Kieling, John, NMENV

Subject: FW: Kirtland AFB Jet Fuel Spill RCRA/CERCLA Request
Attachments: Request to EPA for oversight review of KAFB Jet Fuel Spill.doc; Attachment A FFEO Meeting 9.20110001.pdf; KAFB Better Relationship0001.pdf

-------- Original Message --------
Subject: Kirtland AFB Jet Fuel Spill RCRA/CERCLA Request
Date: Tue, 28 Aug 2012 13:55:15 -0600
From: David McCoy <dave@radfreenm.org>
To: jackson.lisap@epa.gov
CC: Legare.amy@Epa.gov, kling.dave@epa.gov, Patterson.Kenneth@epa.gov, coleman.sam@epa.gov, Dan_Alpert@bingaman.senate.gov, bill_woldman@tomudall.senate.gov, Matthew.Zidovsky@mail.house.gov, cisco.mcsorley@nmlegis.gov, "Martin, David, NMENV" <David.Martin@state.nm.us>, Jeffrey.Lanning@kirtland.af.mil, "Pike, John S Civ USAF AFMC 377 MSG/CEAN" <John.Pike@kirtland.af.mil>, "KAFB/Bitner, Ludie W Jr" <Ludie.Bitner@kirtland.af.mil>, mayorberry@cabq.gov, eromero@cabq.gov, kbrown@bernco.gov, dherrera@bernco.gov, julianmoya@cabq.gov, azizachavez@cabq.gov, wobrien@bernco.gov, pablor@abastoutility.com, heard.anne@epa.gov

USEPA

Lisa Jackson
Administrator

Dear Ms. Jackson,

Please see the attached documents requesting EPA action for the Kirtland Air Force Base Jet Fuel Spill.

Thank you.

Sincerely,

David B. McCoy, Executive Director
Citizen Action New Mexico
POB 4276
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August 28, 2012
Lisa Jackson, Administrator
US Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460
jackson.lisap@epa.gov

Before the U.S. Environmental Protection Agency (EPA)

Citizen Action New Mexico's Request for the EPA to Use Oversight Authority Under the Resource Conservation and Recovery Act (RCRA) or the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) to Protect Albuquerque, New Mexico Drinking Water Aquifer and Municipal Wells from the Kirtland Air Force Base Jet Fuel Spill

Citizen Action New Mexico hereby requests that the EPA use its oversight authority under the Resource Conservation and Recovery Act (RCRA)[1] to co-ordinate state and federal efforts to create and implement an effective and scientific plan for the characterization and use of technology to cleanup the Kirtland Air Force Base ("KAFB") Bulk Fuels Facility (BFF) jet fuel spill.[2]

Alternatively, consideration to conduct an immediate emergency response and enforcement action for cleanup should be implemented under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).[3] KAFB should be placed on the National Priorities List. The New Mexico Environment Department ("NMED"), as authorized agency for EPA, determined that the KAFB jet fuel release poses a significant threat to public health and the environment through contamination of the groundwater that serves Albuquerque's production wells.

The RCRA enforcement process is not accomplishing cleanup of the spill. In September 2011, the EPA Federal Facility Enforcement Office (FFEO) was fully briefed on the impending loss of Albuquerque's drinking water wells and the need

[1] 42 U.S.C. § 6901 et seq.
[2] While authorized states have primary enforcement responsibility under state law, EPA retains enforcement authority under RCRA Sections 3007, 3008, 3013, and 7003. When EPA does enforce in authorized states (called "overfiling"), it enforces the authorized state programs where appropriate. http://www.epa.gov/osw/inforesources/pubs/training/state.txt

If waste in water is presenting an Imminent and Substantial Endangerment, EPA may choose to issue an order under Section 7003 of the Resource Conservation and Recovery Act, 42 U.S.C. § 6972 (RCRA § 7003) under certain circumstances such as insufficient time to commence a civil action or seek a judicial order as required by Section 504 of the Clean Water Act, 33 U.S.C. § 1365 (CWA § 504). http://www.epa.gov/compliance/resources/policies/cleanup/superfund/ise-crossmedia.pdf, p.2
[3] 42 U.S.C. § 9601 et seq.

for intervention and action.[4] Another year has gone by with no EPA response and no action taken.

I. INTRODUCTION AND SUMMARY

Albuquerque, with a population over 600,000, has the largest underground contamination endangering any city's drinking water aquifer and municipal wells in the history of the U.S. Jim Davis, Resource Protection Division, New Mexico Environment Department (NMED) estimated that arrival time for the dissolved plume of Ethylene Dibromide (EDB) to Albuquerque's production wells could be in five years.[5]

Estimates of the size of the spill of aviation gas and jet fuel to Albuquerque's ("ABQ") aquifer have increased geometrically from less than 200,000 gallons to 1 or 2 million gallons to 8 million gallons[6] up to a whopping 24,000,000 gallons[7], the estimate by NMED geologist William Moats (2012). That spill volume of refined chemicals is more than twice the size of the Exxon-Valdez crude petroleum spill in Alaska. The 24 million gallon spill estimate may be understated.[8]

The jet fuel and aviation gas that leaked from the Bulk Fuel Facility, built in the early 1950s, contains a "moving tsunami" of carcinogenic chemicals. Benzine, Toluene, Ethylbenzine, Xylenes, Diesel, Polyaromatic Hydrocarbons (PAHs)[9] and Ethylene Dibromide (EDB) are moving toward ABQ's wells. The municipal wells furnish up to 60% of ABQ's water. The nearest well field to the advancing dissolved plume of EDB from aviation gas are the five Ridgecrest wells that furnish approximately 20% of ABQ's water. The EPA's Maximum Contaminant Limit (MCL) for EDB contamination in drinking water is 50 parts per trillion with a recommended Goal of zero exposure.

The 2011 Air Force Report to Congressional Committees fantastically represented that cleanup of the EDB plume would be accomplished by "natural processes" in 25 years.

Yet, after over 40 years of EDB in the groundwater, "the highest Shallow Zone EDB concentrations … in the historical NAPL area with the highest detected concentration [are] 210 µg/L."[10] This is a level 4200 times above the EPA drinking water limit of 0.05

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[4] See Attachment A.

[5] (Associated Press, 5/23/2012 http://www.airforcetimes.com/news/2012/05/ap-kirtland-jet-fuel-spill-may-reach-24-million-gallons-052312/)

[6] http://bigstory.ap.org/content/new-mexico-says-jet-fuel-spill-could-be-larger

[7] http://www.huffingtonpost.com/huff-wires/20120720/us-albuquerque-water-threat/

[8] A 2006 pilot study (Xitech, Inc.) indicated that the LNAPL thickness is 2.5 ft. The scale of KAFB September 2011 Map is 1 inch = 2812 ft. based on measuring the Google Earth distance from Zuni to Gibson Ave. The size of the LNAPL plume by measuring the KAFB map would be: LNAPL Plume Length = 1 inch = 2812 ft long; LNAPL Width = ½ inch -1406 ft wide; LNAPL Plume Thickness = 2.5 ft. Volume of the LNAPL Plume = 2812 ft X 1406 ft X 2.5 ft; Volume = 9,884,180 cu ft; Volume= 9,884,180 Ft^3 X 7.48 Gallons per FT^3 = 73,933,666 gallons.

[9] http://www.eugris.info/FurtherDescription.asp?Ca=2&Cy=0&T=Poly-Aromatic%20Hydrocarbons&e=7

[10] http://www.kirtland.af.mil/shared/media/document/AFD-120629-057.pdf, p.5-7.

µg/L. The Agency for Toxic Substances and Disease Registry characterizes EDB breakdown in ground water as "hardly at all."[11]

The Air Force recognized the spill in 1999 and now says it is making "progress." NMED knew in 2000 that the KAFB spill was "significant." 13 years later there is inadequate characterization -- poor understanding of the size, extent and depth of the plume of contamination, rate of travel and its proximity to Albuquerque's production wells. No clean up has been achieved for the 1 mile long by ½ mile wide Light Non-aqueous Phase Liquid (LNAPL) plume that is floating on the aquifer and trapped beneath the water table. No clean up has been achieved for the dissolved phase EDB portion of the plume that is 3 miles long by 1½ mile wide.

Despite the imminent and substantial endangerment of the surrounding community no monitoring wells have ever been installed near the municipal production wells to sample for contamination. The nearest proposed monitoring wells would be about 2000 ft/ distant.

The dissolved EDB plume may already have arrived at the municipal wells, but there are no monitoring wells in place in proximity to the municipal wells to measure actual contaminant levels. The municipal wells that are sampled monthly are inadequate to measure contamination because they have corroded screens, no annular rings between the casing and the borehole, pump up to 2,850 gal/min, have well screens that are up to 800 ft long and draw water from 360° that dilutes samples and contaminates them with air.

The Air Force did not deny at a June 12, 2012 quarterly public meeting that the dissolved plume of EDB contamination will arrive at Albuquerque's 5 Ridgecrest drinking water wells. A March 2011 Air Force Report to Congressional Committees indicates the AF does not intend to clean up or prevent the dissolved plume of Ethylene Dibromide (EDB) contamination from reaching ABQ's municipal wells.

The KAFB Fuel oil plume may have devastating impacts on:

- 45 ABQ drinking water wells to the northeast of this moving Jet Fuel Plume,
- the ability of the Water Utility Authority to deliver water to ABQ residences,
- human health, the environment and on the economic conditions of businesses and home owners.

The ongoing delays by government bodies and private environmental contractors will ensure environmental tragedy for Albuquerque. There is no approved containment plan for the LNAPL plume, no ongoing effort to remove the liquid portion (LNAPL) and the

[11] Unlike the other gasoline contaminants that tend to float on top of the aquifer, once EDB reaches ground water it mixes, is highly mobile and can travel separately from the original spill to where it may not be detected. The hazard associated with EDB can persist indefinitely. The Agency for Toxic Substances and Disease Registry characterizes EDB breakdown in ground water as "hardly at all." *The Potential for Ground Water Contamination by the Gasoline Lead Scavengers Ethylene Dibromide and 1,2-Dichloroethane* http://info.ngwa.org/GWOL/pdf/041879375.pdf, p.81-82.

dissolved plume of Ethylene Dibromide (EDB) from Albuquerque's drinking water aquifer. Groundwater monitoring wells have been constructed so that they cannot later be used for vapor extraction. There are no plans for delivery of water treatment.

The majority of the LNAPL mass observed in 2009, the year of lowest water levels, is now trapped below the water table and cannot be cleaned up using soil vapor extraction technology. The chemicals in the LNAPL plume will continue to dissolve "indefinitely" into the aquifer.

Political pressures are being exerted by the Air Force through the Office of Governor Martinez upon the NMED to lessen enforcement efforts -- according to Gov. Martinez, "to better get along." See Attachment B.

Plans offered by KAFB and its current contractor, Shaw Environmental and Infrastructure, Inc. ("Shaw"), are deficient for many reasons and have been routinely rejected by the NMED. Lengthy delays occur between work plan submissions and approval or disapproval.

Co-operation, co-ordination and technical competence -- between the Air Force and its contractors, the NMED and the Water Utility Authority to come up with a plan for remediation and halting the travel of the LNAPL plume and the dissolved plume --are in disarray.

