HAFB 00

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CERTIFIED MAIL
RETURN RECEIPT REQUESTED

December 8, 1999

Howard E. Moffitt
Deputy Base Civil Engineer
49 CES/CEV; 550 Tabosa Avenue
Holloman Air Force Base, NM 88330-8458

SUBJECT: 300 POUND OPEN BURN UNIT: REQUEST FOR SUPPLEMENTAL INFORMATION
EPA ID No. NM6572124422

Dear Mr. Moffitt:

The RCRA Permits Management Program (**RPMP**) of the Hazardous and Radioactive Materials Bureau (**HRMB**) has concluded Technical Completeness Review of Holloman Air Force Base's (**HAFB**) Closure Report for the 300 Pound Open Burn Treatment Unit. The Report was received on May 20, 1999. HRMB has determined that the above referenced report is technically incomplete.

Before NMED can approve closure of the site HAFB is required to submit a sampling plan indicating when the sampling will be conducted, how many samples will be taken, and the time HAFB expects to present the sampling data to HRMB for review and final determination on the site closure.

The enclosed attachment contains HRMB's comments on the Risk – Based Closure Report. Please submit the sampling plan and analytical data to the HRMB within sixty (60) calendar days from the date you receive this letter. Failure to submit the required information within the designated time may result in HRMB issuance of a notice of deficiency to HAFB.

Please present the required information in two hard copies and on a 3.5" diskette compatible with WORD or Word Perfect for Windows 5.x.

If you have any questions please call Kirby Olson at (505) 827-1561 X 1034.

Sincerely,

Cornelius Amindyas, Environmental Specialist
RCRA Permits Management Program
Hazardous and Radioactive Materials Bureau

Enclosure

cc: John E. Kieling, Acting Manager, RCRA Permits Management Program
James P. Bearzi, Chief
David Neleigh, Chief, EPA Region VI
Kirby Olson, Environmental Specialist, HRMB
Allen Chang, EPA Region VI

ATTACHMENT
HRMB's COMMENTS ON CLOSURE REPORT FOR THE 300 POUND OPEN BURN UNIT: HOLLOMAN AIR FORCE BASE

December 8, 1999

Risk Assessment Review of 300-Pound Open Burn Unit at Holloman Air Force Base

HRMB has reviewed the results of the risk assessment done using the closure samples from the 300 -Pound Open Burn Unit at Holloman Air Force Base (**HAFB**). The residual levels reported for metals and organic compounds, including benzene, are all below the Region 6 human health medium-specific screening levels for soils. These levels of contamination should not present an excess risk to human health. The levels of total recoverable petroleum hydrocarbons (**TRPH**) in 19 of the 20 samples taken in trenches 2 and 3 are below 100 ppm (one sample was 210 ppm). No EPA risk-based screening level exists for total recoverable petroleum hydrocarbons (TRPH) because it is a mixture of compounds which may vary from one site to another. HRMB has not yet established a standard or remediation guideline for TRPH. The residual levels at this site are below the lowest recommended remediation action level for TRPH presented in the New Mexico Oil Conservation Division (**OCD**) guidelines for remediation of leaks, spills, and releases. That TRPH guideline would be appropriate for this site which is in a remote area and has fill cover over much of the residual contamination.

The residual contamination levels in the trenches were also evaluated for risk to ecological receptors. HAFB selected ecological screening values from a paper (Friday, 1998) published by Savannah River Site. That paper evaluated and compiled water, sediment, and soil values developed by several groups. The screening values selected by HAFB for evaluating the open burn unit came primarily from the Maximum Permissible Concentration (**MPC**) levels for soil developed by the Dutch Ministry of Health, Spatial Planning, and Environment. The maximum amounts detected at the site, not the upper 95% upper confidence limit (**UCL**) of the mean value, should be compared to the chosen benchmarks because the benchmarks represent maximum values for soil. This comparison shows that chromium and mercury exceeded their benchmarks at trench 1 and barium, cadmium, chromium, copper, and silver exceeded their benchmarks at trench 4.

HRMB compared these maximum residual contaminant levels with No Observed Adverse Effect Level (**NOAEL**) based benchmarks for ingestion of food from the 1996 Revision of Toxicological Benchmarks for Wildlife issued by Oak Ridge National Labs (**ORNL**). In order to make a quick comparison HRMB made the simplifying assumption that the concentration in the soil was equal to the concentration in the food; using the benchmarks given for the American robin. However, all the contaminants of concern that exceeded the benchmarks chosen by HAFB also exceeded the NOAEL based food ingestion benchmarks in the ORNL paper [except for silver, for which the ORNL paper

presented no values the contaminants of concern (**COCs**) at trench 4 to barium, chromium, copper, and silver].

HRMB examined the depth at which each sample that exceeded the benchmarks was taken to see if the high levels occurred primarily at the bottom of the trenches where a number of feet of fill on top might reduce the accessibility of the contamination to wildlife. Many of the high hits for contaminants occurred at shallow depths (1 foot below grade on the side wall). Chromium, in particular, appeared to be distributed evenly throughout the sampled area and not concentrated at depth.

