RECORD OF DECISION
SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

MRI CORP. SUPERFUND SITE

OPERABLE UNIT 2
(GROUND WATER)

TAMPA, HILLSBOROUGH COUNTY, FLORIDA

PREPARED BY:

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA, GEORGIA

SEPTEMBER 2008

RECORD OF DECISION

DECLARATION

Site Name and Location

This Record of Decision (ROD) is for the MRI Corp. Superfund Site Operable Unit (OU) 2 (Ground Water) located at 9220 Stannum Street in Tampa, Hillsborough County, Florida. The U.S. Environmental Protection Agency (EPA) Site Identification Number is FLD088787585.

Statement of Basis and Purpose

This decision document presents the selected remedy for the "Site," OU2 (Ground Water) that was chosen in accordance with the Comprehensive Environmental Response, Compensation, Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Contingency Plan (NCP). This decision is based on the Administrative Record for the Site. This decision represents the final remedy selected for the Site and following completion of the remedial action (RA), the Site will be ready for reuse. The State of Florida, as represented by the Florida Department of Environmental Protection (FDEP), has been the support agency during the remedial investigation/feasibility study (RI/FS) process. In accordance with 40 Code of Federal Regulations (CFR) Sec 300.430, as the support agency, FDEP has provided input during the process and has actively participated in the decision making process. While FDEP concurs with the conceptual model of this proposed remedy, there are specific design concerns which have not been fully addressed at this time.

Assessment of Site

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of (1) hazardous substances to the environment; and (2) pollutants or contaminants from this Site which may present an imminent and substantial endangerment to public health or welfare.

Description of Selected Remedy

The overall cleanup strategy for OU2 (ground water) is to complement and be compatible with the remedy for OU1 (solidification/stabilization [S/S]) for the soil and sediment contamination. Solidified material from the OU1 RA would be used as part of the cap overlying the area contained by the slurry or vertical barrier walls. The remedies for OU1 and OU2 will be implemented concurrently. Following completion of construction and establishment of institutional controls (ICs), the remedy will be protective of both human and ecological receptors. The selected remedy is compatible with the planned future use of the property. The major components for the selected remedy include:

- Excavation of contaminated soils that exceed the cleanup goal for protection of ground water.

- Construction of a containment cell (slurry or vertical barrier walls) to contain impacted shallow ground water.
- Placement of excavated soils above established cleanup goals within the limits of the containment cell.
- Construction of a multimedia cap over the on-site containment cell.
- Backfill of clean soil into areas where contaminated soils were removed.
- Ground water outside the containment cell will be monitored and allowed to attenuate by natural processes.
- Long term monitoring to assess the effectiveness of the remedy and to assure that the cleanup goals are met.
- Five-Year Reviews of the remedy to ensure protectiveness of the remedy.
- ICs through a restrictive covenant and Engineering Controls will be required for the MRI Property and off-site properties and could include the following measures:

    - Prohibit potable ground water use on the MRI Property and adjacent impacted properties;
    - Restrict access to the MRI Property through fencing and warning signs;
    - Limit future land use to uses compatible with industrial/commercial purposes;
    - Prohibit excavation without written approval from EPA and FDEP;
    - Placement of cap cover; and
    - Grant permanent access to the property to EPA and FDEP and their agents and/or representatives.

Statutory Determinations

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the RA (unless justified by a waiver), and is cost effective. This remedy utilizes permanent solutions to the maximum extent practicable for OU2 but does not satisfy the statutory preference for remedies that employ treatment to reduce toxicity, mobility, or volume as a principal element. However, in conjunction with the remedy for OU1 S/S, the statutory preference for treatment will be satisfied for the Site. The remedy eliminates human and ecological exposure to contaminated ground water, permanently controls the mobility of the contaminants, and is protective of ground water resources. The contaminated ground water being addressed through OU2 is relatively immobile and therefore does not constitute principal threat wastes.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that will allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years of construction of the remedy to ensure that the on-site remedy remains protective of human health and the environment, inclusive of the applicable ICs.

Data Certification Checklist

The following information is included in The Decision Summary of this ROD. Additional information may be found in the Administrative Record file for this Site.

- Chemicals of concern (COCs) and their respective cleanup levels (Table 9, page 50)
- Baseline risk represented by the COCs (Tables 1 though 8, pages 42 through 49)
- Cleanup goals established for COCs and the basis for these levels (Tables 9 and 10, page 50)
- How source materials constituting principal threats are addressed (page 31)
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of ground water used in the Baseline Risk Assessment (BRA) and ROD (page 12)
- Potential land and ground water use that will be available at the Site as a result of the selected remedy (page 34)
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (Tables 16 and 17, pages 56 and 57)
- Key factor(s) that led to selecting the remedy (i.e. describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) (pages 36 and 37)

Authorizing Signatures

Franklin E. Hill, Director
Superfund Division
U.S. Environmental Protection Agency, Region 4

9/29/08
Date

RECORD OF DECISION

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ACRONYMS AND ABBREVIATIONS

AOC	Administrative Order of Consent
ARAR	applicable or relevant and appropriate requirement
bls	below land surface
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response Compensation Liability Act
CFR	Code of Federal Regulations
COC	chemical of concern
COPC	chemical of potential concern
CSF	cancer slope factor
CSX	CSX Transportation
cy	cubic yards
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
ESD	Explanation of Significant Differences
F.A.C.	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FS	Feasibility Study
ft	feet
HCPC	Hillsborough County Planning Commission
HHRA	Human Health Risk Assessment
HI	hazard index
HQ	hazard quotient
IC	institutional control
ILCR	incremental lifetime cancer risk
LADD	lifetime average daily dose
MCL	maximum contaminant level
μg/L	micrograms per liter
mg/kg	milligrams per kilogram
MNA	Monitored Natural Attenuation
MW	Monitoring Wells
MRI	MRI Corporation
MSW	municipal solid waste
M/T/V	Mobility/Toxicity/Volume
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	operation and maintenance
OU	Operable Unit
POTW	publicly owned treatment works
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective

ACRONYMS and ABBREVIATIONS (Continued)

RD	Remedial Design
RfD	reference dose
RI	Remedial Investigation
RI/FS	Remedial investigation/feasibility study
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
Site	MRI Corp. Superfund Site
S/S	Solidification/stabilization

DECISION SUMMARY

1.0 Site Name, Location, and Brief Description

This Record of Decision (ROD) is for the MRI Corp. Superfund Site (Site), Operable Unit (OU) 2 (Ground Water) located at 9220 Stannum Street in an industrial area east of Tampa, Hillsborough County, Florida. It is about one-half mile north of the intersection of U.S. Route 301 and State Road 60. Figure 1 depicts a map showing the location of the Site on an aerial photograph. The U.S. Environmental Protection Agency (EPA) is the lead agency for this Site. The EPA Site Identification Number is FLD088787585. Site remediation is to be conducted and financed by the Potentially Responsible Party (PRP). The Site was placed on the National Priorities List (NPL) in 1996.

The "MRI Property" consists of 11.7 acres of vacant land formerly containing a scrap metal de-tinning and recycling facility. In addition to the MRI Property, the Site consists of a segment of the CSX Transportation (CSX) railroad right-of-way located to the east of the MRI Property, and portions of other parcels and storm water drainage pathways located to the north and east of the Site. Figure 2 depicts a map showing the configuration of the Site and the adjacent properties.

The MRI Property is bordered by industrial and commercial properties to the northwest, west, and south. A single concrete block warehouse and concrete foundation pads remain from the former operations. The property is covered with grasses in open areas, shrubs and trees along the northwest and southwest boundaries, and seasonally-wet areas in the north and south portions. Portions of the property have surface debris. Undeveloped fields are located to the north and east. The nearest residence is approximately ¾-mile northwest of the Site.

2.0 Site History and Enforcement Activities

2.1 Operational History

The MRI Property was developed in 1961 as a de-tinning/steel recycling facility. Circa 1975, electrowinning (a variation on electroplating) capabilities were added and in late 1979 or early 1980, a municipal solid waste (MSW) recycling operation was put into service.

The de-tinning area consisted of de-tinning tanks, rinse tanks, a crane system, and supporting utilities. The rinse tanks were partially confined by curbs with sumps provided for collecting spilled rinse water which was sent back to the rinse tank for reuse. The tin electrowinning area included the tin plating and casting building, metal precipitation tanks, and a waste water treatment area consisting of two holding ponds, a filter building, and a neutralization system (see Figure 3). Related facilities included a small machinery shop, laboratory, and several scrap and process solids storage areas.

The de-tinning process began in the early 1960s and was the plant's primary function for over ten years. Scrap metal (recycled cans and metal trimmings from can manufacturers) brought to the Site by rail and truck was stored predominantly in the northern corner of the Site, at times on both sides of the railroad spur. Tin and other coatings were chemically removed from the raw material when it was placed in a heated alkaline bath. After 3.5 to 4 hours, the drums of de-tinned scrap were removed, drained, and batch-washed to reduce the alkaline content and recover "dragged out" de-tinning solutions. The washed drums were then unloaded and spray-washed. Water used in the final spray-washing procedure was contained and used as solution makeup for the batch washing procedure. The batch-washing water was in turn used for solution makeup for the de-tinning process. The de-tinned scrap was pressed into 500- to 600-pound bales that were ultimately shipped off-site (usually by rail) and sold as scrap steel.

The tin-bearing alkaline solutions were pumped from the de-tinning tanks through a leaf pressure filter and the solids (including the tin) were filtered out, producing sodium stannate cake. Prior to 1975, this filter cake represented MRI's final product. It was placed in 55-gallon drums, sealed, and transported off-site for final processing.

The electrowinning capabilities added to the facility around 1975 allowed for on-site processing of the sodium stannate. The sodium stannate was put into a slurry tank and re-dissolved, then transported via overhead pipe to the plating system, reheated, agitated, and treated with sodium sulfide flakes to precipitate lead and various other impurities as metal sulfides. When the solution settled, it produced a clarified alkaline solution and precipitated metal sulfides, or "black muds." The tin-containing alkaline solution was circulated through plating vats for tin removal (electrowinned). Tin recovered from the electrowinning process was melted and cast into 100-pound ingots for shipment. The metal sulfides were washed with clean water to remove excess caustic and nitrate and allowed to resettle. This wash water was decanted to a storage tank to be used as solution makeup for the electrowinning vats.

Prior to 1979, the metal sulfides were pumped into and dried in the settling ponds just north of the electrowinning facility. Use of the drying ponds stopped sometime around 1979 with the installation of a rotary vacuum filter. Initially, dried metal sulfides were stored on heavy plastic liners near the western property line until the volume was sufficient to warrant contacting a buyer. Ground storage of the metal sulfides was also reportedly observed just north of the drying ponds in 1977. An aerial photograph taken in 1980 shows evidence of surface staining in the vicinity of both of these areas. At some point a curbed concrete pad was constructed to store the metal sulfides. The plating solution was neutralized with sulfuric acid to a pH of 7 to 8, and then allowed to settle in a cone-bottom tank. A carbonated process was used in early years; a sodium hypochlorite step was employed in the early 1980s to remove unbound cyanides. The precipitate from this process was mixed and processed with the metal sulfides. The supernatant was pumped to final settling and discharge ponds. After final settling, the treated plating solution was mixed with non-contact cooling water in a ratio of approximately 1:50. The treated plating solution was then discharged into the unnamed ditch east of the Site until sometime around late 1985 when it was directed to the City of Tampa's publicly owned treatment works (POTW). It was reported that in 1978 approximately 5,000 gallons per week of spent plating solution was discharged to the ditch; the discharge rate listed on a 1982 waste water discharge permit application was 10,000 gallons per week.

In late 1979 or early 1980, a MSW operation was put into service. The system consisted of conveyors, a shredder, dust collection system (bag house and cyclone) magnets, a prewash system, de-aluminizing/de-tinning, and rinse systems. Scrap metal for recycling was trucked from can manufacturers and municipal recycling programs throughout Florida. The MSW scrap was typically stored in an area toward the center of the Site north of the two metal sulfides ponds on a concrete pad. When this area was full, however, it was stored in the northwest section of the Site. When this area was also full, MSW scrap was stored in the southwest section of the Site.

Though not initially part of the MSW operation, bimetal cans were processed with MSW once that system became operational. The cans came in by rail. During the MRI Corporation's (MRI) early years, these cans were only rarely processed separately to ship to copper mining industries. The cans were reportedly stored along the fence line in the northeastern corner of the Site between the railroad spur and the pond area and then south as required. In 1977, bimetal can storage was also noted in an area approximately 150 feet (ft) west of the metal sulfides ponds.

Prior to 1980, control/treatment of storm water runoff associated with facility operations and storage areas was minimal or nonexistent. After this time, however, a collection system and underground conduit were reportedly installed to collect all rainwater and/or solution spills in the de-tinning, plating, and MSW process areas. The water was directed to a pumping station and pumped into a large, double-lined retention pond north of the mud ponds for storage. Water in this pond was used as solution makeup for the various processes. By 1980, the water was discharged through a National Pollutant Discharge Elimination System (NPDES)-permitted outfall into the northward-flowing drainage pathway located east of the MRI Property. In 1985, the spent plating solution was redirected from the drainage pathway to the City of Tampa's POTW. Recycling operations ceased in 1987.

2.2 Regulatory and Enforcement History

The facility was cited in 1984 for elevated metals and cyanide in its NPDES discharge. A Screening Site Inspection was conducted by an EPA contractor in 1989. Contaminants detected in soil samples included chromium, lead, zinc, and cyanide. Contaminants detected in ground water samples included chromium, lead, sodium, and cyanide.

In 1992, EPA collected additional soil samples. The results were comparable to those noted in the previous investigation. The Site was proposed for the NPL on June 15, 1996 and finalized on the NPL on December 23, 1996.

Special notice letters for the remedial investigation (RI)/ feasibility study (FS) were mailed in September 1996 to the current owner, its parent corporation, and two former owner/operators. These PRPs were identified through EPA's initial PRP search efforts. The former owner/operators denied liability. MRI indicated that it did not have the resources to conduct the RI/FS. In May 1997, MRI's parent company, Proler International, indicated an interest in doing a portion of the work, but their offer was not sufficient and EPA continued with a fund-lead RI/FS.

In April 1998, Proler International sampled ground water monitoring wells installed by EPA pursuant to an Administrative Order on Consent (AOC). The AOC addressed only that round of ground water sampling.

Special notice letters for the RI/FS were mailed in September 1996 to MRI, Proler International and two former owner/operators of the Site (MRC Holdings, Inc. as successor to American Can Co. and Elf Atochem North America, Inc. as successor to M&T Chemicals, Inc.). No offer was considered sufficient and EPA proceeded to do the work as a fund-lead project.

