FOOTHILL
ENGINEERING
CONSULTANTS, INC.
350 INDIANA ST.
SUITE 415
GOLDEN, CO 80401
303/278-0622
FAX 303/278-0624

June 19, 2000

U.S. Army Corps of Engineers, Omaha District
Attn: CEMRO-ED-EC (Mr. Tom Zink)
215 North 17th Street
Omaha, Nebraska 68102-4978

**SUBJECT: Final Assessment Monitoring Annual Report – Wells N, O, and R**
**Contract No. DACW45-94-D-0031**
**Delivery Order No. 0033**
**Long-Term Monitoring Program, Cannon AFB, New Mexico**

Dear Mr. Zink:

In accordance with the above mentioned contract, Foothill Engineering Consultants, Inc. (FEC) is providing you with four (4) copies of the Final Annual Summary Report for long-term monitoring of wells N, O, and R for 1999 sampling events. The Final Annual Summary Report has been prepared in response to comments received June 5, 2000. The report is accompanied by electronic versions of the document and the analytical data.

Groundwater sampling was performed to evaluate the groundwater quality downgradient of landfills 3 (SWMU 105), 4 (SWMU 104), and 25 (SWMU 97) at Cannon AFB near Clovis, New Mexico. The December 1999 sampling of wells N, O, and R is the last sampling event scheduled under contract DACW45-94-D-0031, Delivery Order Number 0033. Continued sampling is being conducted under another delivery order.

This final report consists of the New Mexico Environmental Department (NMED) Assessment Monitoring Annual Report, the Annual and Semi-Annual Summary Report of Assessment Monitoring, the laboratory analytical results from the sampling of monitoring wells N, O, and R, and the data quality assessment summary.

Copies of the report plus electronic files have also been provided to:

- Mr. Sanford Hutsell, Cannon Air Force Base (eight copies plus one electronic)
- Ms. Margaret Patterson, Newport News, Virginia (two copies plus one electronic)
- USACE – Chemical Quality Assurance Branch Laboratory (one copy plus electronic of data only)

Should you have any questions or concerns regarding this submittal or other matters concerning this project, please do not hesitate to contact me at (303) 278-0622.

Regards,

FOOTHILL ENGINEERING CONSULTANTS, INC.

Karen Holliway

Karen D. Holliway, CPG, CEM
Project Manager
98-325

cc: S. Hutsell Cannon AFB (8 copies)
M. Patterson ACC (2 copies)
Project File (2 copies)

**Comments on Draft Annual Summary Report, Assessment Monitoring, 1999 Sampling Events, Long-Term Monitoring, Landfill Nos. 3, 4, and 25**

**Cannon Air Force Base, New Mexico**

***Comments from: Paula Peters, Project Chemist, CENWO-ED-GC, June 5, 2000***

*Comment 1* *Page 1 – In the first paragraph, include a statement of how long this long term monitoring has been occurring.*

**Response:** **The following text was added: "The LTM for wells N and O began in March 1996 and the LTM for well R began in June 1997".**

*Comment 2* *Pg. 1, 2nd paragraph – Change "Missouri River Laboratory" to "Chemical Quality Assurance Branch Laboratory".*

**Response:** **The text was changed accordingly.**

*Comment 3* *Pg. 2, Well N, 3rd paragraph – Add "As" to the first word of the last sentence in this paragraph.*

**Response:** **The text was changed accordingly.**

*Comment 4* *Pg. 2, Well N, 3rd paragraph – State how long "over time" has been.*

**Response:** **The sentence was changed to read as follows:**

**"As a general observation, zinc exhibits a slight decrease in concentration and vanadium exhibits a slight increase in concentration since the October 1996 sampling event."**

*Comment 5* *Pg. 3, Well O, top paragraph – Again, state how long "over time" is.*

**Response:** **The sentence was changed to read as follows:**

**"Barium exhibits a slight decrease in concentration since the June 1997 sampling event."**

*Comment 6* *Pg. 3, Well R, 2nd paragraph – The text states that PCBs were not detected in the June 1999 sampling event. However, Table 3 shows that PCBs were not analyzed (NA) for the June 1999 event. Also, note that the QA lab detected Aroclor-1260 at 5.3 µg/l in the sample from well R for the June 1999 event. Clarify or resolve this issue.*

**Response:** **The sample was analyzed by EPA SW-846 Method 8082 and PCBs were not detected in the investigative sample or the duplicate**

