DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 377TH AIR BASE WING (AFMC)

NOV 3 0 2012

Colonel John C. Kubinec
377 ABW/CC
2000 Wyoming Blvd SE
Kirtland AFB NM 87117-5600

Mr. John Kieling, Manager
RCRA Permits Management Program
Hazardous Waste Bureau (HWB)
New Mexico Environment Department (NMED)
2905 Rodeo Park Road
Santa Fe New Mexico 87505

Dear Mr. Kieling

Attached please find the letter with subject title: *Response to NMED Letter dated November 6, 2012; Repeat Sampling and Gas Bubbles in Groundwater Samples; Bulk Fuels Facility Spill, Solid Waste Management Units ST-106 and SS-111; Kirtland Air Force Base, New Mexico*. Its submission is in response to the occurrences of gas bubbles observed in repeat groundwater monitoring well samples collected at KAFB-106205, KAFB-106206, and KAFB-106209. The attached letter describes observations and the path forward to determine the source of the gas bubble occurrences. It also contains a gas bubble sampling schedule and a list of monitoring wells that have had occurrences of gas bubbles during the last four quarters of sampling.

Please contact Mr. L. Wayne Bitner at (505) 853-3484 or at ludie.bitner@kirtland .af.mil or Ms. Victoria R. Martinez at (505) 846-6362 or at victoria.martinez@kirtland.af.mil if you have any questions.

Sincerely

JOHN C. KUBINEC, Colonel USAF
Commander

Attachment:
Response to NMED Letter dated November 6, 2012; Repeat Sampling and Gas Bubbles in Groundwater Samples; Bulk Fuels Facility Spill, Solid Waste Management Units ST-106 and SS-111; Kirtland Air Force Base, New Mexico

cc:

NMED-RPD (Davis), w/out attach
NMED-HWB (Moats, McDonald, Salem, Brandwein), w/ attach
NMED-GWQB (J. Schoeppner), w/ attach
NMED-OGC w/out attach
EPA Region 6 (L. King), w/out attach
AFCEE/CMSE (Mr. Oyelowo), w/out attach
/EXEC (Mr. Urrutia), w/out attach
Public Info Repository (Central New Mexico), w/ attach
Administrative Record/Information Repository (AR/IR), w/ attach
File, w/ attach

40 CFR 270.11
DOCUMENT CERTIFICATION
NOVEMBER 2012

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

JOHN C. KUBINEC, Colonel, USAF
Commander, 377th Air Base Wing

This document has been approved for public release.

KIRTLAND AIR FORCE BASE
377th Air Base Wing Public Affairs

KIRTLAND AIR FORCE BASE
ALBUQUERQUE, NEW MEXICO

Response to NMED Letter Dated November 6, 2012
Repeat Sampling and Gas Bubbles in Groundwater Samples

Bulk Fuels Facility Spill
Solid Waste Management Units ST-106 and SS-111

December 2012

377 MSG/CEANR
2050 Wyoming Blvd. SE
Kirtland AFB, New Mexico 87117-5270

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 377TH AIR BASE WING (AFMC)

NOV 30 2012

Colonel John C. Kubinec
377 ABW/CC
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Commander, 377th Air Base Wing

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KIRTLAND AIR FORCE BASE
377th Air Base Wing Public Affairs

Shaw Environmental and Infrastructure, Inc.

2440 Louisiana Blvd NE, Suite 300
Albuquerque, NM 87110
Phone: 505.262.8928

Shaw® Shaw Environmental & Infrastructure, Inc.

December 3, 2012

Subject: **Response to NMED Letter Dated November 6, 2012**
Repeat Sampling and Gas Bubbles in Groundwater Samples
Bulk Fuels Facility Spill, Solid Waste Management Units ST-106 and SS-111
Kirtland Air Force Base, New Mexico

This letter is being submitted in response to the letter received from the New Mexico Environment Department (NMED) on November 6, 2012 regarding the resampling of groundwater monitoring wells KAFB-106205, KAFB-106206, and KAFB-106209, and the sampling of gas bubbles at the three well locations. This letter describes the proposed sampling approach for gas bubbles observed at the three wells of interest: KAFB-106205, KAFB-106206, and KAFB-106209.

