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SOURCE REMOVAL ASSESSMENT REPORT

Prepared for

BEAZER EAST, INC.
CABOT CARBON/KOPPERS SUPERFUND SITE
Gainesville, Florida

Prepared by

TRC
Irvine, California

January 2005

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January 14, 2005 Project No. 29016403

Ms. Amy Williams
Remedial Project Manager
U.S. Environmental Protection Agency, Region IV
4WD-SRTMB
61 Forsyth Street
Atlanta, Georgia 30303-3104

Source Removal Assessment Report
Cabot Carbon/Koppers Superfund Site
Gainesville, Florida

Dear Ms. Williams:

At the request of Mike Slenska, TRC is submitting to you two copies of the above-referenced report on behalf of Beazer East. The enclosed report presents an assessment of the viability of implementing source removal in four key source areas at the Cabot Carbon/Koppers Superfund Site (i.e., the former North Lagoon, the former South Lagoon, the former Process Area, and the former Drip Track Area).

Please feel free to contact Mike Slenska at 412-208-8867 if you have any comments or concerns.

Sincerely,

Tom Patterson
Senior Project Manager

cc: Kelsey Helton, FDEP
John Moussa, ACEPD
Brett Goodman, GRU
Mike Slenska, Beazer East
Tim Basilone, Koppers
John Herbert, Jones Edmunds

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ACKNOWLEDGEMENT

TRC would like to acknowledge GeoTrans Inc., GeoHazard Inc., LQ Communications, AMEC, and Sevenson Environmental Services Inc. for their technical input and contributions for this evaluation.

1.0 INTRODUCTION

1. In the course of substantial communication among the United States Environmental Protection Agency (EPA), Beazer East, Inc. (Beazer), and other stakeholders regarding the Koppers Portion of the Cabot Carbon/Koppers Superfund Site in Gainesville, Florida (the Site), Beazer committed to prepare an assessment of the viability of implementing source removal in four source areas at the Site (i.e., the former North Lagoon, the former South Lagoon, the former Process Area, and the former Drip Track Area). This document, entitled *Source Removal Assessment Report*, has been prepared to satisfy that commitment.

2. For contextual purposes, Beazer notes that this assessment is but one aspect of the most recent efforts that Beazer has made, and is making, in order to more completely understand and address Site conditions. On October 28, 2004, Beazer submitted a letter to EPA that presented a comprehensive description of the tasks that are being undertaken to address concerns raised by EPA, the Florida Department of Environmental Protection (FDEP), Alachua County Environmental Protection Department (ACEPD) and the Gainesville Regional Utilities (GRU). Importantly, that letter reviews conclusions from the most recent data at the Site that indicate that: (1) although Dense Non-Aqueous Phase Liquids (DNAPLs) are present beneath source areas, the focused field investigations of those areas in the Hawthorn Group indicate that the DNAPL is generally immobile (for example, wells completed in the Lower Hawthorn or Upper Floridan do not indicate the presence of mobile DNAPL) and (2) based upon fate and transport simulations, Site-related dissolved phase constituents do not migrate much beyond Site boundaries and, most importantly, that the Murphree well field is not at risk from constituents related to the Site.

3. Notwithstanding these findings, Beazer recognizes the importance of, and is committed to, progressing as quickly as practicable toward arriving at a workable Site-wide comprehensive remediation strategy. In that regard, Beazer agreed to conduct an enhanced DNAPL recovery pilot (active pumping) in the Upper Hawthorn Group, conduct interim measure/pilot studies specified in a letter to EPA dated August 4, 2004, and evaluate source removal options in this Source Removal Assessment Report. Specifically, and at the direct request of EPA, this Source Removal Assessment Report evaluates the efficacy of utilizing interim remedial measures (IRM) associated with source removal in terms of risk reduction, feasibility and cost.

4. Section 121(a) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, 42 USC 9601 et seq. (Superfund) requires that when EPA selects a remedial action in accordance with its Superfund authority, the EPA must "select appropriate remedial actions determined to be necessary to be carried out…which are in accordance with this section and, to the extent practicable, the National Contingency Plan, and which provide for a cost-effective response." Key considerations for EPA in making an appropriate remedial decision include the balancing factors identified in 40 CFR 300.430(e)(7)(ii) (implementability) and 300.430(e)(7)(iii) (cost). This Source Removal Assessment Report evaluates these key criteria as well as other important factors. Note that Beazer does not take a formal position in this document regarding whether any of the source removal options evaluated in this report would constitute a remedial action or a removal action (as those terms are defined in 40 CFR 300.5). Irrespective of the categorization of such an action, it is clear that EPA must consider, at a minimum, whether any such action is feasible, cost effective and will reduce potential Site risks. See, generally, 40 CFR Part 300.415 – 420.

5. The findings of this assessment are intended to be incorporated into an overall Site Feasibility Study to be submitted at a later date following the consideration of data collected from the implementation of the interim measures/pilot remedy approaches described in Beazer's August 4, 2004 letter to EPA.

1.1 ORGANIZATION OF THIS REPORT

1. This report briefly discusses the Site's history and the current understanding of the Site conceptual model from a hydrogeological perspective, and the areas and volumes that would be addressed by source removal. The report then presents a conceptual design for implementation of source removal as an IRM, and discusses the implications of the source removal alternative from the standpoint of risk reduction, feasibility of removal, and cost. The topics discussed in each of the following Chapters are as follows:
   - Chapter 2.0 "Background and Site Conceptual Model" – contains a brief discussion of the Site history and the Site conceptual model.
   - Chapter 3.0 "Source Removal Excavation Plans" – describes the areas and volumes in each of the four source areas and presents a conceptual design for excavation of these four areas, and restoration of the Site.

- Chapter 4.0 "Material Characterization, Management, Treatment and Disposal" – describes the regulatory setting applicable to management, treatment and disposal of the excavated soil, and develops alternative approaches for soil management and disposal.
- Chapter 5.0 "Risk, Feasibility, and Cost Implications of Source Removal" – discusses the implications of implementation of source removal alternatives developed in Chapters 3.0 and 4.0.
- Chapter 6.0 "Survey of Other Projects with Soil Excavation for Source Control" – presents a review of performance of large projects where soil excavation has been used for source control as a method to remedy ground water conditions.
- Chapter 7.0 “Summary and Conclusions” – summarizes the results of the evaluation and presents conclusions.
- Chapter 8.0 "References" - lists the references used in preparation of this Data Report.

2. The Appendices to this report present calculations, cost estimates, and other backup information.

2.0 BACKGROUND AND SITE CONCEPTUAL MODEL

2.1 BACKGROUND

1. The Site plan showing the locations of the four source areas is presented in Figure 2.1. The location of the Site in the City of Gainesville is shown in Figure 2.2. The Site is an active wood treatment facility, and impacts to soil and ground water due to historic wood treatment operations have been identified. The former Cabot Carbon Site is located immediately to the east of the Koppers property. It has impacted soil and ground water due to historic charcoal, pine oil and pine tar manufacturing operations. The EPA manages the two sites together as one Superfund Site. The Site has been undergoing remedial investigation, remedial planning and remedial action under the oversight of the EPA since the late-1980s. A detailed discussion of the history of Site investigations and remedial actions is presented in *Workplan for Additional Characterization of the Hawthorn Group Formation* (2002 Workplan; TRC, January 2002).

2. Further investigation of the Hawthorn Group was performed from early 2002 through 2004 based on scopes of work outlined in the EPA-approved 2002 Workplan and six subsequent workplan addenda. The work performed according to the workplans included the following:

   - Further defining the continuity and integrity of the Hawthorn Group as a barrier to vertical ground water migration under the Site. Investigation results are reported in *Field Investigation Activities Report* (TRC, September 2002) and *Addendum; Hawthorn Group Field Investigation Report* (TRC, August 2003).
   - Refining the hydrostratigraphy and direction of ground water migration within the Hawthorn Group and Floridan Aquifer. Investigation results are reported in *Field Investigation Activities Report* (TRC, September 2002) and *Addendum; Hawthorn Group Field Investigation Report* (TRC, August 2003).
   - Collecting additional data on water quality within the water-bearing zones located in the Hawthorn Group and Floridan Aquifer. Water quality results are reported and discussed in *Field Investigation Activities Report* (TRC, September 2002); *Addendum, Hawthorn Group Field Investigation Report* (TRC, August 2003); *Data Report, November Sampling Event, Investigation of the Hawthorn Formation* (TRC, January 2004); *Data Report, April Sampling Event, Investigation of the Hawthorn Formation* (TRC, June 2004); and *Data Report for Additional Investigation of Hawthorn Group, DNAPL Source Evaluation for the Koppers Industries Property* (GeoTrans, September 2004).

- Identifying and sampling local private wells to further characterize ground water use and quality in the vicinity of the Site. Results are reported in *Report of Results; Investigation of Private Wells* (TRC, June 2004).

- Abandoning or modifying existing ground water monitoring wells that have the potential to be a conduit for vertical migration of ground water constituents from the Surficial Zone to deeper zones. Activities are reported in *Well Abandonment and Modification Report* (TRC, May 2004).

- Sampling and analysis to further define the vertical and lateral extent of DNAPL creosote at the four source areas. Results are reported in *Data Report for Additional Investigation of Hawthorn Group, DNAPL Source Evaluation for the Koppers Industries Property* (the DNAPL Source Evaluation; GeoTrans, September 2004).

- Developing numerical ground water flow and transport models to aid in predicting constituent migration and aid in evaluation of remedial alternatives. Initial results are reported in *Addendum 6: Groundwater Flow and Transport Model; Draft Report* (GeoTrans, October 2004).

3. Based on the results of the studies above, the hydrogeologic conceptual model for the Site was refined. In addition, the distribution of DNAPL and constituent migration to offsite areas were evaluated in detail. The Site conceptual model is summarized briefly below, followed by a discussion of the DNAPL distribution and constituent fate and transport.

2.2 SITE CONCEPTUAL MODEL

2.2.1 HYDROGEOLOGIC CONCEPTUAL MODEL AND GROUND WATER QUALITY

1. A detailed discussion of the Site conceptual model is presented in the Field Investigation Reports (TRC, September 2002; TRC, August 2003). Further refinement to the Site conceptual model is expected as all the data are analyzed together. An update to the Site conceptual model will be presented in the Feasibility Study Addendum for the Site. A simplified cross section presenting the conceptual model for the hydrogeologic conditions at the Site is presented in Figure 2.3.

2. The Site is underlain by a shallow water table sandy aquifer that extends down nominally 25 feet to a clay layer that forms the top of the Hawthorn Group. This upper sandy zone is referred to herein as the Surficial Zone.

3. The Hawthorn Group consists of a series of interbedded clays, clayey sands and silts, all generally of low permeability. There are at least three dense clay layers within the Hawthorn Group that appear to be continuous and act as significant barriers to vertical ground water flow. Along the western Site boundary, four dense clay layers have been identified. Field and laboratory tests confirm the low permeability of the clayey sands and silts, and clay layers.

4. The clay layers separate clayey sand and silt layers that appear to represent separate water-bearing zones that are referred to as the Upper Hawthorn and Lower Hawthorn Zones. There may also be a lower Lower Hawthorn Zone of clayey sand along the western Site boundary (TRC, August 2003). The Ocala Limestone within the Upper Floridan Aquifer underlies the Hawthorn Group.

5. Ground water hydraulic gradients in the Surficial Zone and in the Upper Hawthorn Zone indicate flow toward the northeast. In the Lower Hawthorn Zone, hydraulic gradients are to the northwest. In the Floridan Aquifer, the hydraulic gradient at the Site is relatively flat and may indicate flow toward the north or northeast.

6. Vertical gradients between all the zones are directed downward, and there is a considerable difference in hydraulic head between the Lower Hawthorn Zone and the adjacent zones above and below it (see Figure 2.3). The large difference in hydraulic head indicates that the middle and lower clay units are competent low-permeability units that are restricting vertical ground water flow.

7. Regarding water quality, Site-related organic constituents have been observed in the dissolved phase in the Hawthorn Group wells at the Site. Constituents observed include primarily polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons, benzene, toluene, ethyl benzene, and xylene. These hydrocarbon compounds are indicative of a creosote/wood treatment source. Other organic constituents detected include phenol, 2-, 3-, and 4-methyl phenol, 2,4-dimethylphenol, and pentachlorophenol. Concentrations of these constituents range from nondetect to several parts per million.

8. The organic Site-related constituents mentioned above have been observed in onsite Floridan Aquifer monitoring wells. However, concentrations observed in the Floridan Aquifer are much lower than in the Hawthorn Group wells, and there is a possibility that the observations are related to well installation.

9. Arsenic has been observed at four Floridan Aquifer wells (FW-3, FW-4, FW-6, and FW-7) at concentrations ranging from 10 µg/L to 167 µg/L. However, arsenic levels were either nondetect (<3 µg/L) or below the reporting limit (<5.6 µg/L) at the other 5 Floridan Aquifer Wells and 16 Upper and Lower Hawthorn Zone wells. Arsenic has also been detected at levels between 0.9 µg/L and 44 µg/L at the GRU Sentinel Wells (MWTP-MW-1 and MWTP-MW-2) located 1,350 to 3,460 feet northeast of the Site. The fact that the elevated concentrations in the Upper Floridan are separated from the potential Site sources in the Surficial Zone by low and nondetect concentrations in the Upper and Lower Hawthorn Zones suggests that the arsenic is naturally-occurring. Other observations of arsenic in offsite Floridan Aquifer monitoring wells and the lack of a correlation with observations of other Site-related constituents support that the arsenic may be naturally-occurring. Further monitoring and evaluation will aid in establishing the sources of low levels of arsenic in the Upper Floridan Aquifer.

2.2.2 DNAPL DISTRIBUTION AND OCCURRENCE

1. The DNAPL Source Evaluation (*Data Report for Additional Investigation of Hawthorn Group, DNAPL Source Evaluation for the Koppers Industries Property* [GeoTrans, September 2004]) refined the horizontal extent of the four source areas in the Surficial Zone that contain residual or free phase DNAPL. The refined areas where creosote DNAPL occurs in the Surficial Zone are shown in Figure 2.1. In the Surficial Zone, only residual phase DNAPL and stained soils were observed. This is consistent with observations in past Site investigation activities which indicated no free phase DNAPL in trenches or soil borings, and only two shallow wells where limited amounts of DNAPL accumulated after purging the wells.

2. In addition, the DNAPL Source Evaluation established that creosote DNAPL had migrated into the Hawthorn Group formation to varying degrees beneath the four source areas. Observations of DNAPL were limited to the upper Hawthorn Group in the former South Lagoon and former Process Area. Note that the upper Hawthorn Group is located generally between 25 and 70 feet below ground surface (ft bgs).

3. At the former North Lagoon and Drip Track areas, creosote DNAPL was observed in both the upper and lower Hawthorn Group. GeoTrans noted that the creosote impacts in the lower Hawthorn Group are significantly less than the creosote impacts in the upper

Hawthorn Group. The primary DNAPL impacts are via small seams and stringers. The lower Hawthorn Group is located generally between 70 and 145 ft bgs.

4. The creosote in the lower Hawthorn Group appears to be residual phase, some of which may have been mobilized during well installation. This is based on observations during drilling and on DNAPL removal activities that were initiated shortly after well installation that indicated accumulation of DNAPL in the Lower Hawthorn Zone wells ceased after one or two removal events. The DNAPL in the Upper Hawthorn Zone (in all source areas except the Former South Lagoon) appears to exist as both residual and free phase based on the ongoing results of DNAPL removal activities.