As described below, there are repeated:
NMED Notices of Disapprovals; regulatory delays and unreasonable compromises; failure to follow regulatory orders; repeated extensions; reductions in the number of ordered equipment for soil vapor extraction and monitoring wells; data gaps for characterization of the plume; unreliable groundwater sampling data; lack of remediation or containment in place for the LNAPL plume or the dissolved plume of Ethylene Dibromide; numerous changes in administrative personnel at NMED, the Air Force[12] and its contractors; disagreements between government contractors, scientists at NMED and the Albuquerque Bernalillo County Water Utility Authority (WUA); disagreements between WUA Board members, and; political interference from the Office of Governor for New Mexico and Assistant Secretary of the Air Force Terry Yonkers.

This all substantially and imminently endangers a community comprised of many minority and low income members in violation of Environmental Justice considerations and the Resource Conservation and Recovery Act (RCRA) requirements for corrective action.

The EPA should exert whatever oversight is necessary to make certain that the enforcement of NMED orders is upheld rather than capitulation to Air Force demands to

[12] Col. Gary Dills 1996; Col. Polly A. Peyer 1999; Col Jan. D. Eakle 2000; Col. Kathleen D. Close 2002; Col. Henry L. Andrews, Jr. 2003; Col Terrence A. Feehan 2005; Col. Robert Suminsby (2007); Col. Michael Duvall (2008); Col. Robert L. Maness (2010); Col. Donald Conley (2011); Col. John C. Kubinek (2012); Col. Jeffrey Lanning (2012). http://www.kirtland.af.mil/library/factsheets/factsheet.asp?id=5302

reduce the number of monitoring wells, delay time lines, and ignore remediation requirements.

II. LEGAL CONSIDERATIONS AND THE REGULATORY RECORD

The 13-year long failure of KAFB to characterize the vertical and lateral extent of both the LNAPL and the dissolved plume is a violation of the most basic aspects of the RCRA requirements for corrective action to be performed within a reasonable time. 40 C.F.R. § 264.101. The Maximum Contaminant Limit (MCL) for EDB contamination are exceeded at most monitoring well locations including offsite locations.[13] KAFB has failed to implement and has stated its intentions not to implement corrective action beyond the facility property boundary to clean up its releases to protect human health and the environment as KAFB is required to do. 264.101(c).

The adequacy of the state RCRA permitting program for NMED authority to administer, enforce and exercise control over the required corrective actions of the RCRA program for the jet fuel is called into question. 40 C.F.R. § 239.13. Technical staff attempt to do their job. But that effort is politically interfered with and underfunded.

The continuing misrepresentation by the Air Force and the NMED that SVE will remove the bulk of the LNAPL contamination is a violation of the RCRA requirements for fully disclosing and furnishing all relevant facts at all times. 40 C.F.R. § 270.43. These misrepresentations and lack of full disclosure of facts may also violate public participation requirements of 40 C.F.R. § 124.5 as provided for in 40 C.F.R. § 239.13.

There is violation of the RCRA duty under 40 C.F.R. §§ 264.90-101 to collect reliable and representative groundwater samples. Samples from many wells have been contaminated with air which reduces the presence of volatile components such as EDB. (See discussion below at page 27-29).

RCRA public participation is further compromised by the Air Force and the NMED establishment of a "Technical Advisory Group" that excludes any members of the public stakeholders including the media. Requests were made by the public to at least have one representative present at such meetings even if not given a voice. [14] The request was

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[13] ftp://ftp.nmenv.state.nm.us/hwbdocs/HWB/KAFB/Bulk_Fuels_Facility_Spill/KAFB_6-21-2012_Install_3_well_clusters/Figures_Compiled.pdf , see Fig. 11, 2-DIBROMOETHANE (EDB) CONCENTRATIONS IN SHALLOW GROUNDWATER

[14] http://www.kirtland.af.mil/shared/media/document/AFD-110822-006.PDF Transcript p. 16-17 … "Now, you're holding technical meetings, and myself and others have asked repeatedly to at least be able to monitor these technical meetings. You come here, you make a couple of 30-second statements, maybe two minutes, at the most, and the public has no clue about what the disagreements are, about how to proceed, about whether this can even be cleaned up. It's a massive spill. They never finished cleaning up the Alaskan spill. The Gulf spill is still out there. You know, this is the Exxon Valdez of Albuquerque underground. And it makes sense to allow the public, or at least a member of the press, to sit at a technical meeting and at least monitor what's being said, what's going on, what the differences of opinions are, what the differences and conclusions are."

refused.[15] The public is often less than convinced that it is receiving valid or timely information.[16] "Tiger Team" meetings are held without public presence or presentation of information from the meetings. The Air Force Citizen Advisory Board ("CAB") keeps no transcripts, recordings or minutes for its meetings. Only Air Force handouts are posted online. Thus, issues raised by the public at CAB meetings are not reported.

Despite New Mexico Environment Department's declaration that the jet fuel spill constitutes an "imminent and substantial endangerment of the public and environment," the Air Force has ignored four NMED orders[17] beginning in April 2, 2010 to produce an Interim Measures (IM) Work Plan that would bring about full remediation of the LNAPL plume within 5 years. No IM plan providing remediation other than the use of SVE has been submitted by the Air Force, even though the 24,000,000 gallons of jet fuel is seen closer to the Ridgecrest well field by another 1,200 ft in only 7 months in 2011.[18]

Well testing in 2010 showed that EDB is in wells that did not have prior detections, including concentrations in wells KAFB-1064, KAFB-10616, and KAFB-3411 that exceeded the EPA's Maximum Contaminant Level for drinking water.

The Air Force's proposal for Soil Vapor Extraction ("SVE") will not contain or remove the bulk of the Jet Fuels. The NMED agrees that Soil Vapor Extraction technology cannot remove jet fuel. (John Kieling email 6/28/2011).

The first Soil Vapor Extraction Equipment (Remediation Service, Int'l) went into use at KAFB in July 2004, five years after discovery of the jet fuel spill. Both the Air Force and the NMED continue to represent SVE as a solution for removal of LNAPL from the aquifer and to halt its forward movement. The Air Force and Shaw are proposing a purportedly larger thermal oxidizer soil vapor extraction (SVE) system than that currently

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[15] 6/27/2011 Email on file with Citizen Action from Thomas.Berardinelli@kirtland.af.mil: "Dave, Per our phone conversation following your request to attend working group meetings of the Interagency Group, I posed your request to leadership of agencies represented on the interagency group and consensus of the group was to not make the working group meetings public." …

[16] Ms. Jill Frawley: I want to ask this panel, how stupid do you think the public really is? Do you think that we believe when you sit up there so dignified and all that, that you're telling us the truth? I don't think so. We know there's a spill. We don't have the information. We get patted on the head, "Don't worry. It's safe." See fn 14.

[17] August 6, 2010 ftp://ftp.nmenv.state.nm.us/hwbdocs/HWB/KAFB/Bulk_Fuels_Facility_Spill/KAFB_8-6-2010_Fuel_Spill_NOD_and_Direction.pdf ;
December 10, 2010
ftp://ftp.nmenv.state.nm.us/hwbdocs/HWB/KAFB/Bulk_Fuels_Facility_Spill/KAFB_BFF_Workplan_Approval_with_Modifications_12-10-2010.pdf ;
March 31, 2011 http://www.nmenv.state.nm.us/HWB/documents/KAFB_3-31-2011_Cover_Letter_3_WPs.pdf

[18] Water Utility Advisory Board 2011 Annual Report, p.7,
"KAFB and their contractor, Shaw Environmental have completed four sampling events during 2011, three of which have been reported at the time of this report. The Quarter 3 sampling results, for the activities for July through September, indicate that the plume contaminated with ethylene dibromide (EDB) extends approximately 1,200 feet further downgradient than estimated in December of 2010."
http://www.abcwua.org/pdfs/wpab/WPAB_2011_Annual_Report.pdf

in use as a means to halt and remove the bulk of the LNAPL jet fuel plume.[19] The thermal oxidizer is still in the design stage and will not be operative until at least the end of November 2012. According to NMED Jim Davis,

> "The measurable effectiveness of the new system will not be understood until a period of performance has been recognized. However, rough estimates of performance would suggest that the airflow rates with this new system would reach ten times that of a single SVE unit."[20]

The thermal oxidation technology will not remove the bulk of the LNAPL jet fuel because the LNAPL is trapped beneath the water table[21] and jet fuel does not readily volatilize. The US Environmental Protection Agency Office of Underground Storage Tanks determined years ago that diesel fuels such as jet fuel cannot be effectively removed from an aquifer by Soil Vapor Extraction. (EPA 510-B-95-007 OUST document).[22]

Flying in the face of EPA science, the March 2011 Air Force Report to Congressional Committees stated that "The Air Force remains committed to removing fuel from the ground water as quickly as possible through the LNAPL containment plan and continued Soil Vapor Extraction [SVE] operation."

Thermal oxidizers could have been ordered from many commercial vendors for use without the delays inherent in the design, testing, and permit applications for use from Shaw. The existing type of SVE units are allowed 185 tons per year of emissions and are nowhere near that limit, indicating that additional SVE units of the type now in use could have been readily provided as originally requested by the NMED.

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[19] Shaw may be misleading the public and regulators that the thermal oxidizer will remove 1,000 gallons of fuel per day. The bid documents for the thermal oxidizer indicate that the 1500 CFM thermal oxidizer will remove 1,000 gallons of fuel per day and lists the maximum capacity of that as 88 lbs per hour which would be a maximum of about 300 gallons a day removal. The existing SVE loaded dual engines at Kirtland each have a capacity of 288 gallons per day removal for a total of 864 gallons per day for three of them plus the old unloaded unit removing about 140 gallons per day. Shaw is keeping the existing units on wells that have been mostly cleaned up.

[20] http://www.abcwua.org/pdfs/board/minutes_06_20_2012.pdf, Transcript p. 88

[21] http://www.kirtland.af.mil/shared/media/document/AFD-120629-057.pdf, p. ES-2

[22] Soil Vapor Extraction (SVE) Office of Underground Storage Tanks (OUST) US EPA http://webcache.googleusercontent.com/search?q=cache:xh-4LGjXyvgJ:www.epa.gov/oust/cat/SVE1.HTM+&cd=1&hl=en&ct=clnk&gl=us -- "Diesel fuel, heating oils, and kerosene, which are less volatile than gasoline, are not readily removed by SVE, nor are lubricating oils, which are non-volatile. … SVE is generally not appropriate for sites with a groundwater table located less than 3 feet below the land surface. Special considerations must be taken for sites with a groundwater table located less than 10 feet below the land surface because groundwater upwelling can occur within SVE wells under vacuum pressures, potentially occluding well screens and reducing or eliminating vacuum-induced soil vapor flow. … SVE is generally not effective in treating soils below the top of the capillary fringe unless water table depression pumps are used to draw down the water table. In the vicinity of the extraction wells the water table responds to the vacuum by rising, or 'upwelling', which can cause the well screen to become submerged thereby reducing airflow."

As of August 1, 2012 KAFB Weekly Activity Report, the Thermal Oxidizer still needs to obtain an Emergency Air Permit – in review with Albuquerque Environment Health Department and a Modification to air permit – 2 Jan 2013. The emergency petition application for the emergency permit is not complete. The application stated that

> … "AEHD Air Quality Division can expect to receive the full permit application within 45 days following [NMED] approval of the SVE treatment system design, which is expected in the fall of 2012." (Source: April 30, 2012 Department of the Air Force cover letter to Israel Tavarez AEHD from Public Records Request on file with Citizen Action).

