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Chromium Assessments at Camdenton TCE Sites

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Chromium Sample Data

Based on the sampling conducted to date:

- Camdenton's drinking water wells continue to meet all safe drinking water standards
- Lagoon #3 – Chromium is not a constituent of concern
- Sludge Disposal Area – Chromium is not a constituent of concern
- 221 Sunset drive – Chromium is not a constituent of concern

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Webpage Updates

https://dnr.mo.gov/env/hwp/camdentontce.html

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What is Chromium?

- Chromium is a metallic mineral which naturally occurs in soil
- Chromium is widely used in the production of stainless steel and for chrome plating
- Chromium may exist in two forms:
  - Cr^{+6} hexavalent chromium
  - Cr^{+3} trivalent chromium
  - Total Chromium = Cr^{+6} + Cr^{+3}

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Chromium Sample Data

- Soil and Groundwater samples were analyzed
- Data shows Chromium is not a contaminant of concern
- Chromium was within normal background levels for Missouri

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Former City Lagoon #3

- Chromium was evaluated during the initial Remedial Investigation
- Soil and groundwater samples collected
- Reference - RI Report, 2003 on website
  - https://dnr.mo.gov/env/hwp/camdentontce.html

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Lagoon #3 – Soil Sampling (2006)

- 15 soil borings within footprint of lagoon
- Drilled to upper weathered portion of bedrock
- Sampled depths 3 -11 feet below ground surface

