

---

# COMPASS INDUSTRIES SUPERFUND SITE

TULSA COUNTY, OKLAHOMA

## SECOND FIVE-YEAR REVIEW FINAL REPORT



November 2001

---

905552



## SECOND FIVE-YEAR REVIEW

Compass Industries  
OKD980620983  
Tulsa County, Oklahoma

This memorandum documents EPA's approval of the Compass Industries Second Five-Year Review Report prepared by US Army Corps of Engineers on behalf of EPA.

### Summary of Five-Year Review Findings

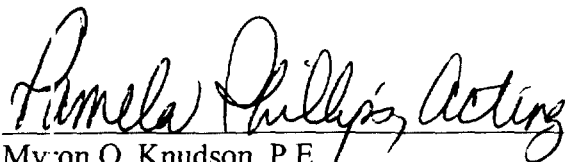
The remedy of a RCRA type cap over the 43 acre landfill is operating as designed. Water samples from the shallow aquifer exposed in seeps adjacent to the cap, and surface water were below action levels set forth in the Operations and Maintenance (O&M) Plan. The City of Sand Springs took over the O&M from Sun Texaco in mid 2000. The cap is in good condition and minor repairs have been made. Settlement of the cap appears to have been minimal.

### Actions Needed

The following deficiencies were noted: 1] woody vegetation growing on the north side slope needs to be removed; 2] additional riprap needs to be placed at west end of swale where liner is visible; and 3] the 10 year settlement survey needs to be performed. To ensure future protectiveness the following actions are recommended : 1] the grass should be mowed every four years. 2] woody vegetation should be removed 3] a periodic check of the cap should be performed to repair soil erosion and prevention of burrowing animals.

### Determinations

I have determined that the remedy for the Compass Industries is protective of human health and the environment, and will remain so provided the action items identified in the Second Five-Year Review Report are addressed as described above.

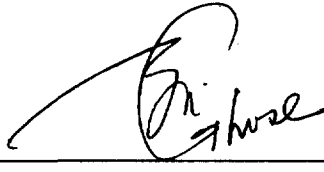
  
Pamela Phillips, Acting

Myron O. Knudson, P.E.  
Director  
Superfund Division  
U.S. Environmental Protection Agency  
Region 6


12/26/01  
Date

CONCURRENCES  
SECOND FIVE-YEAR REVIEW

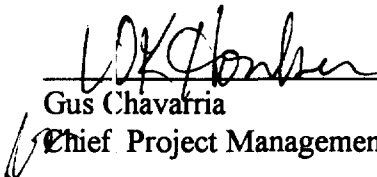
for the  
Compass Industries

 12/14/01

Shawn Ghose M.S., P.E.  
Remedial Project Manager

 12/17/01

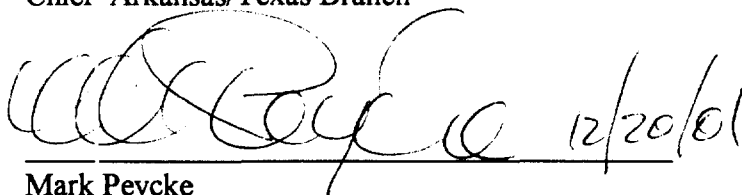
Tracy Sheppard  
Staff Attorney

 12/19/01


Gus Chavarria  
Chief Project Management Section

 12/19/01

William K. Honker  
Chief Arkansas/Texas Branch

 12/20/01

Mark Peycke  
Chief Superfund Branch  
Office of Regional Counsel

 12/17/01

June Buzzell  
Writer/Editor

## Five-Year Review Summary Form

| SITE IDENTIFICATION   |   |                          |
|---|---|--------------------------|
| Site name (from WasteLAN): Compass Industries (Avery Drive)   |   |                          |
| EPA ID (from WasteLAN): OKD980620983  |   |                          |
| Region: 6   | State: OK   | City/County: Tulsa/Tulsa |
| SITE STATUS   |   |                          |
| IPL Status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify) _____   |   |                          |
| Remediation Status (choose all that apply): <input type="checkbox"/> Under Construction <input type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete   |   |                          |
| Multiple OUs?* <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No  | Construction Completion Date: <u>10</u> / <u>  </u> / <u>1990</u> |                          |
| Has site been put into reuse? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No   |   |                          |
| REVIEW STATUS   |   |                          |
| Reviewing agency: <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency _____   |   |                          |
| Author name: Shawn Ghose M.S., P.E.   |   |                          |
| Author title: Remedial Project Manager  | Author affiliation: EPA, Region 6                                 |                          |
| Review period:** <u>5</u> / <u>  </u> / <u>1995</u> to <u>12</u> / <u>  </u> / <u>2000</u>  |   |                          |
| Date(s) of site inspection: <u>1</u> / <u>30</u> / <u>2001</u>  |   |                          |
| Type of review:*** <input checked="" type="checkbox"/> Statutory<br><div style="margin-left: 40px;"> <input type="checkbox"/> Policy    (<input type="checkbox"/> Post-SARA    <input type="checkbox"/> Pre-SARA    <input type="checkbox"/> NPL-Removal only<br/> <input type="checkbox"/> Non-NPL Remedial Action Site    <input type="checkbox"/> NPL State/Tribe-lead<br/> <input type="checkbox"/> Regional Discretion) </div> |   |                          |
| Review number: <input type="checkbox"/> 1 (First) <input checked="" type="checkbox"/> 2 (Second) <input type="checkbox"/> 3 (Third) <input type="checkbox"/> Other(specify) _____   |   |                          |
| Triggering action:****<br><input type="checkbox"/> Actual RA Onsite Construction at OU # _____ <input type="checkbox"/> Actual RA Start at OU# _____<br><input checked="" type="checkbox"/> Construction Completion <input type="checkbox"/> Previous Five-Year Review Report<br><input type="checkbox"/> Other (specify) _____   |   |                          |
| Triggering action date (from WasteLAN): <u>10</u> / <u>  </u> / <u>95</u>   |   |                          |
| Due Date (five years after triggering action date): <u>10</u> / <u>  </u> / <u>2000</u>   |   |                          |

\* ["OU" refers to operable unit.]

\*\* [Review period should correspond to the actual start and end dates of the five-year review in WasteLAN.]

\*\*\* [see page A-18 and Chapter 1 for further explanation.]

\*\*\*\* [see page A-19 and Chapter 1 for further explanation.]

## Five-Year Review Summary Form

### Deficiencies:

No deficiencies were noted during the Five-Year review of the data, but the site inspection revealed the following deficiencies which require correction.

- a) Woody vegetation is growing on the north side slope;
- b) Liner under riprap at west end of swale is visible;
- c) The 10 year settlement survey has not been performed.

Other potential deficiencies which were identified during the inspection included

- d) Possible buildup of thatch;
- e) Woody plants with strong root systems may damage the liner system;
- f) Burrowing animals may also damage the liner system;
- g) Erosion of the protective soil continues to be a concern

### Recommendations and Follow-up Actions:

- a) Remove woody vegetation from the north slope in the noted area;
- b) Add more riprap at the lower end of the swale;
- c) Survey the settlement monuments;
- d) If mowing continues the site should be raked approximately every 4 years.
- e) Remove woody vegetation at least annually.
- f) maintain continued periodic checks for burrowing.
- g) Periodically inspected cap to insure that the full 24-inches remains intact.

### Protectiveness Statement(s):

The remedial action is expected to be protective. Therefore the remedy for the site is protective of human health and the environment.

### Other Comments:

The site should be considered for deletion from the NPL.

## **Executive Summary**

This documents the second five-year review of the Compass Industries Site in Tulsa County, Oklahoma, which was scheduled to be completed in 2000, but was delayed by weather until January 2001. The remedy for the site consists of an approximately 50-acre RCRA-type Cap over the landfill. Post completion activities consist of obtaining and analyzing samples of the water from seeps located adjacent to the site and from the surface of the cap; inspecting the cap for deterioration and settlement; and, maintaining the site as a secured area.

The remedy, including the post closure Operations and Maintenance, is protective of human health and the environment. The remedy is functioning as designed. The cap is generally in good condition, with noticeable minor repairs having been made in the past. Settlement has been minimal. All analyses of the surface water have shown no contaminants above the remedy threshold. The fence has kept the site generally secure with only infrequent trespassing noted.

As there is waste left in place, another five-year review is scheduled for FY 2006. It is recommended that this site be considered for partial or whole deletion from the National Priority List.