A question is raised as to why KAFB is requesting an emergency permit for use of the Thermal Oxidizer units, when the four existing SVE units are not being fully utilized and/or not placed at locations that optimize recovery of soil vapor. Data collected from the existing SVE units indicate that they should be relocated for optimizing greater recovery of soil vapor. NMED is not allowing relocation of the existing SVE units.

The request for bid proposals for the Thermal Oxidizer went out from Shaw on February 22, 2012 with a due date of March 3, 2012. **Thus, delay installation of SVE equipment was unnecessarily incurred from February 2012 to perhaps early 2013.** Thermal oxidizer technology has been commercially available for 15 years from several companies. Shaw will stand to gain financially from furnishing the equipment as against competitors that were not allowed to submit bids to provide thermal oxidizers on what could have been a much earlier timeline.

At the time of this writing, Shaw's operation of the four existing SVE units is limited to one operational unit. The SVE units are not moved to other hot spot locations when concentrations of vapor are reduced at a particular location. Three of the SVE units were not operated at all for a 7 month period in 2011.

There is no integrated technical plan of approach or oversight for the magnitude and complexity of the spill and the technology to be used for remediation. There is no plan to provide water to ABQ when the dissolved plume of EDB reaches the municipal wells.

KAFB has a large annual economic impact on ABQ of an estimated $7.8 Billion so that city and state officials are reluctant to contemplate lawsuits or enforcement actions. The EPA as an outside agency could perhaps correct this imbalance through an independent review by its Kerr Laboratory, an assembled panel of national experts and by issuance of enforcement orders.

The most basic RCRA requirement for corrective action is to <u>clean up releases of hazardous waste</u> stated as follows by EPA:
http://www.epa.gov/osw/hazard/correctiveaction/resources/guidance/sitechar/rfi/rcrav1.pdf :

> SECTION 1
> OVERVIEW OF THE RCRA CORRECTIVE ACTION PROGRAM

> Introduction
> The primary objective of the RCRA corrective action program is to clean up releases of hazardous waste or hazardous constituents at treatment, storage, or disposal facilities subject to Subtitle C of RCRA. "Release" means any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing of hazardous wastes (including hazardous constituents) into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing hazardous wastes or hazardous constituents).

A RCRA facility investigation (RFI) for corrective action requires **characterization** (p.1-6):

> This characterization includes identification of the type and concentration of hazardous waste or hazardous constituents released, the rate and direction at which the releases are migrating, and the distance over which releases have migrated. Inter-media transfer of releases (e.g., volatilization of hazardous constituents from contaminated soils to the air medium) should also be addressed during the RFI, as appropriate.

The RCRA requirements for characterization and corrective action for clean up of the jet fuel contamination have clearly not been timely enforced by the NMED nor met by the Air Force or its contractors, CH2M Hill and Shaw. Nor did the NMED, Air Force and its contractors take timely action to prevent the jet fuel from leaving KAFB and traveling onto city property.

Kirtland took no action for decades to inspect for possible leaking pipes at the Bulk Fuels Facility built in the early 1950s, even though the Air Force knew in the 1980s that such leaks were commonplace.[23] The leaking KAFB BFF fuel was purportedly discovered in 1999. In 2000, a groundwater quality monitoring well detected benzene and boreholes were dug to 200 ft. Dennis McQuillan, a New Mexico Environment Department (NMED) hydrologist in the groundwater bureau identified the jet fuel spill as a "significant spill", finding "tens of thousands parts per million of benzene" and that "if water were added to a soil sample from one of the bore holes, oil will flow to the surface."

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[23] (See Agency for Toxic Substances and Disease Registry http://www.atsdr.cdc.gov/toxprofiles/tp76-c5.pdf -- "JP-4 and JP-7 may be released into groundwaters as a result of seepage from contaminated soils during storage, aircraft maintenance, and fuel storage and dispensing operations (Twenter et al. 1985). A fuel layer of approximately 2 feet was identified in groundwater from shallow wells at Robins Air Force Base (Georgia) on a site where an undetermined amount of JP-4 was released into the soil from an underground fuel supply line in the 1960s (Air Force 1985a).

Groundwater intrusions of JP-4 were reported to have occurred as a result of cracks in the gunnite lining of the diked area surrounding three aboveground storage tanks at the Niagara Falls Air Force Reserve Facility in New York (Air Force 1983a). Additional JP-4 was found in storm water drainings at the facility from underground inlet pipe, and inlet and outlet pipe leaks discovered in 1979 and 1982, respectively. Hydrocarbon groundwater contamination from leaking pipes in a JP-4 fuel farm occurred in a residential area surrounding the U.S. Navy air station in Traverse City, Michigan (Sammons and Armstrong 1986).

The Air Force had not made integrity tests for the pipes for over a decade even though federal law required testing every five years. The Air Force claimed its fuel inventory was off a net 157,000 gallons and that the Air Force would spend $400,000 investigating the spill. (Albuquerque Journal, Kirtland Jet Fuel Spill 'Significant,' Section E, August 5, 2000). The magnitude of the spill might have been reduced by up to 50 percent had the pipes been tested on the five year schedule. (ABQ Journal, p.A8. Overdue Test Finds Kirtland Fuel Leak, 8/8/2000).

Remediation since July 2004 has been limited to the use of only four soil vapor extraction units that removed an estimated 414,000 gallons of soil vapor up until February 2011. The actual volumes of the different types of contaminants that are removed is not measured and is unknown. No mass balance is performed to know for example, how much toluene or EDB is removed.

But neither Kirtland nor NMED moved to make further investigation until 2006 when a single groundwater monitoring well was installed a few hundred yards northeast of the original leak. In late 2006, CH2M-Hill discovered LNAPL at 510 ft deep using a skimmer pump system designed by Xitech, Inc. A pilot test for use of a skimmer pump modified with a booster pump due to the great depth brought up two 55 gallon drums of contamination. Tests indicated the fuel was a combination of aviation gasoline, or AVGAS, used prior to 1976 and JP-4 jet fuel used prior to 1992.

Mark Holmes, environmental project manager with the 377th Mission Support Group Civil Engineer Division stated, "Based on the time period of usage, the fuel has potentially been floating on the groundwater for up to 20 or 30 years."

The Air Force provided the New Mexico Environment Department a corrective action report in February 2007. The long term plan was to remove the fuel with a soil vapor extraction system. The preliminary cost estimate for corrective action implementation was approximately $1.8 million. (Air Force Print News Today, 4/19/2007, New Monitoring Well Reveals Jet Fuel).

In July 2008, then Kirtland Base Commander, Col. Robert Suminsby, said water on the base and in Albuquerque is still safe because the fuel hasn't reached production wells. Mark Holmes, Kirtland program manager said officials estimated the spill at 10 acres but that it was unclear how far the fuel plume in the water table stretches. Baird Swanson, NMED, stated "If the fuel reaches those wells, they will have to be shut down." John Stomp, Water Utility Authority stated, "If it reaches our wells that water is unusable. The base needs to now go clean it up. They need to pump it out and either burn it or let it evaporate in ponds." Michael Jess, a professor at the University of Nebraska's Water Center said if ingested, a blend of water and jet fuel would be toxic and even trace amounts could cause cancer. Col. Suminsby stated the leak could have started in the 1960s. One of the five monitoring wells installed to assess the leak found that the fuel had moved off the Kirtland base to Albuquerque's Bullhead Park. Col. Suminsby stated that the media was not informed until July 2008 about the fuel leakage discovered in

February 2007 because the Air Force chose to wait when plans for a full clean up effort were finished. (Air Force Times, Kirtland Water Deemed Safe despite fuel leak, 07/2008). Jillian Speake, Kirtland base spokesperson, stated "we decided it was better not to scare people right away." (ABQ Journal, Kirtland Jet Fuel Contaminating Groundwater, 7/12/08).

Baird Swanson, NMED environmental scientist, estimated that it would take more than 25 years to reach any wells that produce drinking water. Mark Holmes, Kirtland, said they expect to be able to clean up the fuel before it reaches drinking wells but would institute other – and extremely expensive – plans to remove the fuel if it creeps too close. 11 more monitoring wells were to be drilled at a cost of $2.8 million. (ABQ Journal, Leaked Jet Fuel Not Yet a Danger, 7/12/08).

In August 2008 Kirtland held its first public meeting since the announcing the jet fuel spill had reached groundwater and spread outside base boundaries.[24] A Kirtland official said rough estimates now put the leak at about 2 million gallons, but that the size of the plume was unknown. Base Commander Col. Mike Duvall told a crowd of 75 persons that until the new 11 monitoring wells were finished, the Air Force would have few other details. The annual base report released in June 2008 did not make any mention of the larger leak. Sharon Minchak, a project manager with CH2M-Hill said the danger is low, for now, but the fuel needs to be removed before it reaches too much farther to the northeast – the direction it is moving at a pace of 100 ft a year.

On 4/22/2009 Kirtland base commander Col. Michael Duvall announced that it was removing roughly 1,200 gallons of jet fuel a day from groundwater near the base but that a final plan for the cleanup would not be available until 2012. Kirtland still claimed the leak was only 2 million gallons. (ABQ Journal, Base Cleaning Up Fuel. p.C-2.)

On April 2, 2010 the NMED Groundwater Quality Bureau (GWQB) informed Kirtland that jurisdiction for the jet spill was being placed it under the NMED Hazardous Waste Bureau http://www.nmenv.state.nm.us/HWB/documents/KAFB_4-2-2010_Bulk_Fuel_Spill_GWQB_Letter.pdf:

> "KAFB has not complied with the requirements of the GWQB' s first and second Notices of Disapproval [NODs]. KAFB has failed to provide an interim work plan with specific dates for task completion, or a revised timeline that provides for the investigation and abatement of off-base plumes in a reasonable time frame. Additionally, KAFB's December 30, 2009 letter indicates that it will not be moving expeditiously to begin active remediation of off-base contamination. Given the scope and severity of the contamination plume, KAFB's proposed approach is not acceptable." (Emphasis supplied).

NMED GWQB stated further:

> "KAFB has not and is not meeting the GWQB's requirements. Therefore, the GWQB has transferred oversight of corrective action at SS-111 and ST-106 to the HWB, which will enforce corrective action under the HW A and the New Mexico Hazardous Waste Management Regulations, 20.4.1 NMAC."

[24] http://riograndetribune.org/pdfs/trialballoon-2.pdf Kirtland Showboat Sinking in a Jet Fuel Leak, p.1

A second April 2, 2010 fifteen page letter from the HWB stated in part http://www.nmenv.state.nm.us/HWB/documents/KAFB_4-2-2010_Bulk_Fuel_Spill_HWB_Letter.pdf:
"Data submitted by the Permittee show that the contamination caused by the Bulk Fuels Facility Spill represents a significant threat to human health and the environment, particularly to well water in urban neighborhoods adjacent to Kirtland Air Force Base ("KAFB"). Despite the fact that this release of hazardous constituents was first discovered 10 years ago, the Permittee has not completely characterized the Bulk Fuels Facility Spill, nor conducted adequate remediation."

