

Comprehensive Site Assessment

ARA/Smith's

6301 Burnt Poplar Rd.

660

Groundwater Incident #

Report recd. 3/8/94
by Shield Environmental Associates.

15.1 COMPREHENSIVE SITE ASSESSMENT (CSA)

The CSA sufficiently characterizes the cause, significance and extent of groundwater and soil contamination such that a Corrective Action Plan (CAP) can be developed.

A CSA for groundwater and soil contamination is required if any of the following requirements apply:

1. Contaminant concentrations in groundwater exceed the 15A NCAC 2L groundwater standards
2. Free product is present on the water table
3. Contaminated soil is in contact with groundwater or in proximity to groundwater
4. The Division of Environmental Management or other regulatory agency requests it
5. For petroleum contaminated sites, in-situ soils exceeding the final cleanup level determined by the SSE exist outside the spatial boundaries described in Section 8 "Limiting Quantities and Costs of Soil Treatment/Disposal".

Submit a CSA report to the appropriate regional office. Guidelines for preparing a CSA report appear below. As the CSA report format addresses both soil and groundwater contamination, submit only one report for a site. All sections must be addressed for groundwater contamination; however, for incidents where only soil contamination exists, subsections 7, 10 (J, K, L, M) and 11 (D) may be omitted from the CSA report. Do not submit separate CSA reports for an incident with both soil and groundwater contamination.

15.2 COMPREHENSIVE SITE ASSESSMENT (CSA) FORMAT

Minimum Elements of CSA Reports:

1. Title Page

a. Relevant site information

- Site name, incident identification No. # (if applicable) and location
- Date report submitted
- Responsible party and author of report

2. Executive Summary

a. Source information

- Type of source (gasoline, diesel etc.)
- Container (tank, line, drum)
- UK - Amount of release (gallons, estimated or know)

b. Initial abatement/emergency response information

- 1983 - Tank Closure?
- no cleanup - Soil removal, quantity and disposition
- not detected - Amount of free product recovered and remaining (gallons, estimated)
- Alternative water supply availability and location

c. Damage/extent of release information including potentially affected receptors

- have water in 15-20 ft. - Potentially affected receptors (e.g. water supply wells, surface waters, drinking water supplies)
- none close - Subsurface structures (basements, vaults, etc.)
- Populations (residences, schools, parks, etc.)
- Maximum contaminant concentrations in soil and groundwater (lab data only)
- Groundwater estimated flow rate (ft/yr) and direction

d. Conclusions/recommended corrective action

Soil 2400ppm
 5030
 690 ppm
 Gw B. 5.3 ppm
 T. 21 ppm

17.9 ft/yr
 to WSW

NOTE: The Executive Summary should provide a brief overview of the pertinent site information. i.e., it should provide sufficient information to acquaint the reader with the who, what, when, where, why and how of site activities to date.

3. **Table of Contents**

- a. First page number for each section listed
- b. List of Figures (all placed in a single section following contents text)
- c. List of Tables (all placed in a single section following contents text)
- d. List of Appendices

4. **Site History and Source Characterization**

Owned by *Deer/Smith Inc.*
3 USTs removed 1/26/63

a. Give a history of property ownership and use. Discuss chronology with references, lists and tables indicating owners/operators, dates of ownership (immediately prior to 1/1/74 through the present), uses of site and potential sources, which may include UST's, aboveground storage tanks (AST's), chemicals used and stored onsite, hazardous substances, etc.

Hales in tanks
Gw in gravel pits

b. Summarize release incidents and environmental investigations of known contamination. Discuss current and previous releases including but not limited to dates, sources, extent, inventory discrepancies, system tightness test, odors, stained soils, observed product, samples taken, previous enforcement orders, civil penalty assessments, etc. Reference any previous reports

1200 tons of soil
Stacked in (Area 1000)

c. Summarize corrective actions to date (reference any reports), emergency response/initial abatement, free product recovery and primary and secondary source removal

5. **Potential Receptors and Migration Pathways**

Water well 1600' east,
small surface water body
~1500 feet SW

This section should include identification and location of water supplies within 1500 feet of the contamination; surface water intakes for public water supplies within 0.5 mile; identification of adjacent property owners; identification of subsurface utilities; availability of municipal water lines and identification and discussion of the potential impacts that different pathways may have on contaminant migration (e.g., septic leach fields, utility lines and the effects of fluid mounding, etc.).

