GCL
Environmental Scientists and Engineers

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February 26, 1992

Colonel Thomas A. Norris, Director
Environmental Management Division
1606 ABW-RM, Building 20604
Kirtland Air Force Base, NM 87117-5000

RE: WORK PLAN FOR ADDITIONAL INVESTIGATIONS - BATTERY SHOP FRENCH DRAIN CLOSURE PLAN

Dear Col. Norris:

This work plan is submitted in response to the letter from NMED to KAFB dated December 18, 1991, stating that additional investigations must be conducted at the Battery Shop before the closure plan for the french drain can be approved. NMED suggested that a soil-vapor survey be conducted, followed by a soil boring and sampling program in order to identify the vertical and horizontal extent of soil contamination in the vicinity of the Battery Shop. This work plan is divided into five main tasks, as described below, with an initial task for development of the work plan.

Task 0: Work Plan Development

This task covers preparatory work required for the development of the work plan, including meetings with KAFB and NMED personnel. This project will use Accounting Code 54021.12 under KAFB Delivery Order 5026. A cost estimate for the project is attached.

Task 1: Soil-vapor survey

After reviewing data from the previous Battery Shop environmental study, it appears that the pattern of soil contamination may be quite complex and that more than one source of contamination may exist in the area. Therefore, it is recommended that a soil-vapor survey be conducted, as suggested by NMED, to identify the locations that need further investigation. This soil-vapor survey will be used as a screening procedure to aid the development of a rationale for a subsequent soil boring and sampling program, as required by NMED.

Soil-vapor surveys are very effective in identifying the presence of volatile organics in the soil subsurface and have proved to be a reliable indicator of soil contamination. By using a portable gas chromatograph in the field, soil vapor samples can be promptly analyzed, and this real-time data can be effectively used in guiding subsequent sampling points in the survey, making it a highly effective, self directing program. Our experience has shown that these field results are typically an order of magnitude higher than the results to be expected from laboratory analyses of soil samples from the same locations. Although the soil vapor

sample results will not meet regulatory requirements, they will provide a foundation on which to build a sampling program that will meet the regulatory requirements.

There is reported to be a caliche layer beneath the site that may limit the effectiveness of a soil-vapor survey. However, the lithologic logs from previous soil borings at the site (to about 40 feet in depth) do not indicate any features that would seriously inhibit the transmission of soil vapors. The soils indicated in the logs will readily transmit soil vapors, and a soil-vapor survey should work well at this site. Also, the levels of contaminants reported from the previous sampling events are sufficient to be detected by the portable gas chromatograph.

Therefore, we recommend that a soil-vapor survey be conducted as soon as possible to provide an aid for the placement of the soil borings that NMED has requested. We propose to base the survey on a 400-foot grid (200 feet from the pit in all directions), with samples taken at 100-foot intervals where possible. Building, roads and other obstructions will be avoided. Assuming that 20 sampling points would be selected in this manner, an additional 20 points could be selected to better define "hot spots" that may be encountered. We estimate that this soil gas survey of 40 points, conducted by our experience staff, could be conducted in a maximum of five days. This could easily be the cost of five borings, and would cost less if it is completed in fewer days. By using the soil gas survey to develop a pattern for soil borings, a significant amount of money can be saved by eliminating unnecessary borings in uncontaminated areas. NMED has indicated that they will respect the findings of a soil-vapor survey as a tool to aid in the selection of a sufficient number of soil boring sites to definitively locate the extent of contamination.

A Photovac Model 10S70 will be used to provide semi-quantitative compositional data for volatile organic compounds in the vapor. Decontaminated, galvanized steel sampling probes with threaded ends will be used to collect subsurface vapor samples. Each probe will be driven into the soil to a depth of four feet (or to the depth of refusal) using a slide hammer, and will be fitted with an evacuation line and adaptor for connection to a vacuum pump.

Each probe will be evacuated for 30 seconds using the vacuum pump to remove atmospheric gases prior to each sampling. Aliquots of vapor will then be drawn from the evacuation lines using gas-tight syringes, injected into the gas chromatograph, and analyzed for the target compounds. The size of the aliquots will vary from ten to five hundred microliters depending on the magnitude of soil contamination at the sampling stations.

Calibration of the portable gas chromatograph will be performed on-site prior to analysis of actual soil vapor samples. Calibrant gases that contain the target compounds at concentrations of ten parts per million by volume (ppmv) will be used. Field blanks (atmospheric air drawn through vapor probes and adaptors) will be analyzed to confirm the efficacy of our decontamination procedures. Instrument performance will be validated

through analysis of the BTEX standard once for each set of five to six soil-vapor analyses. Each chromatogram will be stored on a floppy disk.