"The Department has determined that the Bulk Fuel Facility Spill poses a threat to human health and the environment, and furthermore, endangers the groundwater resource including water supply wells - relied upon by the Albuquerque Bernalillo County Water Utility Authority for delivery of safe drinking water to its customers. The contamination also threatens KAFB water supply wells, and those that supply the Veterans Administration ("VA") Hospital. The large size of the LNAPL plume and its proximity to these water supply wells requires that urgent action be taken to prevent the LNAPL plume from contaminating more of Albuquerque's drinking-water supply.

"The Permittee has estimated the volume of fuel released from the Bulk Fuels Facility to range from about 1-2 million gallons, but the actual volume could be considerably larger because characterization of the vadose zone is inadequate. For example, the Department has estimated the volume of sorbed fuel at or greater than 100 ppm in soil to be about 4.8 million gallons; this does not include fuel in soil gas, fuel dissolved in groundwater, and floating fuel forming the LNAPL plume. The Department has estimated the fuel included in the LNAPL plume to be approximately 3 million gallons, giving a total volume of fuel sorbed to soil and that contained within the LNAPL plume at nearly 8 million gallons."

The Air Force has not met requirements of the April 2, 2010[25] New Mexico Environment Department and subsequent orders for an Interim Measures Work Plan for "immediate actions to remediate and stop the migration of the LNAPL plume." Also required: "An implementation schedule showing that remediation of the LNAPL plume will be completed within five years of the Department's approval of the IM Plan."

In its April 2, 2010 letter, NMED officials first accused the Air Force of delay on "a significant threat to human health and the environment." NMED staff demands for an Interim Measures Plan, clean up and more monitoring wells and soil vapor extraction equipment have been ignored and scaled back as part of a political process. In April 2011, after a phone call from the Air Force Assistant Secretary Terry Yonkers to Governor Martinez, NMED James Bearzi was ordered not to speak to the press[26] and

[25] See fn 16.
[26] Albuquerque Journal Sunday, April 03, 2011 Editorial Board
http://www.abqjournal.com/opinion/editorials/0323006797opinioneditorials04-03-11.htm
Keep Data Flowing on Water Contamination

then later removed as Chief of the Hazardous Waste Bureau.[27] NM Governor Martinez is viewed as running interference for the Air Force with the New Mexico Environment Department to reduce regulatory oversight "to better get along."[28] Martinez began her second day in office by firing all seven members of the Environmental Improvement Board.[29] Gov. Martinez trimmed the New Mexico Environment Department by $3 million at a time of great concern for the KAFB jet fuel spill.[30]

In April 2010, the furthest well toward Ridgecrest, the "sentry well," KAFB 106055, supposedly 1000 ft distant from the dissolved plume, already showed signs of contamination when the borehole was first drilled.

The Air Force requested a 45-day extension on the July 7, 2010 deadline to turn in plans to deal with the jet fuel spill. http://www.nmenv.state.nm.us/HWB/documents/KAFB_6-8-2010_Sec_Curry_to_Asst_Sec_AF_Yonkers.pdf NMED granted a 15-day extension "in the interest of comity," but former NMED Secretary Ron Curry complained about repeated Air Force delays. William Olson of the GWQB stated that, "Given the scope and severity of the contamination plume, KAFB's proposed approach is not acceptable." (ABQ Journal, p. 1, Air Force Extension Denied, 5/8/2010.)

On May 4, 2010 the ABQ Journal front page announced that the NMED determined that **Kirtland Jet Fuel Leak Massive** with a new estimate of the jet fuel leak at 8 million gallons. "State officials expressed serious concern about whether the Air Force is acting quickly enough to deal with the problem. The NMED letter of April 8, 2010 stated that

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An advancing specter of contaminated groundwater is worrisome enough. Have one side pump in some bad data on the content and/or potential breadth of that contamination, have the other side dismiss it out of hand, and it becomes downright disturbing.

The best course for everyone involved is to ensure a free flow of information so the public will be aware of any potential threat as well as the concerted effort under way to mitigate the problem. The worst response would be to plug the flow of information to the public.

After a flare up last week over data, in which both a consultant reporting to the Water Authority and the Air Force made misstatements, the state Environment Department decided to turn off the information spigot.

Under the Richardson administration, top regulator James Bearzi frequently commented on behalf of the state Environment Department and at times was critical of Air Force cleanup efforts.

That changed Thursday when results of a re-test of the sentry well sample requested by the Air Force were made public.

The results were ambiguous, but Bearzi's new bosses in the administration of Gov. Susana Martinez decided the person with the most expertise was no longer authorized to speak to the press. Instead, all questions have to go through the new deputy environment secretary.

Who doesn't answer questions.

That doesn't do much to assuage worries in the residential neighborhoods adjacent to KAFB and the fuel plume. And it doesn't do much to instill confidence in the agency responsible for protecting New Mexico's environment.

The Air Force says it wants transparency and accountability. Doesn't the new administration in Santa Fe want the same thing?

If so, why the muzzle?

[27] http://www.santafenewmexican.com/local%20news/New-Mexico-regulators-shuffled--to-new-jobs
[28] http://www.abqjournal.com/main/2011/06/11/news/gov-better-relationship-with-kirtland.html
[29] Gov. Martinez fires all the members of the Environmental Improvement Board http://www.capitolreportnewmexico.com/?p=2772
[30] http://www.santafenewmexican.com/Sidebar/Martinez-proposal-shows-priorities

10 years after the spill was discovered, the Air Force still does not know the full extent of the contamination." The spill was labeled a "significant threat to human health and the environment, particularly to well water in urban neighborhoods adjacent to Kirtland Air Force Base." Air Force officials expressed "belief" that the size of the spill is substantially smaller at only 1 to 2 million gallons and that they had already spent $10 million dealing with the leak.

"We own the problem," said Col. Mark Bartlett, the base mission support commander using a phrase subsequently repeated subsequently over and over by Kirtland officials. James Bearzi, Chief of the NMED Hazardous Waste Bureau called the Air Force's approach "a Little League approach to a major league problem."

On May 19, 2010, Citizen Action New Mexico filed a Hotline Complaint with the Department of Defense for Kirtland Air Force Base alleging among other things that Kirtland has contaminated Albuquerque's drinking water with 8 million gallons of jet fuel that is not being timely and effectively removed from the groundwater, constituting fraud, waste and failure to protect the public health and the environment from the release of cancer and disease causing contamination to air, soil and water at KAFB. No disposition regarding the complaint has been received to date.

On May 22, 2010 Secretary Curry announced that the cost of cleaning up the fuel leak could top $100 million. The relationship between the Air Force and the NMED was described as "contentious." (ABQ Journal, Fuel Cleanup At Base May Cost $100 Million, p.1, 5/22/2010).

On June 18, 2010 Kirtland submitted a Vadose Zone Investigation Plan and an Interim Measures Plan and announced it was turning to a "performance based contract."[31] One of the planned interim measures was:

> "The Air Force has adopted a strategy to halt and prevent further migration of LNAPL in the capillary and saturated zone of the aquifer. The primary mechanism for preventing further LNAPL migration is removal of LNAPL mass from the subsurface to the extent practicable during these interim remediation measures."[32]

The LNAPL migration was to be halted by:

> "A 15 to 22 well SVE system that will extract up to 3,000 standard cubic feet per minute (scfm) of vapor from the soils within and just above the LNAPL plume is planned…"

The Air Force said it planned to provide two dozen Soil Vapor Extraction pumps. The SVE wells and equipment were not installed by the Air Force. Rather than the 30 groundwater monitoring sites the NMED wanted, the Air Force argued that the 18 wells it proposed would be sufficient to characterize the jet fuel in the soil.

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[31] http://www.nmenv.state.nm.us/HWB/documents/KAFB_6-18-2010_Cover_to_VZIP_and_IMWP.pdf.
[32] ftp://ftp.nmenv.state.nm.us/hwbdocs/HWB/KAFB/Bulk_Fuels_Facility_Spill/KAFB_6-18-2010_Interim_Measures_WP.pdf

In a June 2010 meeting with the Journal's editorial board, the most recent commander Col. Robert Maness "acknowledged that 'aggression' had 'been lacking' in the Air Force's previous handling of the spill, and pledged to push forward to deal with the issue. (ABQ Journal, Base Plans Cleans Up Fuel, p. A-1, 6/19/2010).

On June 23, 2010, James Bearzi, Chief of NMED Hazardous Waste Bureau informed the Albuquerque Bernalillo County Water Utility Authority http://www.nmenv.state.nm.us/HWB/documents/KAFB_Bulk_Fuels_Facility_Present_WUA_6-23-2010.pdf that:

- current KAFB remediation measures were inadequate,
- that SVE equipment was operating intermittently,
- 8 million gallons of fuel had been released and
- without doing something different, could take over 50 years to remove fuel from the vadose zone and LNAPL plume.

Mr. Bearzi presented the Inadequate Characterization of the Groundwater:

• Leading edge and margins of dissolved phase groundwater contamination unknown
• Concentrations of dissolved-phase contaminants under LNAPL plume unknown
• Vertical extent of dissolved-phase contamination unknown
• Rate of migration at best poorly defined
• Geologic and hydrologic conditions poorly defined

On August 6, 2010 NMED filed a Notice of Disapproval of the plans for Vadose Zone Work Plan, Interim Measures Work Plan and the Groundwater Investigation Work Plan. NMED stated:

"The contamination caused by the Bulk Fuels Facility Spill at Kirtland Air Force Base (KAFB) represents a significant threat to human health and the environment, particularly to well water that supplies drinking water to portions of Albuquerque, KAFB, and the Veterans' Administration Hospital. Even though this release was first discovered 10 years ago, the U. S. Air Force (Permittee) has not characterized the nature and extent of Bulk Fuels Facility Spill, nor conducted adequate remediation. The threat posed by this release demands immediate and aggressive action as called for in the New Mexico Environment Department's (NMED's) April 2, 2010 letter."

Numerous general deficiencies for all three plans were described for:

- Project organization, data management, and quality assurance
- Not containing the appropriate level of detail for characterization and clean up of the Bulk Fuels Facility Spill and not committing the Permittee to do anything.
- The plan specifically fails to provide detail concerning the types of data that are to be managed, schedules for data submittals and entries into the database, how accuracy and completeness of the data will be ensured, and data availability to the NMED.
- Data gaps were not addressed
- The risk to human health and the environment must be assessed through the use of laboratory analysis of hazardous constituents (e.g., benzene, toluene, ethylene dibromide (EDB), naphthalene, xylenes), not just total petroleum hydrocarbons.

- Use of outdated conceptual model of geologic, hydrologic, and contaminant conditions for the fuel percolation area, the light non-aqueous phased liquid (LNAPL) plume floating on groundwater, and the dissolved-phase contaminant plume in groundwater.
- Lack of quality assurance for sampling
- Lack of required sworn certification
- Lack of specific plans for general refuse, drill cuttings, excess sample material, water (e.g., decontamination, development, purge), spent materials, and used disposable equipment generated during the course of investigation, corrective action, or monitoring activities.
- Failure to immediately implement interim measures for remediating LNAPL floating on groundwater as required by the April 2, 2010 letter.

The 39+ page Notice of Disapproval contained many other specific criticisms of the three plans and set forth a compliance table along with a demand for corrections by September 7, 2010.
ftp://ftp.nmenv.state.nm.us/hwbdocs/HWB/KAFB/Bulk_Fuels_Facility_Spill/KAFB_8-6-2010_Fuel_Spill_NOD_and_Direction.pdf

On September 2, 2010, the Air Force informed NMED that it was switching to a "performance based contract." The Air Force requested a delay for re-submittal of the three plans and performance of the tasks set forth by NMED in the August 6, 2010 Notice of Disapproval.