In April 2000, EPA issued Special Notice Letters for remedial design (RD)/remedial action (RA) to the above-mentioned settling defendants. EPA received good faith offers from MRC, MRI and Proler International, and entered into negotiations with them. Under the Consent Decree, entered on February 19, 2002, by the US District Court for the middle District of Florida, the settling defendants reimbursed EPA for past response costs; further, MRC Holdings, Inc., as the work-performing settling defendant, agreed to conduct the OU1 RD/RA and the OU2 RI/FS.

3.0 Community Participation

EPA conducted community interviews in December 1997 and finalized the Community Relations Plan in May 1998. The area surrounding the Site is industrial/commercial so the interviews were conducted with nearby business owners/managers. The interviewees expressed an interest in remaining on the mailing list. Otherwise, there was little community interest expressed regarding this Site.

EPA contacted the Hillsborough County Planning Commission (HCPC) in April 1999 to confirm the planned future use of the Site and adjoining property. According to the HCPC, the land use designation for the area is Light Industrial Planned, which does not allow for residential use.

EPA issued an RI Fact Sheet in June 1999 which also asked citizens to call EPA if they would be interested in attending a public meeting for the Proposed Plan. In addition, a newspaper article appeared in the *Tampa Tribune* after the fact sheet was released. No one called to express an interest in a meeting. The only phone calls received were from several vendors interested in potential work associated with the Site.

The Proposed Plan Fact Sheet for OU1 was released on August 24, 1999. The initial 30-day comment period was held between August 25, 1999 and September 23, 1999 and was extended until October 23, 1999. The start of the public comment period was advertised in the *Tampa Tribune* on August 25, 1999.

The OU2 Proposed Plan Fact Sheet was released on April 11, 2008, (EPA, 2008). The 30-day comment period was held between April 14, 2008 and May 13, 2008. EPA offered to have a public meeting; however, there was no interest from the community so no meeting was held. The start of the public comment period was advertised in the *Tampa Tribune* on April 14, 2008. EPA's responses to the comments received during the public comment period are included in the Responsiveness Summary, Appendix A of this ROD. The Administrative Record and Information Repository are available to the public at the EPA Region 4 Superfund Record Center and the Brandon Regional Library, 619 Vonderburg Drive Brandon, Florida 33511.

4.0 Scope and Role of Operable Unit or Response Action

EPA often divides large, complicated sites such as this into separate OUs to make them more manageable and thereby expedite investigations and cleanups. As a result, EPA has organized the work into two OUs: OU1 addresses the contamination of soil and sediment and OU2 addresses groundwater contamination. In 1999, EPA issued a ROD for OU1 that addresses the remedy for soil and sediment contamination. The OU1 remedy will address the main threat which is the potential human exposure to soil and sediment contaminated with metals, primarily lead. Reducing contaminant concentrations in soil will also improve the quality of surface and ground water at the Site. The components of the selected OU1 remedy include:

- Excavation of 7,400 cubic yards (cy) of metals-contaminated soils/sediment;
- Screening of material to remove debris;
- Solidification/stabilization (S/S) of excavated material;
- Disposal of solidified material on-site;
- Capping of solidified material;
- Deed restrictions;
- Long-term maintenance of cap and ground water monitoring; and
- Additional ground water monitoring and evaluation for future ground water actions.

The ground water portion of this Site, the focus of this ROD, is referred to as OU2. It is noteworthy that the remedies for OU1 and OU2 are interrelated and will be implemented concurrently. Once this is done, all contaminated media associated with this Site will have been addressed. In so doing, this action will reduce or eliminate risks to human and ecological receptors from contaminated ground water, will complete the RA, and will make the property available for reuse. The RODs for OU1 and OU2 will be implemented pursuant to the remedial authorities of the Comprehensive Environmental Response Compensation Liability Act (CERCLA). This decision document presents the final remedy for the Site.

5.0 Summary of Site Characteristics

The 11.7-acre Site is now vacant but was formerly used as a de-tinning/steel recycling facility. Physical evidence of the former MRI facility activities is visible in much of the subsurface soil on the eastern two-thirds of the MRI Property. A single concrete building, building foundations, and concrete pads are the only remaining structures. Debris includes concrete, reinforcement bars, steel beams, former pond liners, scrap metal, and other remnant process materials.

5.1 Conceptual Site Model

The conceptual site model for OU2 describes the release mechanisms, migration pathways, and potential exposure mechanisms for human receptors. A summary of the conceptual model is provided as Figure 4 and is summarized below:

- Contaminants released from ponds used to store the metal sulfides and spills in the former process area are the primary sources of ground water contamination.
- Contaminants released from the source areas have impacted the ground water (OU2) in the shallow surficial aquifer via infiltration and percolation.
- Contaminated ground water (OU2) poses a potential ingestion risk.
- Contaminated surface and subsurface soil (OU1) poses a potential incidental ingestion and dermal contact risk.
- Runoff from contaminated surface soil has impacted the sediment (OU1) in nearby drainage pathways. This poses a potential incidental ingestion and dermal contact risk.

5.2 Site Geologic and Hydrogeologic Conditions

The Site is underlain by unconsolidated deposits of the surficial aquifer system and limestone of the upper portion of the Floridan aquifer. The unconsolidated deposits of the surficial aquifer include fine to medium-grained sands to silty sands, and in many locations, a transitional layer of clayey sands and sandy clays near the base of the aquifer consisting of at least five percent clay. The limestone of the upper portion of the Floridan aquifer typically includes a highly-weathered zone consisting of a white calcareous clay with residual fine fragments of weathered limestone (marl). The two aquifers are separated by the Hawthorn Group, a generally thick sequence of distinctive gray-green clay which functions as an aquitard, where continuous. The transitional layer of clayey sands and sandy clays also acts as an aquitard. The weathered limestone clay marl can also function as aquitard between the permeable sands of the surficial aquifer and the permeable limestones of the upper Floridan aquifer. Hence, the surficial aquifer and permeable unit of the upper Floridan aquifer are separated by an aquitard throughout the Site.

The surficial aquifer is generally unconfined, with a water table commonly encountered at approximately 2.5 ft below land surface (bls) throughout the Site. Perched water is occasionally present above the surficial aquifer in the north and eastern areas of the Site. The perched water is sometimes observed above pockets of MRI facility process and demolition debris. The general ground water flow direction in the surficial aquifer appears to be to the north or northeast. Potentiometric maps showing recent conditions (October 2006) of the surficial aquifer and upper Floridan aquifer are included as Figures 5 and 6, respectively. Historically, the potentiometric surface in the surficial aquifer has been higher than represented by the most recent data. Ground water levels within EPAMW-5 have ranged from 21.3 ft (April 2003) to16.56 ft (January 2006). Water levels within the upper Floridan have remained more constant, ranging in MWUF-4 from 19.42 ft (December 2004) to 18.23 ft (March 2006).

5.3 Surface Water Hydrology

The MRI Site is well vegetated and poorly drained. The property has been graded level with a gentle relief toward the north of approximately 3 ft. Small, scattered topographic depressions tend to pond during rains. The collected water then evaporates or infiltrates the sandy soils. The flow direction is to the north-northeast.

Most runoff on the Site does not proceed far before ponding and subsequent evaporation or infiltration occurs. However, Site features and sampling results indicate that some runoff does leave the Site. The prominent overland drainage features include an on-site ditch running along the southwest and northwest sides of the Site that drains through a ponded area and then northward off the Site. Runoff then empties into a ditch bordering the railroad bed just east of the Site. This ditch is hydraulically connected to a second, parallel ditch on the opposite side of the railroad bed via a partially blocked concrete drain pipe.

Contaminated runoff migrating into the railroad ditch closest to the Site therefore eventually migrates to the second railroad ditch. It is important to note that the drainage ditches associated with the Site are not connected with a storm water pond located on property just north of the Site. Both railroad ditches slope slightly to the north, eventually discharging into the Tampa Bypass Canal approximately 1 mile west of the Site.

Although runoff is expected to flow predominantly northward, the gradient is so slight there is likely some southward backwashing in the ditches when the water depth rises during heavy rains. None of the drainages are in contact with any city sewer or other man-made storm water catchments. Six-Mile Creek, located approximately 1 mile west of the Site, was modified in the late 1960s to form the Tampa Bypass Canal to divert floodwaters from the Hillsborough River. The Tampa Bypass Canal extends approximately 14 miles from the Lower Hillsborough Flood Detention Area to its discharge point into McKay Bay, part of the Hillsborough Bay system. All storm water drainage ditches eventually lead to the Tampa Bypass Canal.

5.4 Nature and Extent of Contamination

Several investigative studies were performed by the PRP and EPA from 1978 to 1992. The most comprehensive studies are documented in the OU1 RI completed in 1999 (Bechtel, 1999). Several investigations relating to the OU1 RD and the OU2 RI/FS were completed between 2003 and 2007. Collectively, the studies performed as part of the OU1 RD and the OU2 RI comprise the OU2 RI Report (EPA, 2007).

The findings relating to OU1 soils and sediments were reported at length in the OU1 RI (Bechtel, 1999) and are briefly summarized in this ROD. The principal findings relating to OU2 (ground water) are reported at greater detail. Additional detail on all studies relating to OU1 and OU2 may be found in the Administrative Record and Information Repository.

5.4.1 Soil Contamination

The highest concentrations of metals in surface soil, defined as soils located at the surface to 2-ft deep, are generally found in the northern corner of the Site where raw and de-tinned scrap was stored. Lower levels were also found in the vicinity of the de-tinning and electrowinning areas and in the area of the MSW recycling operation. Lead is the primary contaminant at the Site. It was found in 32 of 32 surface soil samples at concentrations ranging from 8.8 to 4,600 milligrams per kilogram (mg/kg) or parts per million (ppm). Subsurface soil samples collected from 2 to 22 ft deep also showed evidence of contamination, but on average at reduced concentrations. Based on the OU1 RI/FS and subsequent investigations, lead ranged from 12 to 20,500 mg/kg in subsurface soil samples.

5.4.2 Sediment Contamination

Sediment samples collected from the drainage pathways indicate that contamination extends north of the Site, along the apparent path of surface water flow. Lead was found in the drainage pathways at concentrations ranging from 33 to 3,300 mg/kg in 15 of 15 samples. Cadmium, chromium, copper, lead, mercury nickel and zinc were also identified in samples collected in the drainage pathways.

5.4.3 Ground Water Contamination

Ground water beneath historical MRI facility and material storage locations contains multiple analytes at concentrations greater than their respective primary and secondary drinking water standards. The highest concentrations of lead and other metals have been measured in ground water samples collected from prior MW, CON-4 and replacement well CON-4R, adjacent to the concrete pad that held the process tanks, as well as near the rinsed de-tinned scrap drainage basin (e.g., location ASB-C9; Figure 7). Lead, which is considered to be the key indicator chemical at the Site, was detected in ground water at a concentration as high as 3,180 micrograms per liter (μg/L) or parts per billion, compared to the federal maximum contaminant level (MCL) for lead which is 15 μg/L. Arsenic, sodium, and chromium were detected at elevated levels at certain locations. Table 1 summarizes concentrations of analytes detected in MRI ground water in the area affected by facility operations. Note that some of the data contained in Table 1 post-dates the data used for the baseline risk assessment (BRA) in 1999 (Bechtel, 1999). A risk analysis of this data is contained in the BRA summary in Section 7.0.

For comparison, Table 1 presents the concentrations of analytes detected in the surficial aquifer ground water in the western portion of the MRI Property, an area thought to represent background conditions. Although representative of background conditions, ground water obtained from this area contains several analytes at concentrations above secondary drinking water standards. Based on these findings, the Florida Department of Environmental Protection (FDEP) has determined that the surficial aquifer ground water at the Site is considered "poor quality" based on naturally-occurring background concentrations of aluminum and iron. This determination is in accordance with Chapter 62-780.200(5) of the Florida Administrative Code (F.A.C.) (FDEP, 2005b).

Ground water collected from the most impacted portion of the MRI Property, in the vicinity of the former de-tinning tanks on the east side of the MRI Property, is often highly colored and appears viscous. Organic carbon has been measured in this ground water at a maximum concentration of 8,650 milligrams per liter (mg/L). The dark-colored ground water does not have an obvious petroleum odor. The dark-colored ground water is unusually reactive when base (alkali) sample preservative or acid sample preservative is added. The reaction produces a flocculent that is light-colored and appears fluffy. For Site characterization, water that reacts with acid and base has been defined as "de-tinning area ground water" because it is generally found in the historical de-tinning area of the former MRI facility.

The origin of this dissolved organic carbon may have been organic compounds that were glued to or contained within the cans and other metal wastes processed at the facility. Tin cans have as many as three coats of lacquer, varnish, or other coating applied over the tin. Such coatings reportedly represent about two percent of the weight of a tin can (Little, 1983). Once used cans as MSW were added to the metal feedstock in 1979 or 1980, additional "loose" organics such as food residues, labels, and glues associated with food packaging were also present (Little, 1983). It is likely that the lacquers, varnish, and coatings on the cans, plus loose organics, were partially broken down and solublized in the caustic de-tinning solution. The organic compounds solublized by the caustic de-tinning solutions appear to be strong complexing agents for metals. The organic-metal complexes keep the associated metals dissolved in the ground water.

The de-tinning area ground water is similar to MRI facility process water in both its physical characteristics and chemical composition. The source of this contamination is believed to be spillage of process water onto the MRI Property during de-tinning and scrap handling operations, particularly during the initial phase of facility operations. The ground water is chemically similar to the facility process water, suggesting that little dilution or chemical changes have taken place in the ground water over the last 25+ years. It appears that the most highly contaminated ground water has been trapped in isolated pockets where there are depressions in the surface of the aquitard underlying the surficial aquifer.

5.5 Contaminant Fate and Transport

Based on slug test data obtained by EPA in 1999, the calculated average linear velocity of shallow ground water was stated to range from 0.14 to 0.3 ft per day, equivalent to 53 to 110 ft per year. Ground water velocities calculated using 2007 data are similar, ranging from 0.09 to 0.4 ft per day.

The northern ephemeral wet area appears to act as a drain for ground water by increased evapotransportation by water-loving plants and by attracting local flow in the shallow aquifer toward itself. Such flows are believed to occasionally overflow out of the wet area and then move away from the MRI Property via overland flow toward the CSX railroad drainage ways.

Ground water transport of the primary chemicals of concern (COCs) including; lead, aluminum and arsenic is dependent on ambient conditions. Behavior can often be predicted based on the redox potential (Eh) and pH of subsurface soils and ground water.

The transport of the primary COCs occurs primarily through the movement of soluble (dissolved) metals within the ground water and is influenced by ambient geochemical conditions. Normally insoluble metals can also be transported in ground water if solublized by complexing agents. Other transport pathways include surface water and airborne transport of insoluble metals; that is, analytes associated with sediments and other particulates, such as airborne dust. In general, chemical transport in the suspended, insoluble phase is controlled by surface water flow and sediment deposition patterns.