5. GeoTrans estimated the volume of soil impacted by DNAPL in the Surficial Zone (GeoTrans, September 2004). These estimates are presented in Table 2.1. Note that the estimate of impacted soil volume is a neat volume (i.e., the volume of soil containing DNAPL and not the volume that would need to be excavated for removal of the soil that contains DNAPL due to construction limitations). GeoTrans noted that there are insufficient borings into the Hawthorn Group to estimate impacted soil volumes for the upper and lower Hawthorn Group deposits. However, as noted above, the impacted volume in the lower Hawthorn Group is anticipated to be lower than the volume in the upper Hawthorn Group.

2.2.3 GROUND WATER AND CONSTITUENT MIGRATION

1. The ground water modeling results are reported in *Addendum 6: Groundwater Flow and Transport Model; Draft Report* (GeoTrans, October 2004). The primary objective of the modeling effort was to evaluate ground water flow and solute transport in the Surficial Zone, Hawthorn Group and Upper Floridan deposits. The model was set up and calibrated using Site-specific lithologic, water level, hydrologic property, and water quality data.

2. Constituent fate and transport simulations were performed for naphthalene (an effective tracer for creosote as it has the highest aqueous solubility and is the most mobile of the constituents found in creosote) and arsenic (a component of wood treatment chemicals that has been observed at high concentrations in the Surficial Zone but is below or near detection limits in the Hawthorn Group). The fate and transport simulations indicate that naphthalene migration is most significant in the Surficial Zone, but is naturally attenuated within a few hundred feet from the Site. In the Upper Floridan Aquifer, offsite concentrations are

predicted to be less than 1 µg/L, which is consistent with monitoring observations, and naphthalene will never reach the Murphree well field.

3. The fate and transport simulations for arsenic indicated that arsenic is not expected to migrate very far from the source locations near the southeastern corner of the Site. Concentrations in the Lower Hawthorn Zone under the arsenic source stayed below 10 µg/L, and remain below detection limits in the Upper Floridan Aquifer. This supports that the observations of arsenic in some of the Upper Floridan Aquifer monitoring wells may be due to natural sources/processes.

3.0 SOURCE REMOVAL EXCAVATION PLANS

1. The objective of source removal IRM would be to remove DNAPL-impacted soils from the four source areas. The removal consists of three primary steps: excavation, treatment and/or disposal, and restoration. In this chapter, the assumptions and basis for excavation of the soils are described, along with a discussion of how the soil excavation would be performed. Restoration of site facilities following excavation is also discussed. In the following chapter, treatment and disposal alternatives are described, and four alternative scenarios are developed for detailed discussion. Once the four source removal alternatives have been defined, they are characterized in Chapter 5.0 from the standpoint of reduction of potential risk, technical feasibility, and costs.

3.1 BASIS AND ASSUMPTIONS FOR EXCAVATION

1. The source removal, or soil excavation, scenario described herein is based on the following objectives, information and assumptions:

   - It is assumed that the DNAPL Source Evaluation accurately identified all the areas with DNAPL-impacted soils in the Surficial Zone. This assumption means that the only impacted soil at the Site is within the outlined areas indicated in Figure 3.1. This assumption is further discussed in Section 5.2.3
   - The objective is to remove the identified DNAPL-impacted soils; not to achieve a target soil cleanup level based on the concentrations of specific chemicals.
   - Only the DNAPL soils in the Surficial Zone would be excavated. Although as discussed in Chapter 2.0, DNAPL-impacted soil has been observed in the upper and lower Hawthorn Group (i.e., to depths on the order of 110 feet), it is cost prohibitive and/or technically infeasible to excavate to the full depth (considering dewatering and shoring requirements) based on the evaluation of the Surficial Zone excavation. This is further discussed in Section 5.2.2.
   - Based on the data gathered in the DNAPL Source Evaluation, the depth of excavation would be approximately 23 feet. Although the depth to the upper clay is generally 25 to 30 feet, the cone penetrometer test (CPT) and direct push sampling data gathered by GeoTrans indicated that DNAPL-impacted soils were generally less than 23 feet deep.
   - Overburden and soil from the layback slopes are assumed to be impacted. This assumption means that all soil excavated to remove the DNAPL-impacted soil identified as part of the DNAPL Source Evaluation would be managed (i.e., treated and/or disposed of) with the DNAPL-impacted soil.

- The safe slope for unshored open excavations following dewatering is estimated to be 2:1 based on Site-specific geotechnical data.
- Shoring would be used to protect the existing chromated copper arsenate (CCA) drip track area and the old brick kiln area that are both located between the former Process Area and former South Lagoon source areas. All other structures and facilities would be demolished or temporarily removed.
- Dewatering of the excavation areas prior to excavation is necessary to maintain stable slopes in the excavations and to avoid excavating "liquid" materials (i.e., creating a mudhole).
- Dewatering for each area is most cost-effectively accomplished using gravel filled trenches with sumps constructed at the location of the toe of the inner slope of each area to be excavated.
- Dewatering water would be treated in a temporary treatment unit (as the existing treatment plant does not have sufficient capacity) and discharged to the publicly-owned treatment works (POTW).

3.2 SOIL EXCAVATION

1. Using the basis and assumptions described above, an excavation plan was developed. The excavation plan is shown in Figure 3.1. Cross-sectional conceptual designs for unshored and shored excavations are shown in Figures 3.2 and 3.3, respectively. The Figures indicate the conceptual locations for dewatering trenches, locations for shoring structures, the excavation areas with the layback for safe slopes, facilities that will be demolished or removed, and temporary access for construction and wood treatment operations.

2. Figure 3.1 also includes a table summarizing the volume of soil in the four excavation areas. Using the basis and assumptions described above, the total volume is 441,000 cubic yards, which assuming 1.6 tons per cubic yard, is on the order of 700,000 tons of soil. Note that this volume is significantly higher than the neat volumes listed in Table 2.1. This is because of the additional volume for layback of the slopes and overburden.

3. It is anticipated that the four areas would be excavated in sequence. The first would be the Drip Track area since, as described in the next chapter, portions of the Drip Track area may be utilized for soils management and disposal operations. The sequential order of the other three areas is relatively arbitrary, but the former Process Area excavation must be completed and backfilled before the South Lagoon excavation is performed to allow temporary access through the existing alternative gate located at the southeast corner of the Site while the existing access road is blocked by the South Lagoon excavation.

4. The sequence of work for excavation of each of the four source areas would generally consist of the following steps:
   - Identify underground utilities and piping, then prepare and implement a plan with the landowner to address underground facilities.
   - Plug and abandon all existing monitoring wells in the areas to be excavated.
   - Construct the dewatering trenches, install treatment plant, and begin dewatering.
   - While dewatering, clear the area to be excavated including removing/demolishing existing buildings and stationary equipment.
   - Begin the excavation and remove soil. The soil would go to a staging/processing/transloading area if it is to be treated or sent offsite for disposal, or directly to an onsite landfill if no treatment is required, as described in Chapter 4.0.
   - Construct shoring and perform additional excavation dewatering as the excavation progresses.
   - Verify attainment of design lines and grades by survey to confirm completion of excavation (i.e., the excavation is not guided by attainment of cleanup levels).
   - Backfill the excavation with clean imported soil. Alternatively, if the selected approach is to treat the soil and return it to the excavation (as further discussed in Chapter 4.0), the excavation would be lined prior to backfilling with the treated soil.

   Each of these steps is further described below.

5. To prepare the area for excavation, underground utilities must be identified and addressed, and existing structures within the area need to be removed or demolished. There are gas lines and water lines within the excavation area footprints. These lines would be located by survey and a plan would be prepared with Koppers Inc. (KI) describing how to address these utilities during and after construction (i.e., rerouting, removal, temporary shut-off, etc.). The plan would be implemented before, during, and after construction to minimize operational impacts and changes to the KI wood treatment operation.

6. A conceptual layout of the dewatering trenches is shown in Figure 3.1 and cross sections showing the configuration of the trenches are shown in Figures 3.4 and 3.5. Selection of trenches versus wells is based on a technical evaluation that indicates a trench dewatering system would be more effective. The trenches would be constructed using a biopolymer

slurry to hold the trench open prior to placing the drain pipe and backfilling with gravel. Sumps would be placed every 200 feet where the water is pumped out for treatment.

7. The water will be treated with a specially constructed temporary treatment facility because the existing plant for ground water does not have sufficient capacity. The water would be treated using oil/water separation, biotreatment, and granular activated carbon to remove organic constituents, and iron or aluminum co-precipitation to remove arsenic. Once treated, the water would be discharged to a POTW like the current treated ground water from the existing treatment plant or discharged to surface water under a National Pollutant Discharge Elimination System (NPDES) permit if the POTW does not have adequate capacity.

8. The dewatering trenches are in areas that will be excavated. Screening-level engineering evaluations indicate that this approach provides more rapid dewatering of the excavation areas and results in less water to manage than using trenches or wells located around the perimeter of the excavation. However, actual configuration would be determined as part of detailed design. The trenches would be excavated along with contaminated soil as the excavation proceeds. Care would need to be taken to assure that the sumps are adequately protected to assure that dewatering could continue.

9. The ground water flow model was used to estimate the flow of water that would have to be treated. Dewatering parameters for each excavation area are shown in Table 3.1, and backup on how these values were determined is provided in Appendix A. The results indicate significant flows (up to 400 gpm) are required for the first few days for dewatering, and then a lower steady state flow (30 to 50 gpm) from each excavation is required to maintain a “dry” excavation. The model estimates that 3 to 5 weeks are required to bring the water levels down to allow excavation to the full depth.

10. Regarding demolition and removal of facilities, KI has been consulted during the preparation of this report to establish which structures and facilities are important and need to be protected and/or replaced, which can be demolished. KI input is reflected in Figure 3.1. It is assumed that demolition debris would be hauled by truck to an offsite landfill.

11. Excavation would be performed with standard construction equipment (i.e., excavators, backhoes, loaders, dozers and/or offroad haul trucks). Use of scrapers is not anticipated because the excavations are too small in area for scrapers to be efficient.

12. Each excavation would be constructed with an internal ramp for the trucks and equipment. The last step of the excavation would be to remove equipment from the excavation and excavate the ramp from outside the hole.

3.3 POSTEXCAVATION SITE SOURCE AREA RESTORATION ACTIVITIES

1. Restoration activities include backfilling the open excavations, and would be performed as excavation of each of the Site source areas is completed. The backfill may be either imported clean soil or, if allowable, treated soil from the excavations. Alternative approaches for soil management which employ both backfilling scenarios are developed in Chapter 4.0.

2. Figure 3.1 identifies the approximate volumes of soil to be excavated, which is equal to the volume of imported soil that is anticipated to be needed to backfill the excavations (approximately 700,000 tons of soil in the aggregate). If treated excavated soil can be used as backfill in the excavations, the need for imported soil would be reduced or eliminated.

3. Once excavation of an area is complete, imported or treated soil would be used to backfill the excavation. A new ramp would be constructed using backfill soil and the excavation would be filled. If the excavation is filled with treated soil, it would first be lined as further discussed in Chapter 4.0. A lined excavation would require greater care for initial placement of the backfill. The backfill would be nominally compacted to 90 percent relative maximum density unless Site restoration plans require a greater degree of compaction, for example to construct a foundation for a building containing heavy equipment

4. The other major restoration activity entails the replacement of facilities at the Site. Figure 3.1 shows the facilities at the Site that KI wishes to retain for their operations. Restoration would include: installation of a new gas-fired boiler in the former Process Area; replacement of other structures and buildings; replacement of tram and railroad tracks associated with wood-treatment operations; and relocation of the storm water drainage ditch. This work would be done after all the remediation work is completed.

5. If an onsite landfill is used for disposal of the soil (an alternative approach described in Chapter 4.0), KI has indicated it will need a new rail spur to service the southern end of the

property as a replacement for the existing spur, which would be displaced by the onsite landfill. Figure 4.3 shows a proposed location for the new spur construction.

6. If railcars will be used to haul excavated soil to offsite RCRA permitted incinerators or landfills, a rail siding would need to be constructed. Such a rail siding would be salvaged for re-use if a buyer could be found. Otherwise, it would be left in place for KI's potential use.

7. Also, as part of the restoration activities, shoring and other construction facilities (i.e., the haul roads, the staging/treatment area, etc.) would be removed and the areas would be restored to their original condition. This would include replacement/ reconnection of utilities, grading, revegetation, etc.

4.0 MATERIAL CHARACTERIZATION , MANAGEMENT, TREATMENT, AND DISPOSAL

1. Should soil be excavated from any of the four Site source areas, it must be categorized properly and managed in a manner consistent with such categorization. Specifically, excavated soil must be staged, stored, treated, and/or transported in strict accordance with statutory and regulatory waste management requirements prior to its final disposition (e.g., onsite or offsite landfill or incineration). This chapter identifies:
   - The probable listed hazardous waste categorization of the excavated soil.
   - The land disposal restriction (LDR) standards that would apply to any onsite or offsite landfill of the excavated soil as a hazardous waste absent the application for and approval of an exclusion from the LDR standards.
   - The potentially available exclusions from the LDR standards.
   - Four specific alternatives under consideration for management (e.g., treatment, staging and disposal) of soil removed from the four Site source areas.

2. Note that when the terms "managed" and "management" are used with respect to the excavated soil, unless otherwise indicated, such terms refer to the handling of soil after it has been excavated from any of the four Site source areas prior to final disposition (e.g., any onsite or offsite staging, storage, treatment, or transportation) as well as the handling of the soil during final disposition (e.g., onsite or offsite landfill).

4.1 CATEGORIZATION OF THE EXCAVATED SOIL

4.1.1 RCRA STATUTORY AUTHORITY

1. Section 3001(a) and (b) of the Resource Conservation and Recovery Act (RCRA) (42 USC 6921[a] and [b]) establishes a framework for the designation of specific types of solid wastes as hazardous wastes. Once generated (e.g., actively managed) and categorized as a hazardous waste, excavated soil must be managed in accordance with specific generation, transportation and disposition requirements dictated by Sections 3002 through 3004 of RCRA (42 USC §§6922 through 6924).

2. Soil, in and of itself, does not come within the RCRA Section 1004(27) (42 USC §6903[27]) definition of "solid waste"(1) and, accordingly, would not be regulated as a "hazardous waste."(2) However, as discussed in greater detail below, upon removal of the soil from the Site source areas for onsite or offsite landfill disposal and/or offsite incineration, the excavated soil would be categorized as a solid waste and as a listed hazardous waste given the presence of listed hazardous wastes within the soil from historical operations conducted at the Site.

4.1.2 RCRA REGULATORY PROGRAM

1. Since 1980, the U.S. Environmental Protection Agency (EPA) has adopted various hazardous waste listings for solid wastes generated from nonspecific sources, specific sources, and other sources (e.g., discarded commercial chemical products, off-specification species, container residues, and spill residues). See 40 CFR §261.31 through §261.33. The following hazardous waste listings are potentially applicable to wastes generated from wood preserving processes at the Site:

   EPA Hazardous Waste No. F032: Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with §261.35 of this chapter or potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes [i.e., F034 or F035], and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol. See 40 CFR §261.31.

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(1) The term "solid waste" means any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved material in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under section 1342 of title 33, or source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954, as amended (68 Stat. 923) [42 USC §2011 et seq.].

(2) The term "hazardous waste" means a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may- (A) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed. See RCRA Section 1004(5), 42 USC §6903(5).

This listing is potentially applicable to all four Site source areas.

EPA Hazardous Waste No. F034: Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol. See 40 CFR §261.31.

This listing is potentially applicable to all four Site source areas.

EPA Hazardous Waste No. F035: Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol. See 40 CFR §261.31.