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Soil Boring Location Map

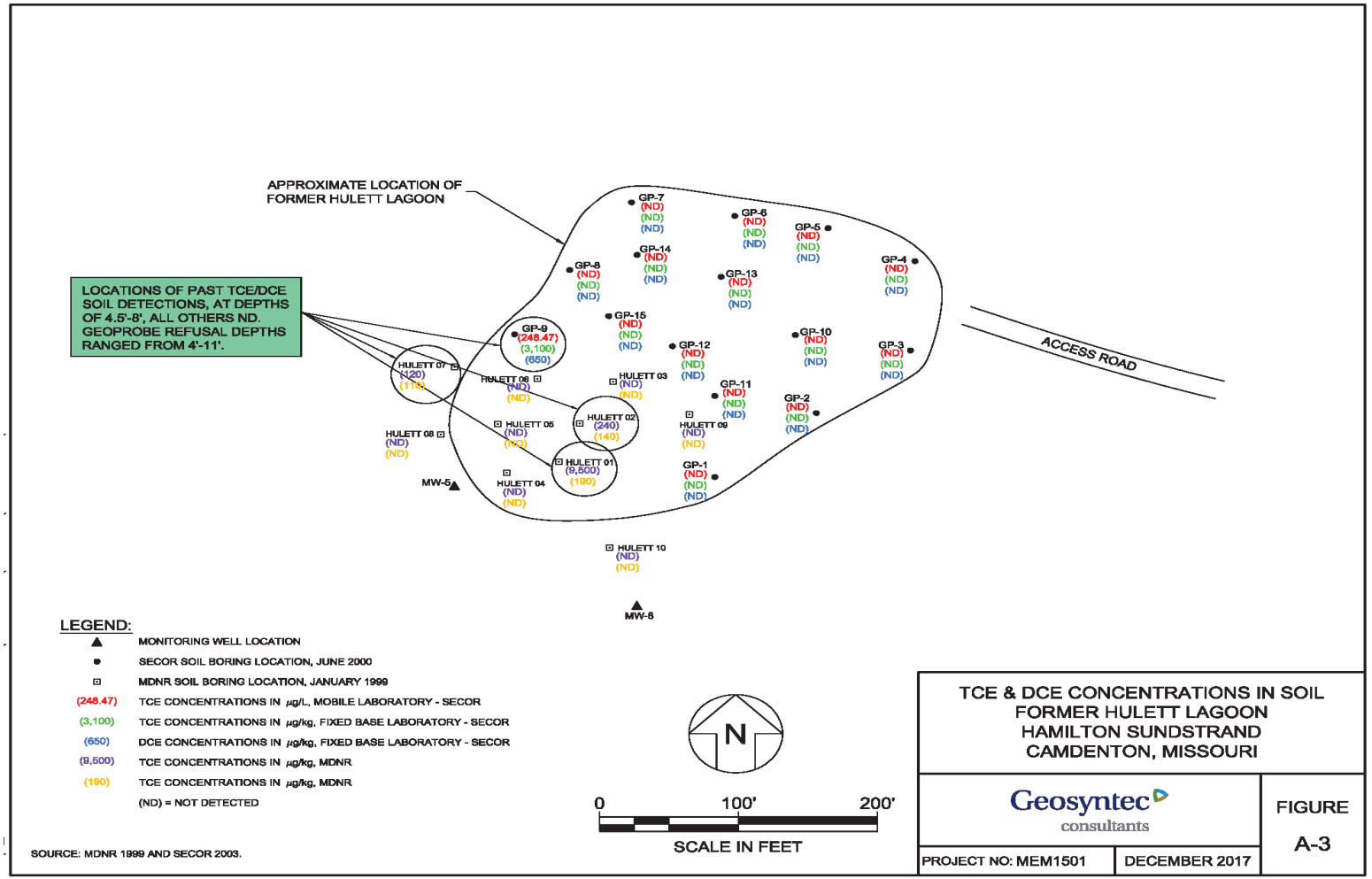

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Table 4.1
Detected Analytes- Hulett Lagoon Soils
Hamilton Sundstrand Remedial Investigation
Camdenton, Missouri

Minimum ppb	Maximum ppb	Average ppb	Natural Low Cr ppb	Natural High Cr ppb
2.0	34.4	15.1	10,000	150,000

Source: University of Missouri-Columbia, "*Activity and Movement of Plant Nutrients and Other Trace Substances in Soils," Hoette and Brown, University Extension, 1995/1999*

https://extension2.missouri.edu/wq428

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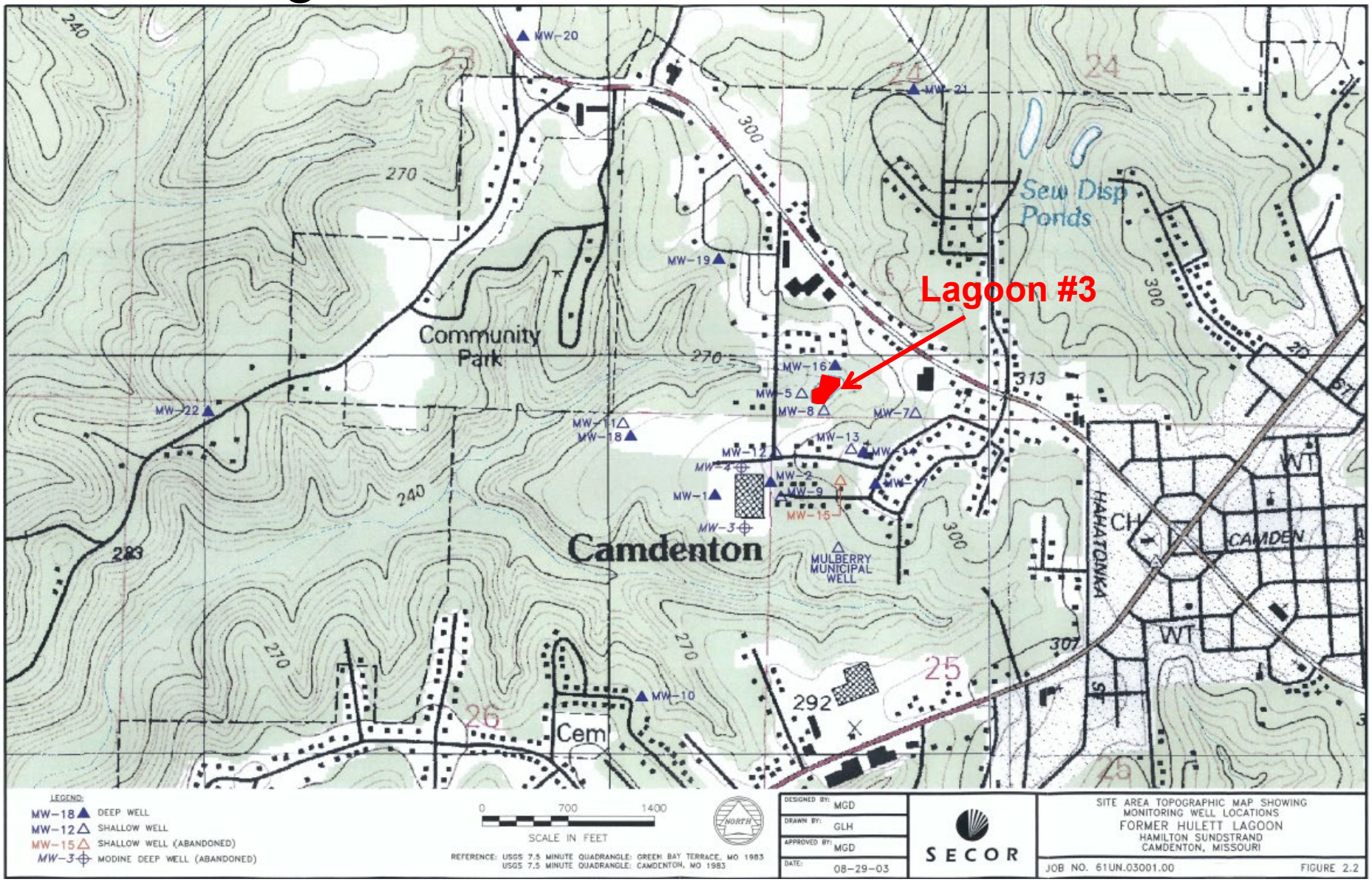
Lagoon #3 – Groundwater Sampling