**sample for well R. The method number for organochlorine pesticides/PCBs is 8081 for sample events from June 1997 through June 1998. The method number for PCBs from December 1998 through December 1999 is 8082. The method numbers in Table 3 were changed to account for these errors.**

**The chromatograph data submitted from the contract laboratory was reviewed by FEC and PCBs were not detected above 1 µg/l in the sample collected from well R. It is uncertain why the Aroclor 1260 was detected at 5.3 µg/l in the split sample analyzed by the QA laboratory.**

*Comment 7* *Pg. 4, top paragraph – State how long this well has been sampled for.*

**Response:** **The following information was added to the text:**

**"Historical results for well R from all LTM sampling events, June 1997 through December 1999, are summarized in Table 3."**

*Comment 8* *Pg. 4, 2nd paragraph – Add "for well R", after "Historical results".*

**Response:** **The text was added to the sentence.**

*Comment 9* *Table 1, 2, 3 –*

*a. The list of TAL Metals here is not correct. Aluminum, antimony, beryllium and silver are all TAL metals but are not shown on this table. Are these metals being analyzed for? Also, tin is not a TAL metal but it was analyzed for. This issue needs to be resolved.*

*b. The results for VOCs and SVOCs should be reported in µg/l, not mg/l.*

*c. The EPA MCLs and New Mexico State Standards for VOCs and SVOCs should also be shown in µg/l, not mg/l.*

**Response:** **The metals list for sampling events through December 1999 was a modified TAL list, which included tin. Tables 1, 2, and 3 were corrected and include aluminum, antimony, beryllium, and silver.**

**Results for VOCs and SVOCs have been converted to micrograms per liter. (In the Draft version, the table units were presented in milligrams per liter to avoid potential confusion by the reader from mixing units on the same table.)**

*Comment 10* *Table 2 – If VOCs were not analyzed in March, June, and October 1996 and in June 1997, put a "NA" in the table instead of leaving it blank.*

**Response:** **VOCs were analyzed for and not detected during those sampling events. The appropriate changes were made to Table 2.**

*Comment 11* *QA Results from the government lab (CQAB Lab) are currently being forwarded to FEC. Please include those results on Tables 1, 2 and 3 and any needed discussion of them with the next version of this document.*

**Response:** **The QA results were included in Table 1 for well N. There are no discrepancies between the investigative sample and the split sample, therefore no additional discussions of results are necessary. Split samples were not collected for well O or well R.**

*Comment 12* *Pgs. 16, 18, and 20 – Should VOCs also be reported on this form?*

**Response:** **These forms are standard for the state of New Mexico, and do not require VOC results.**

*Comment 13* *Appendix III, Analytical Results/Quality Control Data –*

a. *The data packages from the laboratory with all sample results and related QC data must be provided in this appendix. The table that is provided is merely a summary of all results.*

b. *Copies of the chain-of-custody forms must be those that contain the "Received By" signature. This is needed to prove that the chain-of-custody remained intact from the time of sample collection to the time of sample receipt at the laboratory.*

**Response:** **The appropriate laboratory data will be provided as well as hard-copies of the signed chain-of-custody forms in Appendix III.**

*Comment 14* *Appendix IV, Data Quality Assessment – December 1999*

a. *Pg. IV-1 – One of the column headings in the table after the first paragraph is not clear: "Locative Downgradient of Landfill".*

b. *Pg. IV-1 – In the 2nd paragraph, indicate also that Quanterra Environmental Services is a USACE validated laboratory.*

c. *Pg. IV-3, 1.8 SW6010B, Metals – Describe how the "action level (AL)" referenced here is determined.*

**Response:** **Comment a. The text was changed to read:**

**"Located Downgradient of Landfill No."**

**Comment b. The appropriate text was added.**

**Comment c. The text has been changed to read as follows:**

**"Due to the blank contamination concentrations, results less than five times the level of contamination, referred to as the action level (AL), have been qualified as not detected (UB) and results greater than or equal to the AL are flagged with a "B" to denote the blank contamination association."**

***Comments from: Kim Mulhern, Project Geologist, USACE-Omaha***

*Comment 1* *The water sampling logs for the December 1999 event need to be fully completed. In other words, the well volume for each well needs to be calculated and added to the form.*

