with issues and their resolution should be made available to the public.

THE 2018 PLAN SHOULD PROVIDE DISCUSSION OF PROPOSED PILOT TESTS AND IDENTIFY “ENGINEERING REMEDIES” IN RELATION TO AN RFI.

The public needs more than an appearance that something is being done or thought about. Technical conflicts that may exist for anaerobic vs. aerobic methods with respect to EDB degradation should be addressed. Further spread of contamination that may result from well injection, bioventing or problems with mixing should be addressed.

Pump and Treat Extraction Wells

The 2018 Plan should discuss problems with the much touted groundwater extraction wells that have not been cost effective and have removed insignificant amounts of EDB from the groundwater. The Plan only obliquely makes any reference to the use of extraction wells. Associated problems with biofouling,

treated water disposal locations, infrastructure, spreading the EDB and other contaminants further north, and expense are ignored.

Several years ago, the Air Force promised “up to” eight Pump and Treat (P&T) extraction wells but provided no actual agreed number, time period for installation or locations. Only four are installed. It is unproven that installation of even up to eight pump and treat extraction wells would be adequate to contain or collapse the EDB plume movement. At present, removal of one gram of EDB requires pumping approximately 3,800,000 gallons of water. A single P&T extraction well will remove perhaps 100 gallons per minute of contaminated water. Hypothetically, eight extraction wells operating full time would extract 800 gallons per minute or $8 \times 100 \times 60 \times 24 \times 365 = 420,480,000$ gallons per year. In a year’s time one extraction well could optimally only remove 13.8 gm of EDB or 111 gm for 8 extraction wells. *Millions of grams of EDB may be in the aquifer.* $1,000,000 \text{ gm EDB} / 111 \text{ gm} = 9009$ years.

Problems with extraction well shutdowns are not identified that reduce operations. Biofouling is a problem. KAFB-106233 was offline in Q1 2017 due to biofouling and undergoing rehabilitation. Extraction well KAFB-106157 in the parking lot of the Veterans Administration facility had to be plugged and abandoned. KAFB-106157 “did not meet performance objectives for inclusion in the KAFB groundwater remediation system.” <https://hwbdocuments.env.nm.gov/Kirtland%20AFB/KAFB4602.pdf> 9/7/17.

WHERE IS THE RCRA FACILITY INVESTIGATION?

Four years of Strategy Plans are not an adequate substitute for a comprehensive RFI that was due four years ago. Strategy Plans are unenforceable. This spill has been on NMED’s books since 1999. The 2018 Plan^{xi} fails to acknowledge the serious multiyear delays and deficiencies of KAFB to provide: 1). a RCRA Facility Investigation Report (RFI) 2). an adequate Risk Assessment based on an RFI and, 3). timely, effective remedies based on an RFI. The Plan chart at p. 18 indicates that the RFI will be further delayed. There is no enforceable timetable on the chart for when an RFI-based Risk Assessment will be provided. No effective Corrective Measures Implementation can be put in place until an adequate RFI is completed.

The Site History is inaccurate and serves KAFB efforts to minimize public perception of the problems.

1999 Bulk Fuels Facility (“BFF”) leakage discovered.

Comment: Leakage was first discovered seven years earlier in 1992 at the BFF Pump House Bldg. #1033 with pipelines that extended to the BFF unloading facility. The leakage was identified for corrective action as ST-341.^{xii} Legally required annual pipeline inspections of the BFF and use of 5 yr. pressure tests were not performed from 1953 to 1999. A handful of inspection waivers were issued by KAFB knowing that the pipeline valves would fail.^{xiii}

The Site History claim is doubtful that: “2017 – Observations of shift in regional direction of groundwater flow, away from northward, caused by water level rise.”

Comment: INTERA rejected this assertion.

LNAPL was discovered from Bullhead Park skimmer wells to have left the KAFB site in 2006.

Comment: The public was not informed about that until 2008.

2003-15 – Successful soil vapor extraction (SVE) remediation conducted to vacuum contaminants out of spaces between soil particles in the source area.

Comment: The mass of contamination in the vadose zone is unknown to determine a success for LNAPL or EDB.

2015 – Groundwater cleanup began as interim corrective measure aiming to collapse EDB plume away from drinking water wells.

Comment: As pointed out by Intera Reviews for the fuel spill there is no evidence that the EDB plume is collapsing the EDB plume away from the municipal wells.

2016 – Cone of depression observed around groundwater extraction wells.

Comment: So what? Does not correlate with the movement of groundwater.