# TABLE OF CONTENTS

Executive Summary  
Five-Year Review Summary Form  
Acronyms

|      |  |    |
|------|--|----|
| I.   | Introduction .....                             | 1  |
| II.  | Chronology of Remediation Activities .....     | 2  |
| III. | Background .....                               | 2  |
|      | A. Site Location and Description .....         | 2  |
|      | B. History .....                               | 4  |
|      | C. Investigations .....                        | 4  |
|      | D. Land Use Restrictions .....                 | 5  |
| IV.  | Remedial Actions .....                         | 5  |
|      | A. Record of Decision (ROD) .....              | 5  |
|      | B. Remedial Activities .....                   | 6  |
|      | C. Operations and Maintenance Activities ..... | 7  |
|      | D. Results from the First 5-Year Review .....  | 7  |
| V.   | Five-Year Review Process .....                 | 8  |
| VI.  | Five-Year Review Findings .....                | 8  |
|      | A. Community Involvement .....                 | 8  |
|      | B. Review of Existing Data .....               | 8  |
|      | Water Sampling Results .....                   | 8  |
|      | Settlement .....                               | 9  |
|      | Vent Sampling .....                            | 9  |
|      | C. Site Inspection .....                       | 11 |
|      | Inspection of the Cap .....                    | 11 |
|      | Security .....                                 | 11 |
| VII. | Assessment .....                               | 11 |

**TABLE OF CONTENTS**  
**(Continued)**

VIII. Deficiencies ..... 12

IX. Recommendations and Follow-up Actions ..... 13

X. Statement of Protectiveness ..... 14

XI. Next Five-Year Review ..... 14

XII. Other Comments ..... 14

**Attachments**

Attachment 1 ..... Documents Reviewed

Attachment 2 ..... Photographs

Attachment 3 ..... Water Sample Data - O&M Surface Samples

Attachment 4 ..... Cap Vent Emissions Data

Attachment 5 ..... Cap Settlement Data



## Acronyms

|        |   |
|--------|---|
| BDL    | Below Detection Limit   |
| BOD    | Biochemical Oxygen Demand   |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| COD    | Carbon Oxygen Demand  |
| COE    | U.S. Army Corps of Engineers, Tulsa District                          |
| EPA    | U.S. Environmental Protection Agency                                  |
| HDPE   | High Density Polyethylene   |
| HRS    | Hazard Ranking Score  |
| IAG    | Interagency agreement   |
| mg/l   | milligrams per liter (ppm)  |
| NCP    | National Contingency Plan   |
| NPL    | National Priorities List  |
| OSDH   | Oklahoma State Department of Health                                   |
| OWSER  | Office of Solid Waste and Emergency Response                          |
| O&M    | Operations and Maintenance  |
| PCB    | Polychlorinated Biphenyls   |
| ppb    | parts per billion   |
| ppm    | parts per million   |
| PRP    | Potentially Responsible Party   |
| RCRA   | Resource Conservation and Recovery Act                                |
| RI/FS  | Remedial Investigation/Feasibility Study                              |
| ROD    | Record of Decision  |
| TOC    | Total Organic Carbon  |
| TSS    | Total Suspended Solids  |
| ug/l   | micrograms per liter (ppb)  |

## I. Introduction

The Compass Industries Superfund Site is a former landfill which has been capped, with none of the contaminants removed. Remedial Action at the site began in 1990 and was essentially complete that same year. The site is currently under Operations & Maintenance (O&M) and is restricted from public or private use.

The purpose of this report is to document the second five-year review and to comply with the requirements of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and the Office of Solid Waste and Emergency Response (OSWER) Guidance 9355.7-03B-P/EPA 540 R-98-050, dated October 1999.

This review has been performed pursuant to Section 121(c) of CERCLA which states:

"If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented."

Subpart E of the NCP {40 CFR 300.430(f)(4)(ii)} delegates this responsibility to the lead agency, in this case the U.S. Environmental Protection Agency (EPA).

This report is provided by the U.S. Army Corps of Engineers, Tulsa District (COE), under EPA Interagency Agreement No. DW96934255-01-06 for Hazardous Waste Enforcement Support at the Compass Industries, OK site. The EPA has utilized the Tulsa District as its sole oversight agent throughout the Remedial Design, Remedial Action, and Operations and Maintenance (O&M) of the site. Under this IAG, the Tulsa District, provided full-time on-site monitoring during the remedial action, monitored the O&M contractor and performed Quality Assurance testing. The Tulsa District has assisted the EPA, alerting EPA to O&M activities, providing technical assistance, and enforcing its requirements.

This report summarizes the data obtained under this agreement and provides the technical recommendations for continued activity at the site. This information has been summarized on the Five-Year Review Summary Form.

## **II. Chronology of Remediation Activities**

A brief chronology of the activities concerning the Compass Industries site and involving the EPA is provided in Table 1.

## **III. Background**

### **A. Site Location and Description**

The Compass Industries Superfund Site is located in western Tulsa County, Oklahoma near the community of Berryhill. The remediation area occupies approximately 50 acres in the northeastern portion of the 125-acre site. This area is bounded on the east by the Chandler Park baseball diamonds, by the bluffs on the northern side just above Avery Drive and the Arkansas River, and the road through the site to the south.

The topography of the site has been modified by quarrying, landfill, and remediation activities. The road to the south of the remediation area forms a drainage divide and most of the surface water from Chandler Park flows into one of two draws located in the park area. Therefore, the majority of surface runoff from this site results from precipitation directly upon the site rather than run-on from other areas. Run-off from the remediation area flows in a generally westerly direction to the western portion of the site where the flow is intercepted by a draw of an unnamed tributary of the Arkansas River.

John Mathes and Associates identified two aquifers under the Compass Site during the Remedial Investigation. They consist of a perched aquifer and an unconfined aquifer and are depicted in an East-West Cross-section provided in the Remedial Investigation Report. There is no known use for the water contained in either of these two aquifers.

Subsurface water in the upper (perched) aquifer had consisted primarily of water resulting from percolation of precipitation which fell directly upon the site and soaked into the loose fill materials. Additional recharge is probably provided through cracks in the limestone (Hogshooter Formation) adjacent to the site. The underlying shale (Coffeeville Formation) forms the low permeability basal boundary of this aquifer. Outcrops of these formations occur along the northern bluffs, often associated with ground water seeps.

The unconfined aquifer is located 37 to 52 feet below the top of the Coffeyville shale in the Layton Sandstone Formation. Some recharge of this aquifer is believed to be through its overlying shale formation, but, because of the low permeability of the shale, this recharge is believed to be a very small amount. Discharge from this aquifer is again through small seeps in the bluffs on the northwest side.

## Table 1

### Chronology of Remediation Activities

|            |   |
|------------|---|
| Early 1983 | Air Monitoring by EPA and OSDH after repeated complaints by local residents and the media |
| Sept. 1983 | Compass Industries Site proposed for the NPL  |
| July 1984  | EPA and OSDH enter Cooperative Agreement to undertake RI/FS                               |
| Sept. 1984 | Site listed on NPL  |
| July 1987  | Remedial Investigation Report Published   |
| Aug. 1987  | Endangerment Assessment   |
| Sept. 1987 | Record of Decision  |
| Aug. 1988  | Award of Remedial Design Contract   |
| Mar. 1989  | Unilateral Administrative Order issued by EPA against 7 PRPs                              |
| Apr. 1989  | EPA approves Final Design   |
| Jan. 1990  | Remedial Action begins with construction of test fill                                     |
| Oct. 1990  | Remedial Action complete, except turfing  |
| June 1991  | Remedial Action complete  |
| Aug. 1991  | O&M Plan accepted by EPA  |
| Oct. 1993  | EPA notifies PRPs of intent to monitor vents and seeps adjacent to cap                    |
| Sept. 2000 | First 5 Year report finalized   |

## **B. History**

The Compass Industries Superfund Site was originally operated as a quarry. Based upon aerial photography, in 1938 the quarry already occupied approximately 44 acres or about 35% of the total 125 acres included in the site today. The Remedial Investigation report states that the limestone at this site was being utilized as early as 1904 for cement-making and railroad ballast and that a crusher was in operation by 1908. Quarrying operations continued into the early 1960s. Aerial photography from 1964 shows that quarrying operations had ceased and waste disposal activities had started. Photographic evidence shows waste disposal and landfill activities continued at the site into the 1980s. The only period during which landfill activities were permitted by the Oklahoma State Department of Health was between 1972 and 1976. The permit allowed the site to be operated as a municipal landfill, but did not allow the disposal of industrial wastes.

Very few records were maintained by the landfill operators concerning the disposal of wastes or cell locations. However, records do show that the site accepted three categories of hazardous wastes: solids, liquids, and sludges, which included acids, caustics, potentially toxic solvents, and potentially carcinogenic materials. Aerial photographs indicate numerous wet areas and pools of liquid. Sequential photographs show apparent overlapping and irregular filling of landfill cells, making delineation of the cells very difficult.

During the 1970s fires began to appear at landfill. These fires continued until 1984. Often these fires were the result of spontaneous combustion of the waste materials and burned underground for extended periods of time. The smoke expelling from the ground during these fires was noticeably multi-colored and produced odors which prompted citizens' complaints. Photographs depicting these conditions were included in the first 5-Year Report.