Reference the required figures and tables in subsections 10 and 11 below.

Silt/clay
fine sand, rock at ~30'
bedrock at 50-55 ft.

6. Soils Investigation

Briefly discuss the site's soils and geology. Soil gas surveys results should be included if performed. Discuss how soil and geological characteristics may affect the migration and attenuation of contaminants. Reference the required figures and tables in Sections 10 and 11.

NOTE: Full reimbursement for soil treatment may not be approved without adequate evaluation of the most cost-effective treatment options.

7. Groundwater Investigation

- a. Discuss the number, location and construction of monitor wells, in terms of the nature of contaminants (i.e., floaters vs. sinkers, placement of screened interval, etc.) and the aquifer contamination in both the vertical and horizontal extent (i.e., contaminated groundwater in saprolite vs. bedrock, upgradient vs. downgradient wells, etc.).
- b. Discuss the plume's physical and chemical characteristics and significant features or mechanisms that could affect local groundwater flow patterns and plume migration.
- c. Discuss the hydrogeologic conditions unique to the site such as vertical permeability of the unsaturated zone, hydraulic conductivity of the saturated zone, aquifer characteristics, confining beds, and depth to the seasonal high water table.
- d. Discuss justification for all well locations and screening intervals.

WT @ ~6'
Hyd grad = 0.02%
18 in flow toward

Reference the required figures and tables in Sections 10 and 11.

NOTE: If large volumes of contaminated water are to be generated during aquifer testing, use slug tests to gather interim data for developing CSA while awaiting discharge permit for contaminated water.

8. Recommendations

Discuss the proposed preliminary corrective actions for developing a CAP and provide a rationale.

9. **References**

- a. Interview summaries, including dates, contacts, etc.
- b. File reviews for onsite/offsite sources
- c. Resource materials cited

10. **Figures (All figures should include scale, north arrow, and site location in addition to the information listed below)**

- ✓ a. 7 1/2 minute USGS topographical quadrangle map (photocopied portion)
 - indicate water supplies within 1500 feet
 - quadrangle name
 - north arrow
 - scale
- West Bros. ✓ b. County road map
 - include primary/secondary road numbers
- c. ✓ Site base map/plan
 - North arrow
 - Surface features including property boundaries, roads/easements/rights of way, existing and previous building/structure, pavements, product or chemical storage areas, surface water bodies, drainage ways, wetlands, etc.
 - Subsurface features including underground storage tank systems (former/existing), basements, utilities, wells of all types, septic tanks, etc.

NOTE: *All reports submitted to DEM should make use of graphical methods of data presentation to the greatest extent possible. An appropriate number of useful and topical maps, figures and tables should be provided so that rapid and comprehensive reviews of site data are possible. Furthermore, the text of reports should provide a concise synthesis of this graphical information so as to clearly communicate the preparer's own interpretations of the data.*

If possible, a single base map should be used to prepare site plans. potentiometric maps. isocontour maps, etc. using a map scale of 1 inch = 100 feet. Maps and figures submitted to DEM should include conventional symbols.

notations, labelling, legends and north arrows and conform to generally accepted practices of map presentation such as those enumerated in the U.S.G.S. Geological Survey pamphlet, "Topographic Maps".

- d. Receptor well map showing location of all downgradient water supplies within 1,500 feet of contamination including surface water intakes for public water supply, all water supply wells, and irrigation wells. Provide a table listing well owner and pertinent construction details keyed to the figure. The map scale should be 1 inch = 400 feet.

If no water supplies exist within 1500 feet, state this with references in report and on the map.