Task 2: Soil Borings

Two soil borings will be drilled adjacent to the French drain, one on the north side, and one on the south side. The locations of the other soil borings will be determined by analyzing the results of the soil-vapor survey. It is estimated that a maximum of 12 borings will be required, with each boring extending to a maximum of 100 feet. If contamination is found to be deeper than 100 feet, then two borings will be extended to 250 feet. If contamination is found at this depth, one of these borings will be extended to ground water, approximately 500 feet.

Soil borings will be drilled using a hollow stem auger, with soil samples collected with a continuous core sampler. Borings will initially be drilled in the areas of highest contamination, as determined by the soil-vapor survey, in order to evaluate the vertical extent of contamination. Borings will next be drilled at locations that are expected to be outside of the contaminated zones. Then final borings will be drilled as deemed appropriate, based on field observations of the previous borings. In each case, borings will be monitored with an HNu photoionization meter in order to obtain an indication of the presence of volatile contaminants in the soil. This screening tool will be used to determine the final depth of the borings. Samples will be taken as described in task 3. It is expected that 100 feet will be the practical limit of the hollow stem auger at this site and deeper auger borings will not be attempted. If 100 feet cannot be attained in an individual borehole, the boring will be advanced as far as possible, until auger refusal occurs. These initial borings will be filled with bentonite and cement grout after sampling has been completed.

If soil contamination is found to exist at the full depth of any of the borings, then two selected sites will be drilled to 250 feet. Likewise, if contamination is found in any of these 250-foot holes, then one of them will be drilled to ground water (approximately 500 feet). This last boring, if it is required, will be completed as 4-inch PVC ground-water monitor well. These wells will be drilled with a mud rotary drilling rig and samples will be taken with a continuous core sampler. The 250-foot borings will be filled with bentonite and cement grout immediately after sampling is completed.

Task 3: Soil Sampling

The soil-vapor survey and the HNu photoionization meter readings will provide real-time indications of the existence of volatile contaminants in the soil, but they will be used only as screening devices to aid in the selection of locations for the collection of samples for qualified laboratory analysis. Samples for laboratory analysis will be collected with a continuous core sampler in order to obtain undisturbed soil samples.

Samples will be collected from the boreholes at the 10-, 20-, 30-, 40- and 50-foot levels, sent to the lab and analyzed using EPA Method 8240. If samples show no contamination above MDL, then the borehole will be plugged and abandoned. If contamination exists at 50 feet, then samples will continue to be taken every 10 feet to the final depth of the borehole. For the 250-foot and 500-foot holes, samples will be collected every 10 feet, beginning at the 100-foot depth and ending at the final depth of the hole, or until the HNu meter indicates no volatiles for at least two consecutive 10-foot intervals. Samples will be sent to the lab and analyzed for volatile organics by EPA Method 8240, and selected samples will be analyzed for total ICAP lead. If samples show no contamination above MDL for at least the bottom 20 feet of the borehole, then no further deepening of that hole will be required.

Where zones of high contamination are detected by the HNu meter, up to 3 samples will be collected and analyzed for the soil analysis equivalent of appendix 9.

It is anticipated that 10 samples will be taken for volatile organic analysis from each borehole in which volatiles are detected and 5 samples from each borehole in which none are detected by the HNu meter. Assuming that half of the boreholes will be clean, the total number of samples expected to be taken from the boreholes will be about 90. Approximately 55 additional samples will be collected from the 250-foot and 500-foot deep holes, if they are drilled. Another 10 samples will be taken for quality control purposes, making a total of 155 samples for volatile organic analysis. Three samples for total lead analysis will be collected from each borehole and 5 will be collected for quality control, making a total of about 50 lead samples. A judicious sampling protocol will be used to limit the number of samples actually analyzed to the minimum number that will be sufficient to accurately define the extent of contamination at the site.

Attached is the Quality Assurance/Quality Control Plan that will be required to be followed by the analytical laboratory that will perform the sample analyses for this project.

Task 4: Risk Assessment

A risk analysis of the contaminants of concern will be conducted to determine if in-place closure will be adequate. Previously detected contaminants at the site are methylene chloride (MeCl), 1,2-trans dichloroethene (DCE), toluene and ethylbenzene. A risk assessment value will to be established for each chemical, and calculations for the risk assessment will establish the level of contaminants that can remain in the soil at the sites. If the limits established by the risk assessment are exceeded, then the contaminants must be removed, or clean closure cannot be accomplished.