The argument presented in the risk assessment done by HAFB that the literature benchmarks they chose are based on assumptions which are too conservative for this site may be correct, but the Facility needs to do some site specific analyses to demonstrate that the risk at the site is less than that predicted by the benchmark. When there are contaminants of concern remaining after comparison to literature based screening levels, HRMB expects that the Facility will select some receptor species for the site and calculate the dose to which the species are likely to be exposed. This dose can then be compared with the newest dose-based benchmarks developed by the EPA in 1999. This can be done relatively easily using the equations in the HRMB guidance and the default assumptions provided in the appendices for size, ingestion rates, etc. Receptors such as the deer mouse, desert cotton tail , and a bird would be appropriate for this site. These site-specific screening calculations may demonstrate that the residual contamination does not represent an excessive risk to ecological receptors, but the level of risk at the site cannot be adequately assessed without doing this further analysis.

Ecological Risk Assessment Calculations for Holloman AFB Open Burn Unit

In the closure report for the 300 lb Open Burn Unit (**OBU**) at Holloman Air Force Base (**the Facility**), the facility compared the residual levels of contamination at the site to a set of literature benchmarks. Since a number of these contaminants remained at the site at levels higher than the benchmarks, the draft HRMB *Guidance for Assessing Ecological Risks Posed by Chemicals: Screening-Level Ecological Risk Assessment* and the EPA 1999 guidance *Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities* was used to estimate the ecological risks at the site. HRMB calculated the dose ingested by two measurement receptors and compared that to the Toxicity Reference Values (**TRVs**) developed by the EPA for those receptors. These TRVs are provided in Appendix E of the EPA Guidance document and Appendix G of the HRMB Guidance.

Holloman AFB did not include any information in their closure report on the type of ecosystem found at the site or the dominant species of plants or animals found on the site. Based on a set of photographs of the site taken by HRMB during a closure verification inspection, the vegetation near the site is similar to that found in the shrub/scrub ecosystem. The ecosystem near the site is

considered as part of the Chihuahuan desert based on the Audubon Field Guide to Deserts. For either ecosystem the deer mouse and a hawk would be appropriate receptors for which to calculate the dose ingested. This allows one to estimate the risk to a herbivorous mammal and a carnivorous bird. I used the default factors for the red-tailed hawk (even though other species of hawk may be more likely to occur at the site) because more information on ingestion rates, toxicity of chemicals, etc. was available for this species. All the values for bio-concentration factors (BCFs), ingestion rates, and the toxicity reference values were obtained from the EPA 1999 guidance mentioned previously.

The calculations were done for those COCs which exceeded the literature-based benchmarks chosen by Holloman AFB. This included barium, chromium, and mercury at trench 1 and barium, cadmium, chromium, copper, and silver at trench 4. The maximum concentrations of the COCs were used for the calculations, since it was not clear that 95% UCL values presented were calculated following EPA1992 *Supplemental Guidance to RAGS: Calculating the Concentration Term*. If the samples are averaged only for a single depth at each trench (example, 1 ft below grade), then there are only 8 samples, which is less than the minimum of ten samples recommended by the EPA guidance for calculating a 95% UCL. In addition, no statistical test results or graphs are presented to support the assertion that the data are normally distributed; the data do not actually appear to be normally distributed based on a quick examination of these values.

There are five steps in the process of calculating the ecological risk at this site:

1) Compare the maximum value for each COC to the media concentration corresponding to the toxicity reference value (**TRV**) for soil-to-plant and soil-to-invertebrate exposures. These TRVs appear in Appendix E of the EPA 1999 guidance and Appendix G of the HRMB guidance.

2) Calculate the concentration of each COC in plant tissue due to root uptake using the equation in Section 3.1.2.2 of the HRMB guidance. This equation estimates the plant concentration by multiplying the concentration of the COC in soil by the BCF for root uptake from soil and a factor of 0.12 for the conversion of dry weight to wet weight. Values for these BCFs appear in Appendix C of the EPA 1999 guidance.

3) Use the concentrations in plants and in soil ingested to calculate the exposure dose for a herbivorous mammal (the deer mouse) using ingestion rates given in EPA 1999 guidance. Since there is no contaminated surface water at the site, the equation was simplified to the sum of the food ingestion rate multiplied by the concentration in plants and the soil ingestion rate multiplied by the concentration in soil as shown in Section 3.1.2.6.1 of the HRMB guidance. This sum was then compared with the TRV given in EPA 1999 for mammals for each COC.

4) The COC concentration in the mice (needed to calculate the exposure dose for the carnivorous bird) was calculated using the equation in Section 3.1.2.4.2 of the HRMB guidance. This equation estimates the concentration of the COC in the mouse as the sum of the concentration in the mouse's food multiplied by the plant-to-herbivore BCF and the concentration in the soil multiplied by the soil-to-herbivore BCF. Values for these BCFs appear in Appendix D of the EPA 1999 guidance.