Citizen Action filed a Freedom of Information Act request to obtain a copy of the contract. Several months later, the Army Corps of Engineers later provided some 45 pages and withheld 717 pages of the contract. Citizen Action furnished the 45 pages to the NMED and the Water Utility Authority. Citizen Action's administrative appeal requesting the balance of the contract is still pending.[33] The $22,974,682.41 million performance contract is largely for conducting quarterly monitoring, plans for studies and no implementation of remediation technology beyond existing SVE equipment operation. The Air Force has stated that $50 million has been allocated, but no record of that amount has been provided to the public or stakeholders.

[33] A 4/20/2012 email FOIA demial letter from Siobhan.R.Herrera@usace.army.mil stated: "Withholding in the entirety of the technical volume of the proposal was requested by Shaw because it contains critical details of Shaw's technical approach and assumptions for developing solutions to the problems."

The March 15, 2012 Citizen Action appeal letter states in part: Shaw was required to supply information to meet government specifications for the services related to environmental services related to facility investigations, monitoring and operations of remedial systems, and incidental construction associated with remediation activities. Such services and the manner of their undertaking are subject to broad public and agency scrutiny and compliance with the Resource Conservation and Recovery Act and the New Mexico Hazardous Waste Act. Such environmental remediation activities and the methods for accomplishing such clean up have been required by the government at numerous military bases. USACE cannot demonstrate that there would be any significant impairment to obtaining such information in the future by furnishing the requested FOIA documents.

The toxicity, size and costs of groundwater cleanup have been underestimated by Kirtland AFB. One need only compare the much more aggressive Air Force remediation action for a smaller aviation gasoline leak containing EDB at another Air Force site. In 1972, on the Massachusetts Military Reservation (MMR), located on western Cape Cod, a much smaller pipeline leak of 70,000 gallons of aviation fuel cost over $35,000,000 for clean up (1998 dollars). This system required 25 ground water extraction wells, a treatment plant, and 23 injection wells. At another MMR location, a little more than 5 ounces of EDB from only 150 gallons of leaded automotive gasoline contaminated 1.2 billion gallons of water. Concentrations of EDB in aviation gasoline were ~0.600 g/L, (a little more than 2 grams per gallon). KAFB has not provided the amount of EDB that might be contained in the aviation gas portion of the 24,000,000 gallons of fuel spilled. Millions of grams of EDB may be present in the Kirtland fuel spill with a potential to contaminate hundreds of billions or trillions of gallons of water.

Given that the estimate of the size of the jet fuel spill is now 24 million gallons, three times the size it was understood to be at the time the contract with Shaw Environmental and Infrastructure, Inc. was entered into on September 30, 2010, it would seem that any remediation or studies may be grossly under funded, especially for any Interim Measures. The performance work statement states:

> "The interim measures (IMs) that NMED has required are focused on removal of light non-aqueous phase liquid (LNAPL), which is acting as a source of dissolved fuel upgradient of the ABCWUA groundwater supply wells."

Now that the bulk of the LNAPL spill is trapped beneath the water table, the remediation efforts using SVE will not be successful for fuel removal. "NAPL chemical analytical results show that the trapped NAPL will be an ongoing source of dissolved groundwater contamination indefinitely."[34]

On September 7, 2010, NMED granted a delay with a revised compliance schedule for installation of soil vapor extraction units until early 2011, and work plan revisions until November 8, 2010. However, NMED stated:

> "The second paragraph of the Request states: "We do expect the revised work plans will deviate from the prescriptive direction in NMED's letter, however, the Air Force is confident that such an allowance will ensure the cleanup is completed in the most expeditious and efficient manner possible". NMED is willing to consider proposed work that meets or exceeds what NMED has already directed. However, to date the Permittee's work plans have fallen far short of compliance with NMED's April 2 and August 6, 2010 directions, in large part because the plans did not propose robust site characterization. NMED continues to hold that KAFB is not proposing nearly enough groundwater and soil-vapor monitoring wells and sampling locations. Design and implementation of effective interim measures to stop the migration of contaminants both in the vadose zone and the saturated zone is and will continue to be greatly hindered by this lack of site characterization. If the Permittee desires to complete clean up the Bulk Fuels

[34] http://www.kirtland.af.mil/shared/media/document/AFD-120629-057.pdf, p.ES-3

> Facility Spill efficiently and expeditiously, KAFB must take site characterization more seriously."

As of the date of this writing, no new SVE units have been installed at KAFB and the four existing units are operated sporadically.

On September 7, 2010, the Air Force furnished expected travel time information from the jet fuel spill to the Ridgecrest production wells that stated :

> "Flow paths do exist from the Kirtland BFF plume toward production wells Ridgecrest 5 and KAFB-3. Flow paths toward KAFB-3 may be active only seasonally. However, flow paths toward Ridgecrest 5 are active throughout the year."
>
> "The best estimate of transport velocity along flow paths from the Kirtland BFF plume toward production wells is 0.45 ft/day. Transport velocity under a worst-case scenario is 0.90 ft/day."

Table ES-1 provided the best and worst case travel time for Ridgecrest #5 as being Ridgecrest 37.0 years and 18.5 years, respectively, with groundwater traveling at 0.45 ft and 0.90 ft per day. The estimates were made without reliable estimates of hydraulic conductivity. Estimates were not based on data from aquifer tests performed at the Kirtland BFF site. Instead, the hydraulic conductivity was modeled from earlier studies from 1993 to 2002 using data from production wells at other locations. However, those studies give a much shorter travel time. A study by McAda and Barroll (2002) indicated "Horizontal hydraulic conductivity of the depth intervals used by production well fields was 30 ft/day in the east-west direction, and 60 ft/day in the north-south direction."
http://www.nmenv.state.nm.us/HWB/documents/KAFB_9-7-2010_Transpor_Velocity_-_Travel_Time_Report.pdf

On December 10, 2010, NMED issued a Notice of Partial Approval with Modifications and Notice of Disapproval for the revised plans submitted by the Air Force on November, 4, 2010.
ftp://ftp.nmenv.state.nm.us/hwbdocs/HWB/KAFB/Bulk_Fuels_Facility_Spill/KAFB_BFF_Workplan_Approval_with_Modifications_12-10-2010.pdf

"NMED finds the plans to be deficient, and provides the following comments. However, NMED must also ensure that commencement of the vadose zone and groundwater investigations and interim measures not be further delayed. NMED is therefore partially approving with modifications the Work Plans in accordance with Permit Part 1.38 of the Permittee's Hazardous Waste Operating Permit (Permit), issued July 15, 2010."

The NMED approved the installation of 78 new monitoring wells and 35 soil gas monitoring wells. Oddly, NMED allowed KAFB to not install the additional 2 dozen SVE units because (p.7):

> "The Permittee did not accomplish this work, and did not propose any alterative work for NMED to consider. Furthermore, the Permittee has not done anything in the past four months to accelerate the reduction of the soil-vapor mass in the vadose zone at the Bulk Fuels Facility."

NMED found continuing deficiencies in all three plans submitted. These included:

- Failure to address data gaps
- No provision of a site conceptual model for the fuel percolation area, the light non-aqueous phased liquid (LNAPL) plume floating on groundwater, and the dissolved-phase contaminant plume in groundwater.
- Relevant maps and cross-sections that show concentration data for contaminants
- a Quality Assurance (QA) Plan that contains specific quality assurance and quality control activities for the Bulk Fuels Facility Spill project
- Groundwater monitoring issues
- Quality assurance issues
- KAFB failed to provide an Interim Measures Work Plan to conduct interim measures to remediate the LNAPL plume within five years. The tests proposed by KAFB were rejected by an earlier NOD.

NMED would review the December 1, 2010 KAFB plan "to contain the LNAPL plume by proposing to pump and treat contaminated groundwater at the leading edge of the NAPL plume."

NMED demanded "The Interim Measures, Groundwater Investigation, and Vadose Zone Work Plans must be revised and resubmitted by the Permittee to the NMED for its review and approval by March 31, 2011."

On December 23, 2010, NMED issued a Notice of Disapproval for data that was missing and data that was missing for site characterization. NMED further criticized soil boring data as follows[35]:

> "It strains credulity that a number of soil borings/trenches (18 each, FFES-SB-01 through FFESSB-IO and FFES-TP-1 through FFES-TP-8) have the exact same ground-surface elevation, and many of the estimated values for eastings/northings are listed with more significant figures than those purported to represent actual survey data. NMED suspects that the Permittee does not actually survey the ground-surface elevation at soil boring locations, and instead has estimated elevations using a topographic map."

NMED found that KAFB had not submitted "all the required graphs showing concentrations of hydrocarbons (HC) and trends of major hazardous constituent (such as benzene, toluene, ethylene dibromide, xylenes, naphthalene, ethyl benzene, and lead) concentrations versus time for soil vapor and groundwater for each soil-vapor and groundwater monitoring well, as applicable."

Cross sections showing geology and contaminants were missing.

NMED required the information to be submitted by February 28, 2011.

[35] http://www.nmenv.state.nm.us/HWB/documents/KAFB-10-029_12-23-2010_NOD_Critical_Data_Submission.pdf

On January 12, 2011 the Hazardous Waste Bureau made a Public Meeting presentation in Albuquerque for the KAFB BFF Spill. An NMED handout stated that KAFB's LNAPL Containment Plan "proposes to stop migration of LNAPL and dissolved-phase plumes by extracting groundwater at leading edge of LNAPL plume, treating the water, and re-injecting the water back into the aquifer." The handout concluded the plan "Does not provide for removing the bulk of LNAPL."[36]

In a February 2011 email, Rick Shean, Water Utility Authority hydrologist raised the issue that Shaw (Air Force's contractor) is using a less sensitive detection method for EDB than used by former contractor CH2M Hill. ***This means that the dissolved EDB plume is much larger than shown on Kirtland's maps.***

The Air Force has no plan for addressing the dissolved jet fuel plume other than relying on "natural processes" it assumes are present in the ABQ drinking water aquifer. In a March 2011 Report to Congressional Committees, the Air Force reported[37]:

> "In addition to initial investigations and efforts to remove the fuel, the Air Force invested $22.9M in FYI 0 to complete the necessary characterization to install removal systems and $10-million to replace the fuel tanks and piping systems. 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. Because containment and source removal provides sufficient protection for the drinking water of Albuquerque, further active treatment of the dissolved plume will depend on a business case analysis when site conditions post removal are known." (Emphasis supplied).