At the MRI Site, the fate and transport of metals in ground water is likely controlled by the presence of organic-metal complexes and by the Site-specific lithology. Considering that retardation of metals in ground water is likely slight, the currently observed metal concentrations reflect (1) the original locations of release, (2) the presence of discontinuous depressions at the top of the aquitard that are below active flow zones in the surficial aquifer and that are filled with highly contaminated ground water similar to facility waste water, and (3) the ground water flow within the shallow, laterally continuous portion of the chemically-impacted surficial aquifer. This shallow ground water flow appears to be largely controlled on the MRI Property by evapotransportation and by surface discharge at the northern ephemeral wet area.

6.0 Current and Future Land Use

The area immediately surrounding the Site is industrial or undeveloped. The land use designation is LI-P (Light Industrial Planned). The adjacent land use designations are CMU-12 (Commercial, Mixed Use), UMU-20 (Urban, Mixed Use) and HI (Heavy Industrial). The current zoning is M (Manufacturing). Surrounding land zoning classifications are PD-MU (Planned Development, Mixed Use), PD-4 (Planned Development) and CG (Commercial, General).

In 1990, it was estimated that 100 persons lived within a one-mile radius of the Site, mostly to the northwest. The racial makeup of the area was about 80 percent white, six percent Hispanic, and 14 percent other. Based on the 1990 Census, there were only two children under age 9 and seven persons over age 65 living within a mile of the Site. The median family income was about $30,000. There were no schools within a one-mile radius (NUS, 1990).

In 2000, it was estimated that 28,459 persons lived within the 30.4 square mile zip code of the Site. The median age is 32.6 years and the racial makeup of the zip code area was about 51 percent white, 40 percent Black or African American, 18 percent Hispanic, and 9.3 percent other. Based on the 2000 Census, there were 1,907 children under age 5 and 2,511 persons over age 65 living within the zip code of the Site. The median family income was about $35,460 in 1999. There were no schools within a one-mile radius of the Site (US Census Bureau, 2000).

The surficial aquifer is currently classified as Class II (potential source of drinking water) by EPA and as Class G-II (potable water use) by the FDEP. For this site, the FDEP has determined that the surficial aquifer ground water at the Site is considered "poor quality" due to aluminum and iron. The "poor quality" determination is based on naturally-occurring background concentrations of aluminum and iron and is in accordance with Section 62-780.200(5) of the Florida Administrative Code. The surficial aquifer is not currently used as a source of drinking water in the Site vicinity.

Beneath the surficial aquifer is a layer of clay and weathered limestone clay marl that prevents ground water contamination in the surficial aquifer from penetrating into the deeper Floridan aquifer. The general ground water flow direction in the Floridan aquifer is toward the northeast in the site area. The Floridan aquifer is a major source of water for municipalities in the region. The nearest wellfield is greater than 4 miles north (up gradient) from the site.

7.0 Summary of Site Risks

The BRA contained in the OU1 RI (Bechtel, 1999) contained a Human Health Risk Assessment (HHRA). The HHRA evaluated exposure to soil, surface water, and sediment based on data collected prior to 1999. Subsequent to the completion of the HHRA in 1999, ground water investigations continued in support of the OU1 RD and the OU2 RI/FS. These investigations identified additional chemicals of potential concern (COPCs) that were not evaluated in the 1999 HHRA. Details of this assessment are contained in the OU1 ROD (EPA, 1999) available in the Administrative Record and Information Repository. The applicable portions of the HHRA pertaining to ground water are summarized in the following subsections.

7.1 Summary of 1999 Human Health Risk Assessment

The positively identified ground water analytes were screened to exclude analytes that, although present, are not important in terms of potential human health effects. The screening was conducted in accordance with EPA *Supplemental to Risk Assessment Guidance(RAGS): Region 4 HHRA Bulletins* (EPA, 2000). The seven COCs (aluminum, arsenic, chromium, iron, lead, thallium, vanadium) identified in the 1999 HHRA (Bechtel, 1999) are shown in Table 2. Based on an understanding of the fate and transport of contaminants, and the potential for human contact, the potential ground water receptors listed below were examined:

- Future on-site residents and/or workers.

Potentially complete exposure pathways examined were:

- Ingestion of ground water;
- Dermal contact with ground water; and
- Inhalation of volatiles released during showering.

Note that only risks and hazards for future on-site residents are presented in this summary as they represent the greatest potential risk and justify implementation of the selected remedy. The risks and hazards associated with the other current and future receptors/ media combinations may be found in the OU1 HHRA (Bechtel, 1999). The surficial ground water exposure point concentrations (EPCs) for the seven COCs were calculated in accordance with EPA Region 4's *Risk Assessment Guidance (RAGs) (EPA, 2000)* and are shown in Table 3.

Human intakes were calculated for each COC and receptor using the EPCs. Estimates of human intake, expressed in terms of mass of chemical per unit body weight per time (mg/kg/day), were calculated differently depending on whether the COC is a non-carcinogen or a carcinogen. For non-carcinogens, intake was averaged over the duration of exposure and is referred to as the average daily dose (ADD). For carcinogens, intake was averaged over the average lifespan of a person (70 years) and is referred to as the lifetime average daily dose (LADD).

EPA toxicity assessments and the resultant toxicity values were used in HHRA to determine both carcinogenic and non-carcinogenic risks associated with each COC and route of exposure. EPA toxicity values that were used in the 1999 HHRA were:

- reference dose (RfD) values for non-carcinogenic effects, and
- cancer slope factors (CSFs) for carcinogenic effects.

To characterize the overall potential for non-carcinogenic effects associated with exposure to multiple chemicals, the EPA uses a Hazard Index (HI) approach. This approach assumes that simultaneous sub-threshold chronic exposures to multiple chemicals that affect the same target organ are additive and could result in an adverse health effect. The HI is calculated as follows:

$$HI = ADD1 / RfD1 + ADD2 / RfD2 + \ldots ADDi / RfDi$$

where:

$$ADDi = \text{Average Daily Dose for the } ith \text{ toxicant}$$
$$RfDi = \text{RfD for the } ith \text{ toxicant}$$

The term ADDi/RfDi is referred to as the hazard quotient (HQ).

Calculation of an HI in excess of unity indicates the potential for adverse health effects. Indices greater than one will be generated anytime intake for any of the COCs exceeds its RfD. However, given a sufficient number of chemicals under consideration, it is also possible to generate an HI greater than one even if none of the individual chemical intakes exceeds its respective RfD.

Carcinogenic risk is expressed as a probability of developing cancer as a result of lifetime exposure. For a given chemical and route of exposure, excess lifetime cancer risk is calculated as follows:

$$Risk = LADD \times CSF$$

These risks are probabilities that are generally expressed in scientific notation (e.g., 1×10^{-6} or 1E-6). An incremental lifetime cancer risk (ILCR) of 1×10^{-6} indicates that, as a plausible upper-bound, an individual has a one-in-one-million chance of developing cancer as a result of Site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at the Site. For exposures to multiple carcinogens, the EPA assumes that the risk associated with multiple exposures is equivalent to the sum of their individual risks.

The cancer risk for the future adult resident is 1.2×10^{-3}. The future adult resident's overall risk is associated with ingestion of and dermal contact with ground water. Cancer risk is primarily due to ingestion exposure to arsenic in ground water. The carcinogenic risk characterization is summarized in Table 4.

The future child resident's non-cancerous hazard is associated with the same exposure routes included for the future adult resident. The non-cancerous HI for the future child resident is 44. Non-cancerous hazard is primarily attributable to ingestion exposure to arsenic and iron in ground water. The non-cancerous future child's hazard assessment is summarized in Table 5.

7.2 Risk Evaluation Incorporating Ground Water Data Obtained 2003 - 2007

Subsequent to the completion of the 1999 HHRA, ground water investigations continued in support of the OU1 RD and the OU2 RI/FS. These investigations identified additional COPCs that were not evaluated in the 1999 HHRA. Table 1 lists the COPCs and the ranges of concentrations found in the surficial aquifer based on data collected from 1992 through 2007. EPA has performed a revised risk evaluation using the cumulative site data.

The focus of the risk evaluation was the COPCs that have been detected outside the limits of the proposed containment cell (slurry or vertical barrier walls). Five wells were identified as having elevated concentrations of COPCs. In order to determine if these were simply outliers or representative of a more general problem, the data from these wells were grouped together with nearby wells. The five areas of interest and the locations representative of background are shown on Figure 8.

The data used in this risk evaluation are presented in the *Development of Goals for Soil Based Technical Memorandum* (EKI, 2007b) and the *OU2 Feasibility Study* (EKI, 2008). To perform the risk evaluation, the sample locations detected with elevated concentrations of COPCs were grouped together and averaged. These average concentrations were compared to the background average concentrations and to the Remedial Goal Options (RGOs) in Table 6. This approach is consistent with EPA Region 4's approach for calculating EPCs for ground water as part of the risk management process.

Risk-based remediation goal options (RGOs) for each of these COPCs were calculated in accordance with EPA Region 4 *Risk Assessment Guidance (RAGs) (EPA, 2000).* HQ levels of 0.1, 1.0 and 3.0 were calculated for the COPCs. HQs could not be calculated for fluoride, lead or sodium. The updated RGOs are presented in Table 6.

Table 7 shows a comparison of COPCs (manganese, molybdenum, and tin) to these RGOs. As seen from the table, manganese, molybdenum, and tin are not present above risk-based cleanup goals corresponding to a HQ of 1 in any of the five areas identified on Figure 8 or within the limits of the proposed containment cell. For this reason, manganese, molybdenum, and tin are not considered COCs.

Table 8 shows the same comparison for the remaining COPCs. As is shown, nine COPCs do not exceed their applicable cleanup goals (HQ=1 or MCL) in any of the five areas outside the proposed containment cell. These COPCs include: antimony, beryllium, cadmium, cyanide, iron, mercury, nickel, selenium and vanadium. The remaining seven COPCs, aluminum, arsenic, chromium, fluoride, lead, sodium, and thallium do exceed their respective cleanup goals in one or more area based on the groupings of wells described above; therefore, these COPCs are retained as COCs. The cleanup goals for the COCs are shown in Table 9. This list differs from the COCs identified in Table 2 of the 1999 HHRA (Bechtel, 1999): fluoride was added and iron and vanadium were eliminated.

This risk evaluation and the cleanup goals are based on the proposed locations of the containment cell as of the date of the ROD. The OU2 RD will refine the limits of the containment cell; therefore, the alignments may change. In such an event, the risk evaluation presented above could be revisited to reevaluate the potential risks outside the new alignments. This could result in reducing the list of COCs requiring the Monitored Natural Attenuation (MNA) component of the remedy.

7.3 Summary of Ecological Risk Assessment

The ecological risk assessment (ERA) prepared as part of the 1999 OU1BRA (Bechtel, 1999) for soil and sediment was not completed, but instead was to be completed as a part of subsequent work. Results from sediment samples and conservative screening-level food chain analyses suggested there is a potential for adverse effects to birds and small mammals from the soil contamination and to small mammals from the sediment contamination. It should be noted, however, that many of the surface water bodies where samples were collected are intermittent in nature and could not support aquatic life year-round. As a result, persistent populations of aquatic organisms are not expected in many of the aquatic habitats associated with the MRI site, and adverse effects at many locations, if occurring, would be limited to opportunistic species capable of withstanding periods of dryness. Both, EPA and FDEP agree that there are some unresolved issues related to the extent of the sediment cleanup. Since sediments are an OU1-related issue, EPA plans to address the issue through and Explanation of Significant Differences (ESD) in the near future, before the implementation of the remedy. The ESD will complete the ERA for the site.

No exposure pathways between impacted ground water and ecological receptors were identified in the OU1 RI (Bechtel, 1999). Subsequently, a potential pathway from ground water to surface water was identified in the area of the northern ephemeral wet area. The OU2 remedial alternative will reduce the mobility of impacted shallow ground water located within the containment cell and multimedia cap. In so doing, potential movement of impacted ground water to surface water will be eliminated and any potential exposure pathway for ecological receptors will be eliminated as well.

8.0 Remedial Action Objectives

RA Objectives (RAOs) for OU2 provide overall goals to guide the selection and implementation of remedial approaches. They were developed after a thorough review of the extensive amount of data that have been collected to date.

The cleanup goals selected for OU1 (soils/sediments) presented in the 1999 ROD are based on a future industrial/commercial land use for the former facility property. The cleanup goals for ground water and for soil for the protection of ground water presented herein are based on potential residential use. The RAOs for OU2 include the following:

- Prevent human exposure to elevated levels of metals in impacted shallow, surficial aquifer ground water;
- Prevent exposure of potential ecological receptors to elevated levels of metals in impacted shallow, surficial aquifer ground water by preventing shallow impacted ground water from becoming surface water;
- Prevent migration of metals in shallow ground water beyond Site boundaries at concentrations of concern, and prevent transfer of metals to other media; and
- Prevent significant contaminant migration into the Floridan aquifer.

Based on the Site-specific fate and transport evaluation, an analysis of applicable or relevant and appropriate requirements (ARARs), and human health risk-based criteria, EPA adopted the site-specific cleanup goals presented in Tables 9 and 10 to meet these objectives. Note that with regard to the cleanup goal for soil to protect ground water shown in Table 10, EPA concluded that analytes other than lead would also be addressed if remediation for lead is implemented. Thus, it was not necessary to derive ground water protection cleanup goals for additional analytes (EPA, 2005).

9.0 Description of Alternatives

For the Site OU2, the following six alternatives were evaluated in the OU2 FS (EKI, 2008) and were considered potentially effective at attaining the cleanup goals in the ground water at the Site:

- Alternative 1 – No Action
- Alternative 2 – Institutional Controls (ICs)
- Alternative 3 – Monitored Natural Attenuation
- Alternative 4 – Phytoremediation
- Alternative 5 – Extraction, Treatment, and Disposal
- Alternative 6 – Containment and Monitored Natural Attenuation

The remedial alternatives screening performed during the OU2 FS (EKI, 2008) provided the following results: Alternatives 1, 2 and 3 would not be protective of human health and the environment. Additionally, these alternatives would not reduce contaminant concentrations in ground water to attain the cleanup goals within a reasonable timeframe. Alternatives 2 and 3 would not meet the compliance with ARARs threshold criterion; therefore, these two alternatives were eliminated from further consideration. Alternative 4, Phytoremediation, would require further study on its effectiveness and the associated costs for the study would likely be substantial. The effectiveness of the remedy throughout the required depth, potentially several tens of ft, is not viable and roots may create paths for downward chemical migration. Consequently, Alternative 4 was not retained for the detailed evaluation. Alternative 1, the No Action alternative, was retained for a baseline comparison, which is a requirement of the National Contingency Plan (NCP) and the Superfund program. Table 11 shows the estimated costs for Alternatives 1, 5 and 6 and the anticipated duration of each.