The NMED April 13, 2012 letter places the requirement for the resampling of wells KAFB-106205, KAFB-106206, and KAFB-106209 with representatives from the NMED, Kirtland Air Force Base (AFB), and Shaw Environmental & Infrastructure, Inc. (Shaw). The resampling of wells KAFB-106206 and KAFB-106209 was completed on November 6, 2012. Representatives from the NMED, Kirtland AFB, U.S. Army Corps of Engineers (USACE), and Shaw were present to observe the collection of the samples. KAFB-106205 was sampled on November 7, 2012 with representatives from the NMED, Kirtland AFB, and Shaw present to observe sample collection. Samples were submitted to the laboratory for analysis of volatile organic compounds (EPA Method 8260B) and ethylene dibromide (EDB) (EPA Method 8011).

During the field observation of purging at KAFB-106209, the following adjustments were made to reduce or remove bubbles observed in the discharge water:

- Removed the ball-valve between the wellhead and the water quality flow-through meter. The ball-valve is used to regulate the flow of discharge for sampling; during purging of the well, the ball-valve is fully open. There was no change in the size or density of bubbles in the discharge water with the removal of the ball-valve.

- Removed both the ball-valve and the water quality flow-through meter. There was no change in the size or density of the bubbles.

- Reduced the compressor pressure down to 100 pounds per square inch (psi) from the normal pressure of 140 psi, while the ball-vale and water quality flow-through meter were not attached. There was no change in the size or density of the bubbles.

Bubbles of pin-head size/diameter were observed during purging and resample collection at all three well locations. The bubbles noted in the discharge tubing were larger in diameter (approximately pea-sized) and were tiny, pin-head-sized bubbles in the actual water samples. In the case of KAFB-106206, the density of bubbles in the discharge was such that the water in the flow-through meter appeared cloudy. There was no change in bubble size or density with any of the adjustments listed above.

After observing the bubbles in the purging line at KAFB-106209, the NMED, Kirtland AFB, USACE, and Shaw representatives agreed that the NMED samples for VOCs and EDB would be collected with bubbles present in the sampling volatile organic analysis (VOA). The Kirtland AFB samples would be collected using the sampling protocol with no bubbles or headspace in the sample VOA.

Gas Bubble Sampling

In addition to resampling of wells KAFB-106205, KAFB-106206, and KAFB-106209, the NMED November 6, 2012 letter directed Kirtland AFB to implement the four-part method for sampling gas bubbles, as outlined in the Kirtland AFB letter dated February 6, 2012. Those four parts are as outlined as follows:

1. Collect the gas bubbles using Isotech® gas sample methodology. A dedicated technical staff member, who is trained in the protocol, will be assigned to the task of collecting the gas bubble samples and will work closely with the laboratory. Field forms will be revised, and the team will be trained for more thorough documentation of gas sampling.

2. Shaw will also collect gas bubble samples using the traditional two-valve sample cylinders and upflow filling. This will reduce the potential for atmospheric air to enter the sample stream during gas sample collection.

3. Argon gas, in place of the air compressor, will be used to drive gas during sample collection. This will allow Shaw to definitively determine pump functionality.

4. Continue with documentation of the occurrence of gas bubbles in the purge and sample collection logs, including bubble size and bubble behavior.

Shaw recommends sampling gas bubbles at the two of the three wells that were resampled and observed by the NMED, Kirtland AFB, and USACE: KAFB-106205 and KAFB-106206. The gas bubble samples will be collected within 2 weeks of NMED approval of this letter.

Isotech® Gas Sampling Methods

Argon gas, rather than a standard air compressor, will be used to drive the air-piston Bennett sample pump. The connection of the Argon gas will be similar to the compressor connection by connecting directly to the air-inlet tube on the wellhead. The pressure of the Argon gas will be held at 140 psi, which is similar to what is used in the standard compressor methodology.

The IsoBag sampling will be done in accordance with the laboratory sampling methods. After purging the wells, a mechanism will be attached to the pump output for sampling by following the methods outlined in the Quality Assurance Project Plan (QAPjP) (Shaw, 2011). This mechanism will consist of a pressure gauge in line with two valves. The purge valve will allow water to be pumped through the system to purge both the well and the tubing. The second valve, the sampling valve, will provide a point from which a sample split can be slowly "bled" off from the water that is being continuously purged out of the system via the purge valve.