This listing is potentially applicable to all four Site source areas.

EPA Hazardous Waste No. K001: Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol. See 40 CFR §261.32.

This listing is potentially applicable to impacted soils associated with the Former South Lagoon and the Former North Lagoon.

2. The RCRA "definition of solid waste" regulations in 40 CFR §261.2(b)(1) and (2) provide that upon excavation for landfill and/or incineration, soil would be categorized as a solid waste. Further, the RCRA "definition of hazardous waste" regulations in 40 CFR §261.3(a)(2)(iv) provide that the mixture of solid waste with one or more listed hazardous wastes makes the entire mixture a hazardous waste. Because soil excavated from the four Site source areas is likely to contain one or more of the listed EPA Hazardous Waste Nos. K001, F032, F034, and/or F035, all of the soil would have to be staged, stored, treated, and/or transported in accordance with the RCRA hazardous waste requirements prior to its final disposition in a RCRA hazardous waste permitted facility (e.g., onsite or offsite

landfill or offsite incinerator), unless a specific exclusions(s) is granted from the LDR standards applicable to the excavated soil.

3. The LDR treatment standards for the four potentially applicable waste codes are presented in Table 4.1. The LDR standards, potential exclusions to the LDR standards, applicable hazardous waste management requirements, and Site-specific material management alternatives are discussed in the sections below.

4.2 LDR STANDARDS APPLICABLE TO THE TREATMENT OF EXCAVATED SOILS

4.2.1 RCRA STATUTORY AUTHORITY

1. The Hazardous and Solid Waste Amendments of 1984 (HSWA) to RCRA recognize that the continued use of land-based units for disposal of hazardous waste could ultimately result in the future designation of more Superfund sites. The HSWA amendments include specific requirements to help prevent the creation of new contamination sites. Specifically, some of the amendments require that land-based hazardous waste disposal units meet more stringent design requirements (i.e., minimum technology requirements such as double liners and leachate detection and collection systems). Other amendments require site-wide corrective action for solid waste management units at RCRA permitted hazardous waste facilities, such as this Site. As discussed in greater detail below, other amendments establish a timetable by which listed and characteristic hazardous wastes must be treated to specific concentration levels and/or by specific technologies prior to placement in landfills. See RCRA Section 3004(d) through (g) (42 USC §6924(d) through (g)).

4.2.2 RCRA REGULATORY PROGRAM

1. The regulations at 40 CFR Part 268 identify various characteristic and listed hazardous wastes that are prohibited from land disposal unless specific LDR treatment standards are met or an exclusion from such standards is granted. Numeric LDR treatment standards for EPA Hazardous Waste Nos. F032, F034, F035, and K001 (and in the case of some EPA Hazardous Waste No. F032 hazardous constituents, an alternate combustion treatment technology (CMBST) option) were promulgated at 40 CFR §268.40 and are summarized in Table 4.1. The numeric standards are expressed as total waste standards in milligrams per kilogram (mg/kg), unless otherwise noted as CMBST, or as a waste extract standard in milligrams per liter (mg/l). The effective dates for the applicability of the referenced LDR

treatment standards have all passed, making each of the standards relevant to the current analysis. See 40 CFR §268.30(a) and 40 CFR Part 268, Appendix VII, Table 1.

2. In recognition that soil impacted by hazardous waste is often much more difficult to treat to the LDR treatment standards set for the specific hazardous waste than the waste itself, EPA adopted alternative LDR treatment standards presented in 40 CFR §268.49 for soil impacted by hazardous waste. Instead of complying with the LDR treatment standards discussed above and summarized in Table 4.1, impacted soil can be treated either: (1)(A) for most nonmetals, to achieve a 90 percent reduction in total constituent concentrations, and (B) for metals, (i) to achieve a 90 percent reduction in constituent concentrations as measured in leachate from the treated media tested according to the toxicity characteristic leaching procedure (TCLP) or (ii) to achieve a 90 percent reduction in total constituent concentrations (when a metal removal treatment technology is used); or (2) when such treatment would result in constituent concentrations at less than ten (10) times the universal treatment standard (UTS) (40 CFR §268.48), to 10 times the UTS. The effective dates for the applicability of the specific LDR treatment standards to soil impacted by: EPA Hazardous Waste No. K001; and EPA Hazardous Waste Nos. F032, F034, and/or F035, have likewise passed, making each standard relevant to the current analysis. See 40 CFR §268.30(b) and 40 CFR Part 268, Appendix VII, Table 2. With few exceptions (e.g., EPA Hazardous Waste No. F032 regulated hazardous constituents: fluorene and hexachlorodibenzo-p-dioxins), the alternative LDR treatment standards for soil impacted by listed hazardous wastes are at least an order of magnitude greater than the LDR treatment standards for the nonsoil as-generated hazardous wastes.

3. However, in some respects, the LDR treatment standards for soils may be even more stringent than the standards applicable to the listed hazardous wastes because such standards could potentially apply to a whole host of additional constituents, assuming that they are present in the excavated Site soil in concentrations exceeding UTS that would not have otherwise required treatment. Specifically, if Beazer finds that any of the excavated soil contains other underlying hazardous constituents (UHCs) listed in the regulations (40 CFR § 268.48) (i.e., UHCs in addition to those listed in Table 4.1) at levels above UTS, the listed hazardous wastes would also have to be treated for those previously unregulated UHCs as well.

4.2.3 AVAILABLE TREATMENT TECHNOLOGIES

1. Even with these less stringent LDR treatment standards for soil (putting aside the potentially more stringent UHC treatment scenario highlighted above), based upon Beazer's extensive experience with wood treating site remediation, there is no non-CMBST treatment technology (i.e., no technology other than incineration) that has been demonstrated to achieve the LDR treatment standards for DNAPL-impacted soil that would be excavated from the four Site source areas. Thus, technologies such as biotreatment, chemical oxidation and fixation are not discussed further. However, because thermal desorption has been identified by various stakeholders, including the regulatory agencies, as being a potentially effective technology for the treatment of DNAPL-impacted soils, this thermal treatment technology is discussed further below.

2. Thermal desorption has been demonstrated to be potentially effective for the treatment of polycyclic aromatic hydrocarbons (PAHs), particularly the lower molecular weight PAHs, and pentachlorophenol under certain conditions, and it is assumed that this technology could be effective for nonchlorinated phenols under similar conditions. However, thermal desorption has not been demonstrated to be a consistently effective and efficient treatment method for achieving RCRA LDR treatment standards for all listed wastes found in DNAPL-impacted soils at wood treatment sites. Specifically, treatability testing would be needed to demonstrate that the LDR treatment standards for the "F" and "K" listed wastes can be achieved through this treatment option, because thermal desorption may not achieve this result for soil excavated from the four Site source areas. Creosote DNAPL contains a multitude of specific compounds, many of which are the more recalcitrant high molecular weight PAHs. In order for thermal desorption to be effective, LDR treatment standards would have to be met for these compounds. Additionally, thermal desorption has not been demonstrated to be an effective treatment method for materials containing metals, which have been identified in the soil within the Site source areas.

3. Because a majority of the impacted soils are below the water table, the moisture content of the soil will likely affect the treatment efficacy and, hence, post-treatment analytical results. Also, the treatment is unlikely to be effective for "hot spot" heavily impacted soils absent substantial blending of soils. Moreover, although thermal desorption can be implemented with a fairly high processing rate so that treatment can be performed in a relatively short period, the processing rate for excavated soils undergoing treatment by thermal desorption would clearly be a critical path task and would dictate the schedule for remediation if treatment is required. Treatability evaluations and/or testing would also be required to

verify that the excavated soils at residual saturation with creosote DNAPL could be cost-effectively treated in a timely manner using thermal desorption. Nevertheless, for purposes of considering source removal alternatives, assumptions will be made that thermal desorption may be capable of achieving LDR standards for some, but not all, of the regulated hazardous constituents present in the waste streams identified at the Site.

4.3 POTENTIAL EXCLUSIONS FROM THE LDR STANDARDS

4.3.1 RCRA STATUTORY AUTHORITY

1. In recognition that compliance with the LDR treatment standards may not be possible for all hazardous waste streams destined for direct land disposal, the HSWA amendments provide various mechanisms (e.g., treatability variances, no migration determinations) whereby the impact of the LDR treatment standards may be postponed and/or eliminated. See RCRA Section 3004(h) and (i) (42 USC §6924[h] and [i]). Further, as discussed under subsection 4.3.2 below, consistent with the requirements mandated under RCRA Section 3004(u) and (v) (42 USC §6924[u] and [v]), corrective action regulations are in place whereby relief from the stringent LDR treatment standards can be obtained for the land disposal of qualifying hazardous remediation wastes by obtaining agency approval to manage such wastes in specific types of land disposal units.

4.3.2 RCRA REGULATORY PROGRAM

1. The RCRA statutory exclusions mentioned above were codified in the 40 CFR Part 268 regulations and are highlighted below. In addition, regulatory-based corrective action hazardous waste management options for supporting an exemption from the LDR treatment standards are discussed below. Note that these exclusions are not readily obtainable, and they require an extensive investment of both manpower (on behalf of both the PRP and the agencies) and money to prepare the applicable supporting documentation and to meet and negotiate with the regulatory agencies authorized to grant the petitions and/or approve the alternate hazardous waste management scenarios discussed below.

2. In fact, in October of 1997, the United States General Accounting Office (GAO) prepared a report to Congress that directly addressed the delays and complexities associated with EPA's hazardous soil remediation requirements, in general, and the ability of remediators to obtain relief from LDRs, in particular. The report, entitled *Hazardous Waste – Remediation Waste Requirements Can Increase The Time and Cost of Clean-Ups* (GAO/RCED 98-4)

(the GAO Report) demonstrates that even EPA's own Superfund program managers acknowledge that the available LDR treatment standard variances have not solved the inherent difficulties in managing soils contaminated with listed hazardous wastes. The following excerpts from the GAO Report are particularly noteworthy: "The lengthy approval process, which includes obtaining public comments, discourages requests for these variances" (GAO Report, pg. 12) and "Those managers who had used the alternatives more extensively said that they spend considerable time and resources to determine which alternatives to use and how to use them . . . [t]hey found that the alternatives were difficult to use and did not solve all of the problems at a particular site" (*Id.*, pg. 13). If EPA program managers find that the LDR variance alternatives were difficult to use, then it is obvious that the burden in terms of time and cost to the regulated entities seeking such variances is substantial.

4.3.2.1 <u>"No Migration" Petition</u>

1. The RCRA regulations (40 CFR §268.6) provide a complex procedure whereby a hazardous waste generator can obtain an exemption from the applicable LDR treatment standards for disposal of hazardous waste in a specifically designated land disposal unit. This exemption may be granted if the generator can demonstrate, to a reasonable degree of certainty, that no hazardous constituents will migrate from such unit for as long as the wastes placed in the unit would be categorized as hazardous wastes. The required demonstration is typically referred to as a "no migration" petition and must contain the following information: (1) identification of the specific waste and land disposal unit; (2) a detailed chemical and physical waste analysis; (3) a comprehensive characterization of the land disposal unit site, including analysis of background air, soil and water quality; (4) a monitoring plan, containing all of the information required by 40 CFR §268.6(c)(1) through (5), to detect hazardous waste constituent migration at the earliest practicable time; and (5) specific information to ensure the land disposal unit will comply with other applicable federal, state and local laws and regulations.

2. Further, consistent with the regulations of 40 CFR §268.6(b), the "no migration" petition must meet the following exacting criteria: (1) all data must be accurate and reproducible; (2) all sampling, testing, and estimation techniques must have been agency-approved; (3) no migration simulation models must be calibrated and verified with actual measurements for accuracy; (4) a quality assurance and quality control plan must be agency-approved; and

(5) an analysis must be performed to identify and quantify aspects of the demonstration that contribute significantly to uncertainty.

4.3.2.2 "Treatability Variance" Petition

1. The regulations at 40 CFR §268.44 provide another complex procedure whereby a hazardous waste generator or treatment facility can obtain a "treatability variance" from the applicable LDR treatment standards if: (1) it is not physically possible; or (2) it is inappropriate, to treat a hazardous waste to the applicable LDR treatment standard levels or by the specified LDR treatment technology. In order to demonstrate that treatment is not physically possible, the petitioner must show that the physical or chemical properties of the hazardous waste differ significantly from the properties of the waste used to set the treatment standard or technology, and accordingly, the waste cannot be treated to the specified standard or by the specified technology. In order to demonstrate that treatment is not appropriate, the petition must show that requiring treatment to a specified level or by a specified technology is either: (1) technically inappropriate (e.g., compliance would result in the combustion of large amounts of mildly contaminated environmental media); or (2) environmentally inappropriate because it would likely discourage aggressive remediation.

2. The regulations at 40 CFR §268.44(h)(3) further provide that, for contaminated soil, alternate LDR treatment standards(3) can be imposed using a reasonable maximum exposure scenario if the hazardous constituent concentrations in the treated soil resulting from the required LDR treatment would be below the concentrations necessary to minimize short- or long-term threats to human health and the environment.

3. Also, the regulations at 40 CFR §268.44(h)(4) provide (again, for contaminated soil only) that treatment to the LDR treatment standards or by the prescribed technology would not be necessary if such treatment would result in hazardous constituent concentrations below natural background concentrations at the site where the contaminated soil will be land disposed.

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(3) Such alternate treatment standards would be: (1) for carcinogens, constituent concentrations that result in the total excess risk to an individual exposed over a lifetime generally falling within a range from 10^{-4} to 10^{-6}; and (2) for constituents with non-carcinogenic effects, constituent concentrations that an individual could be exposed to on a daily basis without appreciable risk of deleterious effect during a lifetime.

4.3.2.3 RCRA Corrective Action Waste Management Options

1. To reduce the complexities associated with meeting the LDR treatment standards for massive quantities of excavated soil likely to contain widely varying concentrations of hazardous constituents, EPA provides a few options for obtaining exemptions from these standards to facilities, such as this Site, that are subject to the RCRA Corrective Action Program[4].

4.3.2.3.1 CAMU Option for Onsite Waste Management

1. The regulations at 40 CFR §264.552 provide for the use of an area, designated as a corrective action management unit (CAMU), within a facility for managing CAMU-eligible wastes generated onsite during corrective action or cleanup activities. A land disposal unit that received hazardous waste after July 26, 1982 can be designated as a CAMU or incorporated into a CAMU provided: such unit is closed or is in the process of being closed; and the inclusion of the unit will enhance implementation of effective, protective and reliable remedial activities at the facility. The term "CAMU-eligible waste" is defined in 40 CFR §264.552(a)(1), in part, as including soil managed during the implementation of a facility cleanup.

2. The CAMU must be located within the contiguous property where the waste is generated and must be under the control of the generator of the waste. Placement of CAMU-eligible wastes into the CAMU does not trigger the applicability of the LDR treatment standards. Further, consolidation or placement of wastes in the CAMU does not trigger the RCRA Section 3004(o) land disposal unit minimum technology requirements (i.e., double liners, leachate collection, and ground water monitoring), which apply to the operation of hazardous waste land-based units.

3. In order to obtain a CAMU designation for receipt of CAMU-eligible wastes generated onsite, as required by 40 CFR §264.552(d), the following information must be provided to the regulatory agency with authority to approve the CAMU designation: (1) waste origin and subsequent management; (2) hazardous waste categorization; and (3) application of the LDR treatment standards.

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(4) The Site is fulfilling its RCRA corrective action responsibilities through the terms and conditions of the Site's Superfund Order.