Task 5: Report Production

The initial closure plan will be modified to include all new information gathered from the additional investigations and the risk analysis. It will be prepared in a format that is compatible with the Base Wide and Unit Closure Plans previously submitted and approved. Draft copies will be provided to KAFB for a quick review prior to production of a final document. This task includes internal quality assurance review and technical editing. Five copies of the final closure plan will be provided.

We will make preparations for the soil-gas survey as soon as we receive notice to proceed. After completion of the soil gas survey, we will provide a report of the findings and will prepare a final soil boring and sampling plan.

Please call us if you have any questions concerning this work plan.

Sincerely,
H⁺GCL

Claude A. J. Schleyer
Principal Engineer

Robert D. Enz
General Manager
Albuquerque Office

CAJS/llb/0508/BATSHPWP.PRO

Enclosure

cc: Carla Blasko, KAFB
Lt. Col. Pratt, KAFB
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Joe Kennedy, NMED

Components of an Adequate Laboratory
Quality Assurance/Quality Control Plan

New Mexico Hazardous and Radioactive Materials Bureau
Technical Support Group
(505) 827-4300

1. All constituents identified above the MDL must be reported.

   The Method Detection Limit is defined as the estimated concentration at which the signal generated by a known constituent is three standard deviations above the signal generated by a blank, and represents the 99% confidence level that the constituent does exist in the sample.

2. The "tune" of the GC/MS for volatile organic constituents must be checked and adjusted (if necessary) each twelve (12) hour shift by purging 50 ng of a 4-bromofluorobenzene (BFB) standard. The resultant mass spectra must meet the criteria given in table 2 before sample analysis proceeds.

3. The "tune" of the GC/MS for semi-volatile organic constituents must be checked and adjusted (if necessary) each twelve (12) hour shift by injecting 50 ng of a Decafluorotriphenylphosphine (DFTPP) standard. The resultant mass spectra must meet the criteria given in table 2 before analysis proceeds.

4. For every 20 samples, perform and report:

   A. Duplicate spike for organics.

   B. Duplicate sample analysis for inorganics.

   C. Reagent blank, results provided for organic work.

   D. Surrogate and spike recoveries. See item 10.

   E. One check sample at or near the Practical Quantitation Limit for a subset of the parameters.

5. Analytical results must not be "blank corrected."

6. Any deviation from EPA-approved methodology must have a Written Standard Operating Procedure and NMED approval.

7. Detection limits must be generally in line with those listed in Appendix IX to §264.

Components of an Adequate Laboratory
Quality Assurance/Quality Control Plan (cont'd)

8. The laboratory must document:

   A. That all samples were extracted, distilled, digested, or prepared (if appropriate) and analyzed within specified holding times.

   B. That if a sample for volatile analysis is received with headspace, this is reported.

   C. The date of sample receipt, extraction and analysis for each sample.

   D. Any problems or anomalies with the analysis should be documented.

   E. That all solids were analyzed dry and that the reported results are corrected to reflect a dry weight basis.

9. The name and signature of the lab manager must appear on each report.

10. The laboratory's historical surrogate and spike recoveries should fall within plus or minus 20% of the true value. The reported surrogate and spike recoveries must fall within: 1. the historical (statistically based) acceptance limits, generated at the laboratory or 2. the limits tabulated by the appropriate method from the current edition of SW-846, whichever limit is narrower. The actual historical recoveries must be submitted to HRMB with the analysis.

Table 1

BFB Key Ions and Abundance Criteria

Mass	Ion Abundance Criteria
50	15.0 - 40.0 percent of the base peak
75	30.0 - 60.0 percent of the base peak
95	base peak, 100 percent relative abundance
96	5.0 - 9.0 percent of the base peak
173	less than 2.0 percent of mass 174
174	greater than 50.0 percent of the base peak
175	5.0 - 9.0 percent of mass 174
176	greater than 95.0 percent but less than 101.0 percent of mass 174
177	5.0 - 9.0 percent of mass 176

Table 2

BFB Key Ions and Abundance Criteria

Mass	Ion Abundance Criteria
51	30.0 - 60.0 percent of mass 198
68	less than 2.0 percent of mass 69
70	less than 2.0 percent of mass 69
127	40.0 - 60.0 percent of mass 198
197	less than 2.0 percent of mass 198
198	base peak, 100 percent relative abundance
199	5.0 - 9.0 percent of mass 198
275	10.0 - 30.0 percent of mass 198
365	greater than 1.00 percent of mass 198
441	present but less than mass 443
442	greater than 40.0 percent of mass 198
443	17.0 - 23.0 percent of mass 442