As a result of these citizens' complaints, monitoring in the vicinity of the site was conducted by the U.S. Environmental Protection Agency and the Oklahoma State Department of Health (OSDH). Based upon this monitoring, the site was proposed for the National Priorities List (NPL) in September 1983 and listed on the NPL in September 1984. The Hazard Ranking Score (HRS) for the site was 36.57, with the air route of exposure receiving a significantly higher score than either the ground water or surface water exposure routes.

## **C. Investigations**

During the initial site investigation in November 1983 conducted by several EPA contractors, seven monitoring wells (four shallow and three deep) were installed and a biological investigation was conducted. The wells were sampled in January 1984 and

June 1985. During 1983 and 1984, an aerial photographic survey was conducted and approximately 28 borings were installed at the site to extinguish underground fires. These investigations were followed by the Remedial Investigation which was conducted in 1986.

The Remedial Investigation (RI) was conducted by the Oklahoma State Department of Health, with John Mathes and Associates, Inc., as the State's construction contractors. During the RI, eleven additional monitoring wells were installed. Five of these were deep monitoring wells, extending into the Layton Sandstone Formation, while the remaining six were shallow wells for monitoring the perched water table. Ground water samples obtained from the wells, seep water samples obtained from the perimeter bluffs, and surface water samples from drainage ways around the perimeter of the landfill were collected and analyzed. Samples were analyzed for inorganic and organic priority pollutants, Total Organic Carbon (TOC), and barium, chloride, fluoride, and sulfate. Additionally samples from the monitoring wells were analyzed for Carbon Oxygen Demand (COD).

Water analyses concentrations of benzene at three surface locations and one seep location varying between 1.5 and 2.2 ug/l, exceeded the toxic substance goal concentration established by the Clean Water Act Water Quality Criteria for drinking water.

Soil samples from the landfill surface, from trenches, and from sediment in drainage ways leaving the site were obtained and analyzed. The waste had high concentrations of priority pollutant metals, volatile organics, and base-neutral organics, but surface samples and sediment samples had much lower concentrations of organic compounds.

Air sampling was conducted during subsurface explorations. This identified a significant concentration of relatively low hazard nuisance gases, but only trace quantities of toxic volatile organic vapors.

#### **D. Land Use Restrictions**

The EPA has had deed restrictions incorporated into the deeds for these sites. The EPA has required that no activity occur which may damage the landfill cap.

### **IV. Remedial Actions**

#### **A. Record of Decision (ROD)**

Based upon this Remedial Investigation, a Feasibility Study was performed. The

preferred alternative for addressing the contamination at Compass was to cap the site and provide on-site ground water treatment. The EPA, after public comment, signed the ROD on September 29, 1987. The salient features of the ROD were:

- 1) construction of a Resource Conservation and Recovery Act (RCRA) cap over a graded site with diversion of surface water and monitoring of air emissions;
- 2) treatment of the ground water, if deemed necessary from monitoring results, after construction of the RCRA cap;
- 3) restricting site access by installing a fence and posting signs;
- 4) monitoring the site for 30 years to ensure no significant contamination migrates from the site; and,
- 5) providing for additional Remedial Action if significant migration of contaminants occurs.

## **B. Remedial Activities**

The contract for the design of the Remedial Action was awarded to Bechtel Environmental, Inc., in August 1988 by the Oklahoma State Department of Health.

The primary objectives of the Remedial Action were:

- 1) to prevent direct contact between the contaminated site materials, including soil, leachate, surface waters, and air emissions, and the human and animal population;
- 2) to prevent the infiltration of precipitation into the waste; and,
- 3) to divert surface run-on and promote natural drainage of precipitation from the landfill.

The Remedial Action began in January 1990 with the construction of the first test fill. After site mobilization, the contractor installed the leachate collection system as the first item of site work. Then the contractor began grubbing of the heavy vegetation. Following the grubbing, the waste was reshaped by excavating the material from the areas that were high and filling in the low areas. All materials were compacted to reduce settlement of the cap.

The waste at the perimeter was excavated until a bottom width of 36 inches of



clean material was obtained and no waste remained on the exterior slope. Prior to backfilling the trench and covering the waste with impermeable clay material, a gas transmission geotextile was placed directly over the graded waste surface to intercept gases.

The clay material was placed in the trench and over the waste and compacted. This was overlain by a geosynthetic liner system, consisting of an impermeable membrane (30 mil nominal thickness HDPE) and a subsurface drainage system. A sandy soil was placed over the drainage system and covered with topsoil and native grasses.

Construction was considered essentially complete in October 1990. Remaining work at that time consisted of repairing damage which occurred during the first winter and planting native grasses. Both of these items were accomplished in the Spring of 1991.

### **C. Operation and Maintenance Activities**

The O&M Plan includes the following requirements.

- 1) Water leaving the surface of the landfill and water seeping from the bluffs north of the site (above Avery Drive) shall be sampled quarterly.
- 2) Settlement monuments shall be surveyed at least annually to determine settlement/swell within the landfill.
- 3) Inspect the landfill surface semiannually. Repair cracks, fill voids, and reseed as required.
- 4) Maintain security of the site, including fencing and signage.

Requirements added during the O&M period included sampling the air vents for the presence of organic gases and sampling a seep adjacent to the cap.

The PRPs contracted with Flint Environmental Services (a division of Flint Engineering & Construction Co.) to operate the site. Flint was responsible for completing the tasks assigned in the O&M Plan. In 1994, Flint Engineering & Construction Co. divested itself of Flint Environmental Services. Mr. J. Scott Stelle, R.E.M., who had been the Project Manager, has operated the site since that time. Plans were underway at the time of the Five-Year Review for the City of Sand Springs to take control of the Operations and Maintenance activities.

### **D. Results from the First 5-Year Review**

The results are the first 5-Year Review are as follow.

- 1) The remedy of a RCRA type cap over the landfill was found to be operating as designed. Water samples from the shallow aquifer exposed in seeps adjacent to the cap and surface water were below action levels set forth in the Operating and Maintenance Plan. The cap was in good condition, with minor repairs having been made. Settlement of the cap had been minimal.
- 2) No major deficiencies were noted. It was recommended that the grass be mowed every four years, woody vegetation be removed, and periodic checks be made of the cap to repair soil erosion and prevent holes from burrowing animals.

## **V. Five-Year Review Process**

The Compass Industries Five-Year Review was led Mr. Shawn Ghose, Remedial Project Manager for the site. Other persons involved in the review included Mr. Richard Smith, COE Project Manager, Mr. Jeff London, COE Program Manager, and Mr. Scott Stelle, O&M Contractor.

The Five-Year Review consisted of reviewing the data (contaminants of concern in the EPA approved O&M plan) gathered from the O&M sampling events against the established criteria, interviewing local emergency responders, and an inspection of the site.

## **VI. Five-Year Review Findings**

### **A. Community Involvement**

The Compass Industries Superfund Site is located in a relatively remote area of western Tulsa County. The nearest residences are located in an area called Berryhill, an unincorporated community having a high school and a fire station. In an effort to determine any community problems, the EPA representative stopped at the Berryhill fire station and met with representatives of the fire department and the Tulsa County Sheriff's Office in November 2000. Some persons present had vivid memories of the site prior to its being remediated and the problems during that time, indicating they were aware of the site. During the discussion, however, these persons, who would be emergency responders to problems at the site, indicated that they were unaware of any community concern regarding the site and that since the remediation work at the site was completed, there had been no activity at the site which had attracted their

attention.

## **B. Review of Existing Data**

### **Water Sampling Results**

Sampling of the seeps on the bluffs began in February 1992, except for the seep adjacent to the cap which was first sampled in August and September 1991. An additional seep had been located adjacent to the landfill along the northern side during the summer of 1991. No seeps have been sampled since 1995 because the seeps have stopped flowing and efforts to locate them have been unsuccessful. This indicates that the cap is working as designed and is preventing infiltration of water into the landfill.

Water collecting on the surface of the cap after a significant rain is also collected quarterly, as practical. Samples have consistently been below the Monitoring Concentration Levels established in the O&M Plan. Table 2 provides maximum allowable concentrations for the contaminants of concern and the respective maximum concentration from actual samples. Tables of the surface water sampling results are provided in Attachment 3.

### **Settlement**

Data from the first 5-year report indicated that movement at individual monuments have been as great as 0.16 ft. (~2 in.) between annual surveys. The survey required during the 10th year had not been performed at the time of the inspection. Settlement amounts of the magnitude previously identified are normal for this type of construction and do not pose any problem to the integrity of the cap.