4. Prior to granting a CAMU designation and in accordance with 40 CFR §264.552(c), the regulatory agency must assure that: (1) the CAMU will facilitate the implementation of reliable, effective, protective, and cost-effective remedies; (2) CAMU waste management activities will not create unacceptable risks to humans or to the environment resulting from exposure to hazardous wastes or hazardous constituents; (3) uncontaminated areas are included in the CAMU only if including such areas is more protective than management of such wastes at contaminated areas of the facility; (4) wastes within the CAMU will be managed and contained to minimize future releases to the extent practicable; (5) the use of the CAMU will expedite the timing of remedial activity implementation when appropriate and practicable; (6) the CAMU will enable the use, where appropriate, of treatment technologies to enhance the long-term effectiveness of the remedial actions by reducing the toxicity, mobility, or volume of wastes that will remain in place at closure of the CAMU; and (7) the CAMU will, to the extent practicable, minimize the land area of the facility upon which wastes will remain in place after closure of the CAMU.

5. Approved CAMUs must meet minimum design requirements (i.e., composite liner and leachate collection system) unless the regulatory agency determines that: (1) alternate design and operating practices combined with location characteristics will prevent migration of any hazardous constituents into the ground water or surface water at least as effectively as if the minimum design requirements were met; or (2) the CAMU is located in an area with existing significant levels of contamination and an alternative design, including a no-liner design, would prevent migration from the unit that would exceed long-term remedial goals.

6. Further, minimum treatment requirements are also imposed if the regulatory agency determines that the CAMU-eligible waste contains "principal hazardous constituents" (PHCs). PHCs are a subset of the applicable LDR treatment standard constituents and are defined as posing a risk to human health and the environment substantially higher than the cleanup levels or goals established for the facility. Typically, PHCs are: (1) carcinogens that pose a potential direct risk from ingestion or inhalation at or above 10^{-3}; and (2) noncarcinogens that pose a potential direct risk from ingestion or inhalation an order of magnitude or greater over their reference dose. However, the regulations (40 CFR §264.552[e][4][i][B] and [C]) provide other reasons for designating PHCs based upon potential migration to ground water and/or risk to human health and the environment.

7. Treatment standards also typically apply to wastes placed in CAMUs either prior to or shortly after placement. Ironically, such treatment standards are identical to the LDR treatment standards that apply to the land disposal of soils containing hazardous wastes in RCRA hazardous waste landfills. See 40 CFR §264.552(e)(4)(iv). However, the regulations (40 CFR §264.552[e][4][v]) provide a number of factors that can be used by the regulatory agency to adjust the treatment standards to a higher or lower level, including, but not limited to, the technical impracticability of treatment to such levels. Again, the complexity, cost and time associated with the demonstrations for an adjustment can be substantial.

8. Ground water monitoring, closure and postclosure requirements are also applicable to CAMUs used for waste disposal. See 40 CFR §264.552(e)(5) and (6).

4.3.2.3.2 <u>CAMU-Eligible Waste Management Option in Offsite RCRA Permitted Hazardous Waste Landfills</u>

1. The regulations (40 CFR §264.555) allow for the placement of CAMU-eligible wastes in offsite hazardous waste landfills provided that: (1) PHCs are identified and treated in a manner identical to that described above in subsection 4.3.2.3.1; and (2) the receiving landfill has a RCRA hazardous waste permit, meets the new landfill requirements presented in 40 CFR Part 264, Subpart N, and is authorized to accept CAMU-eligible wastes.

2. In order to obtain approval for the offsite disposal of CAMU-eligible wastes, as required by the regulations (40 CFR §264.555[b]), the following information must be provided to the regulatory agency with authority to issue the approval: (1) waste origin and subsequent management; (2) hazardous waste categorization; and (3) application of the LDR treatment standards. Similar to the CAMU option discussed above in subsection 4.3.2.3.1, the treatment standards that are likely to be imposed are identical to the LDR treatment standards that apply to the land disposal of soils containing hazardous wastes in RCRA permitted hazardous waste landfills. See 40 CFR §264.555(a)(2)(i) referencing 40 CFR §264.552(e)(4)(iv). However, the regulations (40 CFR §264.555[a][2][ii] and [iii]), which reference 40 CFR §264.552(e)(4)(v)(A), (C), (D), (E)(1) and, with qualifications, (E)(2), provide a number of factors that can be used by the regulatory agencies to adjust the treatment standards to a higher or lower level, including, but not limited to, the technical impracticability of treatment to such levels.

3. Once approval is obtained and the offsite facility's permit is modified to require prior treatment to any established LDR treatment standards, the generator of the CAMU-eligible waste must comply with the LDR recordkeeping and notification requirements applicable to offsite shipments of hazardous waste. See 40 CFR §264.555(f) and §268.7(a)(4).

4.3.2.3.3 <u>AOC Option for Onsite Waste Management</u>

1. The regulations at 40 CFR Part 270, Subpart H provide for the establishment of an Area of Contamination (AOC) through the issuance of a Remedial Action Plan (RAP), in lieu of a RCRA hazardous waste permit. RAPs are issued to authorize treatment, storage and/or disposal of hazardous remediation waste in, or in close proximity to, an area of contamination that would otherwise require the issuance of a RCRA hazardous waste permit for the continued management of hazardous remediation waste.

2. In accordance with 40 CFR §270.110, an application for a RAP must include: (1) various general information regarding the remediation waste management site (e.g., location information, maps); (2) specific information on the remediation waste (e.g., constituent concentrations, volumes, management processes); and (3) specific information to demonstrate that the contemplated operations will be in compliance with the applicable hazardous waste management standards in 40 CFR Parts 264, 266 and 268.

3. In accordance with 40 CFR §270.230, remediation waste management activities may be conducted at a location away from the area where the remediation wastes originated if such location can be shown to be more protective than the contaminated area or areas in close proximity to the contaminated area.

4.4 TREATMENT AND/OR DISPOSAL ALTERNATIVES CONSIDERED FOR THE EXCAVATED SOIL

1. In light of the hazardous waste characterization and LDR treatment standards issues outlined above, and in order to analyze the risk, technical feasibility, and cost of source removal, the various approaches for management of the excavated soil from the four Site source areas have been assembled into alternative IRM scenarios. Four alternatives have been developed using the approaches diagramed in Figure 4.1. These alternatives are described in Table 4.2 and have been designed to encompass the full range of complexity and cost associated with excavation, treatment, disposal, and site restoration as part of the

source removal IRM. Further, the selected alternatives adequately encompass the range of costs and level of effort that would be required by any other combination of alternatives.

2. All four of the alternatives involve the same excavation activities which are discussed in Chapter 3.0 of this report. Each of the source removal alternatives considered herein for the four Site source areas would entail the use of heavy equipment to excavate massive amounts of contaminated soil down to a depth of 23 feet below ground surface (bgs) and manage the excavated soil containing listed hazardous waste using onsite or offsite facilities. For ease of reference throughout the remainder of this Chapter, each source removal alternative is identified with a unique alternative number as follows:
    - Alternative 1: Excavation and Offsite Incineration
    - Alternative 2: Excavation and Onsite Landfill
    - Alternative 3: Excavation, Thermal Treatment, and Return Soil to the Excavation
    - Alternative 4: Excavation and Offsite Landfill

3. Under all of the Alternatives, approximately: 70,000 cubic yards of soil would be excavated from the Former Drip Track Area; 136,000 cubic yards of soil would be excavated from the Former Process Area; 130,000 cubic yards of soil would be excavated from the Former South Lagoon; and 105,000 cubic yards of soil would be excavated from the Former North Lagoon. Excavation of this material would be accomplished as described in Chapter 3.0. Absent a specific exclusion, all of the excavated soil must be managed in accordance with the less than ninety (90)-day accumulation standards (40 CFR §262.34) for containers, tanks and/or containment buildings for no more than 90 days from the date of excavation until final onsite or offsite landfill or offsite incineration. If compliance with the less than 90-day accumulation standards is not possible, a RCRA Subtitle C permit would be required for such storage units prior to use.

4. Alternative 1 is addressed separately in subsection 4.4.1 below because it is the only Alternative that would fully comply with the applicable RCRA waste management requirements, including LDR treatment standards. Absent obtaining an exclusion(s) from the applicability of the LDR treatment standards, the excavated soil must be transported offsite for incineration at a RCRA permitted treatment, storage and disposal (TSD) facility.

5. Alternatives 2 through 4 are addressed together in subsection 4.4.2 because these Alternatives would only be available if EPA and FDEP grant specific relief from the applicable RCRA standards.

4.4.1 ALTERNATIVE 1: EXCAVATION AND OFFSITE INCINERATION

1. Alternative 1 would utilize offsite incineration as the treatment and disposal method for excavated soil from the four Site source areas. For the present source removal evaluation, only offsite incineration would be employed. Because of the rigorous RCRA Subtitle C hazardous waste permitting requirements for incinerators, offsite treatment at an existing RCRA permitted hazardous waste incinerator would be more feasible than using a mobile onsite incinerator.

2. Incineration is the prescribed "best demonstrated available technology" (BDAT) for soil impacted with EPA Hazardous Waste No. F032 and is the prescribed treatment technology for the following chlorophenolic hazardous constituents: pentachlorodibenzo-p-dioxins and/or tetrachlorodibenzo-p-dioxins (PCDDs) and hexachlorodibenzofurans, pentachlorodibenzofurans, and/or tetrachlorodibenzofurans (PCDFs) (see Table 4.1).

3. As reported in the Revised Supplemental Feasibility Study (RSFS; TRC, September 1999), PCDDs and PCDFs have been detected in source removal area soils at levels above its LDR treatment standard of 0.001 mg/kg for EPA Hazardous Waste No. F032 and above the various other LDR treatment standards for soil impacted by EPA Hazardous Waste No. F032.

4. Under Alternative 1, the excavated soil would be placed directly into trucks and/or railcars (or staged in accordance with the less than 90-day accumulation standards prior to placement in trucks and/or railcars) for transport to offsite RCRA permitted hazardous waste incinerators. A conceptual layout for the staging area, haul roads, and a new rail siding to accommodate the massive quantities of excavated soil that would be transported offsite under this alternative is shown in Figure 4.2.

5. The excavated soil would be transported offsite under a hazardous waste manifest to RCRA permitted hazardous waste incinerators specifically authorized to accept EPA Hazardous Waste Nos. K001, F032, F034 and F035. Beazer obtained information on specific RCRA permitted hazardous waste incinerators that are authorized to accept the excavated soils. The identified incinerators are listed in Table 4.3. Because it is unlikely that a single offsite RCRA permitted hazardous waste incinerator would have the available capacity at any given time to accept all of the excavated soil from the Site for incineration, multiple facilities would be needed.

6. Also, because of offsite capacity and logistic limitations, it is likely that both trucks and railcars would have to be used for transport. An important factor for consideration of Alternative 1 is the number of truckloads and/or railcar loads that would be required to transport all of the excavated soil offsite. Assuming 350,000 tons of excavated soil would be hauled by truck with an average load of 23 tons and 350,000 tons of excavated soil would be hauled by railcar with an average load of 105 tons, there would be 15,100 trucks and 3,340 railcars of excavated soil leaving the Site for incineration offsite. The implications of transporting these large quantities of hazardous waste offsite are discussed in detail in Chapter 5.0.

7. Note that the average haul distance to the offsite incinerators is farther than the haul distance to the offsite landfills addressed below under Alternative 4.

4.4.2 ALTERNATIVES 2 THROUGH 4

1. The following Alternatives would only be available if EPA and FDEP grant specific relief from the applicable RCRA hazardous waste standards. Further, only Alternative 3 involves treatment. Alternatives 2 and 4 would only be available if the applicable LDR treatment standards were waived in their entirety.

4.4.2.1 Alternative 2: Excavation and Onsite Landfill

1. Alternative 2 would utilize an onsite landfill as the disposal method for soil excavated from the four Site source areas. Under Alternative 2, Beazer would have to obtain specific exclusions from the hazardous waste landfill design and operation requirements. In addition, Beazer would have to obtain a waiver of all applicable LDR treatment standards.

2. Potential relief from the LDR treatment standards could be pursued by: (1) filing a "no migration" petition as discussed above at paragraph 4.3.2.1 for the onsite landfill assuming the design of the onsite landfill can be shown to prevent migration of hazardous constituents from the landfill for as long as the waste in the landfill remains hazardous; (2) filing a "treatability variance" petition as discussed above at paragraph 4.3.2.2 for the excavated soil to be placed in the landfill assuming a demonstration can be made that treatment to the LDR treatment standards is technically inappropriate; or (3) obtaining a CAMU or AOC

designation for the planned onsite landfill as discussed above in subsections 4.3.2.3.1 or 4.3.2.3.3, respectively.

3. The excavated soils could be placed directly in the onsite landfill if a “no migration” petition is granted for the onsite landfill or if a “treatability variance” is granted staying the application of the LDR treatment standards to the excavated soils. If a CAMU or AOC designation is obtained for the onsite landfill, it is possible that the application of the LDR treatment standards would be waived. The primary advantages of this onsite landfill alternative is that it eliminates the offsite transportation of excavated soil and simplifies onsite management as there is no treatment or other processing required.

4. The onsite landfill must have enough capacity to accommodate all of the excavated soil from the four Site source areas, as well as any of the impacted media associated with excavating the soil and managing it prior to onsite landfill (e.g., haul road material and staging area material). A conceptual layout for the onsite landfill is shown in Figure 4.3. The proposed location for the landfill was selected with the concurrence of KI representatives given Site-specific operational constraints at this active wood preserving facility.

5. As shown in Figure 4.3, a portion of the contemplated onsite landfill would be located in the northern half of the Former Drip Track Area. Accordingly, this area would have to be excavated and backfilled first concurrent with the construction of the onsite landfill. Conceptually, this could be achieved by constructing the northern portion of the landfill (i.e., containment berms, foundation, drains and liner system) just prior to beginning soil excavation in this area. The excavated soil could then be disposed of in the completed portion of the onsite landfill. Once soil excavation from the Former Drip Track Area was complete, this area would need to be backfilled with clean, imported soil and the remainder of the onsite landfill would need to be constructed.

6. The selected location for the onsite landfill would also trigger the relocation of a portion of the existing storm water control ditch. The relocated portion of the ditch would have to be constructed during Site restoration after completion of all excavation and backfilling and closure of the onsite landfill.

7. A cross section through the landfill detailing the earthworks construction is illustrated in Figure 4.4. The volume of imported soil that would be required to construct the containment berms for the landfill and the cover system (described below) is estimated to be approximately 81,000 cubic yards.

8. Figures 4.5 and 4.6 present conceptual designs for the contemplated RCRA Subtitle C-equivalent liner and cover systems. The liner and cover system designs are actually engineered alternatives to the prescriptive RCRA Subtitle C hazardous waste landfill requirements because the designs incorporate a geosynthetic clay liner (GCL) component. This alternative design must either: be approved by the EPA and FDEP in accordance with the alternative landfill design criteria in 40 CFR §264.301(d); or approved under the onsite CAMU or AOC options discussed above under subsections 4.3.2.3.1 or 4.3.2.3.3, respectively.

9. Under Alternative 2, an exclusion from the applicability of the LDR treatment standards must be granted given the anticipated widely divergent concentrations of hazardous constituents within the excavated soil from the four Site source areas, as well as within any one Site source area.

4.4.2.2 <u>Alternative 3: Excavation, Thermal Treatment, and Return to the Excavation</u>

1. Alternative 3 would utilize soil treatment by thermal desorption with replacement of the treated soil into lined onsite excavations as the disposal method. Under Alternative 3, in using the Site source areas for the post-thermal treatment disposal of excavated soil, Beazer would have to obtain specific exclusions from the hazardous waste land disposal unit design and operation requirements, similar to Alternative 2 above. In addition, Beazer would have to obtain a waiver of the applicable LDR treatment standards that may not be achieved by thermal desorption.