- Conducted in two phases for Chromium
- 16 monitoring wells (MW-7 to MW-22)
- Monitoring well samples analyzed

Monitoring Well Locations



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Phase 1 Chromium Groundwater Sample Results

Minimum ppb	Maximum ppb	Average ppb	Drinking Water MCL ppb
5.8	41.1	17.8	100

Nine of the wells sampled were non-detect for Chromium.

Phase 2 Chromium Groundwater Sample Results

Minimum ppb	Maximum ppb	Average ppb	Drinking Water MCL ppb
5.9	152	42.6	100

Nine of the wells sampled were non-detect for Chromium.

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Results – Monitoring Wells

- Total Chromium was detected
- Total Chromium above Maximum Contaminant Level (MCL)
- Hexavalent Chromium NOT detected
- Chromium no longer needed to be analyzed, Based on Phase I and II results
- Chromium is not a contaminant of concern

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Lagoon #3 – Chromium Summary

- Chromium in soil reflect natural occurrence
- Chromium is not a constituent of concern at this site

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Mulberry Well & Active Public Wells

- Mulberry Well - VOCs only during RI
- Active Camdenton public wells on three-year monitoring cycle for metals
  - Includes Chromium analysis
  - The last Chromium check on the Mulberry Well was on January 29, 1997, and the result was non-detect
- Drinking water meets all Safe Drinking Water Standards
- Sample results can be found at MoDNR Drinking Water Watch website. https://dnr.mo.gov/DWW/

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Camdenton Sludge Disposal Area – 1999 Site Inspection: Soil and Drinking Water Sampling

- 1999 Superfund Site Inspection investigation
  - Sludge, soil and drinking water wells were sampled
  - Chromium included in the analysis
  - Chromium was detected in two out of the twenty soil/sludge samples
  - Drinking water samples were below screening levels for Chromium

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Camdenton Sludge Disposal Area – 2017 Site Reassessment Drinking Water Sampling

- 11 private wells, one public well sampled (Camden Co. PWSD #2), Well #1, this well serves as a back up well
- Two background wells sampled three to four miles from site
- Hexavalent Chromium analyzed at three wells