- e. Local monitoring well map showing location of all monitoring wells for off-site sources within 1,000 feet of the site.
- f. Designation of subsurface utilities, lines, conduits, basements and other structures potentially at risk from free product and/or vapors (note whether they intercept the water table)
- g. Soil sample (grabs, boring, etc.) locations superimposed on base map
- h. Cross-sections through the contaminated soil
- Show at least at least two profiles crossing at or near right angles
 - Indicate sample location results noted adjacently
 - Delineate vertical extent of contamination (preferably in cross section)
 - Indicate subsurface profiles, illustrated fill, bedrock and outcrops, intersecting conduits, structures (if applicable)
 - Show SSE contour (if applicable)
- i. Isoconcentration contour map(s) of soil contamination
- Show horizontal and vertical contaminant extent in unsaturated zone
 - Delineate concentrations above the action level established for soil remediation with a bold contour
 - Delineate the Site Sensitivity Evaluation (SSE) cleanup level with a bold contour
 - Include SSE form (if applicable)

j. Potentiometric/groundwater elevation contour map

- Superimpose on a base map
- Show and label source location(s), monitor wells and recovery wells
- Note water level elevations at wells
- Note footnote pumping conditions
- Identify and locate datum (arbitrary 100', USGS, NGVD) or benchmark
- Use appropriate contour interval
- Show direction of groundwater flow and average gradient

NOTE: *A separate map (modified base map) or acetate overlays may be used for all potentiometric contour maps.*

k. Free product thickness map

- Superimpose on a base map with all wells labelled and thickness noted at wells
- Use appropriate contour interval (0.01 foot minimum)
- Note date and method of measurement

NOTE: *Acceptable methods of free product measurement include interface probes, tape/paste, or other DEM pre-approved methods only.*

l. Contaminant isoconcentration contour map(s)

- Superimpose on a base map with all wells labeled
- Label wells with contaminant, concentration and footnote date of sampling
- Plot total volatile (if applicable) and most widespread contaminant, most concentrated contaminant, (if warranted)

NOTE: *For all applicable plots, a 15A NCAC 2L standard contour must be shown in bold. A series of wells with contaminant levels near or below the 2L standard will be required to demonstrate this condition.*

- m. Contaminant isoconcentration contour crosssections
- Use at least two orthogonal sections that transect the contaminated zone
 - Label wells with contaminant concentrations and footnote date of sampling
 - Use vertical and horizontal scales
 - Depict surface topography and stratigraphy
 - Depict screened intervals of wells and water levels
 - Note potentiometric elevations for each well and soil boring
 - Footnote horizontal and vertical gradient

NOTE: *Data from at least one upgradient and one well or well cluster (i.e., nested or proximal shallow and deep wells) are required to accurately construct these sections. At least deep well or well cluster must demonstrate contaminant levels at or below the appropriate 2L standard.*

11. Tables

- a. Table of water supply well construction details keyed to the appropriate figure(s)

Include well numbers that correspond to map, owner's name, address, well use and construction information.

- b. Table of adjacent property owners

Include names, addresses and telephone numbers and show adjacent properties on the site base map

- c. Table of field screening and laboratory data for soil

Reference sample identification numbers, sample type, (grab, split spoon, auger etc.), sample depth, total depth of boring, analytical method, units and dates of sampling and analysis on the site base map.

NOTES: *The measured point at top of casing must be permanently marked or noted in the field. The table of potentiometric surface elevations should be part of the potentiometric contour map if space allows.*

d. Summary table of dissolved contaminant concentrations in groundwater

- Include "at risk" water supply wells, contaminated supply wells, monitor wells, sample identification numbers referenced on base map, analytical methods and units of measure

12. Appendices

a. relevant information

- Standard operating procedures used at site for sampling, equipment decontamination, field screening, well construction, well gauging, etc.
- Boring logs and soil descriptions
- Well construction records
- Chain-of-custody forms
- Laboratory reports for all samples
- List and/or copies of permits received, permitting agency, permit number and date issued
- Other documentation as appropriate (e.g., tank/line tightness results, aquifer tests)

ARA/Smith's
6301 Burnt Poplar Rd
Greensboro
GW Inc. # 10077

- ① Certificate of water permit
- ② Evidence of attainment (died on index 20)
- ③ Monitoring plan / don't need
- ④ UST installation (?) 12/4/95
- ⑤ Benzene (rather than BTEX)
- ⑥ Other hydraulic conductivity
- ⑦ Schedule
- ⑧ MMS 5 or equivalent summary 11/17/95

ZL .0106(L) CAP by Pyramid Environmental
Rec'd WSR 8/7/95
Sealed by LG

Down gradient well
(how far?)