2. Alternative 3 would necessitate the onsite management (i.e., storage, treatment) of large quantities of excavated soil while the applicable Site source area was lined in preparation for receiving the thermally-treated soil for disposal. As highlighted in the introductory language of this section, if onsite management of the excavated soil either: extended beyond 90 days from the first date of removal from the source area; or could not be conducted in less than 90-day containers, tanks, and/or containment buildings, a RCRA Subtitle C

hazardous waste storage and treatment permit would also have to be obtained prior to excavation of the soil.

3. Assuming for purposes of this discussion that a CAMU or AOC designation would be approved based upon lining the excavation, an appropriate geosynthetic liner would be utilized. A conceptual liner system is shown in Figure 4.7. The liner would consist of a 60-mil high density polyethylene (HDPE) flexible membrane liner (FML) overlain by a 16-ounce (oz.) geotextile cushion layer for protection. A 1-foot layer of drain rock would be placed over the geotextile infiltration, which drains to a 1-foot deep sump area for removal. An 8-oz. geotextile filter would be placed over the drain rock, prior to placement of the excavated, thermally-treated soil.

4. Thermal desorption would be conducted in a semiportable treatment unit(s) in the onsite staging/treatment area. Each onsite treatment unit would be required to be managed in accordance with the less than 90-day accumulation standards for containers, tanks, or containment buildings in 40 CFR §262.34. Any units that were not managed in compliance with these standards would need to be covered by RCRA Subtitle C hazardous waste permits prior to use.

5. In the event that thermal desorption is not successful in meeting the LDR treatment standards (and, in fact, Beazer does not believe that thermal treatment will be effective in treating excavated soils containing varying concentrations of PAHs, pentachlorophenol, PCDDs, PCDFs, and arsenic, at concentrations above the LDR treatment standards), potential relief from the problematic LDR treatment standards could be pursued by: (1) filing a "no migration" petition as discussed above in subsection 4.3.2.1; (2) filing a "treatability variance" petition as discussed above in subsection 4.3.2.2; or (3) obtaining a CAMU or AOC designation for the planned lining of the excavated source removal area as discussed above in subsection 4.3.2.3.1.

6. The excavated soils could be placed directly back into the applicable Site source area as backfill if a "treatability variance" is granted staying the application of the problematic LDR treatment standards to the excavated soils. It may also be necessary to seek a CAMU or AOC designation, and that as part of the CAMU or AOC approval, EPA and FDEP would need to determine that the liner design discussed above is sufficient to support waiving the application of the problematic LDR treatment standards.

7. After thermal treatment, the majority of the excavated soil would be placed back in the Site source area. However, because the liner and drainage system presented in Figure 4.7 would occupy some of the space in the excavation and treatment of the excavated soil is likely to result in an increased volume of soil to be returned to the area (typically on the order of 15 percent by volume), some of the treated soil would have to be removed and managed separately (i.e., by offsite landfill or incineration).

8. Upon return to the Site source area, the thermally-treated excavated soil would be covered by a 1-foot-thick layer of clean, imported soil that would be graded to drain away from the unit. Low-permeability soil or an FML layer could be incorporated into the cover if necessary.

9. The primary advantage of Alternative 3 is that it eliminates the need to transport massive quantities of clean, imported soil to the Site, which would be considerable under Alternatives 1 and 2 above and Alternative 4 below. This Alternative also greatly reduces the amount of excavated soil that may need to be transported offsite.

4.4.2.3 <u>Alternative 4: Excavation and Offsite Landfill</u>

1. Alternative 4 would utilize an offsite landfill as the disposal method for soil excavated from the four Site source areas. Under Alternative 4, a waiver of all applicable LDR treatment standards would have to be obtained prior to arranging for the disposal of the untreated, excavated soil from the Site source areas at an offsite RCRA permitted hazardous waste landfill, similar to Alternative 2.

2. Potential relief from the LDR treatment standards could be pursued by: (1) the offsite RCRA permitted hazardous waste landfill by filing a no migration petition as discussed above in subsection 4.3.2.1; (2) Beazer by filing a treatability variance petition as discussed above in subsection 4.3.2.2 for the excavated soil to be transported offsite for landfill; or (3) Beazer by obtaining a CAMU Eligible Waste in an offsite landfill designation in an attempt to obtain some relief from the otherwise applicable LDR treatment standards as discussed above in subsection 4.3.2.3.2.

3. Under Alternative 4 (and as previously stated under Alternative 1 as well), the excavated soil would be placed directly into trucks and/or railcars (or staged in accordance with the less than 90-day accumulation standards prior to placement in trucks and/or railcars) for

transport to offsite RCRA permitted hazardous waste landfills. A conceptual layout for the staging area, haul roads, and a new rail siding to accommodate the excavated soil that would be transported offsite under this alternative is shown in Figure 4.2.

4. The excavated soil would be transported offsite under a hazardous waste manifest to RCRA permitted hazardous waste landfills specifically authorized to accept EPA Hazardous Waste Nos. K001, F032, F034 and F035. Beazer obtained information on specific RCRA permitted hazardous waste landfills that are authorized to accept the excavated soils. The identified landfills are listed in Table 4.3. Because it is unlikely that a single offsite RCRA permitted hazardous waste landfill would have the available capacity at any given time to accept all of the excavated soil from the Site for disposal, multiple facilities would be needed.

5. Also, because of offsite capacity limitations, it is likely that both trucks and railcars would have to be used for transport. An important factor for consideration of Alternative 4 is the number of truckloads and/or railcar loads that would be required to transport all of the excavated soil offsite. Assuming 350,000 tons of excavated soil would be hauled by truck with an average load of 23 tons and 350,000 tons of excavated soil would be hauled by railcar with an average load of 105 tons, there would be 15,100 trucks and 3,340 railcars of excavated soil leaving the Site for disposal offsite. The implications of transporting these large quantities of hazardous waste offsite are discussed in detail in Chapter 5.0.

5.0 RISK, FEASIBILITY, AND COST IMPLICATIONS OF SOURCE REMOVAL

1. In this Chapter, the source removal activities described in Chapters 3.0 and 4.0 are discussed with regard to potential risks (both reduction of potential risk resulting from the completion of the removal action and additional potential for risks associated with its implementation), technical feasibility and implementability, and cost.

5.1 RISK IMPLICATIONS OF SOURCE REMOVAL

1. The risk implications for source removal are discussed following a brief overview of previous risk assessments for the Site and recent Site characterization results. The risk implications include both the reduction in potential risk that would result from the source removal IRM alternatives described in Chapters 3.0 and 4.0, and the additional potential risks and hazards that could be incurred due to their implementation.

5.1.1 POTENTIAL SITE RISK UNDER EXISTING CONDITIONS

1. The overall objective of this source removal IRM is to reduce a potential threat to human health. Potential threats to human health can result from exposure to Site-related constituents of concern through various pathways such as direct contact with soil or water containing Site-related constituents; inhalation or incidental ingestion of soil, and ingestion of ground or surface water to which constituents have migrated.

5.1.1.1 Surficial Zone Ground Water

1. The Surficial Zone is not currently being used as a source of drinking water and, as discussed in the RSFS, it is unlikely that it would ever be used as a source of drinking water. This is because of its natural poor quality, the availability of city water, and the more dependable source of ground water in the deeper zones. The natural poor quality in the Surficial Zone results from high levels of natural organic acids, which give the water a brownish color (from tannins and lignin) and a low pH (i.e., pH <5.0), and the typically poor sanitary conditions that occur in most shallow ground water. The Surficial Zone also has a limited yield of ground water.

2. Given these considerations, the potential pathway involving potable use of the Surficial Zone ground water is considered incomplete both onsite and offsite and does not represent a realistic potential risk scenario.

5.1.1.2 Hawthorn Group Ground Water

1. The Hawthorn Group, locally, is not currently being used as a source of drinking water and it is unlikely that it would ever be used as a source of drinking water. This is primarily because the yield to a well in much of the Hawthorn Group is too low to provide an adequate source of water. The clayey sand has a hydraulic conductivity of only about 0.3 ft/d. Use of the Hawthorn Group ground water also is unlikely because drinking water is readily available through the GRU or by drilling a Floridan well, which would provide an adequate source of water.

2. Given these considerations, the potential pathway involving potable use of the Hawthorn Group ground water is considered incomplete both onsite and offsite and does not represent a realistic potential risk scenario.

5.1.1.3 Floridan Aquifer Ground Water

1. As noted above, recent investigations of the Floridan Aquifer have been completed and indicate the presence of Site-related constituents. As yet, there has been no formal risk assessment performed regarding exposure to constituents in the Floridan Aquifer, but as indicated by the discussions below there is no current potential exposure pathway associated with Floridan ground water. Floridan wells can be divided into (1) private wells and (2) municipal wells. Existing private drinking water wells are unimpacted and modeling indicates that they will not be impacted in the future (see Figure 5.1). Public water supply is readily available, decreasing the likelihood of future private wells being drilled. Furthermore, installation of new private drinking water wells is prohibited without approval from the St Johns River Water Management District (SJRWMD) (SJRWMD Chapter 40C-3 F.A.C.). Municipal wells are currently not impacted and modeling analyses indicate that the municipal ground water supply (i.e., the Murphree well field) will not be impacted by Site-related constituents. Each of these issues is discussed further below.

2. As part of the Site investigation efforts, a detailed survey was performed to identify private wells in the vicinity of the Site (i.e., within a one-half-mile radius of the Site). The findings

of this survey were reported in Report of Results: Investigation of Private Wells (TRC, June 2004). A subset of the private wells was selected for additional investigation based on their usage, locations relative to the Site, and owner agreements. The selected subset of wells was investigated for well construction details and water quality. The results of the investigation indicated that only one of the private wells, which was used for irrigation purposes only and was located at a property directly adjacent to the Site, had very low detections of Site-related constituents (TRC, June 2004). This well was plugged and abandoned using procedures approved by the SJRWMD in November 2004.

3. The private well survey also confirmed prior information indicating that there are only three known private drinking water wells in use within the vicinity of the Site and these three are believed to be completed in the Floridan Aquifer. These wells have been included in ACEPD's ongoing annual well sampling program since 1986, and as such are tested on regular basis by the ACEPD. To date, the ACEPD sampling has not identified any impacts to these wells of Site-related constituents.

4. In addition, ground water modeling indicates that these wells will not be impacted in the future. Figure 5.1 shows the location of these three private drinking water wells in relation to the predicted constituent concentrations in Floridan ground water. As shown, these wells are not ever expected to be impacted by site-related constituents. ACEPD intends to continue the regular monitoring of these three wells. Both GRU and ACEPD have been unsuccessful in prior attempts to have these private well water users connected to the municipal water supply that is available to all the residents of Gainesville.

5. Any future well installations within the vicinity of the Site are regulated by the SJRWMD. In addition, future wells are unlikely because of a readily available water supply from GRU. Therefore, it is unrealistic to assume that any additional private drinking water wells would be permitted for installation and used in the future. Consequently, the potential for future exposure to Site-related constituents in Floridan Aquifer ground water from future private wells does not exist.

6. Finally, as discussed in Chapter 2.0, Site-related constituents are projected never to reach the existing municipal water supply well-field. The ground water modeling results are reported in *Addendum 6: Groundwater Flow and Transport Model; Draft Report* (GeoTrans, October 2004).

7. Constituent fate and transport simulations were performed for naphthalene and arsenic. The fate and transport simulations indicate that offsite concentrations of naphthalene (an effective tracer for creosote as it has the highest aqueous solubility and is the most mobile of the constituents found in creosote) in the Upper Floridan Aquifer are predicted to be minimal, and naphthalene will never reach the GRU Murphree well field.

8. The fate and transport simulations for arsenic indicated that arsenic is not expected to migrate very far from the source locations near the southeastern corner of the Site, and also will not reach the GRU Murphree well field.

9. Given the considerations outlined above, the hypothetical potential risks of exposure to Site-related constituents in the Floridan Aquifer ground water are considered minimal.

5.1.1.4. Surface Soils

1. Risk assessment studies performed prior to and during the RSFS (TRC, 1999) indicated that direct contact with and inhalation of constituents in surface soils (i.e., the top 2 feet of onsite soils) are potentially complete exposure pathways for onsite workers. Additional risk assessment studies, performed as part of and subsequent to the RSFS, investigated potential risks to KI workers employed at the Site who may have exposure to surface soils by incidental ingestion, dermal contact, and inhalation during their workdays. These studies demonstrated that potential risks to KI workers fall within EPA's acceptable risk range of 10^{-4} to 10^{-6}. In addition, dioxin concentrations in soils fall well below the preliminary remediation goal established by EPA for dioxins and furans in industrial site soils.

5.1.2 REDUCTION OF POTENTIAL RISK BY SOURCE REMOVAL

1. As discussed in Chapter 3.0, the source removal IRM includes removal of soils from the four source areas down to 23 feet (i.e., to the base of the Surficial Zone). It is anticipated that the 440,000 cubic yards of soil that would be removed represent the great majority of the soils with DNAPL that are a source of dissolved constituents in the Surficial Zone.

2. GeoTrans simulated the effects of the source removal IRM on ground water quality conditions using the ground water flow model. The simulations were performed by "shutting off" the sources of naphthalene and arsenic in the Surficial Zone, and allowing the

plume to dissipate and, in the case of naphthalene, biodegrade. The existing ground water extraction system continued to operate in these simulations. The model methodology and results are presented in Appendix A and summarized below.

5.1.2.1 Surficial Zone Ground Water

1. The results of the model simulations for conditions following excavation of the onsite source areas indicate that a considerable amount of time will be required for the ground water quality in the Surficial Zone to improve. The model results for the Surficial Zone are summarized in Figures 5.2 and 5.3. Figure 5.2, which shows the naphthalene distribution after 15 years, indicates that naphthalene concentrations onsite would still be on the order of 20 parts per billion (ppb). The simulations also indicate that 20 years will be required for the concentrations to drop below 10 ppb onsite and offsite. Figure 5.3 shows the arsenic distribution after 100 years. Because arsenic does not biodegrade, the plume will slowly migrate toward the extraction well system where removal occurs. The peak arsenic concentration will decrease from 5,280 μg/L to approximately 1,100 μg/L in the Surficial Zone as a result of the source removal IRM, but the size and shape of the plume will not change significantly compared to no source removal.

5.1.2.2 Hawthorn Group Ground Water

1. The results of the fate and transport simulations with the ground water model indicate that source removal in the Surficial Zone will have essentially no effect on ground water quality conditions in the Hawthorn Group. This finding is consistent with the fact that after removal there will still be residual DNAPL in the Upper and Lower Hawthorn Zones that represents a continuing source of Site-related constituents to Hawthorn Group ground water. Therefore, the source removal IRM will not result in any reduction of potential risk.

5.1.2.3 Floridan Aquifer Ground Water

1. The results of the fate and transport simulations with the ground water model indicate that source removal in the Surficial Zone will have no effect on ground water quality conditions in the Floridan Aquifer, as illustrated in Figure 5.4. This finding is consistent with the fact that after removal, the residual DNAPL in the Upper and Lower Hawthorn Zones will still represent a continuing source of Site-related constituents to Upper Floridan Aquifer ground water. Therefore, the source removal IRM will not result in any reduction of potential risk

due to the potential future exposure pathway for ground water in the Floridan Aquifer. It is important to note that, as further discussed in Section 5.2.2, it is infeasible to remove the DNAPL-impacted soils from the Hawthorn Zones.