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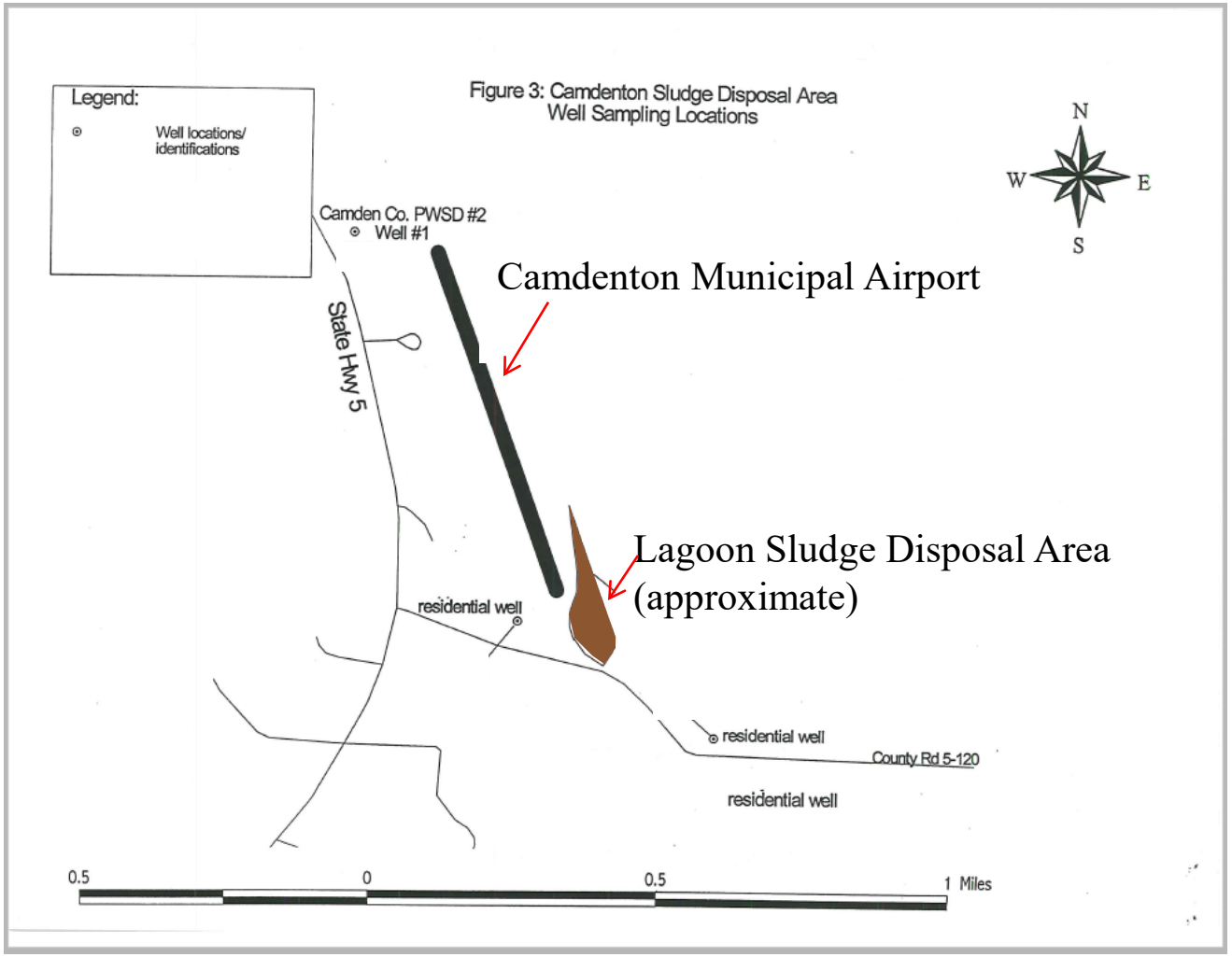
Camdenton Sludge Disposal Area – 1999 Site Inspection: Drinking Water Sample Locations