### **Vent Sampling**

The PRPs have sampled the vents monthly since receiving direction from the EPA in October 1993. Consistently, several vents have indicated the presence of organic vapors. This indicates that the waste is continuing to off gas and that the venting system is working. The organic vapor concentrations appear to be lowering and are higher during warm weather, indicating a reduction in the degradation of the waste. The organic vapors are probably methane gas from the biodegradation of the waste materials and will not constitute a hazard in the open atmosphere at these levels. The results of the vent sampling are provided in Attachment 4.

**Table 2****Known Contaminants Vs. Surface Water Concentrations**

| <b>ANALYSES REQUIRED BY O&amp;M PLAN</b> | <b>EPA ANALYTICAL METHOD</b> | <b>DETECTION LIMIT (ppb)</b> | <b>MAXIMUM ALLOWABLE MONITORING CONCENTRATION</b> | <b>MAXIMUM O&amp;M SAMPLE CONCENTRATION</b> |
|--|------------------------------|------------------------------|---|---|
| ARSENIC                                  | 7060                         | 1                            | 250   | 12.0  |
| HEXAVALENT CHROMIUM                      | 7196                         | 100                          | 1,200   | BDL   |
| LEAD                                     | 7421                         | 1                            | 340   | 10.0  |
| BIS (2-ETHYLHEXYL) PHTHALATE             | 625                          | 2.5                          | 5,000   | 22.0  |
| BENZENE                                  | 624                          | 4.4                          | 116   | BDL   |
| POLYCHLORINATED BIPHENYLS (PCBs)         | 608                          | 0.1                          | 0.1   | BDL   |
| TOTAL ORGANIC CARBON (TOC)               | 415.1                        | 1,000                        | N/A   | 23,600                                      |
| BIOCHEMICAL OXYGEN DEMAND (BOD)          | 405.1                        | 1,000                        | N/A   | 31,800                                      |
| TOTAL SUSPENDED SOLIDS (TSS)             | 160.2                        | 5,000                        | N/A   | 361,000                                     |
| pH                                       | 150.1                        | N/A                          | N/A   | 8.5   |

N/A - NOT APPLICABLE

BDL - BELOW DETECTION LIMIT

## C. Site Inspection

### Inspection of the Cap

The vegetative cover is well established. The site is covered with native grasses except in the main swale where Bermuda grass was planted to control the erosion. The bermuda grass has continued to thrive in spite of no maintenance. The native grasses are beginning to naturally seed this area and mix with the bermuda grasses. The vegetative cover is holding the soil in place, as there are no new erosion sites and the prior erosion sites have been repaired. There are some bare spots, which have been reseeded. Also, some slopes have woody vegetation which must be removed prior to its damaging the liner.

The drainage system appears to be working properly. Wet areas at the west end commonly remain after most other areas have dried. Initially, it was suspected that this may be seepage from the landfill, but monitoring over several years has shown cyclic wetting and drying. The wet areas dry after a prolonged dry spell and do not reappear until after a wet period has occurred with suitable time for the water to infiltrate the soil and pass through the drainage system. Also, the riprap at the west end remains in generally good condition. The riprap at the end of the drainage swale has been repaired, but some additional rock is required.

### Security

There is no evidence of continued or long-term use of the site, although evidence that unauthorized persons have been on the site have been noted. The evidence includes theft of warning signs and broken gates and fence. Other vandalism or damage to the cap have not occurred.

## VII. Assessment

### *Question A: Is the remedy functioning as intended by the decision documents?*

- **Construction of a RCRA cap over a graded site with diversion of surface water:** The RCRA cap was determined to be in proper working order during the inspection. The flow of water through the seeps has effectively stopped, indicating that surface water is not percolating into the waste.
- **Treatment of the ground water, if necessary:** No contaminants above the thresholds established in the O&M plan have been identified. Therefore, there is no need for a treatment system as the cap is providing adequate protectiveness of the ground water.

- **Restricting site access by installing a fence and installing warning signs:** The fence and warning signs have been installed. As the site is located several hundred yards from any populated area and is used for recreational purposes by children and young adults for activities such as dirt bike riding, some trespassing does occur. However, the vandalism has been limited to stealing signs and breaking through the fence to ride. This vandalism does not endanger the remedy or the health of the vandals.
- **Monitoring the site for 30 years to ensure no significant contamination migrates from the site:** The data reviewed in conjunction with this five-year review indicate that the site is being monitored on a regular basis and that there is no migration of contaminants from the site.

***Question B: Are the assumptions used at the time of the remedy selection still valid?***

- **Changes in Standards:** No change of the contaminants of concern or ARARs were identified during this review, which would affect the remedy selection. The maximum contaminant levels were established in the O&M Plan for this specific site.
- **Changes in exposure pathways:** No changes have been noted as there have been no changes in land use around this site.

***Question C: Has any other information come to light that could call into question the protectiveness of the remedy?***

No additional information has been identified that would call into question the protectiveness of the remedy.

## **VIII. Deficiencies**

No major deficiencies were noted during the Five-Year review, as the data were adequate and the site inspection revealed no major deficiencies. Several minor and potential deficiencies were identified during the inspection. These included:

- a) Woody shrubs are clearly evident in an area along the northern slope where the cover is above the natural ground and must be removed.
- b) Riprap which was placed at the lower end of the swale during recent

repairs did not completely cover all of the geotextile. Additional rock needs to be placed here.

c) The settlement monuments which were scheduled to be surveyed during the 10th year will be surveyed as soon as practical. Responsibility for O&M activities changing from Sun-Texaco to the City of Sand Springs may delay completion of this activity.

d) As the area returns to native vegetation, woody plants with strong root systems may damage the liner system; therefore, woody vegetation must be removed at least annually.

e) Continued mowing of the native grasses may result in a buildup of thatch; therefore if mowing continues the site should be raked approximately every 4 years.

f) Burrowing animals including mice, rats, and snakes may also damage the liner system; therefore periodic checks on the site should continue.

g) Erosion of the protective soil continues to be a concern and should be periodically inspected to insure that the full 24-inches remain intact.

## IX. Recommendations and Follow-up Actions

The first three deficiencies noted above require action on the part of the PRPs. Since the responsibility for O&M activities is changing from Sun-Texaco to the City of Sand Springs, additional time is being allowed for correction of these deficiencies.

| <b>Deficiency</b>   | <b>Scheduled Completion</b> | <b>Actual Completion</b> |
|---|-----------------------------|--------------------------|
| Remove woody growth along northern slope                            | June 2001                   | April 2001               |
| Place additional riprap at end of drainage swale at west end of cap | June 2001                   | April 2001               |
| Survey settlement monuments   | June 2001                   | April 2001               |

The O&M contractor was reminded to be continually aware of the potential deficiencies identified and to be vigilant about making the repairs. Under the requirements of the ROD, the PRPs are responsible for monitoring and maintaining the

site for a period of at least 30 years.



## **X. Statement of Protectiveness**

Because the remedial action is expected to be protective, the remedy for the site is expected to be protective of human health and the environment. Based upon the site inspections, the sampling results, and the survey results, the remedial actions are performing well. The RCRA Cap system has been well maintained and now is performing its function with minimal maintenance and movement. The ground water leaving the site, when present, has been substantially below the monitoring concentrations, never having exceeded 10% of any level. The site appurtenant structures, including the fencing, the signs, and the vent pipes, are in sound condition with no signs of physical deterioration. All contaminants of concern appear to be fully controlled by the RCRA Cap.

## **XI. Next Five-Year Review**

The next Five-Year Review will be conducted during FY 2006. The results of this review support the view that the scope of the next Five-Year Review should be limited to an inspection of the RCRA Cap System and the appurtenant structures to ascertain that they are not being damaged by animals or the elements and that vandalism of the site is controlled.

## **XII. Other Comments**

The processes to delete this site from the NPL should be investigated as the remedy has proved to be protective of human health and the environment. The site may be separated into two distinct areas:

- 1) the capped portion of the site where waste remains; and,
- 2) the remaining portion of the site which does not have waste.

The latter area may be deleted without restriction. The capped area should be evaluated to determine if it meets the requirements of 40 CFR 300.425(e)(1).

Contingent upon meeting those requirements, the deletion should include institutional controls to maintain the integrity of the cap.

## **Attachment 1**

### **Documents Reviewed**

Agency for Toxic Substances and Disease Registry, (U.S. Department of Health and Human Services), Compass Industries (Avery Drive), Tulsa, Tulsa County, OK, **Site Review and Update**, December 16, 1993 (Revised).

Bechtel Environmental, Inc., **Final Design Report** for Remedial Action, Compass Industries Superfund Site, March, 1989 (Prepared for the Oklahoma State Department of Health, EPA Cooperative Agreement No. V-006459-01-0).

Bechtel Environmental, Inc., Specifications and Bidding Documents for Remedial Action, Compass Industries Superfund Site, March, 1989 (Prepared for the Oklahoma State Department of Health, Contains **Scope of Work, Quality Assurance Project Plan and Site Safety Plan**).