CONCLUSIONS

1. The 2018 Plan should provide a comprehensive roadmap for protection of human health and the environment. It should provide a strategy that has a demonstrated basis to prevent the EDB from moving to the municipal wells.
2. The goals should be set for achievement in an enforceable, cognizable delivery time period.
3. The plan should present remedies that are technically justifiable, coordinated or based on reliable data or an RFI.
4. The plan should follow RCRA procedures for characterizing the fuel spill, conducting an adequate RFI, CMS and CMI.
5. P&T extraction wells have proven to be a flawed strategy.
6. The plan should address independent oversight.
7. The plan should provide for genuine public participation.

References

ⁱ https://www.env.nm.gov/HWB/documents/KAFB_4-2-2010_Bulk_Fuel_Spill_HWB_Letter.pdf

ⁱⁱ USEPA, Basic Information about Regulated Drinking Water Contaminants, (2010)
<http://water.epa.gov/drink/contaminants/basicinformation/ethylene-dibromide.cfm> Massachusetts Department of Environmental Protection, Current Regulatory Limit: Ethylene Dibromide (EDB), (2004)
<https://search.mass.gov/?q=EDB>

ⁱⁱⁱ USEPA, National Primary Drinking Water Regulations, EPA 816-F-09-004. (2009)
water.epa.gov/drink/contaminants/upload/mcl-2.pdf.

^{iv} Washington State Department of Health <https://www.doh.wa.gov/portals/1/Documents/Pubs/333-101.pdf> p.9

^v Massachusetts Department of Environmental Protection, Current Regulatory Limit: Ethylene Dibromide (EDB), (2004) <http://www.mass.gov/eea/agencies/massdep/water/drinking/standards/ethylene-dibromide.html>

^{vi} KAFB was supposed to have submitted a conceptual site plan by October 1, 2014.

^{vii} https://www.env.nm.gov/HWB/documents/KAFB_7-10-2014_Interim_Treatment_Dissolved_Phase.pdf

^{viii} https://www.env.nm.gov/HWB/documents/KAFB_3-2011_Report_to_Congressional_Committees.pdf

^{ix} https://www.env.nm.gov/HWB/documents/KAFB_8-27-2014_RFIs_retraction.pdf

^x https://www.env.nm.gov/HWB/documents/KAFB_4-2-2010_Bulk_Fuel_Spill_HWB_Letter.pdf

^x https://www.env.nm.gov/HWB/documents/ABCWUA_8-21-2013_KAFB_Presentation.pdf

^{xi} [https://www.env.nm.gov/wp-](https://www.env.nm.gov/wp-content/uploads/2018/03/2018.KAFB_Fuel_Leak_Strategic_Plan_Official_Draft.pdf)

[content/uploads/2018/03/2018.KAFB_Fuel_Leak_Strategic_Plan_Official_Draft.pdf](https://www.env.nm.gov/wp-content/uploads/2018/03/2018.KAFB_Fuel_Leak_Strategic_Plan_Official_Draft.pdf)

^{xii} <https://kirtlandafb.tlisolutions.com/sitedocs/PDFS/22/2291.PDF>

^{xiii} <http://www.radfreenm.org/index.php/mm-kafb/kafb-overview/kirtland-jet-fuel-spill-historical-summary>

Supplemental Comments to 2018 Strategy Plan
Citizen Action New Mexico
April 6, 2018

The historical road for the estimated 24,000,000 gallon Kirtland jet fuel and aviation gas spill is littered with ineffective, half-baked, expensive and failed “interim” remedial efforts that are largely a result of the absence of a viable RCRA Facility Investigation report and the lack of a competent conceptual site model. The other factor is the unreasonable opposition of the Air Force and the New Mexico Environment Department (NMED) to seek independent technical oversight.

The public is simply being lied to in an ongoing conspiratorial shell game used by the Air Force to hide the fact that the Albuquerque aquifer will not be cleaned up. The Air Force can no longer claim that the Pump and Treat technology will clean up the carcinogenic pollutant Ethylene Dibromide in a time frame less than several millennia. The Air Force is now shifting to touting the unproven technology of in situ anaerobic bioremediation. The effort is yet another fantasy told by the Pentagon carnival barkers to distract the public from the reality that the drinking water aquifer has been trashed to the point where major Albuquerque municipal wells will be contaminated. In 2011 the Air Force told Congressional Committees that natural attenuation would take care of the problem by 2025. And long term passive monitoring, instead of aquifer cleanup, seems to be the goal of the 2018 Strategy Plan.

There is no overall analysis for what portion of the Kirtland site is anaerobic and could be expected to be amenable to in-situ bioremediation. Even if the Pilot Test were found to be successful, the practicality of the use and cost of bioremediation spreading over a three dimensional horizontal and vertical volume for EDB 500 ft. below the water table is not discussed. What evidence exists that it would be a viable or even a practical strategy? Nevertheless, the Air Force and NMED have no other fiction to offer a public for their fear for the safety of their drinking water.