5.1.2.4 Surface Soils

1. The four excavation areas targeted for source removal generally correspond to the areas identified in the RSFS that require surface soil remediation due to the potential for inhalation, dermal contact, and incidental ingestion exposures by onsite workers. Therefore, the source removal IRM would ultimately eliminate the potential for onsite worker exposure to contaminated surface soils since the IRM would remove the soils that represent potentially unacceptable incidental ingestion and inhalation risks. However, the potential surface-soil-exposure risks are only related to soils in the top 2 feet and this potential pathway could also be eliminated by covering the affected areas with pavement or clean fill. Thus, if the only goal of source removal were to mitigate the potential surface soil exposure pathways, a soil cover could be used or only the top two feet of soil would need to be excavated (with the excavations being backfilled with clean soil).

5.1.3 IMPLEMENTATION RISKS

1. Implementation risks are risks and hazards that are introduced because of remedial construction and associated activities. These can include onsite and offsite construction accidents, traffic accidents, excessive emissions of dust or vapors, spills, etc. There is also a potential for excessive noise and nuisance odors resulting from implementation that may impact nearby residents and businesses. Many potential implementation risks and impacts are mitigated (but not eliminated) by standard engineering and institutional controls. For example, health and safety planning for remedial construction at Superfund sites requires detailed analysis, physical controls, and the use of personnel protection equipment to protect against expected or likely physical and chemical hazards. There is also contingency planning and protection for unexpected hazards and conditions.

2. Two of the more significant potential implementation risks that can be quantified as part of this source removal assessment include construction risks and transportation risks. These two potential risks are discussed below.

5.1.3.1 Potential Construction Risks

1. Statistics for industry averages of construction accidents can be used to estimate the likely number of accidents and fatalities that may occur as a result of implementing the various alternative IRM approaches contemplated herein. According to Bureau of Labor Statistics (see Appendix B), the injury rate for heavy construction is 38 per million hours worked; with a serious injury (those resulting in more than one lost day of work) rate of 14 per million hours worked. The fatality rate is approximately 0.06 per million hours worked.

2. Appendix C presents a resource loading analysis (man-hours and equipment) for Alternative 2 (disposal in an onsite landfill with all LDRs waived). Alternative 2 was selected for this analysis because it is the simplest to implement and requires the lowest level of construction effort among the four alternatives. Based on the resource loading analysis, Alternative 2 would require approximately 112,000 construction man-hours. Using the industry average statistics, this translates to two serious injuries that would likely result from performing the work, and a probability of approximately 1 in 150 for a project-related fatality to occur. It is important to note that these increased potential risks to workers would be incurred without the benefit of a balancing reduction in risk resulting from the IRM, since, as discussed in the previous section, the IRM will not result in **any risk-reduction** associated with exposure to Site-related constituents. Note also that Alternatives 1, 3, and 4 would have higher potential risks of construction-related accidents and fatalities since these Alternatives require a greater level of construction effort.

5.1.3.2 Potential Transportation Risks

1. There is also the potential for vehicular accidents, resulting in injuries or fatalities, to occur with some of the proposed alternatives. The National Highway Traffic Safety Administration provides statistics for accident and fatality rates per 100 million miles traveled. Data on accident rates for trucks are provided in Appendix B, and indicate that for 2001 (the most recent year for which rates are available), the injury accident rate was 43 per 100 million miles traveled and the fatality rate was 2.32 per 100 million miles traveled. The injuries and fatality statistics apply to all individuals involved in the accidents, not just the drivers of the trucks.

2. Table 5.1 presents an analysis of the total round trip miles that would be required for the alternatives that involve offsite disposal using highway trucks (i.e., Alternatives 1 and 4). For Alternative 1 (offsite incineration), the total vehicle miles are 32,400,000. When these

are combined with the accident rates presented above, this translates to 22 injury accidents and one fatality. For Alternative 4 (offsite disposal in a landfill after waiving LDRs), the total vehicle miles are estimated to be 26,000,000, which translates to 11 injury accidents and 60 percent chance of a fatality. When these increased accident-related potential risks associated with implementing the IRM are compared to the absence of any reduction of potential risk associated with exposure to Site-related constituents, it becomes clear that implementing the IRM creates more potential risk than it reduces.

3. As discussed in Section 4.0, there is also a need to truck the import soil to backfill the excavations for Alternatives 1, 2, and 4, and to construct the landfill if onsite landfill disposal is used (Alternative 2). The amount of imported soil required for these alternatives ranges from 700,000 to 830,000 tons of soil, or 30,500 to 36,000 truckloads. Assuming that this total volume of imported soil would be available from multiple sources within a 50-mile radius of the Site, an average round trip distance of 60 miles (i.e., average distance of import soil sources of 30 miles) could be assumed. This would translate to 1.8 to 2.2 million vehicle miles traveled in the vicinity of Gainesville, indicating an 80 percent to 95 percent chance of an injury accident, and an approximately 1 in 20 chance of a fatal accident caused by importing the soil as part of the source removal IRM.

4. It is important to note that the accident statistics discussed above are based upon actual data and represent average (or expected) injuries and fatalities. The estimates of potential risk (if any) associated with exposure to Site-related constituents are upper bound predictions of potential risks. They do not represent expected risks, as do the trucking accident injury and fatality rates. Indeed, as stated in *Guidelines for Carcinogen Risk Assessment* (EPA. 51 Federal Register 185:33992-34003. September 24, 1986), the actual risks associated with exposure to constituents are likely lower, and may even be zero. Comparison of these two types of predicted potential risks (those predicted from exposure to chemicals using standard risk assessment techniques to those predicted using actuarial data on construction, trucking and traffic accidents) suggests that there would be an overall net increase in potential risks to human health as a result of implementing the IRM.

5. Additional impacts associated with roadway usage by trucks include interruptions in passenger, delivery, and work truck traffic flow, and nuisance factors. Increased truck traffic in the vicinity of the Site is inevitable. While attempts would be made to minimize impacts of increased traffic, additional impacts to sensitive receptors may result from engine noise, tires grinding road cover, braking and mechanical squeals, horns, warning

alarms and engine emissions. At 1,000 tons per day (tpd) and one-half the soil being hauled by truck, there would be up to approximately 22 trucks per day (one every 20 minutes for an 8-hour work day) which would leave the Site for Alternatives 1 and 4. The trucks would likely travel west on NW 23rd Avenue, then north on NW 6th Street to Highway 222 (39th Avenue), then west to Interstate 75; 5 days per week, for nearly three years. Similarly, hauling import soil for Alternatives 1, 2 and 4 would cause similar local traffic impacts, although the routes through the city would vary depending on the location of the import sources. This likely represents a potential significant impact to the community that must be considered as part of project approval and design.

6. For Alternatives 1 and 4, some of the soil would be hauled by rail. The CSX rail transport line is located directly adjacent to the Site and a spur comes into the Site at the northwest corner. At a rate of 1,000 tpd with half the soil being hauled by rail, there would be approximately 5 gondolas per day, containing an average of 105 tons of soil. Rail haul would require 25 empty gondolas cars per week to be brought to the Site and 25 full cars to be towed away for a period of almost 3 years. This type of additional rail traffic load is not generally considered to cause a regional incremental increase in human health or environmental impact because a train that is 25 cars longer does not result in more trains or train accidents. This suggests that rail haul would be preferable if the logistics of acquiring gondolas at a sufficient rate over the entire period of the remedial construction could be worked out. However, the rail tracks go north across 39th Avenue, and would cause some nuisance impacts, such as additional traffic at rail crossings that would not occur absent the IRM.

5.2 TECHNICAL FEASIBILITY AND IMPLEMENTABILITY

1. The technologies being considered (i.e., dewatering, excavation, shoring, thermal desorption, incineration, and landfilling) have all been demonstrated to be effective in removing, detoxifying, and disposing of source material containing the constituents of concern at the Site. Chapter 6.0 presents a review of other sites where these technologies have been implemented to remove source material. However, in general, the source removal projects discussed in Chapter 6.0 have not resulted in improvements in ground water conditions and, as noted in Chapter 4.0, there is uncertainty if the treatment technologies are effective in treating soil to the levels required for disposal according to RCRA regulations.

2. Because of the large volume of soils that will be managed, there are constraints and influences that deserve special consideration. These considerations are discussed in Section 5.2.1 below.

3. Also, as discussed in Section 5.1.2 above, the source removal IRM would not be effective in improving ground water conditions in the Hawthorn Group and Floridan Aquifer because of the presence of source material in the Hawthorn Group deposits. In addition, the IRM was developed assuming that the current characterization is substantially accurate in identifying all the DNAPL-impacted soil in the Surficial Zone (i.e., that no additional DNAPL-impacted soil would be discovered during excavation). Discussion of the feasibility of removal of source material in the Hawthorn Group and the influence of discovering additional source material in the Surficial Zone are presented in Sections 5.2.2 and 5.2.3, respectively.

5.2.1 SCHEDULE AND SPACE CONSTRAINTS

1. In order to perform the source removal interim measure in a timely manner, a relatively high processing rate is necessary. An average processing rate of approximately 2,500 tpd would be required to complete the excavation and disposal work within 1 to 1.5 years. This time will be in addition to the time necessary to design the excavation and soil management facilities, obtain approvals, contract the work, dewater, construct the soil management facilities (staging areas, treatment facilities, the landfill or rail sidings, etc.) and backfill the excavations.

2. Figure 5.5 shows an example sequencing plan for Alternative 2, which indicates that the total project would require just over 2 years from contracting to demobilization. Alternative 2 is considered to be the simplest to implement because there is no treatment involved and the only restriction due to offsite activity is importing the backfill soil (i.e., there are no issues with the number of trucks or gondolas available, traffic, treatment capacity or rate, or landfill capacity).

3. Because of logistical and or equipment limitations for Alternatives 1, 3, and 4, it is highly unlikely that these alternatives could be successfully implemented at an average processing rate greater than 1,000 tpd. Constraints due to coordination, logistics, and equipment are well demonstrated by comparing the soil management constraints for Alternatives 2 and 3. While Alternative 2 would only require that soil be hauled directly to the onsite landfill for

disposal, Alternative 3 will require a substantially greater level of management, and consequently time, as outlined below:

- In Alternative 3, all the soil would require thermal treatment.
- The excavated soil would be stockpiled in "batches" (say 250 tons each for a 1,000 tpd processing rate) prior to thermal treatment.
- Soils would be pretreated (i.e., screening, drying and/or blending) as necessary to allow efficient thermal treatment.
- Each 250 ton batch would be thermally treated:
  - Large thermal treatment units have a capacity on the order of 100 tons per hour (2,400 tpd under 24 hour operation).
  - Two fairly large thermal treatment units (i.e., each with a capacity on the order of 25 tons per hour) would be needed to allow for downtime and surge capacity. These would both be operated 24 hours per day.
- Each batch of thermally treated soil would be tested for PAH and pentachlorophenol to verify that LDR treatment standards have been met:
  - Soils that do not meet treatment standards would be retreated or managed under a contingency plan (i.e., potentially offsite disposal). It is possible that 15 to 35 percent of the soil may require reprocessing based on the observed DNAPL conditions moisture content of the soil, and/or the geotechnical properties of the soil. Additionally, any LDR waiver granted to allow replacement of the soil back into the excavation may require multiple retreatment runs in an attempt to meet the strict Site-specific treatment standards that would likely be required by the LDR waiver (to be protective of ground water).
- Once the treatment requirements have been verified, the treated soils will be disposed in the lined excavations.

4. For the Alternatives involving the offsite haul (i.e., Alternatives 1 and 4), the process rate would be constrained by the logistics of coordinating the movement of a fleet of leased gondolas and on-highway trucks all across the country, and also the acceptance capacity of the TSD facilities receiving the soil. In order to assure the movement of five gondolas and 22 trucks per day (assuming 1,000 tpd and equal tonnage split between rail and road hauling), approximately 125 gondolas would need to be leased and 80 trucks contracted (assuming a 3-week round trip for the railcars and a 3-day round trip for the trucks and allowing for upsets and inefficiencies). The flow of trucks and rail cars would have to be maintained at this rate for nearly 3 years. In addition, the landfills and incinerators for offsite management have constraints on how much material they can accept daily (due to

permit limits and facility constraints). It has been assumed, for this analysis, that the landfills and incinerators could collectively accept 1,000 tpd.

5. As indicated by the above examples, there is a considerable risk of upset conditions caused either by equipment malfunction, poor performance of the treatment process, or poor coordination/management of all the activities. This is especially important considering that there is a limited amount of space available to stage/stockpile the soil during treatment. KI would continue wood treating operations during the IRM, and can allow only a portion of the property to be used for remediation operations. The areas discussed are shown in Figures 4.2 and 4.3. There is not enough room to stockpile more than one day of soil (i.e., 2,000 tons including soil just excavated and soil from the previous day that is awaiting testing results) in consideration of the treatment and operational constraints. Thus if there are upset conditions, the excavation of soil will also stop. The treatment and transportation processes are a critical step in the implementation and feasibility of completing this work in a timely manner unless there is an onsite landfill and the LDRs are waived.

5.2.2 FEASIBILITY OF REMOVING SOURCE MATERIAL FROM THE HAWTHORN GROUP

1. Removal of soil containing DNAPL from the Upper and Lower Hawthorn Zones is considered infeasible and/or cost prohibitive for the following reasons:
   - The excavations would have to be advanced to approximately 70 feet (i.e., the bottom of the Upper Hawthorn Zone) or, in the case of the North Lagoon and Drip Track areas, to approximately 110 feet (i.e., the bottom of the Lower Hawthorn Zone):
     - Dewatering rates would be considerably higher, likely on the order of a few hundred gallons per minute, and this water would require treatment. If the POTW does not have adequate capacity to handle this additional flow, an NPDES permit for discharge to the nearby creeks would be required.
     - Without shoring, the layback of the excavations would extend offsite, south into NW 23rd Avenue, and east across the CSX rail tracks and possibly into the neighboring businesses. In addition, it would likely be impossible to maintain wood treatment operations during the project, so the wood treatment plant would need to be shut down for 2 to 3 years.
     - A shored excavation (i.e., vertical walls below a certain depth) would require an elaborate shoring system in order to reach depths that are 3 to 5 times the depth discussed in earlier chapters for the Surficial Zone. Moving equipment and soil into and out of the excavation would also be problematic, possibly requiring large

hoists. Finally, there would be significant additional health and safety risks due to the potential for caving.

- The volume of impacted soil is unknown, but the total amount could easily be double the 700,000 tons estimated for the Surficial Zone. Additionally, there is an approximately equal volume of potentially clean overburden that must be managed as part of a shored or unshored excavation. Thus the impacted and overburden soil together is likely to be on the order of 1.4 million tons. The logistical constraints discussed in Section 5.2.1 would result in double the amount of time and effort required, and double the implementation risks.
- The lateral extent of the DNAPL in the Hawthorn Group cannot be accurately established prior to excavation, and it is possible that excavations in the deeper zones would need to be extended laterally in order to remove all DNAPL-impacted soils. DNAPL in the lower zones may have migrated laterally outside the footprint of the Surficial Zone excavation. While underground mining techniques (i.e., tunneling and construction of horizontal adits) could be used, these methods are expensive and dangerous.
- Management of the soil onsite would be more difficult as there are additional space and schedule requirements for onsite handling of the larger volume of soil and the facilities required to do so. In addition, there would be insufficient space for an onsite landfill, so both on- and offsite disposal would be required if the soil could not be returned to the excavations after treatment.
- There might not be enough import soil available locally to backfill the excavations if landfill disposal were required.
- The lowest cost scenario (if the project could be successfully designed and approved) would be on the order of at least $100 million (assuming $75 per ton to excavate, treat, and dispose/backfill roughly 1.4 million tons of contaminated soil in addition to the overburden management and import soil).