Bechtel Environmental, Inc., **Remedial Action Report**, for the Compass Industries Superfund Site, January, 1991.

Bechtel Environmental, Inc., **Post Closure Operations and Maintenance Plan** for the Compass Industries Superfund Site, August, 1991 (Revised by letters dated February 21, 1992 and October 6, 1993).

Camrud, M. J., Compass Industries Superfund Site, **Unpublished Paper**, July 17, 1994.

Environmental Protection Agency, Compass Industries Landfill, Tulsa County, OK, **Record of Decision**, September 29, 1987.

Environmental Protection Agency, Compass Industries Site, Tulsa County, OK, **First Amended Administrative Order**, May 31, 1989.

Environmental Protection Agency, **Close Out Report**, Compass Industries Landfill Superfund Site, Tulsa County, OK, June 30, 1992.

Environmental Protection Agency, **Five-Year Review Report**, Compass Industries Landfill Superfund Site, Tulsa County, OK, September 2000.

Flint Environmental Services (A Division of Flint Engineering & Construction Co.), **1992 Annual Monitoring Report**, Compass Industries Site, January 29, 1993.

Flint Environmental Services (A Division of Flint Engineering & Construction Co.), **1993 Annual Monitoring Report**, Compass Industries Site, January 18, 1994.

Lockheed Engineering and Management Services Company, Inc., **Aerial Photographic Analysis of Compass Industries Landfill**, Tulsa, OK, August, 1984.

John Mathes & Associates, Inc., **Remedial Investigation Report**, Compass Industries Landfill, Superfund Site, Tulsa County, Volume 1, July 13, 1987. (Prepared for the Oklahoma State Department of Health).

John Mathes & Associates, Inc., **Feasibility Study Report**, Compass Industries Landfill, Superfund Site, Tulsa County, July 13, 1987. (Prepared for the Oklahoma State Department of Health).

John Mathes & Associates, Inc., **Endangerment Assessment**, Compass Industries Landfill, Superfund Site, Tulsa County, August 10, 1987. (Prepared for the Oklahoma State Department of Health).

J. Scott Stelle, R.E.M., **1994 Annual Monitoring Report**, Compass Industries Site, December 30, 1994.

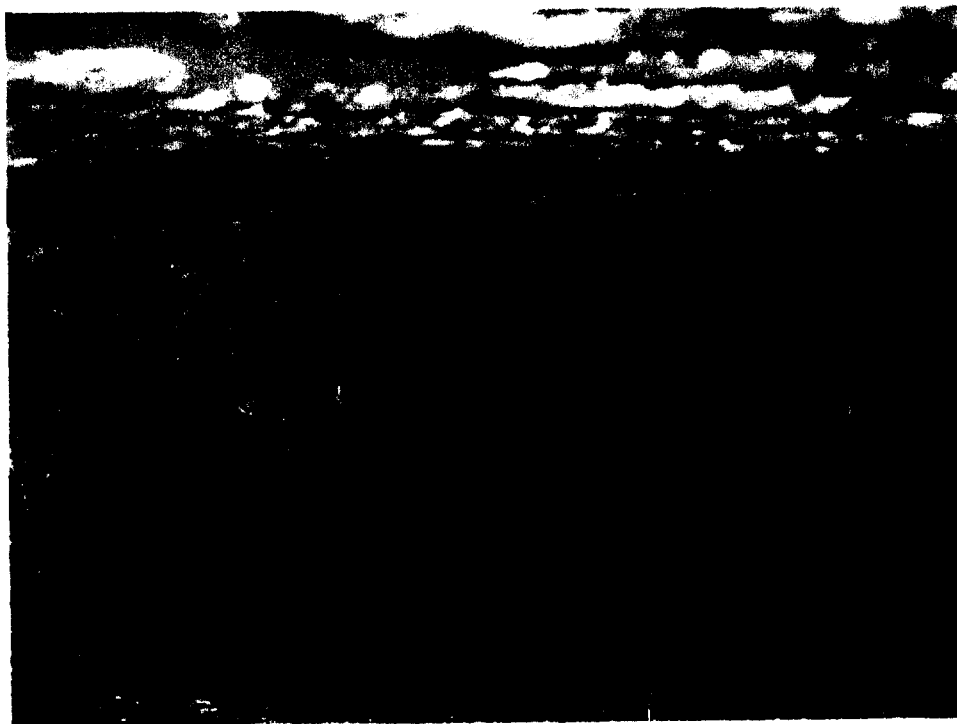
U.S. Army Corp of Engineers, Tulsa District, **Quality Assurance Final Report**, Compass Industries Superfund Site, Volumes I, II, and III, January, 1991.

## **Attachment 2**

## **Photographs**



Scott Stelle, PRP's O&M Contractor, Shawn Ghose, EPA RPM, and Jeff London, COE PM, discuss plan for conducting the Site Inspection.



Overview of landfill cap.



Water flows through drainage swale  
from east end of site.



View toward west end of swale, while attendees discuss project.



Shawn Ghose points out area lacking sufficient rock cover  
at west toe of swale.



Close up of filter fabric not covered with rock.

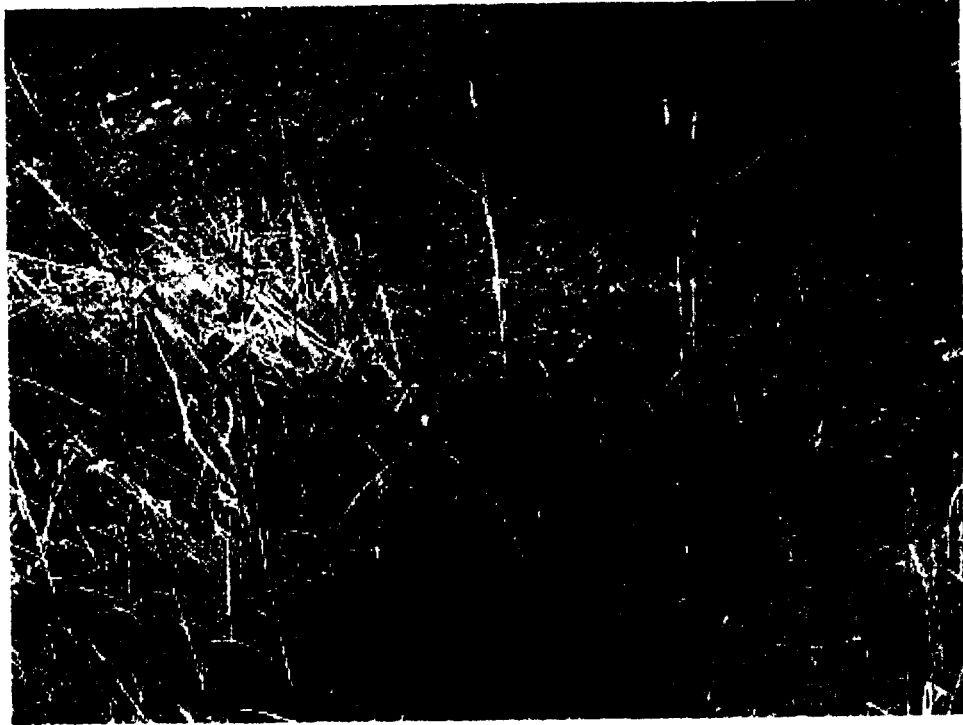




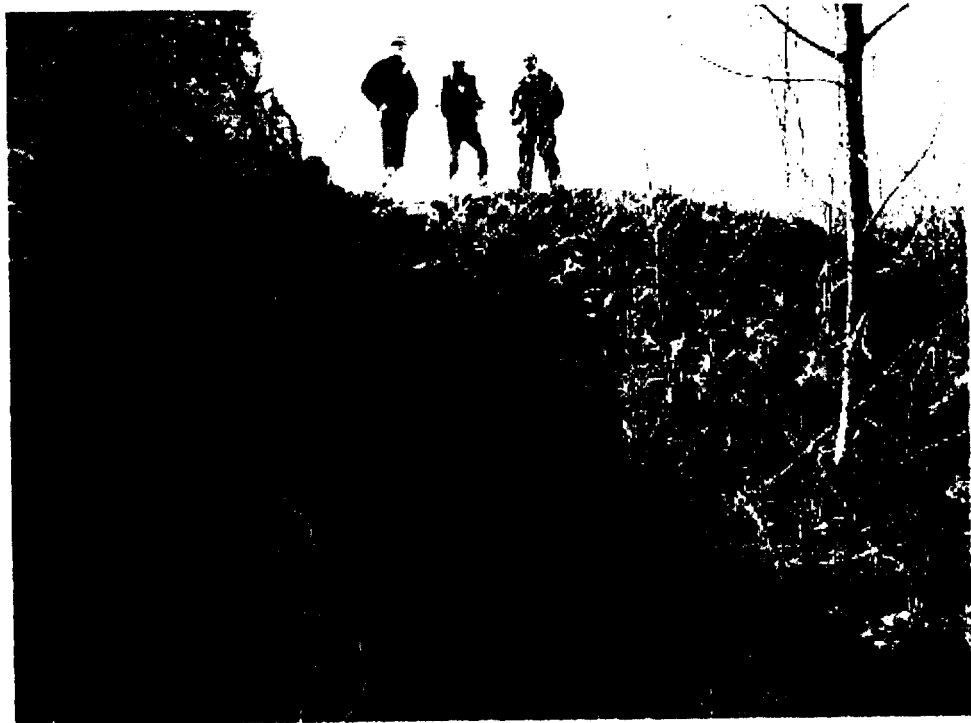
View of Northern Slope in 1992 prior to woody vegetation.