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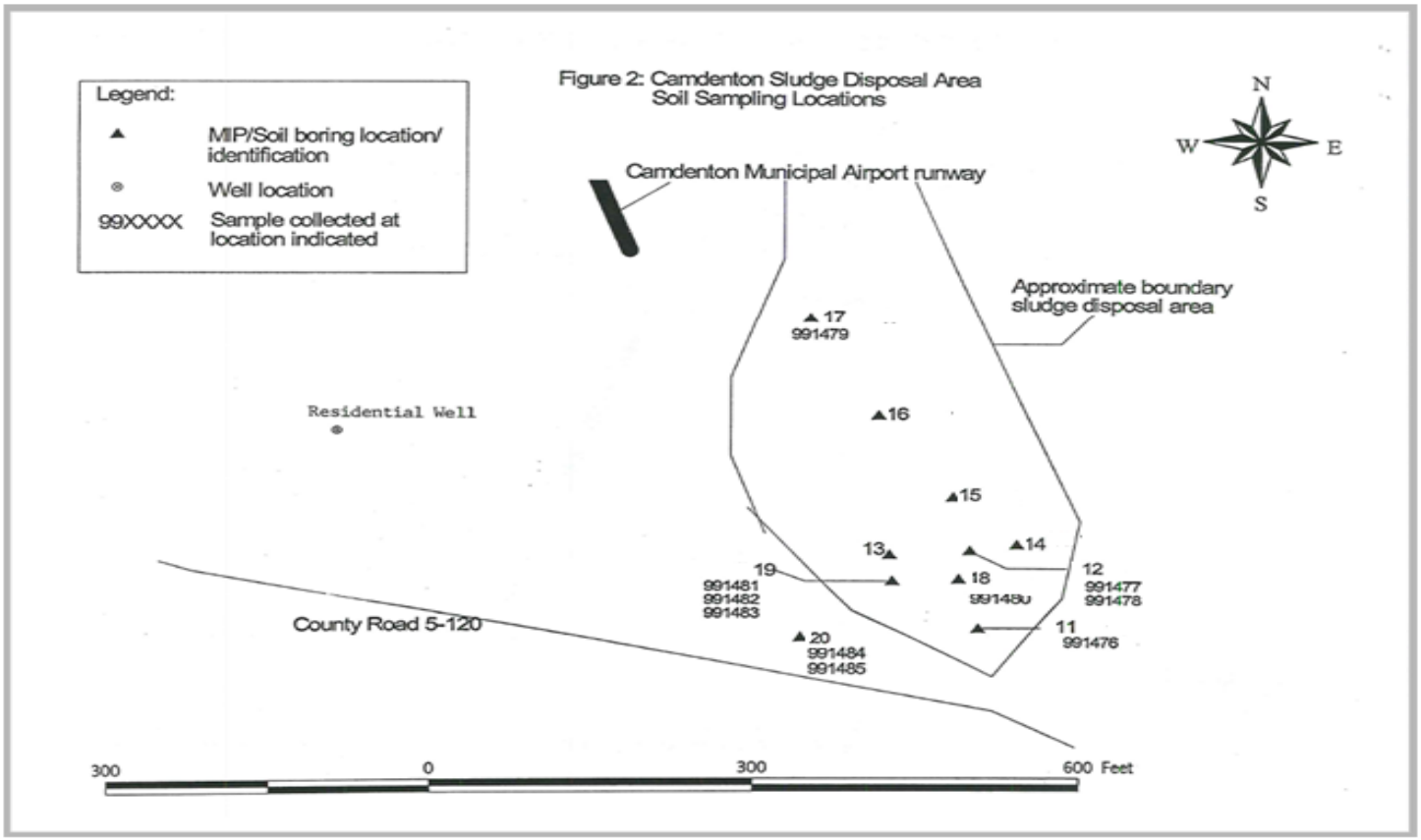
Camdenton Sludge Disposal Area – 1999 Site Inspection: Soil Sample Locations