9.1 Detailed Remedial Alternatives Evaluation

9.1.1 Alternative 1: No Action

Estimated Capital Cost: $40,000
The Superfund program requires the consideration of a No Action alternative to serve as a baseline comparison. Under this alternative, the EPA would take no action at the Site to prevent exposure to ground water contamination. Costs associated with the No Action alternative are for abandoning existing monitoring wells.

<u>Overall Protection of Human Health and the Environment</u>
Alternative 1would not protect human health until the Site eventually attained the remedial goals, if possible. This lack of protectiveness would exist because no controls would be implemented to restrict exposure to impacted shallow ground water. Natural attenuation of elevated metals concentrations would not be protective of human health in the near term, or possibly in the long term either.

Compliance with ARARs

Alternative 1 would not comply with Federal or State primary drinking water standards in the near term. Longer-term compliance for Alternative 1 would depend on the ability of natural processes to attenuate elevated COC concentrations. Tables 12, 13 and 14 identify the chemical-, action-, and location-specific ARARs.

Long-Term Effectiveness and Permanence

Alternative 1, No Action, could eventually reduce COC concentrations to remedial goals through natural attenuation. Upon attainment of these remedial goals, the natural processes that caused the reduction of concentrations of metals would continue to maintain compliance.

Reduction of Mobility/Toxicity/Volume (M/T/V) Through Treatment

Alternative 1 would not demonstrate any reduction of M/T/V.

Short-Term Effectiveness

Under Alternative 1, well abandonment or other below-grade activities at or near the Site could expose human receptors to elevated concentrations of COCs. Alternative 1 would prevent exposure to RA workers, as there would be no RA.

Implementability

Alternative 1 could be implemented immediately because well abandonment equipment is readily available and procedures are in place.

Cost

There are low associated costs with Alternative 1. Costs associated with the No Action alternative are for abandoning existing monitoring wells.

9.1.2 Alternative 5: Extraction, Treatment, and Disposal

Estimated Cost: $10.3 million

This alternative would rely on ground water extraction, with possible treatment to meet industrial waste water standards and disposal to the City of Tampa waste water collection system. Assessment of ground water sampled from well CON-4R, the most highly-impacted well at the Site, suggested that extracted ground water would not be a hazardous waste; however, some form of pretreatment may be needed to meet industrial waste water standards. This alternative would include ICs and Site security measures to limit potential exposure to contaminants in the surficial aquifer ground water. ICs could include one or more of the following measures:

- Prohibit potable ground water use on the MRI Property and adjacent impacted properties.
- Ground water use ordinances would mandate restrictions on ground water extraction for potable use.

- Fences and warning signs would restrict access to the MRI Property.
- Limit future land use to uses compatible with industrial/commercial purposes.
- Prohibit potable ground water use on the MRI Property.
- Restrict access to the MRI Property.
- Prohibit excavation without written approval from EPA and FDEP.
- Grant permanent access to the property to EPA and FDEP and their agents and/or representatives.

Shallow ground water extraction wells and shallow ground water piezometers would be constructed at locations projected to be effective at capturing impacted shallow ground water. A small building would enclose a storage tank for extracted ground water, together with an air compressor and receiver tank for air-driven pumps, electrical equipment and controls, and maintenance equipment associated with the extraction and disposal systems. A pump station would be constructed to discharge into the nearby pressure sewer main.

There are approximately ten permanent monitoring wells and several temporary wells in the surficial aquifer and there are six permanent monitoring wells in the upper Floridan aquifer. Certain existing monitoring wells would be abandoned, if appropriate, in accordance with State regulations. Additional monitoring wells would be constructed if needed.

Alternative 5 is problematic in that the ground water contamination at this Site appears to exist in isolated pockets rather than in a more uniform plume. When ground water contamination exists in a more or less uniform plume, and with favorable subsurface conditions, it is possible to construct a network of extraction wells to pump contaminated ground water to the surface for treatment and at the same time reverse the plume's migration. The challenge at this Site would be to first precisely identify the pockets and then to successfully emplace extraction wells in the pockets. Based on our current understanding of Site conditions, this may not be achievable.

If shown to be technically feasible, this alternative would potentially meet RAOs by reducing levels of COCs below cleanup goals and by reducing the mobility of COCs. It would mitigate impacted shallow ground water transfers to surface water and mitigate ground water migration off-site. The timeframe for this RA alternative could be somewhat less than timeframes of other RA alternatives where natural attenuation would be the only RA. However, physical limitations on mass removal, such as limits to ground water advection and diffusion, would prevent a rapid cleanup and might slow completion of remediation to a timeframe comparable to the remedial timeframe for naturally-occurring attenuation processes.

Overall Protection of Human Health and the Environment
Alternative 5 would be protective of human health and the environment through the use of ICs and Engineering Controls in the short-term. Extraction of impacted ground water

might not reduce concentrations of COCs to below cleanup goal levels in all portions of the Site in the long term.

Compliance with ARARs
Alternative 5 would not comply with Federal or State primary drinking water standards in the short term. Longer-term compliance would depend on the efficiency of mass removal and the speed of natural attenuation processes. Ground water pretreatment and discharge would comply with the appropriate action-specific ARARs. Tables 12, 13 and 14 identify the chemical-, action-, and location-specific ARARs.

Long-Term Effectiveness and Permanence
Alternative 5, shallow ground water extraction and disposal, would continue until concentrations of COCs in shallow ground water are reduced to cleanup goals. Upon attainment of remediation goals, residual levels of COCs would continue to decrease due to natural processes such as diffusion and dispersion.

Long-term monitoring programs and Five-Year Reviews would be required for Alternative 5. Maintenance and/or periodic inspections would need to be performed on a regular basis for Alternative 5.

Reduction of Mobility/Toxicity/Volume) Through Treatment
As a result of mass removal, Alternative 5 would reduce COC mobility and volume. Treatment of extracted ground water would occur using on-site pretreatment equipment, if needed, followed by off-site management at the City of Tampa Waste Water Treatment Plant. Concentrations of COCs would decrease as a result of naturally-occurring processes.

Short-Term Effectiveness
For Alternative 5, ICs would protect members of the community from exposure to impacted ground water. There would be a short-term risk from exposure to extracted shallow ground water for RA workers. However, the risk would be controlled by proper use of personnel protection equipment and monitoring during Site activities.

Implementability
Alternative 5 is problematic in that the ground water contamination at this Site appears to exist in isolated pockets rather than in a more uniform plume. The challenge will be to first precisely identify the pockets and then to successfully emplace extraction wells in the pockets. Based on our current understanding of Site conditions, this may not be achievable. Disposal to the City of Tampa waste water collection system is assumed to be implementable based on initial discussions with the City.

Cost
Based on a conceptual-level cost estimate and preliminary assumptions, the total present value for Alternative 5 is $10,300,000 for a 30-year project life and assumed equivalent uniform annual interest rate of five percent. The estimated capital cost for this alternative

is $1,300,000, and the annual operation and maintenance (O&M) cost is $530,000. The costs for Alternative 5 compared to Alternatives 1 and 6 are shown on Table 11.

9.1.3 Alternative 6: Containment and Monitored Natural Attenuation

Estimated Cost: $6.7 million
This alternative would rely on the containment cell and a multimedia cap to contain the most heavily impacted portion of the surficial aquifer ground water. The barrier walls would be keyed into the confining Hawthorn Group clay layer described previously. The location of the barrier walls would be chosen, based on geotechnical sampling and ground water flow modeling, to surround portions of the MRI Property containing impacted shallow ground water projected to not attain remediation goals by MNA in a reasonable timeframe.

Design and construction of the multimedia cap would be integrated with the design and construction of the containment cell. Among candidates for its construction are combinations of on-site soils, imported soils, standard sodium bentonite, chemically resistant sodium bentonite, calcium bentonite, attapulgite, and cement. If testing indicates that all of these materials fail in one respect or another, the walls will be constructed using sheet piles.

Contamination in the surficial aquifer outside this containment area would rely on MNA as the remedy. The likely efficacy of MNA to achieve the cleanup goals was shown in a ground water modeling study that predicted potential future ground water concentrations of lead over time.

A steady-state numerical ground water flow model was used to predict potential future ground water concentrations of lead, both on the MRI Property and on adjacent properties. The model was developed and calibrated against ground water elevation data from October 10, 2006. The steady-state model was then modified by the addition of ground water concentrations to a transient ground water flow and chemical transport model that included a barrier wall and cap. The maximum ground water concentrations recorded from all sampling events were used to produce the source in order to simulate a conservative modeling scenario. The model was designed to have one stress period lasting 40 years.

Plan views of the predicted lead concentrations, with the containment cell and cap in place, at modeled times of 1, 5, 10, 20, and 40 years are presented on Figures 9 through 13. Based on model simulations after 1 year, simulated off-site elevated lead concentrations (Figure 9) are anticipated for four areas:

- An area approximately 500 ft north of the MRI Property where lead concentrations range to approximately 8 µg/L;
- An area immediately northwest of the MRI Property near the Ippolito Property, where lead concentrations exceed the MCL of 15 µg/L, but are below 50 µg/L; and

- An area along the eastern boundary of the MRI Property near the railroad tracks, where lead concentrations exceed 50 µg/L, but are generally below 100 µg/L.

After 5 years, simulated lead concentrations at East Columbia Drive, adjacent to the northwest property line, range up to approximately 25 µg/L, and simulated concentrations along the railroad tracks range up to 35 µg/L (Figure 10). After 10 years, all simulated lead concentrations outside the property line are equal to the MCL as shown on Figure 11. After 20 years, all simulated lead concentrations outside the property line are below the MCL as shown on Figure 12. After 40 years, all simulated lead concentrations outside the barrier wall are below the MCL, with the exception of a small area adjacent to the northwest corner of the wall. Simulated lead concentrations in this area range up to approximately 70 µg/L immediately adjacent to the wall, but decline to below the MCL within approximately 5 ft of the wall (Figure 13). This area is located completely within the MRI Property.

Also part of Alternative 6 is the excavation of soils and sediments exceeding the remedial goal for protection of ground water (148 mg/kg lead). This soil would be contained within the boundaries of the barrier walls or incorporated into the multi-media cap. Solidified material from the OU1 RA would be used as part of the cap overlying the containment cell. A conceptual location of the walls and cap is shown on Figure 14.

Apart from the monitoring described above to show that the ground water contamination is naturally attenuating, the ground water outside the barrier walls would be monitored to assess the effectiveness of the barrier. Details regarding this portion of the remedy would be developed during the RD phase. Alternative 6 would require the same ICs and Site security measures described in Alternative 5.

Overall Protection of Human Health and the Environment
Alternative 6 eliminates exposure pathways, reduces levels of risk to levels that would be protective of human health and the environment, and eliminates further horizontal or vertical migration. The contained contaminants will remain within the containment cell in perpetuity. Natural attenuation processes would provide long-term progress toward attainment of cleanup goals outside the barrier walls.

Compliance with ARARs
Alternative 6 assumes that the site-specific cleanup goals would not be met within the containment area. It is also assumed that the site-specific cleanup goals would not be in compliance in the short term outside the walls, and that long-term progress would be assessed via monitoring. Tables 12, 13 and 14 identify the chemical-, action-, and location-specific ARARs.

Long-Term Effectiveness and Permanence

For Alternative 6, containment of the ground water is a permanent remedy. The barrier wall system is expected to effectively contain the contaminated ground water. Alternative 6 is assumed to reduce, over time, the concentrations of metals in shallow ground water located outside the containment area through natural attenuation. Migration of COCs beyond Site boundaries would be mitigated upon compliance with cleanup goal levels outside the walls. Upon attainment of these remediation goals, these natural processes would continue to maintain compliance with remediation goals. Long-term monitoring programs and Five-Year Reviews would be required for Alternative 6. Maintenance and/or periodic inspections would need to be performed on a regular basis for Alternative 6.

Reduction of Mobility/Toxicity/Volume (M/T/V) Through Treatment

Alternative 5 evaluated treatment of the contaminated ground water; however, the estimated cost was significantly higher than Alternative 6, the containment alternative. Because of the high cost, treatment of the waste to satisfy the expectation established in the NCP is not realistic. Further, since other less expensive means exist (e.g., Alternative 6) to isolate the waste and thus protect public health, the treatment expectation cannot be reasonably justified. Through natural attenuation, Alternative 6 will reduce the mobility and volume of impacted shallow ground water outside the containment area. Concentrations of COCs outside the walls would decrease from naturally-occurring processes. The mobility of the contaminants will be reduced by the barrier wall system.

Short-Term Effectiveness

For Alternative 6, ICs would protect members of the community from exposure to impacted ground water. There would be a short-term risk from exposure to extracted shallow ground water for RA workers. However, the risk would be controlled by proper use of personnel protection equipment and monitoring during Site activities.

Implementability

Alternative 6 is technically feasible. A subsurface investigation is required to better define the geology along the proposed alignment of the barrier walls. Treatability studies will also be required to select the slurry mix design and to determine the long-term compatibility of the backfill. If testing indicates that these materials fail in one respect or another, the walls will be constructed using sheet piles. ICs imposed under Alternative 6 are considered to be implementable.

Cost

Based on a conceptual-level cost estimate and preliminary assumptions, the total present value for Alternative 6 is $6,700,000 for a 20-year project life and assumed equivalent uniform annual interest rate of five percent. The estimated capital cost for this alternative is $4,890,000 and the annual O&M cost is $140,000. The estimated cost for Alternative 6 compared to Alternatives 1 and 5 are shown in Table 11.

10.0 Comparative Analysis of Alternatives

Six remedial alternatives have been examined with respect to the requirements in the NCP, Code of Federal Regulations (CFR) (40 CFR Part 300.430[e] [9] iii), CERCLA, and factors described in *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA, 1988). The nine evaluation criteria include the following:

Threshold Criteria

- Overall protection of human health and the environment; and,
- Compliance with ARARs.

Balancing Criteria

- Short-term effectiveness;
- Long-term effectiveness and permanence;
- Reduction of mobility, toxicity, or volume through treatment;
- Implementability; and,
- Cost.

Modifying Criteria

- State acceptance; and
- Community acceptance.

A comparative analysis of the alternatives based on the threshold and balancing evaluation criteria is presented below. The objective of this section is to compare and contrast the alternatives to support selection of the remedy for the Site.

As mentioned previously, Alternatives 2, 3, and 4 did not pass the threshold criteria of: (1) Overall Protection of Human Health and the Environment, and (2) Compliance with ARARs, and therefore were not evaluated further. Alternatives 5 and 6 passed the two threshold criteria and were retained for detailed evaluation. Alternative 1, No Action, was retained for evaluation as required by the NCP.