Shawn Ghose, EPA RPM, inspects woody growth along northern slope during 2nd Five-Year Inspection.



Recent erosion repair on landfill cap.



Inspecting previous repair of a slope erosion problem.

**Attachment 3**

**Water Sample Data**

**O&M Surface Samples**



**Compass Site O&M Surface Sample Results**

| ANALYTE  | pH | TSS   | ARSENIC | LEAD  | BOD  | TOC  | PCB's | BENZENE | Bis (2-ethylhexyl)<br>phthalate | Hexavalent<br>Chromium |
|----------|----|-------|---------|-------|------|------|-------|---------|---------------------------------|------------------------|
| UNITS    |    | mg/l  | mg/l    | mg/l  | mg/l | mg/l | ug/l  | ug/l    | ug/l                            | mg/l                   |
| 1997 1st |    |       |         |       |      |      |       |         |                                 |                        |
| 1        | NS | BDL   | BDL     | BDL   | BDL  | 11.8 | BDL   | BDL     | BDL                             | NS                     |
| 2        | NS | BDL   | BDL     | BDL   | BDL  | 11.5 | BDL   | BDL     | BDL                             | NS                     |
| 3        | NS | BDL   | BDL     | BDL   | BDL  | 11.3 | BDL   | BDL     | BDL                             | NS                     |
| 5        | NS | BDL   | BDL     | BDL   | BDL  | 11.2 | BDL   | BDL     | BDL                             | NS                     |
| 6        | NS | BDL   | BDL     | BDL   | BDL  | 11.1 | BDL   | BDL     | BDL                             | NS                     |
| 1997 2nd |    |       |         |       |      |      |       |         |                                 |                        |
| 1        | NS | 41.0  | BDL     | BDL   | BDL  | 11.2 | BDL   | BDL     | BDL                             | NS                     |
| 2        | NS | 128.0 | BDL     | 0.008 | BDL  | 14.3 | BDL   | BDL     | BDL                             | NS                     |
| 3        | NS | 84.0  | BDL     | BDL   | BDL  | 10.9 | BDL   | BDL     | BDL                             | NS                     |
| 5        | NS | 207.0 | 0.005   | 0.015 | BDL  | 10.1 | BDL   | BDL     | BDL                             | NS                     |
| 6        | NS | 1.1   | BDL     | 0.006 | BDL  | 11.3 | BDL   | BDL     | BDL                             | NS                     |
| 1997 3rd |    |       |         |       |      |      |       |         |                                 |                        |
| 1        | NS | BDL   | BDL     | 0.005 | BDL  | 16.6 | BDL   | BDL     | BDL                             | NS                     |
| 2        | NS | BDL   | BDL     | 0.005 | BDL  | 17.0 | BDL   | BDL     | BDL                             | NS                     |
| 3        | NS | BDL   | BDL     | 0.011 | BDL  | 18.6 | BDL   | BDL     | BDL                             | NS                     |
| 5        | NS | BDL   | BDL     | 0.013 | BDL  | 17.4 | BDL   | BDL     | BDL                             | NS                     |
| 6        | NS | BDL   | BDL     | BDL   | BDL  | 15.3 | BDL   | BDL     | BDL                             | NS                     |
| 1997 4th |    |       |         |       |      |      |       |         |                                 |                        |
| 1        | NS | BDL   | BDL     | BDL   | BDL  | 4.4  | BDL   | BDL     | BDL                             | NS                     |
| 2        | NS | BDL   | BDL     | BDL   | BDL  | 4.6  | BDL   | BDL     | BDL                             | NS                     |
| 3        | NS | BDL   | BDL     | BDL   | BDL  | 4.0  | BDL   | BDL     | BDL                             | NS                     |
| 5        | NS | BDL   | BDL     | BDL   | BDL  | 4.1  | BDL   | BDL     | BDL                             | NS                     |
| 6        | NS | BDL   | BDL     | BDL   | BDL  | 4.1  | BDL   | BDL     | BDL                             | BDL                    |

**Compass Site O&M Surface Sample Results**

| ANALYTE                           | pH  | TSS   | ARSENIC | LEAD  | BOD  | TOC  | PCB's | BENZENE | Bis (2-ethylhexyl)<br>phthalate | Hexavalent<br>Chromium |
|-----------------------------------|-----|-------|---------|-------|------|------|-------|---------|---------------------------------|------------------------|
| UNITS                             |     | mg/l  | mg/l    | mg/l  | mg/l | mg/l | ug/l  | ug/l    | ug/l                            | mg/l                   |
| <b>1st Quarter 1998</b>           |     |       |         |       |      |      |       |         |                                 |                        |
| 1                                 | NS  | 102.0 | BDL     | BDL   | 17.2 | 8.4  | BDL   | BDL     | 0.002                           | NS                     |
| 2                                 | NS  | BDL   | BDL     | BDL   | 31.8 | 9.8  | BDL   | BDL     | 0.001                           | NS                     |
| 3                                 | NS  | BDL   | BDL     | BDL   | 19.0 | 8.8  | BDL   | BDL     | 0.002                           | NS                     |
| 4                                 | NA  | NA    | NA      | NA    | NA   | NA   | NA    | NA      | NA                              | NA                     |
| 5                                 | NS  | 7.0   | BDL     | BDL   | 9.7  | 9.0  | BDL   | BDL     | 0.001                           | NS                     |
| 6                                 | NS  | BDL   | BDL     | BDL   | 8.6  | 8.8  | BDL   | BDL     | 0.001                           | NS                     |
| <b>2nd Quarter 1998</b>           |     |       |         |       |      |      |       |         |                                 |                        |
| 1                                 | NS  | BDL   | BDL     | BDL   | BDL  | 22.5 | BDL   | BDL     | 0.002                           | NS                     |
| 2                                 | NS  | BDL   | BDL     | 0.008 | BDL  | 23.2 | BDL   | BDL     | 0.002                           | NS                     |
| 3                                 | NS  | BDL   | BDL     | BDL   | BDL  | 20.4 | BDL   | BDL     | 0.002                           | NS                     |
| 4                                 | NA  | NA    | NA      | NA    | NA   | NA   | NA    | NA      | NA                              | NA                     |
| 5                                 | NS  | 7.0   | BDL     | BDL   | BDL  | 23.4 | BDL   | BDL     | 0.002                           | NS                     |
| 6                                 | NS  | 6.0   | BDL     | BDL   | BDL  | 23.7 | BDL   | BDL     | 0.002                           | NS                     |
| <b>3rd Quarter 1998</b>           |     |       |         |       |      |      |       |         |                                 |                        |
| No Samples collected this Quarter |     |       |         |       |      |      |       |         |                                 |                        |
| <b>4th Quarter 1998</b>           |     |       |         |       |      |      |       |         |                                 |                        |
| 1                                 | NA  | 7.0   | BDL     | BDL   | BDL  | 11.4 | BDL   | BDL     | BDL                             | NS                     |
| 2                                 | NS  | BDL   | BDL     | 5.55  | BDL  | 10.5 | BDL   | BDL     | BDL                             | NS                     |
| 3                                 | NS  | BDL   | BDL     | BDL   | BDL  | 9.4  | BDL   | BDL     | BDL                             | NS                     |
| 5                                 | NS  | BDL   | BDL     | BDL   | BDL  | 8.6  | BDL   | BDL     | BDL                             | NS                     |
| 6                                 | 7.4 | BDL   | BDL     | BDL   | BDL  | 9.9  | BDL   | BDL     | BDL                             | BDL                    |