**Response:** **The sampling logs were filled out completely and added to the final report.**

# FINAL

# ANNUAL SUMMARY REPORT
# ASSESSMENT MONITORING
# 1999 SAMPLING EVENTS

# LONG-TERM MONITORING
# LANDFILL NO. 3 (SWMU 105),
# LANDFILL NO. 4 (SWMU 104),
# AND LANDFILL NO. 25 (SWMU 97)

**CANNON AIR FORCE BASE**
**Clovis, New Mexico**

**June 2000**

## EXECUTIVE SUMMARY

This report summarizes the data obtained during the 1999 annual sampling events for the long-term monitoring (LTM) program of monitoring well N (Landfill 4), monitoring well O (Landfill 3), and monitoring well R (Landfill 25) at the Cannon Air Force Base (CAFB) near Clovis, New Mexico (Figure 1). The LTM for wells N and O began in March 1996 and the LTM for well R began in June 1997. Monitoring wells N, O, and R are located downgradient of their respective landfills (Figure 2). The project scope includes an annual sampling event performed in December 1999 for monitoring wells N and O and semi-annual sampling events in June and December 1999 for monitoring well R.

The wells were sampled using dedicated pumps previously installed in the wells. For the sampling events, one groundwater sample was collected from each well and submitted for chemical analyses. For quality control (QC) and quality assurance (QA) purposes, one field duplicate sample and one field split sample were collected during each sampling event (June and December 1999). The split sample was sent to the U.S. Army Corps of Engineers (USACE) Chemical Quality Assurance Branch Laboratory.

Groundwater samples collected from monitoring wells N, O, and R were analyzed for the parameters by the analytical methods identified below.

- Volatile organic compounds (VOCs), SW-846 Method 8260B with specific list of Appendix IX constituents
- Semivolatile organic compounds (SVOCs), SW-846 Method 8270B with specific list of Appendix IX constituents
- Polychlorinated biphenyls (PCBs), SW-846 Method 8082
- Herbicides, SW-846 Method 8151A
- Target Analyte List (TAL) metals, SW-846 Methods 6010B and 7470A
- Sulfate, U.S. Environmental Protection Agency (EPA) Method 375.4
- Chloride, EPA Method 325.3
- Nitrate, EPA Method 353.2
- Phenol, EPA Method 420.2
- Organophosphorous pesticides, SW-846 Method 8140
- Organochlorine pesticides, SW-846 Method 8081A

### Well N

No analyzed constituents exceed their respective EPA maximum contaminant levels (MCLs) or the New Mexico State Standards (NMSS). Table 1 provides a summary of historical results – March 1996 through December 1999. Results from the USACE Chemical Quality Assurance Branch Laboratory are also presented for the December 1999 sample event. Well N was the only well from which a split sample was collected.

Except as discussed below and shown in Table 1, Appendix IX constituents (VOCs, SVOCs, organophosphorous pesticides, organochlorine pesticides, herbicides, or PCBs), dioxin (TCDD), and total phenols were not detected in the groundwater samples collected from monitoring well N.

The annual sampling event revealed the presence of several metal analytes at trace concentrations. Essential inorganic nutrients of calcium, iron, magnesium, potassium, and sodium were detected at trace concentrations consistent with historical results. Arsenic, barium, lead, selenium, vanadium, and zinc were detected at concentrations below their respective EPA MCL. Barium, lead, and selenium exhibited trace concentrations that are similar to historical results. As a general observation, zinc exhibits a slight decrease in concentration and vanadium exhibits a slight increase in concentration since the October 1996 sampling event.

General chemistry results for nitrate, chloride, and sulfate were less than EPA MCLs and NMSS.

Annual sample results for well N are summarized in the appropriate New Mexico Environmental Department (NMED) Annual Summary Report for Assessment Monitoring forms.

### Well O

No analyzed constituents exceed their respective EPA MCLs or the NMSS.

Except as discussed below and shown in Table 2, Appendix IX constituents (organophosphorous pesticides, organochlorine pesticides, herbicides, or PCBs), dioxin

(TCDD), and total phenols were not detected in the groundwater samples collected from monitoring well O.

The annual sampling event revealed the presence of several metal analytes at trace concentrations. Essential inorganic nutrients of calcium, iron, magnesium, potassium, and sodium were detected at concentrations consistent with historical results. Copper, lead, selenium, vanadium, and zinc exhibited trace concentrations that are similar with historical results that are all below their respective EPA MCL or NMSS. Barium exhibits a slight decrease in concentration since the June 1997 sampling event. However, barium does not exceed the EPA MCL or NMSS.

VOCs detected in well O included carbon tetrachloride, chloroform, and trichloroethene, each at concentrations below EPA MCLs.

General chemistry results for nitrate and sulfate were less than EPA MCLs and NMSS. Chloride slightly exceeds EPA secondary MCLs and the NMSS.

