KAFB 07

DEPARTMENT OF THE AIR FORCE
377th Civil Engineer Division (AFMC)
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22 Feb 07

MEMORANDUM FOR MR. WILLIAM C. OLSON, CHIEF
GROUNDWATER QUALITY BUREAU (GWQB)
NEW MEXICO ENVIRONMENT DEPARTMENT (NMED)
PO BOX 26110
SANTA FE NM 87502

FROM: 377 MSG/CEVR
2050 Wyoming Blvd, S.E.
Building 20685, Suite 118
Kirtland AFB, NM 87117-5270

SUBJECT: 15-Day Corrective Action Report for the Discharge Near the Bulk Fuels Facility (BFF), Kirtland Air Force Base (KAFB), NM

1. The Environmental Management (EM) Branch of KAFB is submitting the subject report in accordance with the New Mexico Water Quality Control Commission Regulations (WQCC), 20.6.2.1203A.(6).

2. The proposed corrective action for the discharge is described in the attachement. The pilot test for the phase-separated hydrocarbon removal, one part of the proposed corrective action, is being initiated today. Additional corrective action will be implemented as described in the report. EM has consulted with Mr. Baird Swanson of your staff concerning the corrective action strategy outlined in the report.

3. If you have any questions, please do not hesitate to contact me at (505)-853-6534 or Mark Holmes at (505) 846-9005.

CARL J. LANZ, P.G., GS-13
Chief, Restoration Section

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NMED Hazardous Waste Bureau

KAFB3074

Proposed Corrective Action for Phase-separated Hydrocarbon (PSH) Investigation and Removal

Technical Approach

Kirtland AFB plans to institute parallel courses of action to address three critical objectives for the PSH investigation and removal activities at the Kirtland AFB Bulk Fuels Facility. These include 1) emergency phase-separated hydrocarbon (PSH) product recovery in monitoring well KAFB-1065; 2) delineation of PSH through installation of up to five additional groundwater monitoring and one PSH-recovery wells; and 3) implementation of a remedial alternative capable of effectively recovering the maximum volume of PSH to the technical extent practicable in a timely fashion. The expected activities will presumably proceed in the sequence as presented above. The technical approach for each of these objectives is discussed in more detail below.

Emergency PSH Recovery

Kirtland AFB is currently making plans to begin emergency recovery of the PSH that has been identified in monitoring well KAFB-1065. PSH is located on top of groundwater approximately 487 feet below ground surface (ft bgs). The PSH has been identified as a mixture of aviation gasoline (AVGAS) and JP-4 jet fuel. Due to the depth to groundwater at the KAFB-1065 location the options for recovery of PSH are limited. Kirtland AFB and its contractor have made arrangements to pilot-test a PSH-only skimmer recovery pump in KAFB-1065. The pump will be provided by a local New Mexico vendor, Xitech Instruments, and has been modified with a booster pump that should provide sufficient lift to overcome the 487 feet of head required to pump the PSH to the ground surface. Kirtland AFB anticipates the pump will be able to be installed and testing begun by March 1, 2007. The benefits of the skimmer pump are that it recovers only PSH product as opposed to also recovering large amounts of groundwater. If the PSH-only skimmer pump operates successfully it will be Kirtland AFB's preferred alternative for instituting emergency PSH recovery and would be utilized in KAFB-1065 for near term recovery of PSH. The rate of product recovery will be assessed during the pilot testing operations as will whether a sustainable thickness of PSH continues to enter the KAFB-1065 well screen.

If the skimmer pump is unable to successfully or reliably operate from the subject depth Kirtland AFB will evaluate the viability of installing and testing a total fluids pump in KAFB-1065. If utilized, a total fluids pump will be placed at a depth setting in the well so as to primarily recover PSH; however under this operation some groundwater also will be pumped. A similar pilot-testing phase as that anticipated for the skimmer pump would be conducted using a total fluids pump. The testing would assess whether a sustainable thickness of PSH enters the KAFB-1065 well screen and whether such thickness can be feasibly recovered without generating a disproportionate volume of groundwater which would potentially require handling as hazardous waste.