Table 15 presents a comparative analysis of Alternatives 1, 5 and 6. Table 15 provides qualitative ranking scores for each evaluation criterion for each alternative. Each alternative's performance against the criteria (except for present worth) was ranked on a scale of 0 to 5, with 0 indicating that none of the criterion's requirements were met and 5 indicating all of the requirements were met. The ranking scores combined with the present worth costs provide the basis for the comparison of the alternatives. With the exception of short-term effectiveness and implementability, Alternatives 5 and 6 ranked higher than Alternative 1 across all the criteria. Alternatives 5 and 6 are the same for overall protection and compliance with ARARs. Alternative 6 ranks higher than Alternative 5 in terms of long-term effectiveness and permanence, implementability, and cost. Alternative 5 ranks slightly higher than Alternative 6 in the category of M/T/V through treatment.

10.1 Overall Protection of Human Health and the Environment

Alternatives 5 and 6 would provide protection of human health and the environment by eliminating, reducing, or controlling risk through removal, treatment, and/or containment with Engineering and ICs. Alternative 1 would not satisfy this threshold criterion.

10.2 Compliance with ARARs

Section 121(d) of CERCLA and NCP §300.430(f)(1)(ii)(B) require that RAs at Superfund sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations, which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA Section 121(d)(4).

Applicable requirements are those cleanup goals, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal or State environmental laws or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, RA, location, or other circumstance found at a Superfund site. Only those State standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable. Relevant and appropriate requirements are those cleanup goals, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal or State environmental laws or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, RA, location, or other circumstance at a Superfund site, address problems or situations sufficiently similar to those encountered at the Superfund site that their use is well-suited to the particular site. Only those State standards that are identified in a timely manner and are more stringent than Federal requirements may be relevant and appropriate. Compliance with ARARs addresses whether a remedy will meet all of the ARARs of other Federal and State environmental statutes or provides a basis for invoking waiver.

Each remedial alternative is evaluated for its compliance with ARARs as defined in CERCLA Section 121(f). The following items must be considered during the evaluation:

- Compliance with contaminant-specific ARARs (i.e., MCLs). This consideration includes whether contaminant-specific ARARs can be met and whether a waiver may be appropriate if they cannot be met.
- Compliance with location-specific ARARs (i.e., protection of historic sites, regulations regarding activities near wetlands/floodplains). This consideration includes whether location-specific ARARs can be met or waived.
- Compliance with action-specific ARARs (i.e., RCRA treatment technology standards). This consideration includes whether action-specific ARARs can be met or waived.

Neither Alternative 5 nor 6 would comply with ARARs in the short term. Longer term, Alternatives 5 and 6 will satisfy ARARs. Alternative 1 does not satisfy ARARs in the short term; longer term, compliance would depend on the ability of natural processes to attenuate elevated COC concentrations to the cleanup goals.

10.3 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once clean-up levels have been met. This criterion includes the consideration of residual risk that will remain following remediation and the adequacy and reliability of controls. Each alternative, except the No Action Alternative 1, provides some degree of long-term protection. Evaluation of the long-term effectiveness and permanence of a remedial alternative addresses the results of a remedial alternative in terms of the risk remaining at the site after RAOs are achieved. Long-term effectiveness is evaluated based on the following three factors:

- Magnitude of the remaining risk. This consideration addresses the residual risk remaining from untreated waste or treatment residuals at the end of the remedial activities;
- Adequacy of controls. This consideration addresses the adequacy and suitability of the controls, if necessary, that are used to manage the treatment residuals or untreated wastes that remain at the site; and
- Reliability of the controls. This consideration addresses the long-term reliability of management controls, if used, for providing continued protection from the treatment residuals or untreated wastes.

Alternative 1, No Action, could eventually reduce COC concentrations to remediation goals through natural attenuation. Upon attainment of these remediation goals, the natural processes that caused the reduction of concentrations of metals would continue to maintain compliance.

Both Alternatives 5 and 6 achieve long-term effectiveness and permanence; however, Alternative 6 is rated slightly higher than Alternative 5 since extraction of impacted pockets of ground water is deemed problematic. ICs will be necessary for both alternatives to ensure compatible land use is maintained. Similarly, all alternatives would necessitate Five-Year Reviews of remedy protectiveness since unrestricted use/unlimited exposure criteria would not be met. Adequate and reliable controls can be readily established for all of the alternatives.

10.4 Reduction of Mobility, Toxicity, or Volume through Treatment

Reduction of M/T/V through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy. This criterion addresses the statutory preference for selecting a RA that employs treatment technologies that are able to permanently and significantly reduce the M/T/V of the COCs as their principal element. The ability of a remedial alternative to reduce the M/T/V of the COCs is evaluated based on the following five factors:

- The treatment processes, the remedies employed and the materials they treat;
- The amount (mass or volume) of hazardous materials that will be destroyed or treated by the remedial alternative, including how the principal threat(s) will be addressed;
- The degree of expected reduction in M/T/V of COCs, measured as a percentage of reduction or order of magnitude;
- The degree to which the treatment is irreversible; and
- The type and quantity of treatment residuals that would remain following the treatment actions.

Alternative 1 would not demonstrate any reduction of toxicity, mobility, or volume through natural attenuation at the Site.

As a result of mass removal, Alternative 5 would reduce COC mobility and volume. Treatment of extracted ground water would occur using on-site pretreatment equipment, if needed, followed by off-site management at the City of Tampa Waste Water Treatment Plant. Concentrations of COCs would decrease as a result from naturally-occurring processes.

Alternative 5 evaluated treatment of the contaminated ground water; however, the estimated cost was significantly higher than Alternative 6, the containment alternative. Because of the high cost, treatment of the waste to satisfy the expectation established in the NCP is not realistic. Further, since other less expensive means exist (e.g., Alternative 6) to isolate the waste and thus protect public health, the treatment expectation cannot be reasonably justified. Through natural attenuation, Alternative 6 will reduce the mobility and volume of impacted shallow ground water outside the containment area. Concentrations of COCs outside the walls would decrease from naturally-occurring processes. The mobility of the contaminants will be reduced by the barrier wall system.

10.5 Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community and the environment during RA until cleanup goals noted in Tables 1 and 2 are achieved. The short-term effectiveness of a remedial alternative is evaluated with respect to its effect on human health and the environment during its implementation. Short-term effectiveness is evaluated based on the following four factors:

- Protection of the community during the RA. This consideration addresses any risk that results from the implementation of the RA (i.e., dust from an excavation) that may affect human health;

- Protection of workers during the RA. This consideration addresses threats that may affect workers and the effectiveness and reliability of protective measures that may be taken;
- Environmental impacts. This consideration addresses the potential adverse environmental impact that may result from the implementation of the remedial alternative and evaluates how effective available mitigation measures would be able to prevent or reduce the impact; and
- The amount of time required until the RAOs are achieved. This consideration includes an estimate of the time required to achieve protection for the entire Site or for individual elements associated with specific Site areas of threats.

The risk to community and workers would be minimal for all alternatives. None of the risks would be uncontrollable. The on-site RA construction crew could potentially be exposed to contaminated dusts during the soil removal and installation of monitoring and extraction wells. These risks would be controllable by the use of dust suppressants. The risk to the on-site RA construction workers would be controlled by proper use of personnel protection equipment and monitoring during Site activities.

10.6 Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

Alternative 1 is implementable because no action is performed. Costs associated with Alternative 1 are for well abandonment.

As noted above, Alternative 5 is problematic in that the ground water contamination at this Site appears to exist in isolated pockets rather than in a more uniform plume. The challenge will be to first precisely identify the pockets and then to successfully emplace extraction wells in the pockets. Based on our current understanding of Site conditions, this may not be achievable. Disposal to the City of Tampa waste water collection system is assumed to be implementable based on initial discussions with the City.

Alternative 6 is technically feasible. A subsurface investigation is required to better define the geology along the proposed alignment of the barrier walls. Treatability studies will also be required to select the slurry mix design and to determine the long-term compatibility of the backfill. If testing indicates that these materials fail in one respect or another, the walls will be constructed using sheet piles. ICs imposed under Alternative 6 are considered to be implementable.

10.7 Cost

For each remedial alternative, a minus 30 to plus 50 percent cost estimate has been developed. Cost estimates for each remedial alternative are based on conceptual engineering and design and are expressed in 2008 dollars. The cost estimate for each remedial alternative consists of the following four general categories:
Capital Costs. These costs include the expenditures that are required for construction of the remedial alternative (direct costs) and non-construction/overhead costs (indirect costs). Capital costs are exclusive of the costs required to operate and maintain the remedial alternative throughout its use. Direct costs include the labor, equipment and supply costs, including contractor markups for overhead and profit, associated with activities such as mobilization, monitoring, site work, installation of treatment systems, and disposal costs. Indirect costs include items required to support the construction activities, but are not directly associated with a specific item.

Total Construction Costs. These costs include the capital costs with the addition of the contractor fee (at 10 percent of capital costs), engineering and administrative costs (at 15 percent of capital costs), and a contingency allowance set at 25 percent of the capital costs with contractor fees and engineering and administrative costs.

Present Worth O&M Costs. These costs include the post-construction cost items required to ensure or verify the continued effectiveness of the remedial alternative. O&M costs typically include long-term power and material costs (i.e., operational cost of a water treatment facility), equipment replacement/repair costs, and long-term monitoring costs (i.e., labor and laboratory costs), including contractor markups for overhead and profit. Present worth analysis is based on a seven percent discount rate over a period of 30 years.

Total Present Worth Costs. This is the sum of the total construction costs and present worth O&M costs and forms the basis for comparison of the various remedial alternatives.

There are low associated costs with Alternative 1.

Based on a conceptual-level cost estimate and preliminary assumptions, the total present value for Alternative 5 is $10,300,000 for a 30-year project life and assumed equivalent uniform annual interest rate of five percent. The estimated capital cost for this alternative is $1,300,000, and the annual O&M cost is $530,000.

Based on a conceptual-level cost estimate and preliminary assumptions, the total present value for Alternative 6 is $6,700,000 for a 20-year project life and assumed equivalent uniform annual interest rate of five percent. The estimated capital cost for this alternative is $4,890,000 and the annual O&M cost is $140,000. Costs for the three alternatives are summarized in Table 11.

10.8 Modifying Criteria

State and community acceptance are modifying criteria that shall be considered in selecting the RA.

10.8.1 State/Support Agency Acceptance

The State of Florida, as represented by FDEP, has assisted in the Superfund process through the review of the RI/FS documents and has actively participated in the decision making process. While the FDEP concurs with the conceptual site model of this proposed remedy, there still are specific design concerns which have not been fully addressed at this time.

10.8.2 Community Acceptance

Approximately 100 copies of the Proposed Plan (EPA, 2008) were mailed to citizens in neighborhoods adjacent to the Site. The notice of availability of these documents was published in the *Tampa Tribune* on April 14, 2008. A public comment period on the documents was held from April 14 to May 13, 2008. EPA's responses to questions and comments received are included in the Responsiveness Summary which is Appendix A to this ROD.

10.9 Principal Threat Wastes

The NCP establishes an expectation that EPA will address the principal threats posed by a site through treatment wherever practicable (NCP §300.430(a)(1)(iii)(A)). Identifying principal threat waste combines concepts of both hazard and risk. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile, which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. The contaminated ground water (highly colored and viscous) being addressed through OU2 is relatively immobile and therefore does not constitute principal threat wastes. Therefore, no source materials constituting principal threats will be addressed within the scope of this action. Further, in conjunction with the remedy for OU1 S/S, the statutory preference for treatment will be satisfied for the Site.

11.0 Selected Remedy

11.1 Rationale for the Selected Remedy

Based upon consideration of the requirements of CERCLA, the NCP, FDEP applicable regulations, the detailed analysis of the alternatives and public and state comments, EPA has selected the following remedy: Alternative 6, Containment and Monitored Natural Attenuation. Alternative 6 will augment and complement the OU1 remedy S/S. The selected remedy for OU2 meets the threshold criteria of protection to human health and the environment and compliance with ARARs. Further, the selected remedy satisfies the RAOs discussed in Section 8. The primary reason for this is that Alternative 6 provides protection by containing the contaminated ground water and soil above cleanup goals noted in Tables 9 and 10 within the Site boundary, and is significantly less costly than Alternative 5. Ground water contamination in the surficial aquifer outside the containment walls will decrease from naturally-occurring processes. Ground water monitoring will be performed outside of the barrier walls to verify the protectiveness of the remedy and to monitor for natural attenuation outside the slurry or vertical barrier walls.

The selected remedy will satisfy the statutory requirements of CERCLA Section 121(b) by being protective of human health and the environment; complying with ARARs; being cost-effective; utilizing permanent solutions and alternative treatment technologies to the maximum extent practicable when the OU1 remedy is factored in; and meeting the preference for remedies that employ treatment that permanently and significantly reduces the M/T/V of hazardous wastes as a principal element. This action represents the final remedy selected for the Site, and, as such, is compatible with the intended future use of the Site. This action also is compatible with and complementary to the action for OU1.

11.2 Description of the Selected Remedy

The Selected Remedy will consist of the construction of containment cell and a multimedia cap to contain the most heavily impacted portion of the surficial aquifer ground water. The location of the containment cell will be keyed into the confining Hawthorn Group clay layer. The location of the barrier walls will be chosen, based on geotechnical sampling and ground water flow modeling, to surround portions of the MRI Property containing impacted shallow ground water projected to not attain remediation goals by MNA in a reasonable timeframe. Figure 15 illustrates the approximate extent of the ground water contamination above cleanup goals.

Design and construction of the multimedia cap will be integrated with the design and construction of the containment cell. Among candidates for construction of the containment cell are combinations of on-site soils, imported soils, standard sodium bentonite, chemically resistant sodium bentonite, calcium bentonite, attapulgite, and cement. If compatibility testing indicates failure of these materials in one respect or another, the walls will be constructed using sheet piles.

Soil above the remedial goal for protection of ground water (148 mg/kg) will be excavated and contained within the containment cell. The ground water contamination outside the containment cell will be monitored and allowed to attenuate by natural processes. This remedy will be implemented concurrently with the OU1 remedy S/S for the soil and sediment contamination. The stabilized material will become a component of part of the cap.

11.2.1 Institutional and Engineering Controls

Institutional and Engineering Controls will be required as part of the selected remedy. This ROD establishes the Institutional Controls (ICs) to be implemented. ICs are non-engineering measures which usually include legal controls to affect human activities in such a way so as to prevent or reduce exposure to contamination. The purpose of the ICs is to impose on the subject property "use" restrictions which run with the land for the purpose of implementing, facilitating and monitoring a remedial action to reduce exposure, thereby protecting human health and the environment. ICs which are required for the subject properties will be implemented after construction of the remedy and must be drafted in accordance with FDEP's *Institutional Controls Procedures Guidance* (FDEP, 2004). A restrictive covenant will document the requirements and restrictions placed on the subject properties and will be filed with the county land office. Some of the ICs which will be generally implemented include, but are not limited to, the following:

- Prohibit potable ground water use on the MRI Property and adjacent impacted properties;
- Limit future land use to uses compatible with industrial/commercial purposes;
- Prohibit excavation without written approval from EPA and FDEP; and
- Grant permanent access to the property to EPA and FDEP and their agents and/or representatives.