5.2.3 CONSIDERATIONS REGARDING DISCOVERY OF ADDITIONAL MATERIAL IN THE SURFICIAL ZONE

1. The source removal IRM considered herein is based on the known distribution of DNAPL and assumes that there are no unknown locations containing DNAPL-impacted soil. Based on experience with previous removal actions, it is rare that Site characterization and remedial design studies are able to completely delineate all locations with subsurface contamination. Consequently, removal actions typically result in discovery and excavation of a greater quantity of soil than is anticipated during design.

2. The typical conceptual model for DNAPL releases is that the DNAPL migrates essentially vertically until a barrier to flow occurs, and then the liquid spreads laterally/down dip. The lateral spreading may allow the DNAPL to encounter permeable vertical pathways, which allow further migration downward. Vertical and lateral migration continues in this manner until it reaches its residual saturation or encounters a competent barrier preventing further migration and the DNAPL pools.

3. The findings of the DNAPL Source Evaluation (GeoTrans, September 2004) are consistent with this migration model in that there were locations where DNAPL-free soil overlies DNAPL-impacted soils located on top of the uppermost clay layer, and there were observations of staining and odors laterally outside the source areas. The sources at the Site were active for a considerable period of time, so it is likely that a considerable amount of DNAPL could have entered the subsurface and spread both laterally and vertically. Therefore, it is likely that additional DNAPL-impacted soils would be discovered during excavation of the source removal IRM.

4. This is important because two fundamental assumptions in this evaluation of source removal are that the goal of the excavation is to remove only the currently-identified soils (i.e., not to excavate to a concentration-based cleanup standard) and that the current characterization accurately identifies all the areas with DNAPL-impacted soils in the Surficial Zone. Excavating to neat lines and grades as described herein is an extremely unusual approach for remediation, and it is unlikely that such an approach would be approved by the regulatory agencies. In addition, even if the approach were approved based on the current data, it is likely that source material would remain in the Surficial Zone, further highlighting the lack of a reduction in potential risk as described in Section 5.1.2 above.

5.3 COSTS

1. Engineering-level costs have been estimated for the four Alternatives. The costs are summarized in Table 5.2, and cost estimate details and backup are provided in Appendix D. The lowest cost alternative is Alternative 2 (disposal in an onsite landfill with a waiver for all LDRs), and is estimated to be over $35 million. The next lowest cost alternative (which involves treatment) is approximately triple the cost (i.e., nearly $110 million).

2. The difference in cost between Alternatives 1 and 2 demonstrates the impact of regulations specific to wood treatment wastes discussed in Section 4.1 (i.e., the land disposal

restrictions [LDRs]; 40 CFR Part 268). This is very important because a waiver of land disposal restrictions can be difficult to obtain and requires considerable demonstration and evaluation.

3. As noted in Section 5.1 above, implementation of the IRM will not reduce any potential risks associated with potable use of ground water and reductions in potential direct soil contact and inhalation risks can be achieved without the excavation contemplated by this Source Removal Assessment Report. Therefore, considering the costs necessary to perform IRM ($35 to $500 million), the benefit of such expenditure to perform the excavation is clearly limited.

6.0 SURVEY OF OTHER PROJECTS WITH SOIL EXCAVATION FOR SOURCE CONTROL

1. As part of evaluating large-scale excavation as a source removal measure for the Site, a review of information on other contaminated sites was performed to investigate the techniques employed and the results of remediation. Project sites from all of the EPA Regions were reviewed. Project sites that were reviewed in detail had similar contamination, involved large volumes of soil, or employed removal of source material as a remedial approach. Sites with smaller volumes of soil contamination were not reviewed for the survey. A variety of sources of information were used, including websites of the EPA and other regulatory agencies and reports in hard copy form. Some of the regulatory project managers were contacted via e-mail to gather additional details on costs, scopes of work, and status of the surveyed projects.

2. The information gathered during the survey is presented in Tables 6.1 and 6.2. Table 6.1 lists identified projects that utilized excavation as a source removal measure. Table 6.2 lists identified projects where the original remedy in the Record of Decision (ROD) was excavation, but the ROD was amended to eliminate excavation of a large volume of soil. In general, the ROD changes were based on the lack of risk reduction and the implementability/feasibility of the ROD remedy.

3. The projects listed in Table 6.1 utilized a variety of treatment methods for the excavated soil, such as incineration, thermal desorption, and solidification. All of the sites were contaminated with a mixture of organic and inorganic chemicals, including wood preserving chemicals, petroleum products, and other industrial wastes. Soil was excavated from areas on the project sites above and below the ground water table. At some of the sites, sediment was also removed from underwater areas of ponds, bayous, streams, and rivers.

4. In reviewing information for the various surveyed sites, the following general observations were made:

   - The ground water remains contaminated at all of the sites reviewed. While ground water conditions have generally improved following excavation, none of the removal actions have cleaned up the ground water to meet MCLs. Most of the sites are still implementing active treatment of the ground water to remediate the contamination. This is consistent with the findings of a 2003 expert panel coordinated by the EPA that concluded that they were not aware of any documented, peer-reviewed case of DNAPL source depletion beneath the water table where MCLs have been achieved (EPA, 2003).
   - The sites will require long term Operations and Maintenance (O&M) of the ground water remediation systems.

- The cost for remediation at the sites is relatively high when compared to costs for effective remediation at other similar size contaminated sites that did not use source removal.
- Removal at several sites was not complete, and residual soil or sediment contamination remains even after extensive excavation of the sites.
- Some of the sites may also require future removal actions to address lingering DNAPL sources in the soil.

7.0 SUMMARY AND CONCLUSION

1. This Source Removal Assessment Report evaluates the feasibility of conducting interim source removal at four Site source areas in the form of soils excavation followed by (i) offsite incineration or disposal; or (ii) onsite treatment and/or disposal. As requested by the EPA and other stakeholders, and as required for agency determination of remedial activities pursuant to Superfund and the NCP, a significant part of this evaluation involved an analysis of three factors: feasibility, potential risk reduction and cost. The Report finds that the source removal options available to Beazer at this Site are infeasible, do not reduce potential risks and are not cost-effective.

2. This Source Removal Assessment Report demonstrates that the options evaluated for large-scale removal of impacted soils are impracticable and generally infeasible. Every option evaluated involves excavation of huge volumes of soil (estimated at 440,000 cubic yards of soil down to the bottom of the Surficial Zone) with all of the attendant problems associated with excavating, staging, treating and/or temporarily storing such large quantities. To further complicate this scenario, excavated soils would likely have to be managed as listed hazardous wastes under RCRA. The listed hazardous characterization of the soils adds enormous complexity and cost to every step of the soils management process through ultimate disposition. For offsite incineration or disposal in a landfill, EPA's LDR requirements must be met, which severely limit available facilities that are authorized to accept the impacted soils and dramatically increase disposal costs. The offsite options also involve increased environmental and safety risks to the surrounding public as a result of the thousands of shipments of hazardous waste that would be moved through neighboring communities for ultimate disposal. With respect to onsite disposal, Beazer would be required to obtain waivers from the currently applicable strict regulatory prohibitions and restrictions associated with onsite landfilling of hazardous wastes. Applicable regulations would require Beazer to prepare and submit complex and time consuming technical, legal and cost demonstrations in order to seek such waivers. Finally, Beazer understands that these waivers take a very long time to be reviewed and acted upon, and are difficult to obtain.

3. The Source Removal Assessment Report also demonstrates that the source removal options will not meaningfully reduce potential Site risks associated with migration of constituents into drinking water aquifers at the Site, which were of primary concern to EPA and the other stakeholders and the major driver for this evaluation. With regard to this concern, the Report concludes that there is no current or future unacceptable potential risk to any receptors of

ground water impacted by Site constituents. This conclusion is based on observations and ground water modeling and projections even without any source removal. Notwithstanding that conclusion, the Report goes further and concludes that source removal options do not create meaningful reductions in risks to ground water for at least the following reasons: (i) in the Surficial Zone, ground water is not being used for potable purposes (city water is readily available), the existing natural poor quality of the shallow ground water absent impacts from wood treating operations does not support potable uses, and new uses of potable ground water are inhibited by local ordinance absent specific regulatory approvals; (ii) in the Hawthorn Group Zones and Floridan Aquifer, source removal would have no appreciable effect on the distribution and concentration of Site-related constituents; moreover, removal of the DNAPL impacted soils in the Surficial Zone will not eliminate ongoing impacts from limited amounts of residual DNAPL in the Hawthorn and Upper Floridan zones, thereby making the removal exercise meaningless; and (iii) Site-related constituents do not migrate much beyond Site boundaries and the Murphree well field is not at risk from such constituents in ground water.

4. Finally, this Source Removal Assessment Report projects enormous cost associated with the source removal options. Table 5.2 projects costs that range from the low end of over $35 million (for disposal in an onsite landfill with a full waiver of LDR requirements) to $500 million (for offsite treatment/disposal in compliance with LDR requirements). In Beazer's view, under any analysis these costs are exorbitant and unsupportable, and are particularly so in light of the lack of potential risk reduction that would be achieved as detailed above.

5. In summary, the Report finds no technical or practical basis for implementing source removal options at the Gainesville Site. Notwithstanding these conclusions, Beazer remains committed to progressing as quickly as practicable toward arriving at a workable Site-wide comprehensive remediation strategy based upon sound science and meaningful potential risk reduction. The results of this Report will be incorporated into a revised Site Feasibility Study to be submitted at a later date following consideration of data collected from the implementation of the interim measures/pilot remedy approaches ongoing at the Site.

8.0 REFERENCES

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United States General Accounting Office (GAO), October 1997. *Hazardous Waste – Remediation Waste Requirements Can Increase The Time and Cost of Clean-Ups* (GAO/RCED 98-4).

USEPA, September 24, 1986. *Guidelines for Carcinogen Risk Assessment*, 51 Federal Register 185:33992-34003.

TABLE 2.1

VOLUMES OF SURFICIAL ZONE SOIL CONTAINING DNAPL IN THE FOUR SOURCE AREAS(1)(2)

SOURCE AREA	ESTIMATED VOLUME (cubic yards)
Process Area	35,500
Drip Track	10,000
South Lagoon	21,700
North Lagoon	32,500
TOTAL	**99,700**

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(1) Volumes are “neat” quantities, i.e., they do not include the volume of soils from overburden and layback of slopes.

(2) From Geotrans, September 2004.

TABLE 3.1

SUMMARY OF DEWATERING
QUASI STEADY-STATE RATES AND VOLUMES

SOURCE AREA	MAXIMUM DEWATERING FLOW RATE (gpm)	AVERAGE QUASI STEADY-STATE FLOW RATE (gpm)	APPROXIMATE TIME FOR DEWATERING (days)	INITIAL DEWATERING VOLUME[1] (gallons)	QUASI STEADY-STATE VOLUME[2] (gallons)
Process Area	372	57	20	2,595,951	2,293,496
Drip Track	270	38	20	2,010,093	2,863,887
South Lagoon	401	42	35	4,031,365	3,812,092
North Lagoon	218	29	17	1,257,904	3,581,920
				Total	12,551,395
				Total Water Produced[3]	22,446,707

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(1) Volume of water that must be removed to allow excavation.
(2) Volume of water pumped to keep the excavation dewatered during construction.
(3) Initial dewatering volume plus steady-state volume.

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TABLE 4.1

LAND DISPOSAL RESTRICTIONS
TREATMENT STANDARDS FOR HAZARDOUS WASTES

WASTE CODE	WASTE DESCRIPTION	REGULATED HAZARDOUS CONSTITUENTS	TREATMENT STANDARD (mg/kg unless noted as "mg/L TCLP")	ALTERNATIVE SOIL TREATMENT STANDARD(4) (mg/kg unless noted as "mg/L TCLP")
F032	Chlorophenolic formulations	Acenaphthene	3.4	34
		Anthracene	3.4	34
		Benz(a)anthracene	3.4	34
		Benzo(b)fluoranthene	6.8	68
		Benzo(k)fluoranthene	6.8	68
		Benzo(a)pyrene	3.4	34
		Chrysene	3.4	34
		Dibenz(a,h)anthracene	8.2	82
		2-4-Dimethylphenol	3.4	34
		Fluorene	8.2	82
		Hexachlorodibenzo-p-dioxins	14	140
		Hexachlorodibenzofurans	0.001 or CMBST(1)(2)	0.01
		Indeno(1,2,3-c,d)pyrene	3.4	34
		Naphthalene	5.6	56
		Pentachlorodibenzo-p-dioxins	0.001 or CMBST(1)(2)	0.01
		Pentachlorodibenzofurans	0.001 or CMBST(1)(2)	0.01
		Pentachlorophenol	7.4	74
		Phenanthrene	5.6	56
		Phenol	6.2	62
		Pyrene	8.2	82
		Tetrachlorodibenzo-p-dioxins	0.001 or CMBST(1)(2)	0.01
		Tetrachlorodibenzofurans	0.001 or CMBST(1)(2)	0.01
		2,3,4,6-Tetrachlorophenol	7.4	74
		2,4,6-Trichlorophenol	7.4	74
		Arsenic	5.0 mg/L TCLP(3)	50 mg/L TCLP(3)
		Chromium (Total)	0.60 mg/L TCLP(3)	6.0 mg/L TCLP(3)

TABLE 4.1

LAND DISPOSAL RESTRICTIONS
TREATMENT STANDARDS FOR HAZARDOUS WASTES
(Continued)

WASTE CODE	WASTE DESCRIPTION	REGULATED HAZARDOUS CONSTITUENTS	TREATMENT STANDARD (mg/kg unless noted as "mg/L TCLP")	ALTERNATIVE SOIL TREATMENT STANDARD(4) (mg/kg unless noted as "mg/L TCLP")
F034	Creosote formulations	Acenaphthene Anthracene Benz(a)anthracene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Chrysene Dibenz(a,h)anthracene Fluorene Indeno(1,2,3-c,d)pyrene Naphthalene Phenanthrene Pyrene Arsenic Chromium (Total)	3.4 3.4 3.4 6.8 6.8 3.4 3.4 8.2 3.4 3.4 5.6 5.6 8.2 5.0 mg/L TCLP(3) 0.60 mg/L TCLP(3)	34 34 34 68 68 34 34 82 34 34 56 56 82 50 mg/L TCLP(3) 6.0 mg/L TCLP(3)
F035	Inorganic preservatives containing arsenic or chromium	Arsenic Chromium (Total)	5.0 mg/L TCLP(3) 0.60 mg/L TCLP(3)	50 mg/L TCLP(3) 6.0 mg/L TCLP(3)
K001	Sediment sludge	Napthalene Pentachlorophenol Phenanthrene Pyrene Toluene Xylenes-mixed isomers Lead	5.6 7.4 5.6 8.2 10 30 0.75 mg/L TCLP(3)	56 74 56 82 100 300 7.5 mg/L TCLP(3)

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(1) CMBST (Combustion) – High Temperature organic destruction technologies, such as combustion in incinerators, boilers, or industrial furnaces operated in accordance with the applicable requirements of 40 CFR part 264, subpart O, or 40 CFR part 265, subpart O, or 40 CFR part 266, subpart H, and in other units operated in accordance with applicable technical operating requirements; and certain noncombustive technologies, such as Catalytic Extraction Process.