Annual sample results for well O are summarized in the appropriate NMED Annual Summary Report for Assessment Monitoring forms.

### Well R

Concentrations of detected analytes are summarized in Table 3. As part of the QA/QC program for the semi-annual sampling events, a field duplicate was collected at well R to measure field and analytical precision and accuracy. The June 1999 field duplicate sample was identified as CAFB-MWX-0699. The December 1999 field duplicate sample was identified as CAFB-MWX-0699. For analytes detected above reporting limits, adequate precision was observed in the sample-duplicate pair (CAFB-0699MWR/CAFB-0699MWX) collected during the June 1999 sampling event and in the duplicate pair (CAFB-MWR-1299/CAFB-MWX-1299) collected during the December 1999 sampling event (see Table 3).

For the June 1999 sample event, chromium (total), iron (total), manganese (total), and nickel (total and dissolved) were detected above EPA MCLs and the NMSS. The EPA MCL for nickel has been remanded for further evaluation. Barium (total), copper (total), lead (total), manganese (total), selenium (total), vanadium (total), and zinc (total) were detected in trace concentrations that were below both the EPA action level and the NMSS. Results

for other constituents (VOC, SVOCs, organochlorine pesticides, organophosporous pesticides, herbicides, PCBs, and phenols) were not detected (ND), indicating that Appendix IX constituents were not present above laboratory reporting limits in any of the groundwater samples.

For the December 1999 sample event, arsenic (total) and zinc (total) were detected in addition to the constituents detected during June 1999. Copper (total) was not detected in December as it was in June. Iron (total) was detected at concentrations greater than the EPA MCL but below the NMSS. Results for other constituents (VOCs, SVOCs, organochlorine pesticides, organophosporous pesticides, herbicides, PCBs, and phenols) were not detected (ND), indicating that Appendix IX constituents were not present above laboratory reporting limits in any of the groundwater samples.

Historical results for well R from all LTM sampling events, June 1997 through December 1999, are summarized in Table 3. The following observations are based on comparison to historical results:

- Chromium (total) exhibited the highest concentration of 0.333 milligrams per liter (mg/L) in June 1999 exceeding both the EPA MCL and the NMSS. In December 1999, chromium concentrations decreased and only exceeded the NMSS. Chromium (dissolved) was not detected during the June and December 1999 sampling events.
- Iron (total) exceeded the EPA secondary MCL but not the NMSS. Iron exhibited a fluctuating concentration with the highest concentration of 1.48 mg/L in June 1999. Iron (dissolved) exhibited a slight increase from June to December 1999 but the concentrations did not exceed any standards.
- Manganese (total) historically exceeded the EPA secondary MCL and has decreased since 1998 to below the secondary MCL. Manganese (dissolved) exhibited a slight increase from June to December 1999 but did not exceed any standards.
- Nickel (total) has exceeded both the EPA MCL and NMSS since installation of the well in 1997. Concentrations from 1997 to 1999 fluctuated and showed an overall decrease in concentrations. Due to the presence of nickel (total), nickel (dissolved) was added to the parameter list in June 1999. Nickel (dissolved) exhibited concentrations exceeding the NMSS for both the June and December 1999 sample events.
- Lead (total) and selenium (dissolved) exhibited decreasing concentrations. However, selenium (total) exhibited increasing concentrations. None of these concentrations exceeded EPA MCL or NMSS.
- Arsenic (total), barium (total), vanadium (total), and zinc (total) have exhibited fairly consistent results since June 1997.

Following the sampling events, NMED Assessment Monitoring Annual Report forms were completed and submitted to the USACE, CAFB, and Air Combat Command, summarizing the analytical results for each well. The Assessment Monitoring Annual Report forms for the annual and semi-annual sampling events are presented in Appendix I to facilitate review of the analytical and field data.

Field forms are provided in Appendix II; Analytical results and associated QC data, as reported by Quanterra Environmental Services, are presented in Appendix III; a data quality assessment summary for the December 1999 sample event is provided in Appendix IV; and a data quality assessment summary for the June 1999 sample event is provided in Appendix V.

## REFERENCES

Foothill Engineering Consultants, Inc. (FEC), 1999, Final work plan amendment 2, field sampling plan, quality assurance project plan, site safety and health plan.

U.S. Environmental Protection Agency (EPA), 1994a, National functional guidelines for organic data review.

U.S. Environmental Protection Agency (EPA), 1994b, National functional guidelines for inorganic data review.