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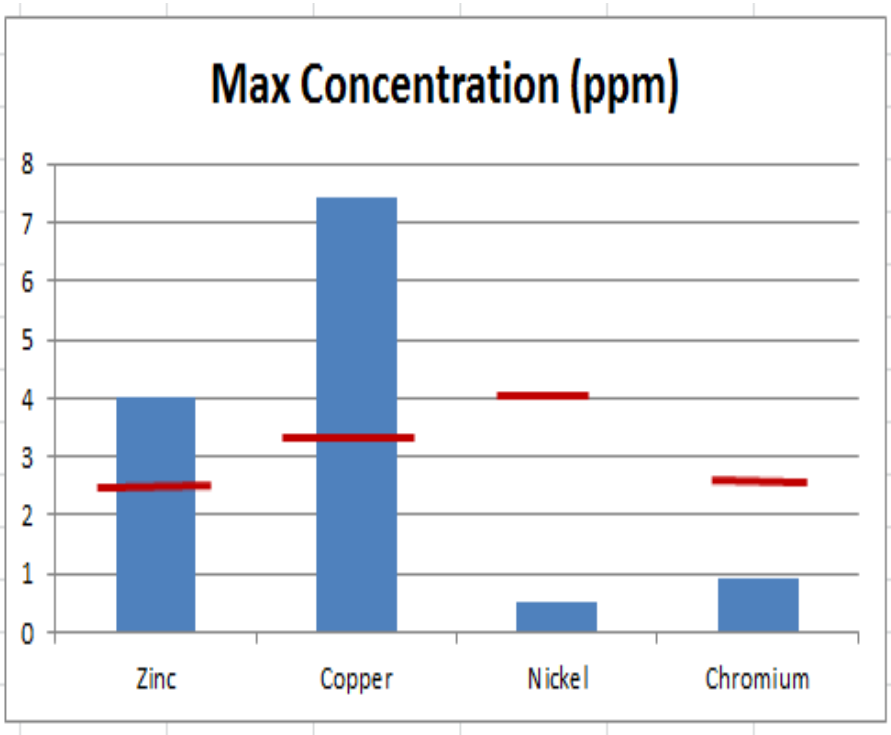
221 Sunset Drive Facility Pre-treatment System Maximum Metals Effluent Results During Connection to CTPL Dec. 1987 to June 1989



Red bars indicate applicable general federal pretreatment regulations.

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221 Sunset Drive

- Total Chromium was sampled in soil at 221 Sunset Drive in 1993, 1997, and 2000

- Total Chromium was below the health based screening level for industrial soil and the background soil range for Camden County