5) The exposure dose to the carnivorous bird is determined using the equation in Section 3.1.2.6.1 of the HRMB guidance. This equation estimates the exposure dose as the sum of the COC concentration in mice multiplied by the food ingestion rate and the COC concentration in soil multiplied by the soil ingestion rate. The ingestion rates for the red-tailed hawk given in the EPA 1999 guidance were used, since information on other species of hawks was not available.

The estimated dose ingested calculated for each receptor was compared with the TRV for that receptor. The dose ingested divided by the TRV gives an Ecological Screening Quotient (ESQ) for each COC for each receptor. The ESQ is conceptually the same as a hazard quotient (HQ) used in human health risk assessments

FOR TRENCH 1

The media concentration corresponding to the TRV for plant and invertebrate toxicity for mercury is significantly higher than the residual level of this metal at this site, so mercury does not represent an excess risk to plants or invertebrates at the site. No comparison could be made for chromium since only a media concentration corresponding to a TRV for hexavalent chromium was available. The estimated doses ingested by the mouse and the hawk for both mercury and chromium were below the corresponding EPA mammal and bird TRVs.

Based upon the screening level ecological risk calculations, the residual levels of the two constituents of concern (mercury and chromium) do not appear to represent an excess ecological risk to receptors at Trench 1.

FOR TRENCH 4

Levels of barium, copper, and cadmium all exceeded the media concentrations corresponding to plant toxicity. Plant toxicity TRVs are not usually used as the deciding factor for site decisions, because they are often based on a small number of studies on field crops (such as corn), which may not be relevant to this site.

Comparisons with media concentrations corresponding to TRVs for invertebrates produced ESQs of less than one for cadmium and lead; the ESQ for copper was 1.8. No comparison could be made for barium and chromium because TRVs for invertebrates were not available.

The estimated dose ingested by a mouse divided by the corresponding TRV generated an ESQ of 0.15 for copper, an ESQ of 2.1 for silver, and an ESQ of 6.5 for cadmium.

The estimated dose ingested by a hawk was below the corresponding EPA TRV for cadmium, copper, and silver.

Residual levels of barium generated ESQs substantially greater than one for both the mouse and hawk at trench 4. By setting the EPA TRV equal to the dose ingested and solving the equation for a soil concentration, I determined that the barium level in soil needed to correspond to a safe dose ingested for the mouse would be 42 mg/kg. This is approximately one half the background concentration of barium at Holloman AFB. The barium levels at trench 4 are definitely elevated above background, but in this case the TRV may not provide a reliable estimate of the ecological risk because of its relationship to background.

Based on the screening level ecological risk calculations, the residual levels of silver and cadmium at trench 4 indicate some residual ecological risk to herbivorous mammals. A review of the data in Appendix J of the closure report revealed that the silver concentration was based on a single detection at 6 ft below grade. All other samples were non-detect for silver. At 6 ft below grade (with clean fill on top) the residual silver probably does not represent the threat to herbivorous mammals indicated by the ESQ.

However, both of the high cadmium levels occurred at the shallowest depth sampled (1 ft below grade) and both were on the same wall of the trench. These high cadmium concentrations (2.2 and 5.9 mg/kg) occurred in two of the three samples taken at that depth on that side of the trench. The location of the high levels and the estimated ecological risk indicate that the residual levels of cadmium on side C of trench 4 warrant further investigation. If additional shallow (surface and 1 ft) samples are taken, the residual risk could be recalculated based on those results.

Holloman AFB should also redo the residual risk calculations if they believe that the calculations done by HRMB do not reflect conditions at the site.

Suggested Additional Sampling for HAFB 300 LB OBU

In order to establish whether residual levels of cadmium on side C of trench 4 represent an excess ecological risk that would require additional remediation work, Holloman AFB should probably take some additional samples for metals to characterize that portion of the site. These samples should be at the surface or up to one foot down. In order to use the average (95% UCL of the mean) of the

cadmium concentrations instead of the maximum values, the sampling needs to meet the guidelines in the EPA *Supplemental Guidance to RAGS: Calculating the Concentration Term*. This requires taking a total of at least 10 samples (they already have three) and then using statistical tests or graphing to demonstrate whether the data is normally distributed or log normally distributed. The distribution has to be determined since it affects how the 95% UCL of the mean is calculated. This mean could then be used in the calculations described in the HRMB guidance to estimate the residual risk from cadmium.

The 95% UCL of the mean included in the closure report should not be used because they do not appear to have been calculated in accordance with the EPA guidance. The closure report states that the sampling data was assumed to have a normal distribution, but this is not demonstrated through graphing or statistics. A quick glance at the results in appendix J of the report seems to show that the results may not be normally distributed. Also, results for all depths from 1 to 6 ft were averaged to calculate the 95% UCL of the mean in the closure report; the low levels of cadmium found at 6 ft inadvertently reduce the impact of the higher surface contamination. The surface contamination more accurately reflects the ecological risk to herbivorous mammals at this site.

Alternatively, the facility could redo the ecological risk assessment calculations for the site following the HRMB guidance if they feel that the values used for ingestion rates or the receptors selected were not appropriate for the site conditions.