The sampler will slowly open the purge valve to purge any gas air from the tubing. The flow rate will be controlled such that the system maintains a pressure close to the maximum pressure of the water system or pump. The flow rate will be measured at 10-minute intervals during sampling. When the line has been adequately purged, and steady state has been achieved, the sampling valve will be opened slightly to purge the air from the valve. The flow rate will then be reduced, and the fitting from the sample valve will be connected to the IsoBag, and the bag will be filled. The IsoBag will be filled with approximately 500 cubic centimeters (cc) of water. Once the bag has been adequately filled, the sampling valve will be closed and quickly disconnected from the IsoBag.

The IsoBag sample containers will be labeled, packaged, and shipped according to the methods outlined in the QAPjP (Shaw, 2011). The samples will be shipped the same day the samples were collected via an overnight shipping method.

Path Forward

Based on the field discussions with the NMED, Kirtland AFB, USACE, and Shaw representatives, the following are potential sources for the bubbles observed:

1. Improperly functioning sampling equipment

2. Aeration of the groundwater due to air-rotary casing hammer (ARCH) drilling methods used for installation of monitoring well

3. The dissolution of naturally occurring gases as the water comes into equilibrium with atmospheric pressure at the ground surface

It is expected that the gas signature of each of the three scenarios will be unique and therefore, the following correlations can be drawn from the gas bubble sample results:

- If the gas sample is predominantly Argon in composition, it can be concluded that the source of the bubbles is sampling equipment that is not working properly. This will result in a programmatic evaluation of the Bennett sampling pumps, and additional discussions with the NMED will be required to determine the path forward.

- If the gas sample has an atmospheric composition, aeration of the aquifer from ARCH is the most likely reason for the cause of bubbles in the groundwater purge and sample water. Based on experience with similar sites in New Mexico, where ARCH has been used and has resulted in bubbles, the bubbles caused by this drilling method will be persistent with time. Additional discussions with the NMED may be required if ARCH is determined to be the source of gas bubbles in groundwater.

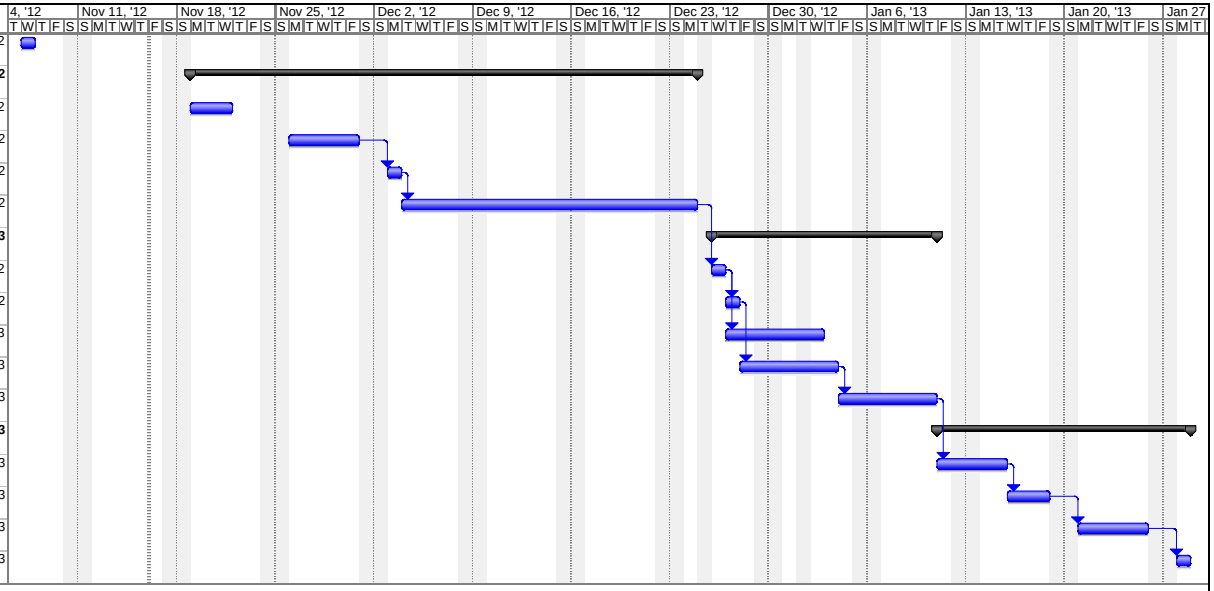
- If the gas sample has a composition that is enriched in carbon dioxide or methane, it can be concluded that the gas bubbles are naturally occurring due to the dissolution of gases coming to equilibrium with the surface atmospheric pressure.