**Compass Site O&M Surface Sample Results**

| ANALYTE                      | pH | TSS  | ARSENIC | LEAD  | BOD  | TOC  | PCB's | BENZENE | Diis (2-ethylhexyl) phthalate | Hexavalent Chromium |
|------------------------------|----|------|---------|-------|------|------|-------|---------|-------------------------------|---------------------|
| UNITS                        |    | mg/l | mg/l    | mg/l  | mg/l | mg/l | ug/l  | ug/l    | ug/l                          | mg/l                |
| DETECTION LIMIT              |    | 5.0  | 0.001   | 0.001 | 1.0  | 1.0  | 0.1   | 4.4     | 2.5                           | 0.5                 |
| 1 <sup>ST</sup> QUARTER 1999 |    |      |         |       |      |      |       |         |                               |                     |
| 1                            | NS | BDL  | BDL     | BDL   | BDL  | 18.9 | BDL   | BDL     | BDL                           | NS                  |
| 2                            | NS | BDL  | BDL     | BDL   | BDL  | 18.1 | BDL   | BDL     | BDL                           | NS                  |
| 3                            | NS | BDL  | BDL     | BDL   | BDL  | 19.5 | BDL   | BDL     | BDL                           | NS                  |
| 5                            | NS | BDL  | BDL     | BDL   | BDL  | 24.1 | BDL   | BDL     | BDL                           | NS                  |
| 6                            | NS | BDL  | BDL     | BDL   | BDL  | 23.2 | BDL   | BDL     | BDL                           | NS                  |
| 2nd Quarter 1999             |    |      |         |       |      |      |       |         |                               |                     |
| 1                            | NS | BDL  | BDL     | BDL   | BDL  | 22.5 | BDL   | BDL     | BDL                           | NS                  |
| 2                            | NS | BDL  | BDL     | BDL   | BDL  | 19.4 | BDL   | BDL     | BDL                           | NS                  |
| 3                            | NS | BDL  | BDL     | BDL   | BDL  | 27.2 | BDL   | BDL     | BDL                           | NS                  |
| 5                            | NS | BDL  | BDL     | BDL   | BDL  | 13.1 | BDL   | BDL     | BDL                           | NS                  |
| 6                            | NS | BDL  | BDL     | BDL   | BDL  | 13.8 | BDL   | BDL     | BDL                           | NS                  |
| 3 <sup>rd</sup> Quarter 1999 |    |      |         |       |      |      |       |         |                               |                     |
| 1                            | NS | BDL  | BDL     | BDL   | BDL  | 80.1 | BDL   | BDL     | BDL                           | NS                  |
| 2                            | NS | BDL  | BDL     | BDL   | BDL  | 76.5 | BDL   | BDL     | BDL                           | NS                  |
| 3                            | NS | BDL  | BDL     | BDL   | BDL  | 60.2 | BDL   | BDL     | BDL                           | NS                  |
| 5                            | NS | BDL  | BDL     | BDL   | BDL  | 58.4 | BDL   | BDL     | BDL                           | NS                  |
| 6                            | NS | BDL  | BDL     | BDL   | BDL  | 38.4 | BDL   | BDL     | BDL                           | NS                  |
| 4th Quarter 1999             |    |      |         |       |      |      |       |         |                               |                     |
| 1                            | NS | BDL  | BDL     | BDL   | BDL  | 17.4 | BDL   | BDL     | BDL                           | NS                  |
| 2                            | NS | BDL  | BDL     | 5.55  | BDL  | 20.4 | BDL   | BDL     | BDL                           | NS                  |
| 3                            | NS | 28.0 | BDL     | BDL   | BDL  | 17.6 | BDL   | BDL     | BDL                           | NS                  |
| 5                            | NS | BDL  | BDL     | BDL   | BDL  | 21.0 | BDL   | BDL     | BDL                           | NS                  |
| 6                            | NS | BDL  | BDL     | BDL   | BDL  | 22.1 | BDL   | BDL     | BDL                           | NS                  |

BDL = Below Detection Limit

NSE = Non Sampling Event

**Compass Site Q&M Surface Sample Results**

| ANALYTE                            | pH | TSS  | ARSENIC | LEAD  | BOD  | TOC  | PCB's | BENZENE | Bis (2-ethylhexyl)<br>phthalate | Hexavalent<br>Chromium |
|------------------------------------|----|------|---------|-------|------|------|-------|---------|---------------------------------|------------------------|
| UNITS                              |    | mg/l | mg/l    | mg/l  | mg/l | mg/l | ug/l  | ug/l    | ug/l                            | mg/l                   |
| DETECTION LIMIT                    |    | 5.0  | 0.001   | 0.001 | 1.0  | 1.0  | 0.1   | 4.4     | 2.5                             | 0.5                    |
| <b>1<sup>ST</sup> QUARTER 2000</b> |    |      |         |       |      |      |       |         |                                 |                        |
| 1                                  | NS | 5.0  | BDL     | BDL   | BDL  | 17.0 | BDL   | BDL     | BDL                             | NS                     |
| 2                                  | NS | 5.0  | BDL     | BDL   | BDL  | 25.0 | BDL   | BDL     | BDL                             | NS                     |
| 3                                  | NS | 5.0  | BDL     | BDL   | BDL  | 30.0 | BDL   | BDL     | BDL                             | NS                     |
| 5                                  | NS | 7.0  | BDL     | BDL   | BDL  | 35.0 | BDL   | BDL     | BDL                             | NS                     |
| 6                                  | NS | BDL  | BDL     | BDL   | BDL  | 28.0 | BDL   | BDL     | BDL                             | NS                     |
| <b>2nd Quarter 2000</b>            |    |      |         |       |      |      |       |         |                                 |                        |
| 1                                  | NS | 7.0  | BDL     | BDL   | BDL  | 28.0 | BDL   | BDL     | BDL                             | NS                     |
| 2                                  | NS | 6.5  | BDL     | BDL   | BDL  | 25.0 | BDL   | BDL     | BDL                             | NS                     |
| 3                                  | NS | 7.0  | BDL     | BDL   | BDL  | 17.0 | BDL   | BDL     | BDL                             | NS                     |
| 5                                  | NS | 5.0  | BDL     | BDL   | BDL  | 26.0 | BDL   | BDL     | BDL                             | NS                     |
| 6                                  | NS | 9.0  | BDL     | BDL   | BDL  | 32.0 | BDL   | BDL     | BDL                             | NS                     |
| <b>3<sup>rd</sup> Quarter 2000</b> |    |      |         |       |      |      |       |         |                                 |                        |
| 1                                  | NS | NSE  | BDL     | BDL   | NSE  | NSE  | NSE   | BDL     | BDL                             | NS                     |
| 2                                  | NS | NSE  | BDL     | BDL   | NSE  | NSE  | NSE   | BDL     | BDL                             | NS                     |
| 3                                  | NS | NSE  | BDL     | BDL   | NSE  | NSE  | NSE   | BDL     | BDL                             | NS                     |
| 5                                  | NS | NSE  | BDL     | BDL   | NSE  | NSE  | NSE   | BDL     | BDL                             | NS                     |
| 6                                  | NS | NSE  | BDL     | BDL   | NSE  | NSE  | NSE   | BDL     | BDL                             | NS                     |
| <b>4th Quarter 2000</b>            |    |      |         |       |      |      |       |         |                                 |                        |
| 1                                  | NS | BDL  | BDL     | BDL   | BDL  | 20.0 | BDL   | BDL     | BDL                             | NS                     |
| 2                                  | NS | BDL  | BDL     | BDL   | BDL  | 21.0 | BDL   | BDL     | BDL                             | NS                     |
| 3                                  | NS | 5.0  | BDL     | BDL   | BDL  | 20.0 | BDL   | BDL     | BDL                             | NS                     |
| 5                                  | NS | 15.0 | BDL     | BDL   | BDL  | 19.0 | BDL   | BDL     | BDL                             | NS                     |
| 6                                  | NS | 11.0 | BDL     | BDL   | BDL  | 20.0 | BDL   | BDL     | BDL                             | NS                     |