Some of the engineering controls which will be generally implemented include, but are not limited to the following:

- Fences and warning signs would restrict access to the MRI Property, and
- Cap cover.

The PRP is responsible for implementing the restrictive covenant with FDEP and will submit all associated documents as a part of the "Interim Remedial Action Report," 480 days after the remedy has been constructed in order for EPA to issue the RA Certification of Completion. The restrictive covenant will ensure that the land use remains non-residential and that appropriate precautions are taken for any potential future intrusive subsurface work activities (e.g., installation of utility lines) in order to prevent disturbance of the containment cell and cap and to ensure short- and long-term effectiveness of the remedy. EPA will grant certification of completion when restrictive covenants are in place. The PRP will coordinate establishment of the covenant with FDEP and EPA. The covenant will be drafted in accordance with FDEP's *Institutional Controls Procedures Guidance* (FDEP, 2004) using the model Declaration of Restrictive Covenant.

11.2.2 Five-Year Reviews

A statutory review of the ongoing protectiveness of the remedy will be performed by EPA no less often than every five years after initiation of the RA. This review is a public process, and will be conducted to ensure that the selected remedy remains protective of human health and the environment.

11.2.3 Summary of Estimated Remedy Costs

The estimated present worth cost for remedy construction is approximately $6,700,000. Capital costs are summarized in Table 16, and O&M costs are summarized in Table 17. Additional changes in the cost estimate are likely to occur as new information and data are collected during the engineering design of the remedial alternatives. Major changes, if they occur, may be documented in the form of a memorandum in the Administrative Record file, an ESD, or a ROD Amendment. This is an order of magnitude cost estimate that is expected to be within plus 50 percent to minus 30 percent of the actual project costs.

11.2.4 Expected Outcomes of the Selected Remedy

The results from the implementation of the selected remedy include the long-term isolation of all contaminated ground water that may pose a risk to human health in a commercial setting through contact. The remedy is compatible with the planned use for the Site. The selected remedy is fully compatible with and complimentary to the remedy for OU1. The required ICs would be necessary to limit contact with contaminated soil. Therefore, they have no impact on the long-term effectiveness of the remedy and site reuse. The selected remedy has the lowest short-term impacts to the community and is consistent with similar decisions nationally.

11.2.4.1 Available Land Use

The soil cleanup goal noted in Table 10 is based on protecting the underlying surficial aquifer. Ground water will be suitable for use as a drinking water resource once cleanup goals noted in Table 9 are met. Note that this aquifer is considered a low yield/poor quality aquifer, by FDEP designation in Chapter 62-780, F.A.C. (FDEP, 2005b). Therefore, the likelihood of its ever being developed as a drinking water resource is low.

ICs will limit the on-site land uses in the disposal area and will restrict the use of ground water on-site and in adjacent impacted areas. During remedy implementation, engineering and administrative controls will be used to protect the public from environmental exposure or safety hazards associated with the cleanup activities. When this construction is complete, the Site property will be suitable for commercial/industrial development. It is anticipated that reuse of the property can occur prior to meeting the ground water cleanup goals noted in Table 9.

11.2.4.2 Final Cleanup Goals

The final cleanup goals and the basis for the cleanup goals are discussed in Section 7.0 and included in Tables 9 and 10. These cleanup goals are protective of human health and the environment.

12.0 Statutory Determinations

Based on information currently available, EPA as the lead agency believes the Preferred Alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The EPA expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA 121(b): (1) be protective of human health and the environment; (2) comply with ARARs (or justify a waiver); (3) be cost-effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies, and satisfy the preference for treatment as a principal element, to the extent practicable.

12.1 Protection of Human Health and the Environment

The selected remedy satisfies the statutory requirement for protection of human health and the environment through isolation of contaminated ground water from human receptors, monitored natural attenuation of ground water until exposure levels are reduced to at or below cleanup levels, ICs, and administrative controls. The selected remedy does not include treatment as a major element because there are no principal threats to be remedied in this OU. The engineering principles and technology for the selected remedy are well established and are expected to be reliable over the long-term. Site conditions are conducive to construction of the remedy, and it is compatible with the expected future use of the Site.

12.2 Compliance with ARARs

Implementation of the Selected Remedy will comply with all federal and state chemical-specific, action-specific, and location-specific ARARs. Chemical-specific requirements include those laws and regulations governing the release of materials possessing certain chemical or physical characteristics, or containing specified chemical compounds. Chemical-specific requirements set health- or risk-based concentration limits or ranges in various environmental media for specific hazardous substances, contaminants, and pollutants. Table 12 presents the chemical-specific ARARs, criteria and guidance for the Selected Remedy.

Action-specific requirements are technology-based, establishing performance, design, or other similar action-specific controls or regulations for the activities related to the management of hazardous substances or pollutants. Action-specific requirements are triggered by the particular RA selected to accomplish the cleanup. Action specific requirements that will be complied with by the selected remedy primarily include federal and state hazardous waste regulations and discharge requirements. A summary of the requirements to be met through the implementation of the Selected Remedy is provided in Table 13.

Location-specific requirements are design requirements or activity restrictions based on the geographic or physical position of the Site and its surrounding area. Location-specific requirements set restrictions on the types of remedial activities that can be performed based on site-specific characteristics or location. Location-specific requirements were evaluated and potentially consist of location standards for wetland protection, protection of endangered species, fish and wildlife coordination, and meeting the substantive requirements of a NPDES permit for storm water drainage from the containment cell, construction sites, and industrial activities as shown in Table 14.

12.3 Cost Effectiveness

EPA has determined that the selected remedy is cost-effective and that the overall protectiveness of the remedy is proportional to the overall cost of the remedy. The cost-effectiveness of the remedy was assessed by comparing the overall effectiveness of the remedy (i.e., long-term effectiveness and permanence; reduction in M/T/V; short-term effectiveness) with the other alternatives considered. More than one remedial alternative may be considered cost-effective, but CERCLA does not mandate that the most cost-effective or least expensive remedy be selected.

12.4 Permanent and Alternative Treatment solutions

The selected remedy uses permanent solutions and alternative treatment solutions to the maximum extent practicable. The selected remedy will provide an acceptable degree of long-term effectiveness and permanence. The remedy will require Institutional and Administrative Controls over the long-term to remain effective, but these remedy components are neither unusual nor exceptional in degree or cost. The remedy can be reliably considered permanent.

12.5 Preference for Treatment as a Principal Element

In addition to the four statutory mandates previously discussed, the NCP includes a preference for treatment for the selected remedies in addressing the principal threat at the Site. The selected remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable when the OU1 remedy is factored in.

12.6 Five-Year Review Requirement

CERCLA Section 121 and 40 CFR Part 300 require a review of RAs at least every five years if the RA results in hazardous substances, pollutants, or contaminants remaining in place above levels that allow for unlimited use and unrestricted exposure. Because this remedy will result in hazardous substances, pollutants or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five (5) years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

12.7 Documentation of Significant Changes

Pursuant to CERCLA 117(b) and NCP 300.430(f)(3)(ii), the ROD must document any significant changes made to the Preferred Alternative discussed in the Proposed Plan. The ground water cleanup goals presented in the EPA Proposed Plan for arsenic, lead, and sodium were listed at ten times the federal and State MCLs for potential drinking water sources based on the designation of the ground water in the vicinity of the MRI Site as low yield or poor quality. These goals were derived in error from Chapter 62-780.680(2)(c) F.A.C. which provides for alternative cleanup target levels for low yield or poor quality ground water within the MRI property boundaries only. Chapter 62-780.680(2)(c) does not contemplate allowing such deviations from MCLs beyond the MRI property boundaries. Further, despite the designation of the ground water in the vicinity of the MRI Site as low yield or poor quality, it is nevertheless classified as G-II, an actual or potential drinking water source. Therefore, the listing of cleanup goals in the Proposed Plan at ten times the federal and State MCLs was erroneous. As correctly indicated in Table 12, the relevant and appropriate standards for actual or potential sources of drinking water are the federal and State primary MCLs. This conclusion and correction is consistent with the findings presented in the EPA approved OU2 Feasibility Study Report prepared by Erler & Kalinowski, Inc. on behalf of MRC Holdings, Inc. The area to be addressed by MNA is shown in Figure 15.

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TABLES

Table 1
Chemicals of Potential Concern in Surficial Aquifer
February 1992 through February 2007

Chemical of Potential Concern	Range of Detected Concentrations (µg/L)	Range of Background Concentrations (µg/L)
Aluminum	7.5 - 2,700,000	3.9 - 900
Antimony	0.3 - 25.8	0.6 - 1.7
Arsenic	1.1 - 1,380	1.1 - 1.7
Beryllium	0.04 - 19.4	0.03 - 0.03
Cadmium	0.04 - 199	0.04 -0.04
Chromium	1.2 - 4,010	4.2 - 11.8
Cyanide (Total)	2.0 - 52,000	3.7 - 72
Fluoride	77 - 50,200	77 - 171
Iron	137 - 323,600	240 - 26,200
Lead	0.05 - 7,757	0.01 - 0.1
Manganese	5.2 - 1,390	20.3 - 449
Mercury	0.1 - 22.5	0.1 - 0.1
Molybdenum	0.246 - 815	0.5 - 18.1
Nickel	1.3 - 617	1.5 - 10.6
Selenium	0.7 - 800	2.9 - 3.2
Sodium	380 - 22,100,000	2,200 – 55,700
Thallium	0.01 - 30.7	0.02 - 0.02
Tin	1.36 - 101,000	0.5 - 2.1
Vanadium	2.1 - 7,200	0.9 - 4.7

µg/L is micrograms per liter or parts per billion

Table 2
Occurrence, Distribution, and Selection of Chemicals of Concern in Ground Water (1999 Human Health Risk Assessment)[1]

Chemical of Concern	Min Conc.[1] (ppb)	Max Conc.[1] (ppb)	Mean Conc. (ppb)	95% UCL of Mean (ppb)	Background Conc. (ppb)	Screening Toxicity Value (ppb)
Aluminum	1,600	110,000	36,000	35,800,000	976	50
Arsenic	11	69	23.4	95.5	8.5	50
Chromium	10	290	79.3	1,930	ND	100
Iron	1,200	53,000	14,300	101,000	436	1,100
Lead	4.0	380	86.6	2,010	ND	15
Thallium	9.0	9.0	2.18	2.96	NC	0.26
Vanadium	7.0	420	122	1,390	ND	26

Key
Conc. = Concentration
ppb = parts per billion
NA = Not applicable
ND = Not detected
NC = Not calculated due to small sample size
Note: 1. Minimum/maximum detected concentration in ground water
[1] Source: Remedial Investigative Report. Bechtel, 1999.

Table 3
Summary of Ground Water Chemicals of Concern and Medium-Specific Exposure Point Concentrations (1999 Human Health Risk Assessment)[1]

Scenario Timeframe: Future
Medium: Ground Water
Exposure Medium: Surficial Aquifer Ground Water

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Conc.	Units	Statistical Measure
		Min	Max					
Tap: Ingestion	Aluminum	1,600	110,000	μg/L	12/14	110,000	μg/L	Max
	Arsenic	11	69	μg/L	9/14	69	μg/L	Max
	Chromium	10	290	μg/L	12/14	290	μg/L	Max
	Iron	1,200	53,000	μg/L	13/14	53,000	μg/L	Max
	Lead	4.0	380	μg/L	12/14	380	μg/L	Max
	Thallium	9.0	9.0	μg/L	1/11	2.96	μg/L	95% UCL-T
	Vanadium	7.0	420	μg/L	11/14	420	μg/L	Max

Key
μg/L: Micrograms per liter
95% UCL: 95% Upper confidence limit of log-transformed data, using one-half the sample quantitation limit for non-detects
Max: Maximum detected value
[1] Source: Remedial Investigative Report, Bechtel, 1999.

Table 4
Risk Characterization Summary – Carcinogens
(1999 Human Health Risk Assessment)[1]

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risks			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water	Ground Water	Site-Wide	Aluminum	NA	NA	NA	NA
			Arsenic	1.2E-03	NA	2.2E-06	1.2E-03
			Chromium	NA	NA	NA	NA
			Iron	NA	NA	NA	NA
			Thallium	NA	NA	NA	NA
			Vanadium	NA	NA	NA	NA
						Ground Water Risk Total=	1.2E-03

NA: Not applicable
[1] Source: Remedial Investigative Report, Bechtel, 1999.

Table 5
Risk Characterization Summary – Non-carcinogens
(1999 Human Health Risk Assessment)[1]

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Non-Carcinogenic Hazards			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Ground Water	Ground Water	Site-Wide	Aluminum	7.0E+00	NA	3.6E-02	7.1E+00
			Arsenic	1.5E+01	NA	2.1E-02	1.5E+01
			Chromium	3.7E+00	NA	2.6E-01	4.0E+00
			Iron	1.1E+01	NA	1.1E-01	1.1E+01
			Thallium	2.4E+00	NA	3.3E-03	2.4E+00
			Vanadium	3.8E+00	NA	1.8E-01	4.0E+00
			Ground Water HI total				44
			Total developmental neurotoxicity HI				7.1
			Total skin, vascular effects HI				15
			Total Gastrointestinal irritation HI				11
			Total blood chemistry HI				2.4

NA: Not applicable HI: Hazard index
[1] Source: Remedial Investigative Report, Bechtel, 1999.

Table 6
Risk-Based Remedial Goal Options for Ground Water
Based on Non-Cancerous Hazards Using Residential Exposure Assumptions

Equation Definition:

C = [THI x BW x AT x 365(d/yr) x CF] / [EF x ED x [(IRw/RfDo)+(IRa x VF x 1/RfDi)]]

Parameter	Definition	Value
C	chemical concentration in water (ug/L)	
RfDo	oral reference dose (mg/kg-day)	Chem. spec.
RfDi	inhalation reference dose (mg/kg-day)	Chem. spec.
BW	body weight (kg)	70
AT	averaging time (yr)	30
CF	conversion factor (ug/mg)	1000
EF	exposure frequency (d/yr)	350
ED	exposure duration (yr)	30
THI	target hazard index	1
IRw	daily water ingestion rate (L/day)	2
IRa	inhalation rate (m3/day)	20
VF	volatilization factor (L/m3)	0.5

COPC	RfDo	RfDi	Hazard Quotient Level (µg/L)		
			HQ=0.1	HQ=1	HQ=3
Aluminum	1.0E+00	NA	3,650	36,500	109,500
Antimony	4.0E-04	NA	1	15	44
Arsenic	3.0E-04	NA	1	11	33
Beryllium	2.0E-03	NA	7	73	219
Cadmium	5.0E-04	NA	2	18	55
Chromium (Total)	3.0E-03	NA	11	110	329
Cyanide	2.0E-02	NA	73	730	2,190
Fluoride	NA	NA	NA	NA	NA
Iron	7.0E-01	NA	2,555	25,550	76,650
Lead	NA	NA	NA	NA	NA
Manganese [1]	2.4E-02	NA	90	900	2,700
Mercury	3.0E-04	NA	1	11	33
Molybdenum	5.0E-03	NA	18	183	548
Nickel	2.0E-02	NA	73	730	2,190
Selenium	5.0E-03	NA	18	183	548
Sodium	NA	NA	NA	NA	NA
Thallium	7.0E-05	NA	0.3	3	8
Tin	6.0E-01	NA	2,190	21,900	65,700
Vanadium	5.0E-03	NA	18	183	548

1. The RfDo for manganese in IRIS is 1.4E-1 mg/kg/day based on the NOAEL of 10 mg/day. For soil exposure, Region 4 policy is to subtract the average daily dietary exposure (5 mg/day) from the NOAEL to determine a "soil" RfDo. When this is done, a "soil" RfDo of7E-2 mg/kg/day results. For water, a neonate is considered a sensitive receptor for the neurological effects of manganese. Thus, caution (in the form of a modifying factor) is warranted until more data are available. Using a modifying factor of 3 results in a "water" RfDo of 2.4E-2 mg/kg/day.