(2) For these wastes, the definition of CMBST is limited to: (1) combustion units operating under 40 CFR 266, (2) combustion units permitted under 40 CFR Part 264, Subpart O, or (3) combustion units operating under 40 CFR 265, Subpart O, which have obtained a determination of equivalent treatment under 268.42(b).

(3) TCLP = Toxicity Characteristic Leaching Procedure

(4) As defined in 40 CFR § 268.49 for soil impacted by Hazardous Waste

TABLE 4.2

ALTERNATIVE SCENARIOS EVALUATED

ALTERNATIVE NUMBER	DESCRIPTION OF MANAGEMENT[1]	TREATMENT OF SOILS IN:			
		Drip Track Area	South Lagoon	North Lagoon	Former Process Area
--	Excavation (common to all scenarios)	70,000 cy	130,000 cy	105,000 cy	136,000 cy
1	Dispose in Offsite TSD Incineration Facility (no LDRs waived)	Incineration			
2	Dispose in Onsite Landfill (LDRs waived)	No treatment			
3	Backfill treated soils in lined excavation (LDRs waived)	Thermal Desorption			
4	Dispose in Offsite RCRA-Subtitle C Landfill (LDRs waived)	No Treatment			

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(1) LDR treatment standards require treatment for creosote, pentachlorophenol, dioxins/furans and arsenic.

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TABLE 4.3

POTENTIAL OFFSITE SOIL DISPOSAL FACILITIES

OPERATOR	LOCATION	TYPE OF FACILITY	ROUND TRIP DISTANCE (MILE)	COMMENTS
Clean Harbors Environmental Services	Deer Park, Texas	Incineration	1,700	- Incineration for F032, F034, and F035 soils - Offsite disposal, onsite landfill available for incineration residue - To be used in conjunction with Aragonite and Kimball incineration facilities because of capacity issues - Both rail and trucking will be utilized
	Aragonite, Utah	Incineration/Storage (before treatment and disposal)	4,600	- Incineration for F032, F034, F035 soils - Rotary Kiln incineration technology - Offsite disposal - Convenient rail services (union Pacific and Burlington Northern Railways) - To be used in conjunction with Deer Park and Kimball incineration facilities because of capacity issues - Both rail and trucking will be utilized
	Kimball, Nebraska	Incineration/Onsite RCRA "C" monofill	3,500	- Incineration for F032, F034, and F035 soils - Thermal oxidation incinerator - Offsite disposal - To be used with Deer Park and Aragonite incineration facilities because of capacity issues - Both rail and trucking will be utilized
	Lone Mountain, Waynoka, Oklahoma	Subtitle "C" Landfill Facility	2,600	- Soils can be directly landfilled as hazardous material if treatment standards are met, or if Region IV and State waive the LDRs - Soils can be directly landfilled as non-hazardous material if Region IV and State approve and waive "F" Listings - Both rail and trucking will be utilized
	Grassy Mountain, Utah	Subtitle "C" Landfill Facility	4,600	- Soils can be directly landfilled as hazardous material if treatment standards are met, or if Region IV and State waive the LDRs - Soils can be directly landfilled as non-hazardous material if Region IV and State approve and waive "F" Listings - Both rail and trucking will be utilized

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TABLE 4.3

POTENTIAL OFFSITE SOIL DISPOSAL FACILITIES
(Continued)

OPERATOR	LOCATION	TYPE OF FACILITY	ROUND TRIP DISTANCE (MILE)	COMMENTS
Waste Management Inc.	Emelle, Alabama	Subtitle "C" Landfill Facility	1,000	- Soils can be directly landfilled as hazardous material if treatment standards are met, or if Region IV and State waive the LDRs - Soils can be directly landfilled as non-hazardous material if Region IV and State approve and waive "F" Listings - Option only available upon conformance with 40 CFR regulations and/or approval from State and Federal agencies. - If approved, will be utilized with Lake Charles landfill facility - Rail option is not cost effective
Waste Management Inc.	Lake Charles, Louisiana	Subtitle "C" Landfill Facility	1,500	- Soils can be directly landfilled as hazardous material if treatment standards are met, or if Region IV and State waive the LDRs - Soils can be directly landfilled as non-hazardous material if Region IV and State approve and waive "F" Listings - Option only available upon conformance with 40 CFR regulations and/or approval from State and Federal agencies - If approved, will be utilized with Emelle landfill facility - Rail option is not cost effective

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TABLE 5.1

ANALYSIS OF VEHICLE MILES REQUIRED FOR DISPOSAL

	QUANTITY	UNITS	BASIS/COMMENTS
Total tons of soil	700,000	tons	Given
Average truckload	23	tons	Engineer's experience
Total truckloads	15,300	loads	Extension (assumes ½ the soil is hauled by truck and the other half is transported by rail)
Assumed Processing Rate	1,000	tons per day	Assumption based on engineer's experience
Truckloads per day	22	loads	Extension, assuming ½ the soil moved by truck
Average Roundtrip Vehicle Miles per Load for Alternative 1 (Incineration)	2,115(1)	miles	See note (1) and Table 4.3
Total Vehicle Miles for Alternative 1	**50,000,000**	**miles**	**Extension**
Average Roundtrip Vehicle Miles per Load for Alternative 4 (RCRA C Disposal)	1,700(2)	miles	See note (2) and Table 4.3
Total Vehicle Miles for Alternative 4	**26,000,000**	**miles**	**Extension**

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(1) Assumes ⅓ of the truckloads requiring incineration go to each of the three incineration facilities identified in Table 4.3 (i.e., Deer Park, Texas [1,700 r.t. miles], Aragonite, Utah [4,600 r.t. miles], and Kimball, Nebraska [3,500 r.t. miles]). Three facilities are assumed based on likely capacity limitations.

(2) Assumes ⅓ of the truckloads going to each of the three closest Subtitle C facilities identified in Table 4.3 (i.e., Emelle, Alabama [1,000 r.t. miles], Lake Charles, Louisiana [1,500 r.t. miles], and Waynoka, Oklahoma [2,600 r.t. miles]). Three facilities are assumed based on likely capacity limitations.

TABLE 5.2

SUMMARY OF COSTS

TASK		ALT 1	ALT 2	ALT 3	ALT 4
Demolition		$160,600	$160,600	$160,600	$160,600
Excavation		$16,968,925	$16,662,431	$7,813,988	$16,968,925
Onsite Treatment of Soil/Transloading Facilities		$126,305	--	$59,286,430	$126,305
Onsite Landfill		--	$5,267,804	--	--
Lined Excavation/Backfill with Treated Soil		--	--	$3,150,934	--
Offsite Treatment/Disposal		$441,720,600	--	--	$188,879,424
Site Restoration		$1,426,580	$1,392,920	$1,193,000	$1,426,580
Other	Engineering (including Field Investigations)	$6,138,707	$1,878,700	$5,728,396	$2,767,491
	Local Permitting	$3,836,692	$1,174,188	$3,580,248	$1,729,682
	Construction Management/Project Management	$6,138,707	$1,878,700	$5,728,396	$2,767,491
	QA/QC	$3,836,692	$1,174,188	$3,580,248	$1,729,862
	Contingency	$11,510,075	$3,522,563	$10,740,743	$5,189,046
	Fee	$7,673,384	$2,348,375	$7,160,495	$3,459,364
Total		**$499,537,266**	**$35,460,470**	**$108,123,477**	**$225,204,590**

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TABLE 6.1

SURVEYED PROJECT SITES

Project Name	Project Description	Project Location	Project Dates	Remediation Technology	Ground Water Conditions	Estimated Price
Gulf States Utilities	Manufactured Gas plant starting in 1916. The coal tar by-products were disposed on into marshlands. The marshlands were also used as a landfill for electrical equipment and poles. Excavation and offsite disposal of the contaminated sediment was completed in 2002.	Lake Charles, Louisiana	2000-2002	Excavation/Offsite disposal	Monitored Natural Attenuation	$20,000,000(1)
Fairbanks Disposal Pit	Abandoned pit used for disposal of construction debris, drummed waste, and liquid waste. Over 111,000 cubic yards of contaminated soil was excavated in 1994/1995 with a portion transported offsite for disposal. In 2001/2002, 90,000 cubic yards of clean overburden and contaminated soil were excavated, treated onsite, and returned to the excavation.	Fairbanks, Florida	1994-2003	Excavation/Offsite disposal	Ongoing O&M of groundwater treatment system; concentrations decreasing	$34,000,000
Bayou Bonfouca	The site is a former creosote plant that started operation in 1892. Plant operations resulted in contamination of soil, water, and sediments. 170,000 cubic yards of sediment were excavated and incinerated onsite.	Slidell, Louisiana	1989-2001	Excavation/Onsite Incineration	Ongoing O&M of groundwater treatment system	$140,000,000
Augusta MGP	The site is a former manufactured gas plant that started operation in 1852. Operation of the plant resulted in the contamination of soil and a canal. Over 60,000 tons of soil were excavated and transported for disposal offsite. An additional 82,000 tons of contaminated soil were solidified in place.	Augusta, Georgia	2003	Excavation/Offsite disposal, Onsite Solidification, Insitu Oxidation	Ongoing O&M of groundwater treatment system	$40,000,000
American Creosote Works, Inc.	The site is a former wood treatment plant that began operations in 1901. Waste disposal and site operations resulted in soil and water contamination. 56,000 cubic yards of soil were excavated and incinerated onsite. Over 7,000 cubic yards of soil were capped onsite. Insitu treatment of 275,000 cubic yards of soil is continuing at the site.	Winnfield, Louisiana	1988-2003	Excavation/Onsite Incineration	Ongoing O&M of groundwater treatment system	$17,000,000
American Creosote Works	A wood treatment plant operated at the site from 1931 to 1980. Soil and water were contaminated by waste disposal and facility operations. An emergency response action excavated 100,000 cubic yards of soil. The soil was solidified and capped onsite. An additional remedial action excavated 90,000 cubic yards of soil. That soil was solidified and buried onsite. Over 500,000 gallons of contaminated water was treated and discharged.	Jackson, Tennessee	1983-2004	Excavation/Onsite Treatment/Landfill and Offsite Disposal	Monitoring of groundwater	$6,000,000
Sikes Disposal Pits	In the 1960's the site was used for the disposal of chemical waste from petrochemical companies in the area. The waste was disposed of in unlined sand pits. Waste disposal resulted in soil and water contamination. 496,000 tons of sludge and soil were excavated and incinerated onsite. In addition, 350,000,000 gallons of water were incinerated onsite.	Crosby, Texas	1983-2002	Excavation/Onsite Incineration	Monitoring of groundwater	$120,000,000
Southern Ship Building	A ship building plant was constructed on the site in 1919. The facility operations resulted in the contamination of water and soil. 67,000 cubic yards of soil were excavated and incinerated at the Bayou Bonfouca project site. The ash was then placed in a landfill at the site.	Slidell, Louisiana	1995-2001	Excavation/Onsite Incineration	No active groundwater remediation (Shallow, perched, lenses of groundwater contaminated)	$25,000,000
Selma Pressure Treatment	The site is a former wood treatment facility located near Fresno, California. Operation of the facility resulted in soil contamination. The site was excavated and contaminated soil was to be placed in an onsite landfill. Only 12,000 cubic yards were excavated, and then the operation was stopped to re-evaluate the cleanup remedy.	Selma, California	1988-2004 (Remedy not fully implemented)	Excavation/Onsite Landfill	O&M of groundwater treatment system	$2,500,000
Waterloo Coal Gasification Plant	A coal gasification facility was constructed at the site in 1901. Waste tar disposal and operation of the facility resulted in soil contamination. Approximately 12,000 tons of soil was excavated and transported to the George Neal Power Generation Station for incineration. An additional 14,000 tons of soil was excavated and treated onsite with thermal desorption.	Waterloo, Iowa	1993-1998	Excavation/Onsite Thermal desorption and Offsite Incineration	Monitoring of contaminated groundwater to establish ACLs (MCLs/MCLGs were found to be not practical)	$40,000,000(1)
Escambia Wood	The site was a wood treatment facility that started operation in 1942. Facility operations resulted in contaminated soil. 225,000 cubic yards of soil was excavated and stockpiled onsite. A feasibility study is being completed to look at the options for the soil.	Pensacola, Florida	1982-2005	Excavation/Onsite Storage	RI of groundwater	$330,000,000(1)
Coleman-Evans Wood Preserving Company	The site started operations as a wood preserving site in 1952. Operation of the facility resulted in soil and water contamination. 210,000 tons of soil was excavated and treated onsite with thermal desorption.	Whitehouse, Florida	1986-2005	Excavation/Onsite Thermal Desorption	Remedial Design for groundwater treatment	$210,000,000(1)
Cape Fear Wood Preserving	The site was used as a creosote wood preserving facility, starting in 1953. Soil and water were contaminated by operation of the facility. Over 113,000 cubic yards of soil were excavated and treated by onsite thermal desorption. Field study being conducted to test removal of DNAPL with in-situ electrical resistivity.	Fayetteville, North Carolina	1977-2005	Excavation/Onsite Thermal Desorption	O&M of groundwater treatment system	$20,000,000
Brunswick Wood Preserving	Starting in 1958, a creosote wood preserving facility was operated at the site. The site operations resulted in the contamination of soil and water. Over 150,000 tons of soil were excavated and disposed of offsite. Additional soil has been stored onsite. A feasibility study is being conducted to determine the options for the remaining soil.	Brunswick, Georgia	1991-2005	Excavation/Offsite Disposal and Onsite Storage Cell	RI/FS of groundwater	$32,000,000
Southern Maryland Wood Treating Site	Utilized from 1965 to 1978 for wood preserving, site operations resulted in surface soil, surface water, and shallow ground water impacts. There was no potential for deep groundwater contamination based on observed water quality and hydrogeologic conditions. 270,000 tons of soil were removed, treated, and replaced in the excavations.	Hollywood, Maryland	1982-2001	Excavation/Onsite Thermal Desorption/Redisposal	No further risk associated with shallow ground water due to excavation and institutional controls	$60,900,000

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(1) Cost estimated by TRC based on the available site information.

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TABLE 6.2

SITE WITH AN AMENDED RECORD OF DECISION (ROD)

PROJECT NAME	PROJECT DESCRIPTION	PROJECT LOCATION	NEW REMEDY SELECTED	REASON FOR CHANGE OF REMEDY
McColl Superfund Site	Waste sumps containing approximately 97,000 cubic yards of acid sludge waste from petroleum refineries.	Fullerton, California	In-situ solidification	State court injunction. Implementation risks (odors and air emissions) exceeded baseline risks.
J.H. Baxter Superfund Site	The site was a former wood treatment facility. Facility operations resulted in contamination of soil and surface and ground water at the site.	Weed, California	Containment with a slurry wall and caps; limited excavation, treatment and on-site disposal of surface soils	Increase in estimated volume of DNAPL-impacted soils; no significant reduction in risk would result from excavation; technical impracticability.
Waste Disposal, Inc.	The site was a former disposal facility. The site contains liquid and solid wastes and petroleum refinery wastes.	Santa Fe Springs, California	In-situ capping with soil gas control	No risk reduction would result from excavation (baseline risks at the site were below acceptable range).
Mercier Lagoons	Lagoons at the Site were used for industrial organic waste (DCA 42% by weight) disposal between 1968 and 1972	Ville Mercier, Quebec, Canada	Pump and treat as a confinement measure	Risk reduction associated with existing exposure pathways and termination of ground water pump and treat system would not result from excavation. Extent of DNAPL is greater than proposed excavation depth. The actual extent of DNAPL could be deeper than known. Potential release of vapors and fugitive dust into the atmosphere. High health risks associated with conducting the excavation.

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