There is no technical basis for the Air Force assumption that "natural processes" will remove the EDB from the groundwater before it reaches Albuquerque's drinking water wells.[38] The Quarterly Monitoring & Site Investigation Report, KAFB-011-0048c

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[36] http://www.nmenv.state.nm.us/HWB/documents/KAFB-10-037_6-28-2012_Enhanced_Well_Development.pdf

[37] http://www.nmenv.state.nm.us/HWB/documents/KAFB_3-2011_Report_to_Congressional_Committees.pdf

[38] EDB has migrated the full length of the monitoring network and was detected above the U.S. Environmental Protection Agency (EPA) maximum contaminant level (0.05 micrograms per liter) in samples from 28 of 51 shallow wells, 11 of 27 of intermediate wells, and 2 of 28 deep wells during the Fourth Quarter 2011 event. EDB is the one compound that was detected in the shallow, intermediate, and deep zones in the farthest downgradient well cluster (GWM 10; KAFB-106055, KAFB-106057, and KAFB-106058) during Third and Fourth Quarters 2011. ftp://ftp.nmenv.state.nm.us/hwbdocs/HWB/KAFB/Bulk_Fuels_Facility_Spill/KAFB_4-12-2012_Oct-Dec_2011_Quarterly_Rpt/KAFB-012-0002c_Quarterly_Rept_Oct-Dec%202011_ALL%20BKMRK_4-13-12.pdf p.ES-3. The furthest downgradient monitoring well has a reported EDB concentration of 0.65 µg/L, which is above the regulatory MCL of 0.05 µg/L. Based on the groundwater flow directions and velocities … the current monitoring well network is not sufficient to determine the extent of EDB groundwater contamination. p.5-8.

April – June 2011 states:[39]
p.ES-3

> The effect of microbial degradation on EDB migration rates and extent is less clear and the current extent of EDB is a strong indication that any EDB degradation rates are quite slow. Additional compound-specific microbial and isotope data are required to determine whether microbial degradation is having any effect on EDB migration.

The September 2011 Quarterly Report states:
p. 5-12[40]

> "The effect of microbial degradation on EDB migration rates and extent is less clear. Additional compound-specific data are required to determine whether microbial degradation is having any effect on EDB."

At p.7-4:

> "The only other outstanding data gap from the first quarterly report is information related to the EDB degradation and fate and transport mechanisms."

The Air Force neglected to inform Congress that no approved plan for removal of the fuel plume either for LNAPL or the dissolved plume is in place. The Air Force stated that:

> "The vertical and lateral extent of the dissolved plume below the surface of the groundwater has not been fully characterized."

The Air Force did not inform Congress that no removal of LNAPL has taken place.

The Air Force did not inform Congress of the numerous NMED Notices of Disapproval and data gaps for each of the three plans required for submittal by NMED under the Resource and Conservation and Recovery Act (RCRA) corrective action program.

The Air Force proposed "to achieve remedy-in place (RIP) for the interim measures by September 30, 2014, achieve plume stability in three (3) years, and, without further active treatment, reach MCLs in groundwater by 2025." Thus, the Air Force ignored completely the NMED requirement for active remediation of the dissolved plume of EDB.

The Air Force reported that "The objective of the containment system is hydraulic control of the LNAPL plume." The Air Force failed to mention that it had not received approval from NMED to operate any hydraulic control/containment system and none is in place.

Concerns were expressed by both NMED and the Water Utility Authority that the proposed containment wells would draw the LNAPL plume closer to the production wells. (See below, March 31, 2011 NMED and 11/02/2011 letter of the Water Utility Authority). Moreover, KAFB has not obtained necessary permit from the NMED Groundwater Protection Bureau for the operation of the containment wells.

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[39] Ibid.
[40] http://www.kirtland.af.mil/shared/media/document/AFD-110930-094.pdf

The Air Force omitted the fact that travel time to Albuquerque production wells was only based on modeling data from other locations, not site specific, and that those studies indicated travel time of up to 60 ft/day.

Again on March 31, 2011, NMED criticized the Air Force's Work Plan for containing the liquid jet fuel (LNAPL) phase. The Air Force emphasized that their proposed pump and treat plan could not be developed because characterization of the plume had not been obtained."

- NMED ordered the Air Force to provide more detail and clarification of the criteria to be used to demonstrate that there would be adequate capture of the jet fuel by the use of extraction wells.
- NMED questioned the use of extraction wells at the outer edge of the plume because the jet fuel could be spread further.
- NMED asked which wells would be used to assess the performance of the remediation system.
- NMED raised the issue that the Air Force lacks extraction and discharge permits from several agencies for contaminated water that would be brought to the surface.
- NMED stated that the WUA comments on the Work Plan needed to be considered by Kirtland.

On April 15, 2011, the ABCWUA Water Utility Advisory Board met and reviewed an Update on Review of Kirtland Air Force Base Bulk Fuel Spill Work Plans by David Jordan, PE, INTERA, Inc. INTERA was hired as a consultant to the ABCWUA. INTERA stated that there was "inadequate characterization of aquifer properties." INTERA found that Kirtland's Interim Measure Containment proposed design for two extraction wells at the downgradient edge of the LNAPL plume and one re-injection well is "unlikely to achieve containment" due to – "unrealistic or non-conservative assumptions" and -- "No phased approach, but NMED rejected earlier work with a phased approach." INTERA found also that the proposed system would not contain contamination for both the LNAPL and the dissolved phase migration near the LNAPL lens. INTERA requested:

- real time data sharing with NMED/Kirtland/Shaw.
- Ensure that the extent of fuel contamination above the water table and its potential as a source is well defined
- Ensure that the extent of dissolved phase in groundwater is well defined.
- Ensure that proposed remedial actions are protective of groundwater and supply wells.

At the same meeting, Dwight Patterson, an environmental engineer informed the Water Utility Advisory Protection Board (4/15/2011 Minutes) that he is "very concerned about the size of this contamination and that the proposed cleanup activities will not be enough to clean up this plume in time before it impacts the Water Authority's wells. What makes this plume unique, according to Mr. Patterson, is that "the plume is 500 ft. below ground surface, making it very difficult to extract with current remediation technology." Mr.

Jordan [Intera, Inc. advisory to the WPAB] said he did not disagree with Mr. Patterson's statements."[41]

A June 7, 2011 email from WUA hydrologist Rick Shean to John Pike, USAF included 12 issues. The issues addressed included:

- The need for characterization to define LNAPL distribution in the vadose zone in the source area.
- Install additional monitoring wells to more accurately define the horizontal downgradient plume boundary.
- Define the vertical extent of the dissolved-phase plume.
- Providing maps of groundwater contamination concentration to include all detected values, even if they do not reach applicable water quality standards. "Eliminating detected contaminants from the data products eliminates or conceals critical data for assessing plume growth or change."

Shean is concerned that Shaw's use of significantly less sensitive detection limits than those of CH2M-Hill created Quality Assurance problems and would yield inaccurate plume maps, i.e., show a smaller extent of the plume.

A July 8, 2011 KAFB LNAPL Containment Interim Measure Work Plan identified five data gaps for characterization data needed to complete the final design of the pump and treat system[42]

- Hydraulic conductivity of the aquifer
- Groundwater quality in the immediate vicinity of the NAPL plume
- NAPL chemical and physical parameters
- NAPL migration soil parameters
- Quantitative definition of the three-dimensional hydrogeologic framework for the final design.

After the political removal of James Bearzi as Chief the Hazardous Waste Bureau, on August 3, 2011, even with the significant data gaps, NMED granted partial approval for the extraction wells. The earlier demands of the April 2, 2010 letter were not referenced again for enforcement. As a result of the NMED's new kinder, gentler approach to the Air Force, NMED gave partial approval for the pump and treat well construction to begin -- even though it is contrary to NMED's earlier orders and assessment. Although the pump and treat well was installed, NMED Jim Davis has expressed reservations for the use of the containment well to not make the problem worse.[43]

On September 22, 2011, in a meeting that took place in the Washington, D.C. office of the EPA Federal Facilities Enforcement Office ("FFEO"), environmental engineer Dwight Patterson informed FFEO and EPA Region 6 that the fuel oil spill at Kirtland is the most difficult and threatening remediation site in the United States at this time. Patterson said that major emergency response action with the most aggressive removal

[41] http://www.abcwua.org/pdfs/wpab/wpab_minutes_041511.pdf, p.3
[42] ftp://ftp.nmenv.state.nm.us/hwbdocs/HWB/KAFB/Bulk_Fuels_Facility_Spill/KAFB_7-8-2011_LNAPL_Cont_IM_WP/
[43] http://www.abcwua.org/pdfs/board/minutes_06_20_2012.pdf, p. 60-61, Jim Davis NMED

methods necessary should be employed to remove the contamination. He stated reasons that:

- there is no hydraulic containment of the dissolved or LNAPL plumes at the aquifer;
- all current NMED approved interim measures (IM) were only studies;
- that a "tipping point" has been reached so that EDB is now accelerating toward the Ridgecrest production wells from the pumping of those wells;
- that only SVE technology is actively being used and that SVE cannot remove remove jet fuel according to NMED and EPA.

Patterson believes that a tipping point will be reached for the LNAPL plume trapped beneath the aquifer if full scale remediation efforts are not undertaken very soon.

On November 2, 2011, Water Utility Authority hydrologist, Rick Shean, raised the concern that the injection well proposed by KAFB for pump and treat "could accelerate the movement of dissolved phase contaminants to the downgradient public supply wells." … "Contaminated water will be introduced to a location where it currently does not exist."

Ongoing Delays in Installation of Groundwater Monitoring Wells for Characterization

On April 16, 2012, the Albuquerque Journal published the front page article "Base Effort 'Inadequate'":

> "Kirtland Air Force Base's efforts to determine the extent of jet fuel contamination are 'inadequate,' according to the New Mexico Environment Department, which is demanding new, deeper monitoring wells to determine the risk to Albuquerque drinking water wells.
>
> "'We don't know how far it goes,' said Rick Shean, a water quality hydrologist with the Albuquerque Bernalillo County Water Utility Authority. That makes it impossible to say how soon the contamination might reach the nearest wells, forcing a key part of the area's water supply to be shut down."

On April 13, 2012, NMED approved three additional monitoring wells that were proposed by KAFB nearly a year earlier. NMED called the March 2011 Work Plan for additional ground water monitoring wells "inadequate to fully characterize the Bulk Fuels Facility Spill within a reasonable time." The letter contained a demand for KAFB to submit an additional work plan with the goal of completing characterization by November 2012. NMED stated:

> "The northern part of the EDB plume needs additional characterization that was not addressed in the Work Plan."
>
> "The Permittee has been aware of the inadequate characterization on the northern part of the EDB plume since at least December 2011."

The NMED April 13 approval was conditional:[44]

[44] ftp://ftp.nmenv.state.nm.us/hwbdocs/HWB/KAFB/Bulk_Fuels_Facility_Spill/KAFB_6-21-2012_Install_3_well_clusters/Attachment%20A/NMED_13April2012_Letter_Additional_Groundwater_Monitoring_Wells.pdf

Conditions for Approval of Work Plan

NMED finds that a single well at each location is insufficient to characterize the vertical extent of the leading edge of the ethylene dibromide (EDB) plume, especially in light of the fact that groundwater samples collected from the two well clusters nearest to the leading edge of the plume contained EDB concentrations above the Maximum Contaminant Level (MCL) of 0.050 µg/L in both the third and fourth quarters of 2011. Of particular note, the concentrations of EDB exceeded the MCL in the shallow, intermediate, and deep wells at each of the two well clusters. Furthermore, pumping in the nearby production wells is expected to induce a downward-directed vertical gradient in groundwater in the vicinity of the production wells. Therefore, a single well screened across the water table at each of the proposed three locations is insufficient for site characterization.