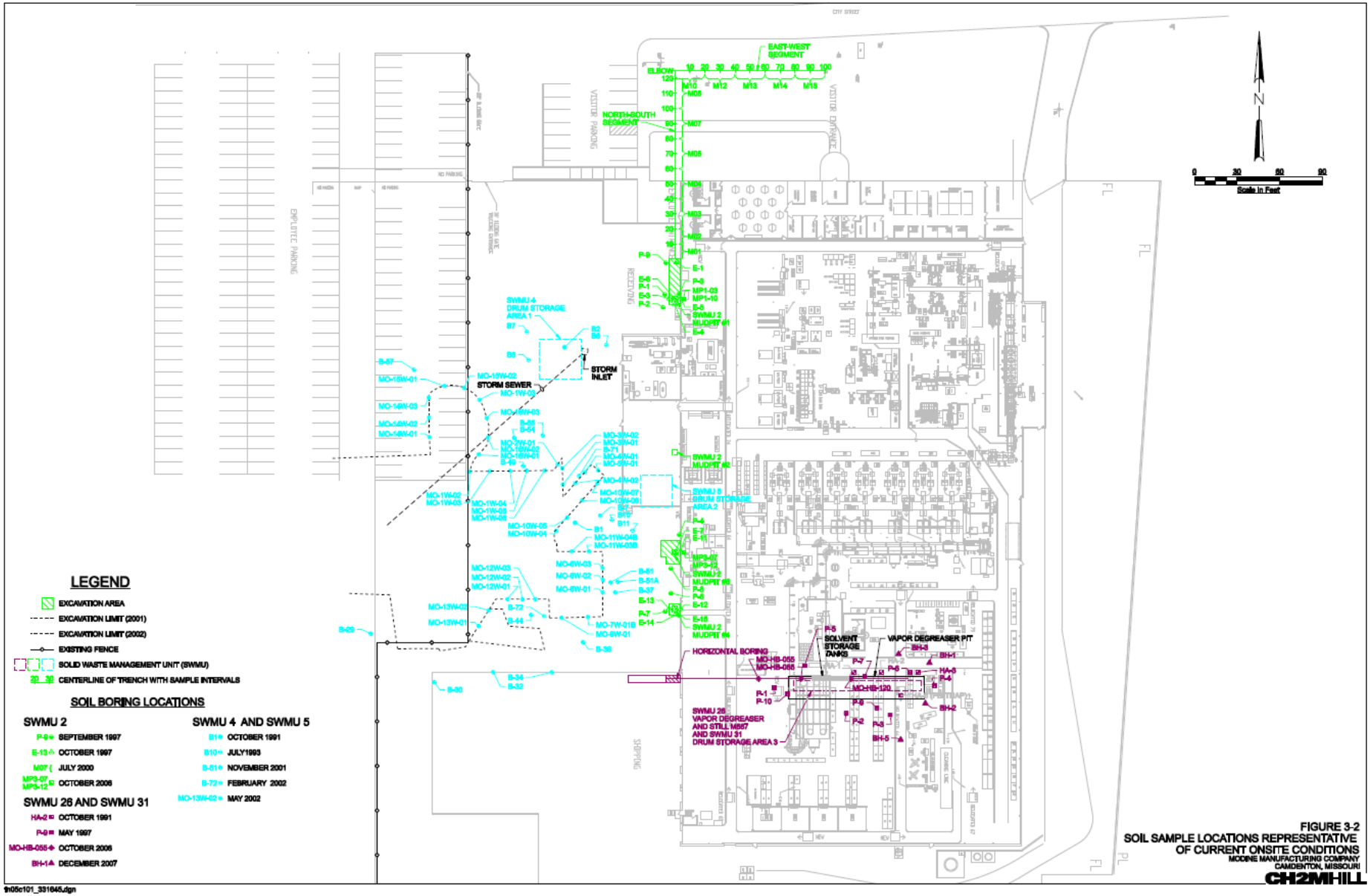

FIGURE 3-2
SOIL SAMPLE LOCATIONS REPRESENTATIVE OF CURRENT ONSITE CONDITIONS
MODINE MANUFACTURING COMPANY
CAMDENTON, MISSOURI
CH2MHILL

9h05c101_331645.dgn

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COMPARISON OF 221 SUNSET DRIVE HISTORICAL ON-SITE CHROMIUM DATA TO EPA REGIONAL SCREENING LEVELS AND BACKGROUND SOIL CONCENTRATIONS

Metals	Industrial Soil mg/kg	Background Range for Camden County mg/kg	Site Specific Background mg/kg	Soil Boring Results 1993 mg/kg	Soil Boring Results 1997 mg/kg	Composite Soil and Sludge Samples 2000 mg/kg	Soil Boring Results beneath former Manufacturing Building June 2018 mg/kg
Total Chromium	1,800,000	30 - 70	38 -110	10-52	8.48-28.1	12.9-59.5 (soil) 431-4,890(sludge)	NA
Hexavalent Chromium	6.3	NA		NA	NA	NA	<0.42(ND)-5.1

EPA Regional Screening Level Tables, Industrial Soil dated May 2018 (TR=1E-6, HQ=1.0)
Geochemical Survey of Missouri, Geography of Soil Geochemistry and Classification by Factor Analysis of Missouri Agricultural Soils, Ronald R. Tidball, Geological Survey Professional Paper 954 –H, I, 1984
1999 PA/SI Camdenton Sludge Disposal Areal Table 9
NA = not analyzed, ND = non-detec

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221 Sunset Drive

- Hexavalent Chromium was sampled during the June 2018 investigation under the manufacturing building floor
- Hexavalent Chromium was detected below health based screening levels for industrial soils
- Hexavalent Chromium is NOT a Constituent of Concern at this site