If the skimmer pump can not be successfully operated and evaluation of using a total fluids pump indicates that it is not an efficient and effective means to recover PSH, Kirtland AFB will assess the viability of instituting regularly scheduled manual recovery of product. Manual product recovery would utilize passive PSH-recovery canisters with a tripod lift system. Furthermore, if testing of pump applications indicate the rate at which PSH enters the KAFB-1065 well bore does not support higher rate recovery of PSH, then it may be more

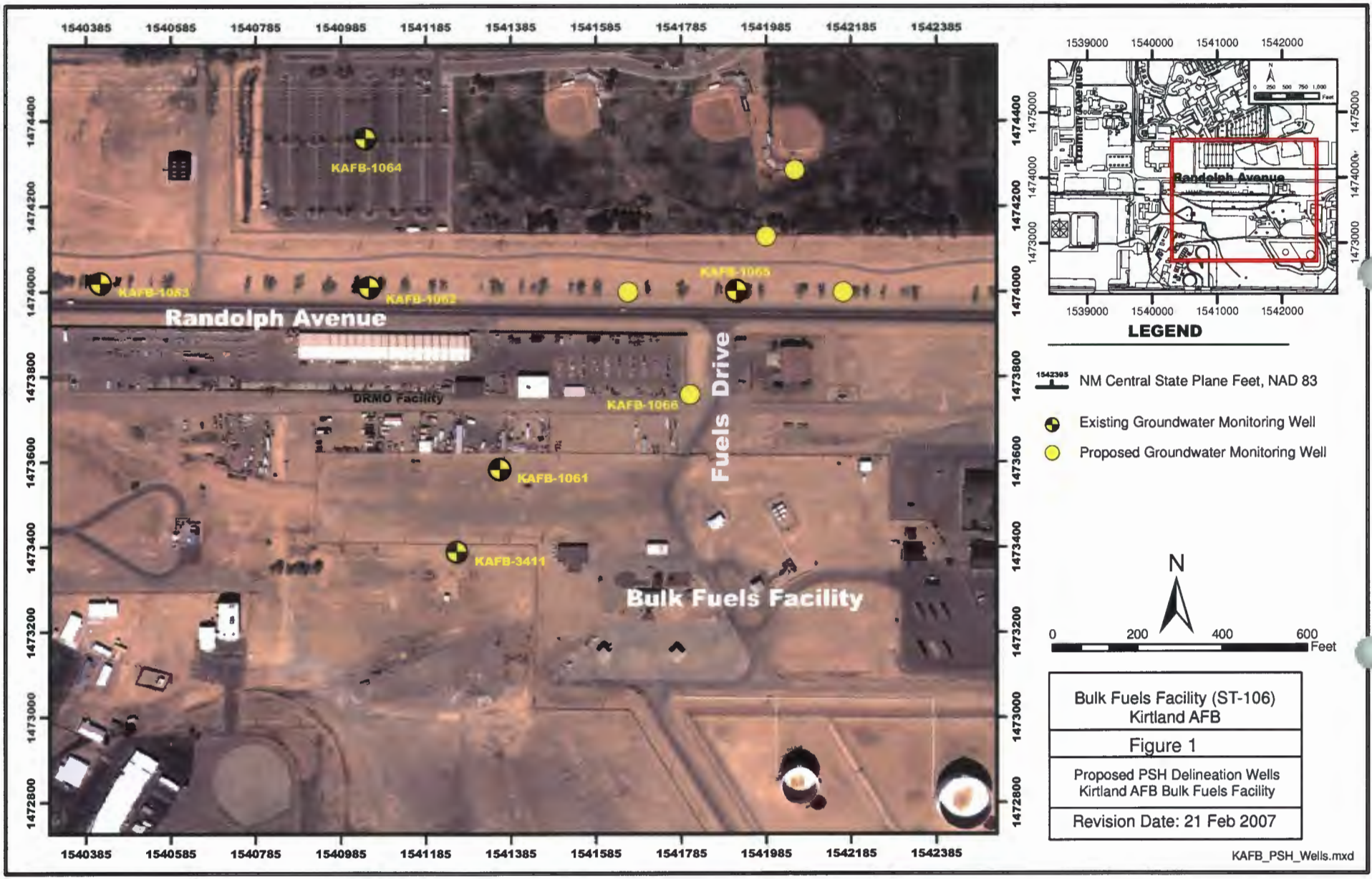
gallons of petroleum hydrocarbon mass from the subsurface at the Bulk Fuels Facility. High concentrations of vapor-phase hydrocarbons amenable to extraction by SVE are generated from a PSH surface. SVE is a proven technology for the successful recovery of both AVGAS and JP-4 PSH by increasing the volatilization of the PSH product and recovering it for destruction in the ICEs. The SVE approach with ICEs also provides the benefit of being capable of influencing a large PSH-impacted surface area on top of the groundwater table extending out from the primary extraction wells and also providing remediation of even a very thin PSH layer. Additionally, the active vapor extraction provides the benefit of active remediation of sorbed PSH that may be present in the overlying vadose zone and within the capillary fringe above the groundwater table.