Table 7
Area Average Concentrations of Manganese, Molybdenum, and Tin Compared to Cleanup Goals
(Concentrations in µg/L)

Analyte	Back-ground Area	Within Containment Cell	Area 1	Area 2	Area 3	Area 4	Area 5	Cleanup Goal	Basis
Manganese	201	184	186	341	84	148	72	900	HQ=1
Molybdenum	8.2	127	6.7	10.3	6.9	88	74	183	HQ=1
Tin	1.3	10,001	623	183	39	2,555	480	21,900	HQ=1

Background Sample Locations: CON-1, EPAMW-3, P6, SDF-1, SSP-2
Within Containment Cell Sample Locations: ASB-C1, ASB-C2, ASB-C4, ASB-C5, ASB-C6, ASB-C8, ASB-C9, ASB-C11, ASB-W4, ASB-W6, ASB-W7, ASB-W8, CON-2, CON-3, CON-4, CON-8, CON-9, CON-4R, DBP-1, E2, HP-5, HP-5-2007, HP-5-2007-E, HP-5-2007-S, HP-5-2007-W, RRS-1, RRS-2, RRS-3, RVF-1, RVF-2, RVF-3, RVF-4, RVF-5, SLB1-1, SLB1-2, SLB3-1, SLB3-2, SMS-2
Area 1 Sample Locations: OPE-12, OPE-16, OPE-16B, OPE-16C, OPE-17
Area 2 Sample Locations: OPE-8, OPE-13, OPE-14, OPE-18, OPE-19, OPE-20, OPE-21
Area 3 Sample Locations: OPE-5, OPE-26, OPE-27, P4
Area 4 Sample Locations: ASB-C10, ASB-C12, ASB-C14, ASB-C15, ASB-W3, CON-10, CON-11
Area 5 Sample Locations: ASB-C3, ASB-W5, HP-5-2007-N, SLB2-1, SLB2-2, SSP-1
HQ = Hazard Quotient   µg/L = micrograms per liter

Table 8

Area Average Concentrations of Chemicals of Potential Concern Compared to Cleanup Goals

(concentrations in µg/L)

Analyte	Back-ground Area	Within Containment Cell	Area 1	Area 2	Area 3	Area 4	Area 5	Cleanup Goal	Basis
Aluminum	283	7,713	6,977	2,242	457	**55,069**	**45,450**	36,500	HQ=1
Antimony	0.9	4.7	1.4	1.6	0.5	4.9	5.6	6	MCL
Arsenic	0.6	**125**	6.4	9.2	5.1	**43**	**11**	10	MCL
Beryllium	0.01	3.5	0.8	0.6	0.08	2.0	1.1	4	MCL
Cadmium	0.01	**7.0**	0.6	0.4	ND	1.9	0.9	5	MCL
Chromium	3.2	**469**	22	21	9	**275**	**211**	100	MCL
Cyanide	27	**7,259**	103	63	15	ND	18	200	MCL
Fluoride	124	**6,657**	1,020	2,573	ND	**8,771**	2,255	4,000	MCL
Iron	9,500	**27,177**	14,439	8,603	2,240	18,453	8,495	25,550	HQ=1
Lead	0.03	**351**	**33**	1	0.5	**661**	**64**	15	MCL
Mercury	0.02	0.7	ND	ND	ND	ND	0.04	2	MCL
Nickel	3.8	**126**	17	15	7.1	54	31	100	MCL
Selenium	1.2	**73**	1.2	2.6	2.2	13	6.9	50	MCL
Sodium	18,662	**2,895,189**	**209,660**	155,717	**269,250**	**2,282,800**	**576,990**	160,000	MCL
Thallium	0.005	1.4	0.03	0.04	1.0	**2.5**	0.1	2	MCL
Vanadium	1.7	**826**	32	25	8.0	153	161	183	HQ=1

Background Sample Locations: CON-1, EPAMW-3, P6, SDF-1, SSP-2

Within Containment Cell Sample Locations: ASB-C1, ASB-C2, ASB-C4, ASB-C5, ASB-C6, ASB-C8, ASB-C9, ASB-C11, ASB-W4, ASB-W6, ASB-W7, ASB-W8, CON-2, CON-3, CON-4, CON-8, CON-9, CON-4R, DBP-1, E2, HP-5, HP-5-2007, HP-5-2007-E, HP-5-2007-S, HP-5-2007-W, RRS-1, RRS-2, RRS-3, RVF-1, RVF-2, RVF-3, RVF-4, RVF-5, SLB1-1, SLB1-2, SLB3-1, SLB3-2, SMS-2

Area 1 Sample Locations: OPE-12, OPE-16, OPE-16B, OPE-16C, OPE-17

Area 2 Sample Locations: OPE-8, OPE-13, OPE-14, OPE-18, OPE-19, OPE-20, OPE-21

Area 3 Sample Locations: OPE-5, OPE-26, OPE-27, P4

Area 4 Sample Locations: ASB-C10, ASB-C12, ASB-C14, ASB-C15, ASB-W3, CON-10, CON-11

Area 5 Sample Locations: ASB-C3, ASB-W5, HP-5-2007-N, SLB2-1, SLB2-2, SSP-1

HQ = Hazard Quotient ND = Not detected MCL = EPA's Maximum Contaminant Level µg/L = micrograms per liter
Boldface Type denotes exceedance of applicable cleanup goal.

Table 9
Cleanup Goals for OU2 Ground Water Chemicals of Concern Based on 2008 Risk Analysis using February 1992 through February 2007 Data

Contaminant	Cleanup Goal (µg/L)[1]	Basis[2,3]
Aluminum	36,500	HQ=1
Arsenic	10	MCL[2,3]
Chromium	100	MCL[2,3]
Fluoride	4,000	MCL[2,3]
Lead	15	MCL[2]
Sodium	160,000	MCL[2]
Thallium	2	MCL[2,3]

[1] µg/L is micrograms per liter or parts per billion.
[2] Florida Maximum Contaminant Level (MCL)
[3] Federal MCL
HQ – Hazard Quotient

Table 10
Cleanup Goal for Protection of OU2 Ground Water from Soil Contamination

Contaminant	Cleanup Goal (mg/kg[1])
Lead	148

[1] mg/kg is milligrams per kilogram or parts per million.

Table 11
Cost Comparison of Remedial Alternatives

Alternative Description		Capital Cost	Annual Costs	Duration (years)	Total Present Worth Cost
1	No Action	$40,000	$0	30	$40,000
5	Extraction, Treatment, and Disposal	$1,300,000	$530,000	30	$10,300,000
6	Containment and Monitored Natural Attenuation	$4,890,000	$140,000	20	$6,700,000

Total Present Worth Cost: The amount of money that EPA would have to invest now at five percent interest to have sufficient funds available at the actual time the remedial alternative is implemented.

Table 12
Chemical-Specific ARARs, Criteria, and Guidance

Applicable or Relevant and Appropriate Provisions of the following Standards, Requirements, Criteria, or Limitations	Status	Citation	Description and Comment
Federal Safe Drinking Water Act National Primary Drinking Water Standards	Relevant and Appropriate	Certain provisions of: 40 CFR Part 141.62	Legally-enforceable Federal drinking water standards that are applicable requirements for existing or potential future drinking water sources. Establishes enforceable health-based standards for specific contaminants that have been determined to adversely affect human health. This requirement is relevant and appropriate to protect ground water, a potential drinking water source, from contaminants found in surface and subsurface soil at the site.
State Florida Drinking Water Standards	Relevant and Appropriate	FAC Chapter 62-550.310	Established to implement the Federal Safe Drinking Water Act by adopting the national primary drinking water standards and by creating additional rules to fulfill state and federal requirements.
Florida Contaminant Cleanup Target Levels Rule	Relevant and Appropriate	FAC Chapter 62-777, Tables I and II	This provides default Cleanup Target Levels (CTLs) for soil, groundwater, and surface water cleanup.
Florida Contaminated Site Cleanup Criteria	Relevant and Appropriate	FAC Chapter 62-780.650(1)(d)	In developing site-specific or alternative CTLs for aluminum, a lifetime excess cancer risk level of 1.0E-6 and a hazard index of 1 or less shall be used, as applicable.
Florida Surface Water Quality Standards	Relevant and Appropriate	FAC Chapter 62-302.530	Establishes standards and criteria for protection of state surface water bodies which may be applicable during RA of the site soils or ground water if water is discharged.

Table 13
Action-Specific ARARs, Criteria, and Guidance

Applicable or Relevant and Appropriate Provisions of the following Standards, Requirements, Criteria, or Limitations	Status	Citation	Description and Comment
Federal NPDES General Pretreatment Regulations	Relevant and Appropriate	40 CFR Parts 403, 414, and 455	Addresses requirements for, and oversight of, Industrial Users who introduce pollutants into POTWs. Must meet substantive requirements of the permit.
State Regulation of Storm Water Discharge	Applicable	FAC Chapter 62-25.025(7)	The discharge of untreated storm water may reasonably be expected to be a source of pollution of waters of the state and is subject to Department regulation. This requirement is relevant and appropriate for any onsite RAs where storm water requires management.
Florida Water Well Permitting and Construction Requirements	Relevant and Appropriate	FAC Chapter 62-532.500	Establishes minimum standards for the location, construction, repair, and abandonment of water wells.
Florida Natural Attenuation with Monitoring Regulation	Relevant and Appropriate	FAC Chapter 62-780.690(8)(a) thru (c)	Specifies minimum number of wells and sampling frequency for conducting groundwater monitoring as part of a natural attenuation remedy. The substantive requirements associated with implementation of groundwater monitoring will be met.[1]

1. The designated number of wells, sampling time frames/frequency, and specific parameters for analyses will be provided in a Monitoring Plan that is included in a post-ROD document (e.g. Remedial Design or Remedial Action Work Plan) that is approved by the EPA and FDEP.

Table 14 Location-Specific ARARs, Criteria, and Guidance			
Applicable or Relevant and Appropriate Provisions of the following Standards, Requirements, Criteria, or Limitations	**Status**	**Citation**	**Description and Comment**
Florida Environmental Resource Permit Procedures	Applicable	FAC Chapter 62-343.050 and 070	This rule requires an environmental resource permit when action requires dredging or filling in, on, or over wetlands or other surface waters. Florida Department of Environmental Protection (FDEP) will be consulted to determine the substantive aspects of an environmental resource permit.

Table 15
Comparative Analysis of Alternatives

Remedial Alternative	Criteria Rating						Approximate Present Worth ($)
	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness and Permanence	Reduction of M/T/V Through Treatment	Short-Term Effectiveness	Implementability	
1 No Action	0	0	1	0	5	5	$40,000
5 Extraction, Treatment, and Disposal	5	5	4	5	4	3	$10.3 million
6 Containment & Monitored Natural Attenuation	5	5	5	4	4	5	$6.7 million

"0" indicates noncompliance, while a ranking of "5" indicates complete compliance.

Table 16
Estimated Remedy Construction Costs

	Estimated Costs (a)			
Capital Costs	**Unit**	**Quantity**	**Unit Cost**	**Total**
Mobilize and demobilize contractor for well abandonment and installation	ls	1	$10,000	$10,000
Abandon existing wells	ea	13	$1,000	$13,000
Construct and develop monitoring wells (surficial)	ea	10	$2,500	$25,000
Mobilize and demobilize contractor for containment cell installation	ls	1	$40,000	$40,000
Dispose of displaced ground water and manage storm water during construction	ls	1	$300,000	$300,000
Construct containment cell(b) (2,500 lf x 30 ft deep)	sf	75,000	$18	$1,350,000
Construct cap (220,000 sf)	sf	220,000	$5	$1,100,000
Implement institutional controls	ls	1	$20,000	$20,000
Containment cell hydraulic conductivity testing	ls	1	$30,000	$30,000
Subtotal Estimated Construction Costs				**$2,888,000**
Engineering design and services during construction (30% of subtotal):				$866,400
Subtotal Estimated Costs:				**$3,754,400**
Contingency (assumed to be 30 percent):				$1,126,320
Total Estimated Capital Costs:				***$4,890,000***

a. Costs for implementation of OU1 Remedy (e.g., demolition, removal of debris, soil remediation) are not included.

b. Conservative depth of the containment cell used for estimated cost. Containment cell length includes outer wall plus inner wall included as a contingency to account for stratigraphy variations in its vicinity.