BDL = Below Detection Limit

NSE = Non Sampling Event



## **Attachment 4**

### **Cap Vent Emissions Data**

| <b>1996 Vent Monitoring Results</b><br>(Organic Vapor Analyzer Readings, ppm) |             |     |     |     |     |     |     |     |     |     |     |
|---|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Month   | Vent Number |     |     |     |     |     |     |     |     |     |     |
|   | 1           | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  |
| Jan 96  | BDL         | 50  | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| Feb 96  | BDL         | 10L | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| Mar 96  | BDL         | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| Apr 96  | BDL         | 300 | BDL | BDL | BDL | BDL | BDL | 100 | 150 | BDL | BDL |
| May 96  | BDL         | 300 | BDL | BDL | BDL | BDL | BDL | 50  | 150 | BDL | BDL |
| Jun 96  | BDL         | 100 | BDL | BDL | BDL | BDL | BDL | 200 | 80  | BDL | BDL |
| Jul 96  | BDL         | 50  | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| Aug 96  | BDL         | 10  | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| Sep 96  | BDL         | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| Oct 96  | BDL         | 50  | BDL | BDL | 100 | BDL | BDL | BDL | BDL | BDL | BDL |
| Nov 96  | BDL         | 10  | BDL | BDL | 100 | BDL | BDL | BDL | BDL | BDL | BDL |
| Dec 96  | BDL         | 10  | BDL | BDL | 150 | BDL | BDL | BDL | BDL | BDL | BDL |

| <b>1997 Vent Monitoring Results</b><br>(Organic Vapor Analyzer Readings, ppm) |             |     |     |     |     |     |     |     |     |     |     |
|---|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Month   | Vent Number |     |     |     |     |     |     |     |     |     |     |
|   | 1           | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  |
| Jan 97  | BDL         | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| Feb 97  | BDL         | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| Mar 97  | BDL         | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL | BDL |
| Apr 97  | BDL         | 100 | BDL | BDL | BDL | BDL | BDL | 100 | 150 | BDL | BDL |
| May 97  | BDL         | 100 | BDL | BDL | BDL | BDL | BDL | 50  | 50  | BDL | BDL |
| Jun 97  | BDL         | 100 | BDL | BDL | BDL | BDL | BDL | 50  | 80  | BDL | BDL |
| Jul 97  | BDL         | 50  | BDL | BDL | BDL | BDL | BDL | 80  | 100 | BDL | BDL |
| Aug 97  | BDL         | 100 | BDL | BDL | BDL | BDL | BDL | 50  | 50  | BDL | BDL |
| Sep 97  | BDL         | 80  | BDL | BDL | BDL | BDL | BDL | 50  | 80  | BDL | BDL |
| Oct 97  | BDL         | 80  | BDL | BDL | 100 | BDL | BDL | 50  | 100 | BDL | BDL |
| Nov 97  | BDL         | 100 | BDL | BDL | 100 | BDL | BDL | 50  | 50  | BDL | BDL |
| Dec 97  | BDL         | 80  | BDL | BDL | 150 | BDL | BDL | 50  | 100 | BDL | BDL |

| <b>1998 Vent Monitoring Results</b><br>(Organic Vapor Analyzer Readings, ppm) |  |  |  |  |  |  |  |  |  |  |  |
|---|--|--|--|--|--|--|--|--|--|--|--|
|---|--|--|--|--|--|--|--|--|--|--|--|

| Month  | Vent Number |         |     |     |     |     |     |     |     |     |     |
|--------|-------------|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|        | 1           | 2       | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  |
| Jan 98 | BDL         | 150 ppm | BDL | BDL | 200 | BDL | BDL | 150 | 150 | BDL | BDL |
| Feb 98 | BDL         | 150     | BDL | BDL | 50  | BDL | BDL | 50  | 50  | BDL | BDL |
| Mar 98 | BDL         | 150     | BDL | BDL | 150 | BDL | BDL | 150 | 100 | BDL | BDL |
| Apr 98 | BDL         | 50      | BDL | BDL | 100 | BDL | BDL | 150 | 150 | BDL | BDL |
| May 98 | BDL         | 50      | BDL | BDL | 50  | BDL | BDL | 50  | 50  | BDL | BDL |
| Jun 98 | BDL         | 50      | BDL | BDL | 150 | BDL | BDL | 50  | 100 | BDL | BDL |
| Jul 98 | BDL         | 30      | BDL | BDL | 10  | BDL | BDL | 10  | 10  | BDL | BDL |
| Aug 98 | BDL         | 20      | BDL | BDL | 20  | BDL | BDL | 20  | 20  | BDL | BDL |
| Sep 98 | BDL         | 20      | BDL | BDL | 10  | BDL | BDL | 25  | 10  | BDL | BDL |
| Oct 98 | BDL         | 50      | BDL | BDL | 30  | BDL | BDL | 40  | 50  | BDL | BDL |
| Nov 98 | BDL         | 10      | BDL | BDL | 10  | BDL | BDL | 20  | 20  | BDL | BDL |
| Dec 98 | BDL         | 40      | BDL | BDL | 20  | BDL | BDL | 30  | 15  | BDL | BDL |

| 1999 Vent Monitoring Results<br>(Organic Vapor Analyzer Readings, ppm) |             |     |     |     |    |     |     |     |     |     |     |
|--|-------------|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|
| Month  | Vent Number |     |     |     |    |     |     |     |     |     |     |
|  | 1           | 2   | 3   | 4   | 5  | 6   | 7   | 8   | 9   | 10  | 11  |
| Jan 99   | BDL         | 30  | BDL | BDL | 30 | BDL | BDL | 20  | 30  | BDL | BDL |
| Feb 99   | BDL         | 30  | BDL | BDL | 20 | BDL | BDL | 20  | 10  | BDL | BDL |
| Mar 99   | BDL         | 20  | BDL | BDL | 20 | BDL | BDL | 20  | 30  | BDL | BDL |
| Apr 99   | BDL         | 80  | BDL | BDL | 65 | BDL | BDL | 50  | 30  | BDL | BDL |
| May 99   | BDL         | 90  | BDL | BDL | 55 | BDL | BDL | 70  | 100 | BDL | BDL |
| Jun 99   | BDL         | 10  | BDL | BDL | 30 | BDL | BDL | 10  | 30  | BDL | BDL |
| Jul 99   | BDL         | 95  | BDL | BDL | 65 | BDL | BDL | 30  | 50  | BDL | BDL |
| Aug 99   | BDL         | 100 | BDL | BDL | 65 | BDL | BDL | 80  | 100 | BDL | BDL |
| Sep 99   | BDL         | 50  | BDL | BDL | 10 | BDL | BDL | 90  | 65  | BDL | BDL |
| Oct 99   | BDL         | 65  | BDL | BDL | 85 | BDL | BDL | 50  | 50  | BDL | BDL |
| Nov 99   | BDL         | 150 | BDL | BDL | 85 | BDL | BDL | 120 | 100 | BDL | BDL |
| Dec 99   | BDL         | 50  | BDL | BDL | 20 | BDL | BDL | 30  | 60  | BDL | BDL |

| 2000 Vent Monitoring Results<br>(Organic Vapor Analyzer Readings, ppm) |  |  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|--|--|
|--|--|--|--|--|--|--|--|--|--|--|--|

| Month  | Vent Number |    |     |     |    |     |     |     |    |     |     |
|--------|-------------|----|-----|-----|----|-----|-----|-----|----|-----|-----|
|        | 1           | 2  | 3   | 4   | 5  | 6   | 7   | 8   | 9  | 10  | 11  |
| Jan 00 | BDL         | 60 | BDL | BDL | 50 | BDL | BDL | 50  | 30 | BDL | BDL |
| Feb 00 | BDL         | 80 | BDL | BDL | 50 | BDL | BDL | 75  | 80 | BDL | BDL |
| Mar 00 | BDL         | 10 | BDL | BDL | 20 | BDL | BDL | 10  | 20 | BDL | BDL |
| Apr 00 | BDL         | 50 | BDL | BDL | 55 | BDL | BDL | 60  | 40 | BDL | BDL |
| May 00 | BDL         | 75 | BDL | BDL | 45 | BDL | BDL | 70  | 75 | BDL | BDL |
| Jun 00 | BDL         | 15 | BDL | BDL | 25 | BDL | BDL | 10  | 30 | BDL | BDL |
| Jul 00 | BDL         | 55 | BDL | BDL | 65 | BDL | BDL | 65  | 50 | BDL | BDL |
| Aug 00 | BDL         | 70 | BDL | BDL | 55 | BDL | BDL | 60  | 65 | BDL | BDL |
| Sep 00 | BDL         | 20 | BDL | BDL | 20 | BDL | BDL | BDL | 15 | 25  | BDL |
| Oct 00 | BDL         | 25 | BDL | BDL | 35 | BDL | BDL | BDL | 25 | 20  | BDL |
| Nov 00 | BDL         | 40 | BDL | BDL | 25 | BDL | BDL | BDL | 30 | 35  | BDL |
| Dec 00 | BDL         | 10 | BDL | BDL | 15 | BDL | BDL | BDL | 15 | 15  | BDL |

## **Attachment 5**

### **Cap Settlement Data**

## Settlement Monument Elevations

|                                       | No. 1    | No. 2         | No. 3         | No. 4    | No. 5      | No. 6     |
|---------------------------------------|----------|---------------|---------------|----------|------------|-----------|
| Elevation at Installation<br>Oct 1990 | 860.74   | 847.58        | 846.15        | 832.54   | 822.40     | 823.34    |
| Elevation<br>July 1994                | 860.73   | 847.47        | 846.09        | 832.58   | 822.44     | 823.34    |
| Current<br>Elevation<br>April 2001    | 860.76   | 847.42        | 846.06        | 832.55   | 822.25     | 823.34    |
| Total<br>Movement                     | Up 0.02' | Down<br>0.16' | Down<br>0.09' | Up 0.01' | Down 0.15' | Unchanged |

\* – The surveyor was unable to locate Settlement Marker No. 5 in 1994. The elevation shown is from the October 1993 survey.