As of April 13, 2012 it was evident that there still was no comprehensive characterization in place. NMED stated[45]:

Requirement for Characterization Plan

It is clear that even after the wells that are the subject of the Work Plan are installed, the coverage of wells at the leading edge of the plume will be insufficient to adequately characterize the contaminant plume as the well clusters will be located with insufficient density to properly assess the concentrations of EDB within the contaminant plume. In other words, the Permittee is required to determine the concentrations of contamination throughout the plume, not just find the leading edge. Although the Permittee and its contractor have disagreed that the average spacing of wells at the leading edge of the plume can be less than that compared to the source area of the plume, the NMED does not share this point of view. Instead, it is the northern part of the EDB plume that represents the most serious threat to Albuquerque's drinking-water supply. The northern part of the EDB plume needs additional characterization that was not addressed in the Work Plan.

NMED ordered that KAFB "must begin installing the nine wells immediately, and complete well installation and development by July 31, 2012. That date would not be achieved.

NMED stated further that:

> "Characterization completed to date indicates that the contaminant plumes in both the vadose zone and the groundwater are much more extensive that originally believed, and **the volume of fuel released into the environment accordingly is much greater than originally believed.** The Permittee has been aware of the inadequate characterization of the northern part of the EDB plume since at least December 2011. In more than four months the Permittee's response has been limited to the proposed additional wells of the Work Plan. The importance of installing these additional wells is of utmost importance." (Emphasis supplied).

NMED ordered that the plan for additional new wells was to be submitted to NMED by no later than May 31, 2012. The new additional wells were to be completed no later than November 30, 2012. Neither date would be achieved.

[45] Ibid.

On May 15, 2013 the NMED stated:[46]

> "Once the U.S. Air Force (Permittee) has completed the installation of the cluster wells approved in the April 13, 2012 letter, and has evaluated the analytical data of groundwater samples collected from these wells, the information will be used to determine the locations of additional wells to define the concentration and extent of the ethylene dibromide (EDB) contamination. These additional wells will provide coverage at the northern and eastern portion of the plume.
>
> …
>
> "Pursuant to Section 6.5.17 of the Permittee's Hazardous Waste Operating Permit, the Permittee is required to determine the concentrations of contamination throughout the plume. Knowing the concentration of contamination within the plume is vital to determine appropriate interim measures and eventually the final remedy."

NMED made a further delay for KAFB to submit the plan for the installation of additional wells to the three cluster sites to total nine wells. The NMED informed KAFB[47]:

> "Once the U.S. Air Force (Permittee) has completed the installation of the cluster wells approved in the April13, 2012 letter, and has evaluated the analytical data of groundwater samples collected from these wells, the information will be used to determine the locations of additional wells to define the concentration and extent of the ethylene dibrornide (EDB) contamination. These additional wells will provide coverage at the northern and eastern portion of the plume."

The NMED knew on April 13, 2012 that the jet fuel plume was "much greater than originally believed," i.e., the 2010 estimate of 8,000,000 gallons. However it was not until July 20, 2012 that the public learned the new estimate was that the plume was 24,000,000 gallons, three times the earlier estimate.[48] The calculations for that estimate have not been provided to the public for review.

On July, 27, 2012, it was announced by the Albuquerque Journal that the three new monitoring well clusters that KAFB was ordered to have installed by July 31, 2012 would be delayed. One of the well drilling contractors went out of business and the loss of the drilling rigs delayed the work. Bernalillo County Commissioner Maggie Hart-Stebbins, a Water Utility Authority Board member stated, "It just gives the appearance that they don't feel the same urgency about this that we do."[49]

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[46] http://www.nmenv.state.nm.us/HWB/documents/KAFB-10-019_5-15-2012_Clarification_Letter_Char_Plan.pdf

[47] ftp://ftp.nmenv.state.nm.us/hwbdocs/HWB/KAFB/Bulk_Fuels_Facility_Spill/KAFB_6-21-2012_Install_3_well_clusters/Attachment%20A/KAFB-10-019_5-15-2012_Clarification_Letter_Char_Plan.pdf

[48] http://www.huffingtonpost.com/2012/07/20/kirtland-air-force-base-fuel-spill_n_1688603.html

[49] Albuquerque Journal, New Wells to Monitor Jet Fuel Leak Delayed, p. C-2, July 27, 2012.

KAFB was granted an extension by NMED until November 2012 to drill the new monitoring wells because one of the two drilling contractors went out of business.[50] Thus, no new wells would be installed by the July 31, deadline; no plan for the necessary additional wells would be submitted by May 31, 2012 and the November 30, 2012 for completion and development was not in effect. November 30, 2012 became the new deadline for the wells that were previously ordered to be installed by July 31, 2012.

It seems nearly incomprehensible to Citizen Action that -- for the largest spill in US history into an aquifer -- drilling rigs are unavailable or that the Air Force would have no knowledge that a contractor was going out of business in time to locate additional drilling companies and that the NMED would grant a 3 month delay to resume drilling.

KAFB supply well #3 will have a 3 well cluster placed in proximity to it. Representatives of the San Pedro Neighborhood Association asked the Air Force at the June 12, 2012 quarterly Citizen Advisory Board meeting why no monitoring wells were being provided in close proximity to the City's Ridgecrest wells as was being done for the KAFB supply well.

On June 20, 2012 NMED Jim Davis stated at the Water Utility Authority Board meeting (http://www.abcwua.org/pdfs/board/minutes_06_20_2012.pdf, Transcript at p. 103):

> "Currently, the only effect that is operating on the plume other than the remediation strategies is the movement of the regional groundwater aquifer and potentially the cone of depression created by pumping at the Ridgecrest well field, as well as Kirtland and VA wells."

At that June 20, 2012 WUA meeting Commissioner Rey Garduno stated (Transcript, p.32)[51]:

> "The concern I have is that the vapor soil extraction method has proven not to be very effective from the viewpoint of especially now that we are talking about 24 million gallons. And the numbers, are not mine, these are numbers that have been moved forward by Kirtland Air Force Base, is in the half a million gallons per year. That will be 48 years before anything gets done, even if that were the only way that that could be remediated. And it's not. Not all of the contaminants will vaporize, will become a vapor source, and a lot of these things are moving in a way that I think will contaminate, by the estimation, again, of some of the folks that have been looking at this, in five years. We don't have that kind of time."

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[50] ftp://ftp.nmenv.state.nm.us/hwbdocs/HWB/KAFB/Bulk_Fuels_Facility_Spill/KAFB_6-21-2012_Install_3_well_clusters/KAFB_6-21-2012_cover_letter.pdf The June 21 letter requested a delay until September 30. Since the Air Force did not provide a rationale for the delay the NMED did not grant it based on the June 21 letter. http://www.nmenv.state.nm.us/HWB/documents/KAFB-10-019_6-28-2012_Approval_additional_9_wells.pdf . On July 21 the NMED reversed itself and granted the delay because a drilling subcontractor had gone out of business. http://www.nmenv.state.nm.us/HWB/documents/KAFB-10-019_7-18-2012_Approval_Extension_3_clusters.pdf

[51] http://www.abcwua.org/pdfs/board/minutes_06_20_2012.pdf

Commissioner Garduno stated what he thought should be included in a resolution that he later introduced to the Water Utility Authority as follows:

> "The agreement shall include requirements for Kirtland Air Force Base to place groundwater monitoring equipment as close as possible to the Ridgecrest municipal wells. The agreement should include the requirement for Kirtland Air Force Base to begin the investigation for technologies and installation of water treatment facilities for the wells, including financial assurance and to halt the further movement of the liquid -- LNAPL -- or liquid jet fuel and to plan for and implement remediation technology to address the long term contamination of soils and aquifer."

The Kirtland groundwater investigation was compromised by unreliable sampling methods. In a letter of September 28, 2011 NMED directed[52]:

> "KAFB to analyze entrained gas found in groundwater samples from Bulk Fuels Facility (BFF) Spill wells KAFB-106045, KAFB-106061, and KAFB-106081. NMED is not persuaded by the conclusion, in the [KAFB] January 6 letter, that the entrained gas includes carbon dioxide and methane that are exsolving from the groundwater under natural conditions.
>
> "Instead, the data indicate that the entrained gas is air. Entrained air would be expected to adversely affect the collection of representative samples of groundwater to be analyzed for volatile organic compounds, such as benzene, toluene, xylene, and ethylene dibromide, which are major contaminants at the BFF."

NMED pointed out that 18 additional wells provided compromised water samples and ordered that Kirtland

> "must immediately repeat the collection and analysis of gas samples as recommended by Shaw Environmental Inc. (Shaw), particularly because of the concern that the original gas samples may have been inadvertently contaminated with air."

On May 10, 2012, KAFB provided a response that did not include compliance with NMED's order for "repeating and conducting the collection and analysis of gas samples." Thus, earlier defective samples apparently would not be questioned further. This is a violation of the RCRA duty to collect reliable and representative groundwater samples. KAFB stated[53]:

> "In the event that gas bubbles are witnessed during a sampling activity, Ms. Diane Agnew, Shaw Environmental, Inc., will be contacted by the onsite Shaw personnel and requested to the field location. Ms. Diane Agnew will contact Mr. Will Moats of the NMED Hazardous Waste Bureau, an Army Corps of Engineers representative, and Mr. Wayne Bitner (KAFB) to request their presence to the

[52] http://www.nmenv.state.nm.us/HWB/documents/KAFB_3-2-2012_NMED_Letter_Gas_Bubbles.pdf

[53] http://www.nmenv.state.nm.us/HWB/documents/KAFB_5-10-2012_response_NMED_3-2-2012_gas_bubbles.pdf

field location observing gas bubbles in the sampling stream. The group, once assembled at the site location, will make recommendations towards a determination if additional gas bubble sampling is required based upon the field observations made by the assembled team. A final determination of the path forward will be made by the NMED and followed by KAFB to complete the sampling effort.

"The 2 March 2012 letter directed KAFB to collect additional gas samples and deliver the results to NMED by 1 June 2012. Based on discussions held during the 5 April 2012 Tiger Team meeting, no additional gas bubble samples will be accomplished other than those directed through the process outlined above. If samples are collected, the results will be delivered to the NMED within 45 days of date of sample collection." (Emphasis supplied).

Thus, the Tiger Team allowed unreliable samples to remain in the data base, contrary to RCRA requirements for taking reliable and representative groundwater samples.

Shaw does not meet the sampling, shipping and analyses protocols required by EPA for volatile organic compounds (VOCs). Sampling protocol call for sampling, putting the sample on ice and shipping it overnight for analyses. Shaw sent samples collected for VOCs to RTI Laboratory in Livonia, Michigan. EPA protocol requires[54]:

"Once samples are collected, it is imperative that they be stored in conditions which maintain the integrity. All samples should be placed in shipping containers or other suitable containers with ice to reduce the temperature as soon as possible. Ideally, samples should be shipped the day of collection for overnight delivery to the laboratory. If overnight transit is not feasible due to site logistics, samples should be held at 4°C until shipping."

The RTI laboratory sample receipt checklist report (#1111023) shows that VOC samples collected between 10/18/2011 and 10/24/2011 were sealed on 10/25/2011 into transport cooler C-304, but no temperature of the cooler was provided. The samples did not arrive until 10/31/2011 at RTI. Samples were not analyzed until at the earliest on 11/1/2011 with the great majority of VOC samples not analyzed until 11/9/2011 or 11/20/2011. There is no evidence that the bottled samples were put on ice after the samples were taken by Shaw.