15.3 CORRECTIVE ACTION PLAN

The CAP describes the proposed remedial actions at a site. The CAP's are required when the CSA indicates that additional remedial action is necessary.

Submit the CAP to the regional office for approval. Approval of the CAP is conditional upon approval of any required permits. Responsible parties and owners/operators may, in the interest of minimizing environmental contamination and promoting more effective cleanup, initiate groundwater and soil remediation before CAP approval. However, they must notify the appropriate regional office of their intentions to begin remediation, comply with any conditions imposed by the Department, and incorporate the self-initiated remedial measures into the CAP. Public notice of the CAP is required for regulated UST before approval is final. The Department encourages soil and groundwater cleanups to proceed as soon as possible, sometimes without the appropriate regional office approval. The CAP approval is required but should not hinder the initiation or progress of a cleanup.

Guidelines for preparation of a CAP report appear below. Because the CAP report format addresses both soil and groundwater contamination, address each applicable medium (i.e., soils, groundwater) separately within the report. Do not submit a separate report for both soil and groundwater.

15.4 CORRECTIVE ACTION PLAN (CAP) REPORT GUIDELINES

1. Table of Contents (please number all pages of text)

2. Introduction

- a. Site Name, location (attach 7 1/2 minute USGS topo map with quad name, and site map indicating city and road names/numbers), Responsible Parties (owners/operators if UST site), Property Owner, Incident # (if known)
- b. Purpose of CAP (e.g. response to Notice Of Violation (NOV) and/or Notice of Regulatory Requirements (NORR), remediation of soil, groundwater, surface water, vapors)
 - State cause of contamination and source(s)
 - Cite specific regulations violated
 - Cite substances exceeding the groundwater standards and the soil remediation guidelines (and, if applicable, cite the naturally occurring concentrations)
 - State the classification of the affected groundwater
- c. Brief Summary of Initial Remedial Actions to Date
 - Tank/Soil excavation - specify number, contents and capacity of tanks removed, date(s) of removal, tank condition, dimensions of excavation and quantity of soil excavated.
 - Soil treatment/disposal (quantities and methods)
 - Free product recovery (quantities and methods)
 - Any other corrective actions taken
 - Specify additional quantities of soil, free product, etc. that need to be remediated
- d. Reference Previous Reports Submitted (UST Closure Report, (if applicable), Initial Abatement and Site Check, Free Product Recovery, Initial Site Characterization, Comprehensive Site Assessment (CSA), etc.)
 - Cite titles, report dates, and dates submitted to regional office
 - From Comprehensive Site Assessment (CSA) report (see CSA Report Guidelines for contents), attach plume maps/cross sections indicating the lateral and vertical extent of contamination for free product, soil, and dissolved groundwater contamination; note water levels and data/reference points on all cross sections

Do not attach a copy of any report as an appendix !

10k diesel

500 gal gas

500 gal w/o

253 tons of soil

excavated

- e. Reference Any Previous Permits/Certificates (e.g. Certificates of Approval or Soil Remediation Permits, interim discharge permits, etc.)
 - Cite permit number
 - Cite approval/permit issue dates

3. Objectives of the CAP

- a. Statement of goals and expected accomplishments (e.g. free product recovery, containment or retardation of plume migration, reduction of contaminant concentrations and reduction in areal/vertical extent of plume, protection of nearby water supplies, etc.)
- b. Target cleanup concentrations for soil and/or groundwater (include Table summarizing existing levels and target clean-up levels)

NOTE: *If Site Sensitivity Evaluation (SSE) was performed to obtain soil clean-up levels, reference submitted documentation.*

- c. Target startup and completion dates of Corrective Action Plan
 - Submittal of pilot test data
 - Submittal of necessary permit applications
 - Commencement of remedial actions
 - System installation
 - System activation
 - System shut-down
 - Estimated time frame to achieve clean-up goals, target clean-up concentrations
 - Project completion date (to satisfaction of DEM)

4. Exposure Assessment

- a. Present Table summarizing historical analytical data. Note violations of groundwater standards and soil clean-up levels (See Site Sensitivity Evaluation (SSE) Section)
- b. Briefly discuss the physical and chemical characteristics of the contaminants, including their toxicity and persistence.