A schedule for gas bubble sampling and submittal of the results is included as Attachment 1 to this letter.

Attachment 2 of this letter is a table summarizing wells that had documented occurrences of bubbles for the past four quarters of groundwater sampling; an “X” in the table indicates bubbles were observed.

ATTACHMENT 1

ID	Task Name	Duration	Start	Finish
1	Receipt of NMED Letter Regarding Gas Bubbles	1 day	Wed 11/7/12	Wed 11/7/12
2	**Kirtland AFB Letter Response w/ Sample Method**	**26 days?**	**Mon 11/19/12**	**Mon 12/24/12**
3	USACE and KAFB Review	3 days	Mon 11/19/12	Wed 11/21/12
4	Staffing for Commander Signature	5 days	Mon 11/26/12	Fri 11/30/12
5	Submit to NMED	1 day?	Mon 12/3/12	Mon 12/3/12
6	NMED Review	15 days	Tue 12/4/12	Mon 12/24/12
7	**Gas Bubble Sampling**	**11 days**	**Wed 12/26/12**	**Thu 1/10/13**
8	Sample at KAFB-106205	1 day	Wed 12/26/12	Wed 12/26/12
9	Sample at KAFB-106206	1 day	Thu 12/27/12	Thu 12/27/12
10	Lab Analsis of KAFB-106205 Sample	4 days	Thu 12/27/12	Wed 1/2/13
11	Lab Analysis of KAFB-106206 Sample	4 days	Fri 12/28/12	Thu 1/3/13
12	Data Validation	5 days	Fri 1/4/13	Thu 1/10/13
13	**Data Table Letter**	**12 days**	**Fri 1/11/13**	**Mon 1/28/13**
14	Prepare Data Table and Cover letter	3 days	Fri 1/11/13	Tue 1/15/13
15	USACE and KAFB Review	3 days	Wed 1/16/13	Fri 1/18/13
16	Staffing for Commander Signature	5 days	Mon 1/21/13	Fri 1/25/13
17	Submit to NMED	1 day	Mon 1/28/13	Mon 1/28/13



Project: Gas_Bubble_Sampling_Sched
Date: Fri 11/16/12

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

ATTACHMENT 2

Bubbles Only Data

Well ID	Shallow, Intermediate, Deep	Qt4, 2011	Qt1, 2012	Qt2, 2012	Qt3, 2012
KAFB-3					
KAFB-15					
KAFB-16					
KAFB-3411	Shallow				
KAFB-1061	Shallow				
KAFB-1062	Shallow				
KAFB-1063	Shallow				
KAFB-1064	Shallow				
KAFB-1065	Shallow		X		
KAFB-1066	Shallow				
KAFB-1067	Shallow				
KAFB-1068	Shallow		X		
KAFB-1069	Shallow			X	
KAFB-10610	shallow				
KAFB-10611	Shallow				
KAFB-10612	Shallow				
KAFB-10613	Shallow				
KAFB-10614	Shallow				
KAFB-10615	Shallow				
KAFB-10616	Shallow				
KAFB-10617	Shallow				
KAFB-10618	Shallow				
KAFB-10619	Shallow				
KAFB-10620	Shallow				
KAFB-10621	Shallow		X		
KAFB-10622	Shallow				
KAFB-10623	Shallow				
KAFB-10624	Shallow				
KAFB-10625	Shallow				
KAFB-10626	Shallow			X	
KAFB-10627	Shallow				
KAFB-10628	Shallow				
KAFB-10628-510	Shallow				
KAFB-106029	Shallow			X	
KAFB-106030	Intermediate			X	
KAFB-106031	Deep (550 ft)				X
KAFB-106032	Shallow		X		
KAFB-106033	Intermediate	X			X
KAFB-106034	Deep (550 ft)		X		X
KAFB-106035	Shallow				
KAFB-106036	Intermediate		X		
KAFB-106037	Shallow				X
KAFB-106038	Shallow				
KAFB-106039	Intermediate	X	X	X	
KAFB-106040	Deep (550 ft)	X	X	X	
KAFB-106041	Shallow				
KAFB-106042	Intermediate				
KAFB-106043	Deep (590 ft)		X	X	
KAFB-106044	Intermediate				
KAFB-106045	Deep (550 ft)				X
KAFB-106046	Shallow				