The only relevant document posted on the NMED website regarding the Pilot Test seems to be the July 9, 2015 *Technical Memorandum for a Conceptual Pilot Test*. The Anaerobic Biodegradation Pilot Test should identify contact information for the person in charge (Tara Kunkel), the laboratory name and what laboratory tests performed tests used to design the pilot field test. No Work Plan for the project appears to have been submitted and approved by the NMED for the Pilot Test. No plan for oversight is provided. CB&I is no longer the contractor for the Pilot Test. There is no lead biochemist.

No scientific studies have been identified by the Memorandum that remotely indicates the applicability of the Pilot Test for the Kirtland site. While asserting that EDB can be biodegraded, the Memorandum provides no details as to the volume of EDB that is to be found at the unidentified location for the Pilot Test.

The concern for extracting contaminated groundwater and the reinjection of the contaminated water into the aquifer is not addressed:

- Will the water be processed for removal of hazardous materials such as Ethylene Dibromide prior to reinjection?
- What volume of water will be withdrawn and injected? Hourly pumping information?
- Did the NMED issue a UIC permit or some sort of variance for the reinjection?
- What will be the depth of the extraction?

The necessary anaerobic environment for growth of the bacteria does not exist for most of the groundwater plume of contamination at Kirtland. There is no identification of what “[c]ertain areas of the BFF site are anaerobic ...” The identification of the exact location of the pilot test is not provided with information regarding the existing anaerobic conditions at such a site. The supposed data for the Pilot Test is from an unidentified laboratory that asserts that bacteria have to be added to the unidentified site. There is no detailed discussion of the issue of mixing – bringing bacteria that are not indigenous in any quantity, amendments and EDB together at the same time to a depth of some 500 ft plus. How to validate the EDB removal in the field goes without discussion. The groundwater sampling protocol is not discussed, but as is shown in the picture on P.17 for the pilot test, open air samples are being made that would destroy evidence of contaminants of concern.

Figure 1 of the Memorandum indicates that bacteria would have to be added. There is no scientific information or peer reviews to show what amounts would be necessary. There is no identification of what groundwater monitoring wells would be used to monitor performance of the in situ treatment. Moreover, a June 29, 2017 INTERA Technical Memorandum discussing data gaps for the RCRA Facility Investigation (RFI) identified significant issues regarding measuring EDB concentration over time and the overestimation of degradation rates in the groundwater. The necessary controls are not identified in the Pilot Test Memorandum for how EDB concentration rates will be accounted for as affected by other active remediation such as soil vapor evaporation, LNAPL skimming, bioslurping, and the rise in the water table. INTERA states that “Abiotic degradation of EDB is reported to have been observed in the laboratory but there are no reports of it being observed in field conditions anywhere.”

Figure 2 of the Memorandum does not identify what would be the optimum bacterial population density to be achieved by proper biochemistry and to what degree the presence of Oxygen would inhibit the growth or survival of the added bacteria.

Figure 3 of the Memorandum provides no technical information as to how the experiment was performed or who performed the experiments, the number of times performed, the volume of water, evidence from peer review. There is no explanation as to how the lower line of the graph was arrived at. There is no information as to what control factors were in operation or in absence that may have resulted in overestimation of EDB degradation. There are no references or websites for further information.

There are 3 zones of contamination - the vadose zone, the saturated zone, and the EDB separated plume. The Pilot Test does not reference the mass of contamination entering the groundwater from the

vadose zone. Fifty-three of 62 Shallow groundwater monitoring wells no longer function to measure the plume extent and concentrations.

The 2018 Strategy Plan does not address the continuing lack of a positive interaction with public stakeholders except for meeting with them. There has been resistance to accomplishment of the 2014 Legislature Memorial asking for independent oversight; denial of an application for KAFB as a Superfund site or to be placed on the National Priorities List; the cancellation of the Citizens Advisory Board; the denial of the petition for creation of a Remediation Advisory Board (RAB). The field office control center that should have remained in Albuquerque was removed to AFCEC in Texas . There is no organization chart to show the public the personnel and operations between various regulatory components, no agendas of technical meetings, no transcripts, no video recordings, no minutes, no summaries of technical issues, no person from the public allowed at technical group meetings. There is no real path forward absent an RFI to lay the groundwork for a Corrective Measures Evaluation and Corrective Measures Implementation Plan.

There is a constant change of technical plans. The ICE units were discontinued. The SVE Catox did not work properly and was abandoned. Air sparging was not completed. Pump and Treat was supposed to provide 8 extraction wells and there are only four. Now there is the impractical plan for bioremediation. There has been no RFI for years and no resolution of the INTERA concerns raised by the ABQ Water Utility Authority.

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