- c. Identify all significant pathways for human exposure, considering:
 - Release scenario and source characterization
 - Fate and transport of contaminants within affected media
 - Current and future uses of affected media (soil, air, surface water, groundwater, biota)
 - Exposure points and routes (ingestion, inhalation, etc.)
- d. Discuss the potential effects of residual contamination (post-remedial) on nearby surface water and groundwater.
- e. Identify potential receptors at greatest risk assuming no further corrective action. (Consider current and future uses of nearby surface water and groundwater.)

5. Evaluation of Remedial Alternatives

NOTE: Address each medium (soil, groundwater, surface water, vapors, etc.) separately, and present a table summarizing the following:

- a. Discussion of Remedial Options:
 - Feasibility of various alternatives
 - Options for disposal of groundwater
 - Advantages vs. disadvantages
 - Cost estimates (capital and yearly overhead estimates)
 - Alternate Water Supplies
- b. Statement of Recommendation and Rationale for Selection:
 - For remediation of affected medium (soil, groundwater, surface water, etc.)
 - For any discharge and associated permitting, if necessary

6. Proposed Corrective Action Plan

NOTE: Address each medium (e.g., soil, groundwater, etc.) separately.

- a. Overview/General Description of System
- b. Conceptual Design/Process Flow Diagram

NOTE: Detailed design plans and specifications along with the operational characteristics and performance standards of each system component should be placed in the Appendix.

- c. Basis for Selection of Recommended Remediation
- Results of bench tests/pilot studies
 - Results of aquifer tests
 - Diagram of radius of influence with recovery wells superimposed on plume map
 - Flow rates, injection rates determined
 - Anticipated effluent concentrations after each unit of treatment

NOTE: Include data compiled, calculations, pump curves, performance charts, etc., in the Appendix

- d. System Layout Superimposed on Base Map (include all components of the system - groundwater and vapor recovery wells, air/water injection wells, interceptor trenches, infiltration galleries, groundwater treatment units, discharge points, piping, etc.)
- e. System Security and Safety Measures (e.g. security fence, automated system controls and shutoff, explosion proof systems)
- f. Limitations (Discussion of limiting factors such as site restrictions, climate, biofouling, technological feasibility, type of contaminants, impacts on environmental receptors, etc. Also discuss proposed methods of dealing with the limitation)
- g. Operation and Maintenance of the System
- System startup information/data (e.g., where applicable, initial influent concentrations, dissolved oxygen levels, pH, etc.)
 - Modifications to system, if necessary
 - Certified operator, if necessary
 - Automated/manual controls
 - Maintenance plan and schedule
- h. Follow-up Monitoring, System Evaluation, and Reporting
- Sampling plan (locations, sampling methods, frequency, and analytical methods)
 - Plan for periodic monitoring to detect changes in groundwater movement, plume geometry, and qualitative characteristics of the plume; and to assess site response to disposal of effluent (Consult with appropriate regional office).
 - Evaluation of the effectiveness of the system (e.g., accomplishment of goals regarding free product recovery, retardation of plume migration, reduction in areal/vertical extent of contamination, contaminant removal efficiencies, achievement of target cleanup concentrations)

7. Permits

List all required permits for soil and groundwater remediation. *Attach copies of completed applications in the Appendix. DO NOT SUBMIT ANY FORMAL PERMIT APPLICATION WHEN SUBMITTING CORRECTION ACTION PLAN FOR REVIEW.*

Note: Original application and appropriate number of plan copies should be submitted to the appropriate permitting agency.

8. Report Certification by NC Professional Engineer and/or Geologist

9. References

10. Appendices

Include the following, if applicable:

- Cost Estimates for Remedial Technologies (attach prepared estimates and quotes obtained)
- Detailed design & specifications of system components
- Pump curves, performance charts
- Design calculations
- Aquifer test data/calculations
- Copies of completed permit applications

NOTE: *Do NOT include any previously submitted reports in the Appendix. Previous reports should be cited in the Introduction Section (under 2d of this outline.)*