Bubbles Only Data (continued)

Well ID	Shallow, Intermediate, Deep	Qt4, 2011	Qt1, 2012	Qt2, 2012	Qt3, 2012
KAFB-106047	Intermediate		X		
KAFB-106048	Deep (550 ft)				
KAFB-106049	Shallow				
KAFB-106050	Intermediate				X
KAFB-106051	Deep (550 ft)		X	X	X
KAFB-106052	Shallow				
KAFB-106053	Intermediate	X	X		
KAFB-106054	Deep (550 ft)	X	X		
KAFB-106055	Shallow				
KAFB-106057	Intermediate	X	X		X
KAFB-106058	Deep (550 ft)		X		
KAFB-106059	Shallow				X
KAFB-106060	Intermediate		X	X	X
KAFB-106061	Deep (590 ft)				
KAFB-106062	Deep (590 ft)				
KAFB-106063	Intermediate		X		
KAFB-106064	Shallow				
KAFB-106065	Intermediate		X		X
KAFB-106066	Deep (550 ft)		X		
KAFB-106067	Shallow				
KAFB-106068	Deep (590 ft)		X	X	X
KAFB-106069	Intermediate				
KAFB-106070	Shallow				
KAFB-106071	Deep (590 ft)	X	X	X	
KAFB-106072	Intermediate		X	X	
KAFB-106073	Intermediate		X		X
KAFB-106074	Deep (590 ft)		X		X
KAFB-106075	Shallow				X
KAFB-106076	Shallow				
KAFB-106077	Intermediate				
KAFB-106078	Deep (590 ft)			X	
KAFB-106079	Shallow		X	X	X
KAFB-106080	Intermediate				
KAFB-106081	Deep (590 ft)				
KAFB-106082	Shallow				X
KAFB-106083	Intermediate		X	X	X
KAFB-106084	Deep (590 ft)		X	X	X
KAFB-106085	Shallow				
KAFB-106086	Intermediate			X	X
KAFB-106087	Deep (590 ft)			X	X
KAFB-106088	Shallow				
KAFB-106089	Intermediate		X	X	X
KAFB-106090	Deep (590 ft)	X	X	X	X
KAFB-106091	Shallow				
KAFB-106092	Intermediate	X	X	X	
KAFB-106093	Deep (590 ft)		X	X	X
KAFB-106094	Shallow	X	X		
KAFB-106095	Intermediate			X	
KAFB-106096	Deep (590 ft)	X	X		
KAFB-106097	Intermediate		X	X	X
KAFB-106098	Deep (550 ft)		X	X	

Bubbles Only Data (concluded)

Well ID	Shallow, Intermediate, Deep	Qt4, 2011	Qt1, 2012	Qt2, 2012	Qt3, 2012
KAFB-106099	Intermediate	X	X		
KAFB-106100	Deep (550 ft)		X		
KAFB-106101	Intermediate			X	
KAFB-106102	Deep (550 ft)				
KAFB-106103	Intermediate	X			
KAFB-106104	Deep (550 ft)	X	X	X	X
KAFB-106105	Intermediate		X		
KAFB-106106	Shallow		X		
KAFB-106107	Deep (550 ft)		X	X	X
KAFB-106007-R					
KAFB-2819-R-CRT					
KAFB-VA2					
KAFB-ST106-VA2					

ft Foot/feet
ID Identification