The same RTI laboratory sample receipt checklist shows that seals on sample bottles were not intact upon arrival; temperatures were not within the correct range of > 0º C to 6º C; sample temperatures were not taken and recorded upon receipt; traffic report or a packing receipt was not present. KAFB/Shaw was not contacted and no required explanation was given.

Fixed gasses that were collected on 10/19/2011 that were placed in the Tedlar bags were not shipped until 10/25/2011 and not sampled until 11/4/2011. RTI Laboratory sampling for fixed gases was not appropriately accomplished for the October – December 2011 period for fixed gases.[55]

[54] http://www.epa.gov/region6/qa/qadevtools/mod5_sops/soil_sampling/r9-voc-soilsample_gui.pdf
[55] https://kirtlandafb.tlisolutions.net/sitedocs/PDFS/12/1267.11.PDF

"Fixed Gases (Noncondensable Gases Light Hydrocarbons) Analyses:
All sample analyses included a Method Blank, LCS, LCSD and Duplicate, where applicable. All QC parameters were within established control limits except where noted on the QC summary forms or below. Initial and continuing calibration results were within method specifications.
Samples collected in Tedlar bags have a limited holding time as specified by the manufacturer for the collection of volatile organic compounds. There is no known stability data for the analytes of interest for this project collected in Tedlar bags. The standard holding time is 48 hours for Tedlar bags. Due to the nature of the project sample analysis within 48 hours was not feasible." (Emphasis supplied).

EPA manuals clearly describe that Soil Vapor Extraction technology is not usable for diesel type fuels in the aquifer. Nevertheless, Shaw Environmental, Inc. and the NMED have claimed continuously that SVE technology will remove the LNAPL. Shaw has proposed designing a Thermal Oxidizer, a larger SVE unit than those currently in use. The design and installation won't be complete until November 2012 and will thereafter have to be tested, adjusted, etc. There is no evidence that the larger SVE units will be able to remove more volume of vapors even though the amount of air extracted is increased. (See discussion above for Thermal Oxidizer).

Moreover, the Air Force, Shaw and the NMED have known since 2011 that the LNAPL jet fuel is trapped beneath the water table where it cannot be removed at all by SVE. Shaw states that it will be "an indefinite problem."

The June 2012 Quarterly Report [56]states:

"The time-series analysis of the vapor concentration data since 2007 shows only marginal vapor concentration declines over time, even in the SVE wells. It is concluded that while substantial contaminant mass has been removed from the vadose zone (approximately 400,000 gallons of NAPL-equivalent mass vapor), the overall effect of the current SVE efforts is difficult to determine from the vapor concentration data.

"Rising groundwater levels continue to result in decreases in NAPL thickness and observations in monitoring wells. During the last three quarters, NAPL has been consistently observed in only a few monitoring wells. The majority of the NAPL mass observed in 2009, the year of lowest water levels, is now trapped below the water table.

"NAPL chemical analytical results show that the trapped NAPL will be an ongoing source of dissolved groundwater contamination indefinitely. (Emphasis supplied).

"The extent of EDB groundwater contamination at the northeastern extent of the plume is not defined at this time. Assuming no degradation and adsorption factors, a simple migration calculation shows that EDB has a low retardation factor of R =

[56] http://www.kirtland.af.mil/shared/media/document/AFD-120629-057.pdf

1.03. Therefore, it is possible that EDB will migrate at an estimated velocity of 0.97 times the groundwater flow velocity if there is limited EDB degradation. Assuming a 50-year NAPL on water table and an average groundwater velocity of 95 ft/yr, the calculated EDB plume downgradient of the NAPL area is approximately 4,500 ft long if no EDB degradation is assumed. The observed EDB plume length downgradient of the NAPL area is 2,500 ft, which is substantially less than the calculated estimate; however, the northeastern extent of the plume is still undefined at this time and will require additional monitoring wells to delineate the downgradient extent of the EDB plume."

The Air Force is not displaying a sense of urgency for this emergency. The Air Force has not removed a single gallon of jet fuel from the groundwater since the determination was made in 2007 that LNAPL was floating on the aquifer. There is currently no containment of either the dissolved fuel oil plume or the liquid jet fuel plume migrating northward towards the Ridgecrest wells. Colonel Conley stated at his March 13, 2012 public meeting that the Air Force has no plans to remediate the dissolved plume other than SVE extraction to be conducted on Kirtland. Col. Conley also stated at the same meeting that the Air Force's action plan, if the fuel oil contamination reaches a Ridgecrest well, is to "shutdown the well." No plans for replacement of city production wells are on the table.

So far the only damage control for the Albuquerque drinking water aquifer is political. After the Air Force learned the spill may be 24 million gallons, the Air Force began telling the public that it is only concerned with the level of contamination that is seen in the groundwater, not the estimated spill volume. However, experts agree that the extent, persistence of contamination, clean up time, scale of remediation necessary and costs are factors clearly related to the size of a spill.

All shallow groundwater monitoring wells have been contaminated with EDB above the EPA drinking water standards and the extent of the EDB is unknown. None of the monitoring wells were constructed so that they could later be used for remediation purposes. The groundwater sampling events do not provide error data and sampling data varies erratically for a plume that has been in existence for several decades.

According to KAFB in its FY 2010 Expenditure Summary, "The total value of Kirtland Air Force Base's economic impact is approximately $7.8 billion."
http://www.kirtland.af.mil/shared/media/document/AFD-110504-006.pdf
The potential for local and statewide political and economic impact from the jet fuel spill is substantial. The Air Force has extremely minimal cleanup efforts in place, shows a history of exercise of political influence to ignore, avoid and delay strong regulatory measures. Regulatory agencies can be reluctant to levy criticism, especially when regulatory personnel are removed from their posts, budgets are cut and regulatory positions remain unfilled thereby increasing workload. Local politicians may be threatened with the loss of revenue and loss of campaign funds. Hard criticism of the Air Force at public meetings can be chilled by implying that somehow one is unpatriotic or not respectful of the bravery and commitment of US troops.

The Air Force should have been characterizing and remediating the LNAPL and dissolved jet fuel for over 10 years. The Air Force has only removed 400,000+ gallons of vapor. At a March 2012 Citizen Advisory Board meeting, Col. Conley could not provide the figure for how much soil vapor has been removed since the April 2, 2010 letter of the NMED demanding remediation in 5-years. None of the Liquid Non-aqueous Phase Liquid (LNAPL) had been removed according to Col. Conley.

If the current lack of remediation and delay for coordinated, well thought out planning and action continue, the magnitude of the contamination that will reach the municipal drinking water wells in Albuquerque, NM will dwarf the environmental disasters caused by the US Air Force at dozens of Superfund sites around the country. The KAFB jet fuel is an environmental disaster that requires an immediate emergency response. As Rey Garduno put it, "time is not on our side."

Citizen Action believes that EPA FFEO and EPA Region 6 can no longer act only as an observer but should take an active participatory role in all respects.

August 27, 2012

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Citizen Action New Mexico is a 501 (c)(3) project of the New Mexico Community Foundation.

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Meeting Agenda
U.S. EPA, Federal Facilities Enforcement Office, Washington, DC
and Xitech Instruments, Inc.

Date: Thursday September 22, 2011 10:00am
Regarding: Kirtland AFB Bulk Fuels Facility Spill Albuquerque, New Mexico

Attending:
EPA Headquarters at Washington, D.C.
Federal facilities Enforcement Office
Kenneth Patterson, Deputy Director
Catland Miz (attorney)
Andrew Cherry (attorney)

Region 6 Office (conference call)
Dallas, Texas
Hazardous Waste Enforcement Branch (6EN-H)
Mark Hansen, Assistant Director
Paul James, Corrective Action
Terry Hubner, P.G. (KAFB Project Manager)

Xitech Instruments, Inc.
Dwight Patterson, President

Agenda:
1. Purposes for this Meeting.

The 1st purpose of this meeting is to present documents to the EPA that indicate the New Mexico Environmental Department staff changes have changed enforcement time frames and actions to the point that puts the wells at risk.

The 2nd purpose of this meeting is to ask the EPA to determine the appropriate use of SVE at the KAFB spill.

The 3rd purpose of this meeting is to ask the EPA to carefully review the KAFB Containment Plan for risks of failure to capture.

The 4th purpose of this meeting is to share my suggestions for removing the LNAPL in the vadose zone and the LNAPL and dissolved NAPL in and on the aquifer water table.

The 5th purpose of this meeting is to ask the EPA consider creating a plan B for the City of Albuquerque, VA Hospital, and KAFB wells if any of their wells become impacted by the KAFB spill.

2. Brief Review of KAFB spill
3. Present documents relating to NMED enforcement changes.
4. Present documents relating to SVE
5. Present documents relating to the approved containment IM
6. Present documents relating to my suggestions for LNAPL removal
7. Misc. documents

Gov.: Better Relationship with Kirtland 6-11-11

Jet Fuel Cleanup Efforts Praised

By Sean Olson
Journal Staff Writer

Gov. Susana Martinez on Friday praised the Air Force for its recent efforts to clean up the contamination of a massive Kirtland Air Force base jet fuel leak and signaled a kinder, gentler approach from the New Mexico Environment Department in dealing with the underground plume.

Observers warn, however, that a hands-off approach by the state has warranted little progress in the past.

In a letter to Air Force Assistant Secretary Terry A. Yonkers, Martinez blamed "previous leadership" in New Mexico for a poor working relationship with the Air Force.

She said the Air Force's current plans, including drilling 35 wells to get a better idea of the plume's dimensions and taking a more active approach to pumping out the jet fuel, are the correct approaches to dealing with the issue.

"That is why I applaud your performance-based remediation approach that allows for the most effective cleanup in the shortest time frame," Martinez wrote.

Col. Robert Maness, Kirtland Air Force Base commander, said in a statement Friday that the working relationship between the state and the base had improved since Martinez took office in January.

"Both the Governor and (NMED Secretary David) Martin have committed to work with us in a very collaborative and positive manner. We are all focused on the same objective: Cleaning up the fuel contamination as quickly as possible to ensure that the people of Albuquerque continue to have safe drinking water," Maness said.

Don Hancock of the Southwest Research and Information Center said a more congenial NMED relationship with Kirtland will be effective as long as the agency doesn't allow the Air Force slack in its cleanup responsibilities. A more hands-off approach from the administration of former Gov. Bill Richardson, until the last year of his second term, did little to expedite cleanup efforts, Hancock said.

"I think the proof will be in the pudding as to whether the state is going to put requirements on Kirtland and watchdog what they are doing," he said.

In an April 2010 letter, NMED officials accused the Air Force of dragging their feet on "a significant threat to human health and the environment." It was the first time the agency put significant public pressure on Kirtland's efforts.

Since then, the Air Force has ramped up its cleanup methods, allocating $50 million for the 35 wells to determine the plume size and 78 other monitoring wells, which will help them determine a long-term plan by October 2014.

The Air Force learned of a leaky pipe in Kirtland's jet fuel loading facility in 1999. The small leak in the pipe is estimated to have been allowing jet fuel to leak into the soil for decades, releasing as much as 8 million gallons of fuel into the ground.

In the past several months, new wells have shown that fuel-related chemicals are present outside the area officials have estimated the plume to exist, including at depths where drinking water wells pump groundwater. Although officials maintain that other factors could cause the chemicals to be present, experts say the most likely explanation is the plume has spread farther than once believed.

None of the chemicals detected have been found in large enough quantities to be harmful.