The SVE approach will essentially be bioslurping, where PSH and vapor-phase hydrocarbons are recovered simultaneously using the same equipment. The approach involves placing a small-diameter drop pipe (i.e. 0.5- to 0.75-inch diameter) into the well to a depth at the top of the PSH surface. SVE vacuum is applied to this drop pipe to entrain PSH into the extraction flow. The vapor extraction through the drop pipe enhances volatilization and recovery of petroleum hydrocarbon mass directly from the PSH surface. Due to the extreme depth to the PSH, the PSH will not be recovered in liquid form, but instead it will fully volatilize as it travels up the pipe and into the ICEs for destruction.

Application of vacuum to the overall well enhances PSH flow to the well bore by a conceptually similar mechanism as groundwater depression. Whereas groundwater pumping enhances PSH recovery as a result of a cone of depression being developed on the water table that allows PSH to flow to the well bore, application of vacuum to the well enhances PSH recovery as PSH flow is induced towards the negative pressure. Active SVE also has the benefit of extending its radius of influence into the geologic formation around the well bore. The propagation of a larger radius of influence is not possible with skimmer pumps unless the groundwater table is depressed. Application of vacuum will enhance direct volatilization of petroleum hydrocarbon mass from the broader PSH surface and convey that contaminant mass back to the well bore in the vapor phase where it can be recovered. Since the proposed SVE system contains two ICEs, one ICE will be connected to the drop pipe and the second ICE will be connected to the well bore. The top of the well casing will be fitted with a tee with multiple bushings (Christmas-tree type fitting) to separate the flows using multiple connections.

The ICE SVE unit would be initially pilot tested at the KAFB-1065 location prior to full scale operation to confirm that it can be applied at this depth application and that necessary flow rates and vapor inlet concentrations can be achieved. However, based on preliminary vapor concentration measurements from the vadose zone exposed within the KAFB-1065 well screen, the mass recovery rate from the vadose zone/PSH interface is estimated to be 120 gallons per day equivalent, which is the maximum fuel consumption by the two ICEs.

Kirtland AFB does not anticipate that skimmer or total fluids pumps or manual recovery will be an efficient means to remove large quantities of petroleum hydrocarbon mass from the subsurface. Pumping and manual PSH recovery have only a localized influence and therefore only collect PSH which is immediately adjacent to an extraction well. In addition, both generate a waste stream of recovered PSH and potentially recovered groundwater that must be managed and disposed. Alternatively, SVE with ICEs can induce flow and recover both PSH and vapor-phase petroleum hydrocarbons from across a much larger PSH surface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DRMO Facility
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KAFB-1061
KAFB-3411
Fuels Drive
Bulk Fuels Facility
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Ironman Avenue
Randolph Avenue
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Feet
LEGEND
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Existing Groundwater Monitoring Well
Proposed Groundwater Monitoring Well
N
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Feet
Bulk Fuels Facility (ST-106)
Kirtland AFB
Figure 1
Proposed PSH Delineation Wells
Kirtland AFB Bulk Fuels Facility
Revision Date: 21 Feb 2007
KAFB_PSH_Wells.mxd