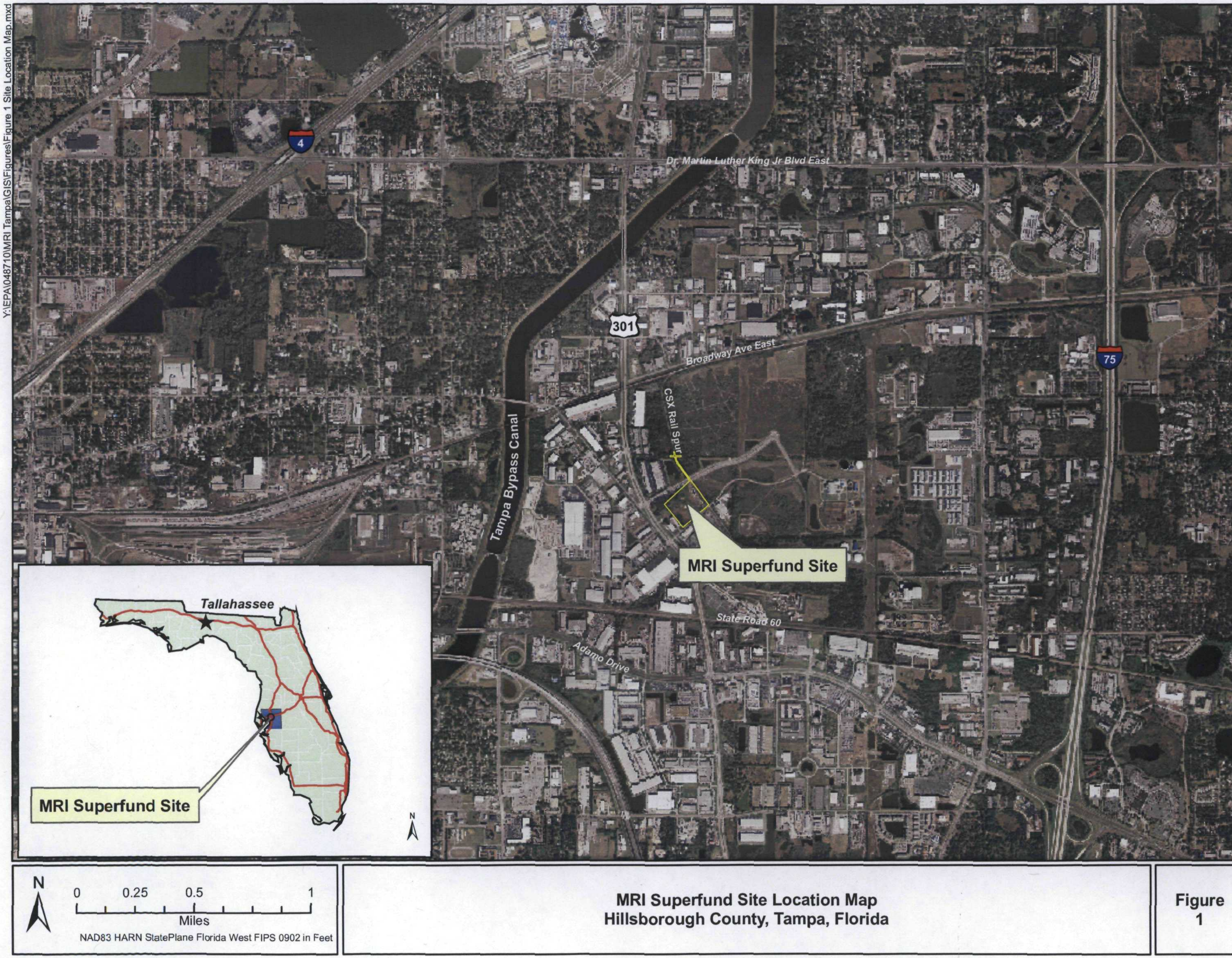
ls = lump sum lf = linear feet ea = each sf = square feet

Table 17

Estimated Remedy Operation & Maintenance Costs

Annual Operation & Maintenance Costs	**Estimated Costs (a)**			
	Unit	**Quantity**	**Unit Cost**	**Total**
Gauge monitoring wells	qtr	4	$2,500	$10,000
Sample monitoring wells and analyze samples	yr	1	$8,000	$8,000
Prepare containment system performance report (b)	qtr	4	$4,000	$16,000
Prepare monitoring report	yr	1	$20,000	$20,000
Prepare CERCLA 5-year review report	yr	0.2	$40,000	$8,000
Maintenance of monitoring wells and piezometers	yr	1	$4,000	$4,000
Legal and consultant support	qtr	4	$5,000	$20,000
Regulatory oversight	yr	1	$20,000	$20,000
Subtotal Estimated Operation & Maintenance Costs:				**$106,000**
Contingency (assumed to be 30 percent):				$31,800
Total Estimated Annual Costs:				***$140,000***
a. Costs for implementation of OU1Remedy (e.g., demolition, removal of debris, soil remediation) are not included.				
b. The cost of cap maintenance is not included here, as it would be provided under OU1.				
qtr = quarter yr = year				

FIGURES



MRI Superfund Site Location Map
Hillsborough County, Tampa, Florida

Figure 1

N

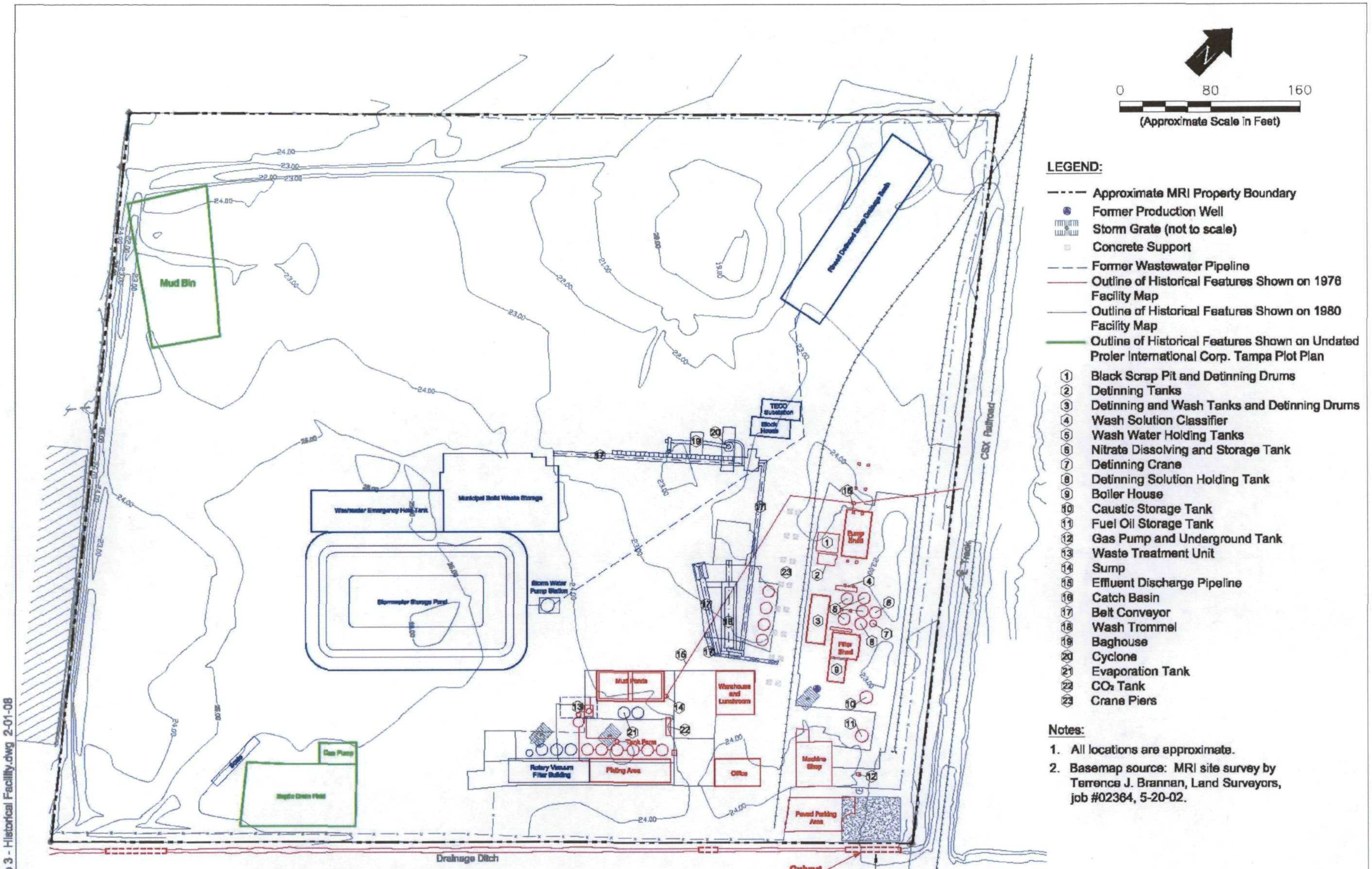
0 150 300 600

Feet

NAD83 HARN StatePlane Florida West FIPS 0902 in Feet

MRI Superfund Site Layout Map
Hillsborough County, Tampa, Florida

Figure 2



HISTORICAL FACILITY FEATURES

FIGURE 3

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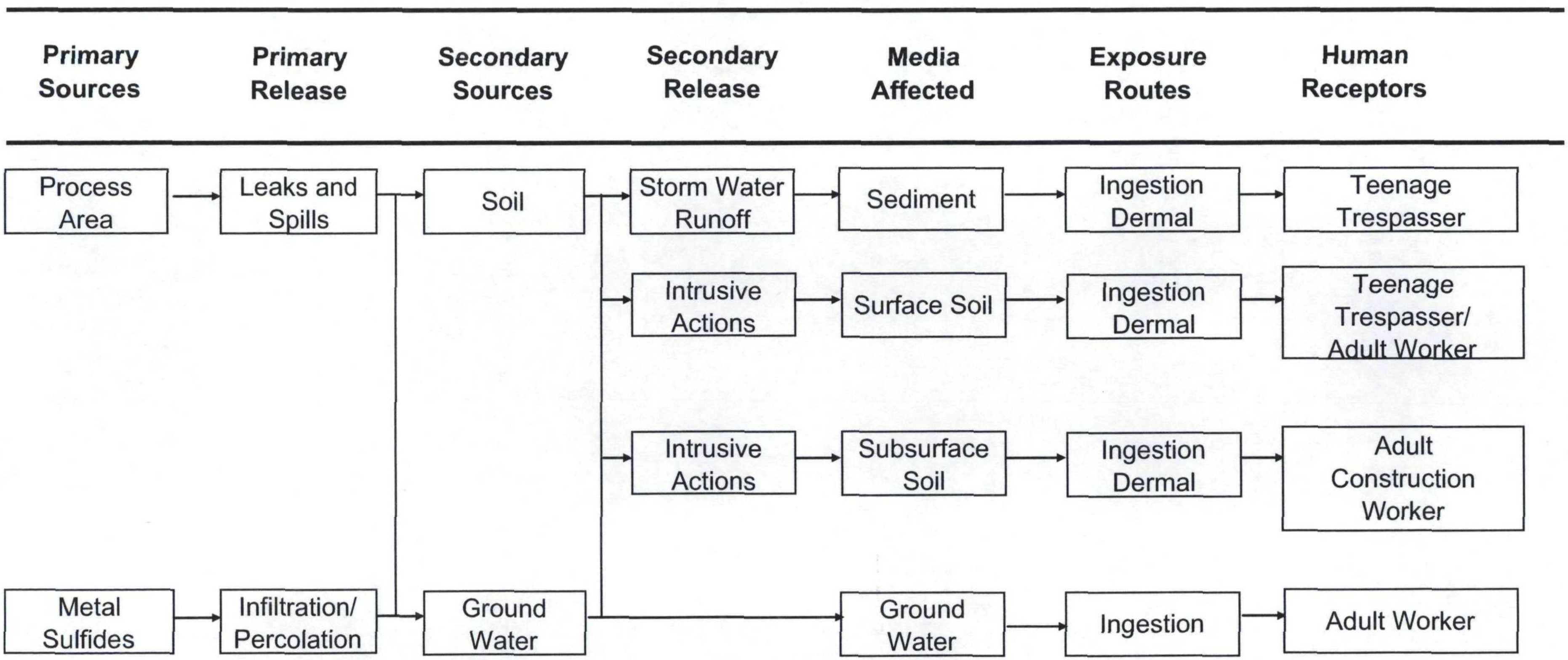
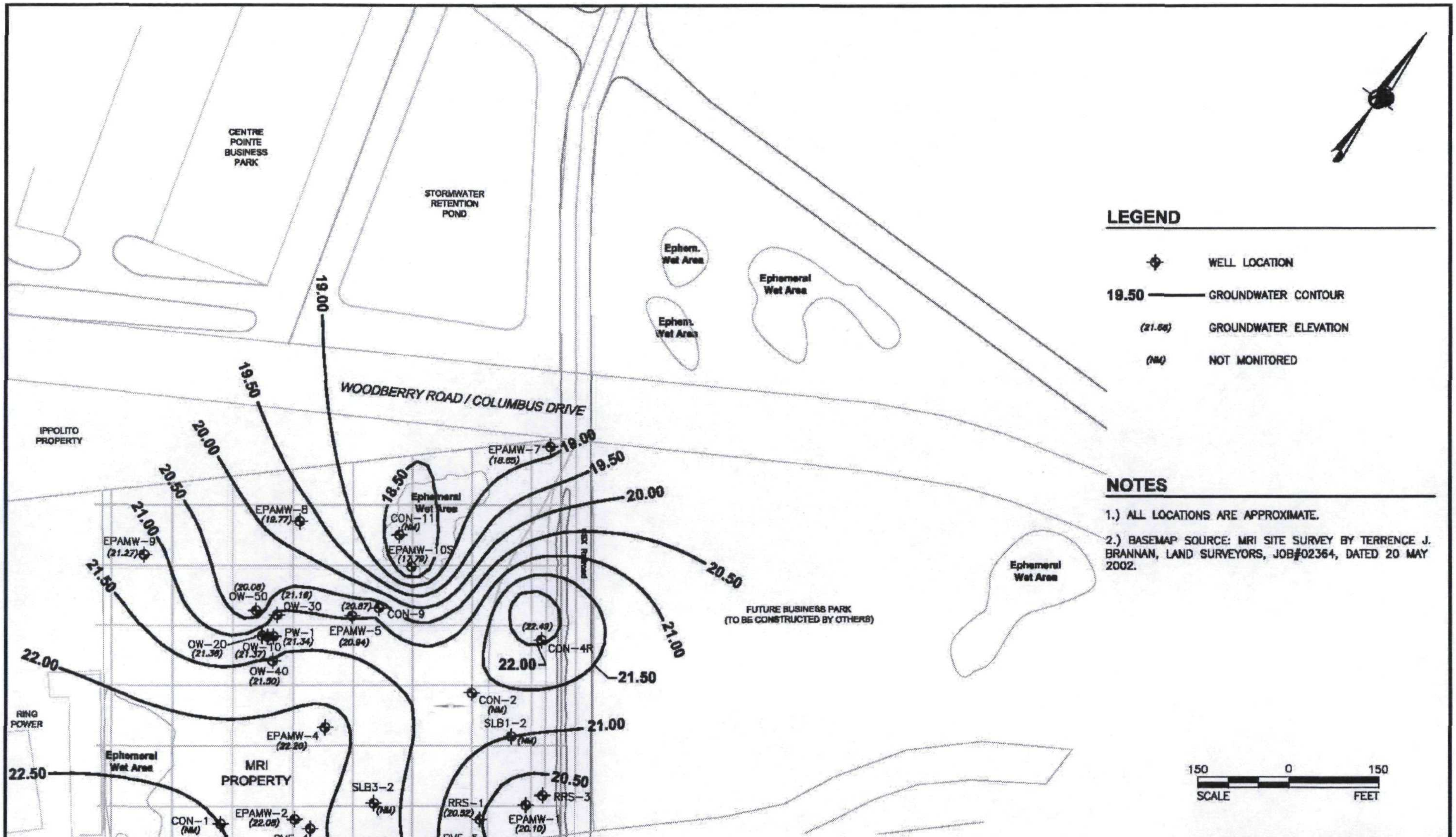
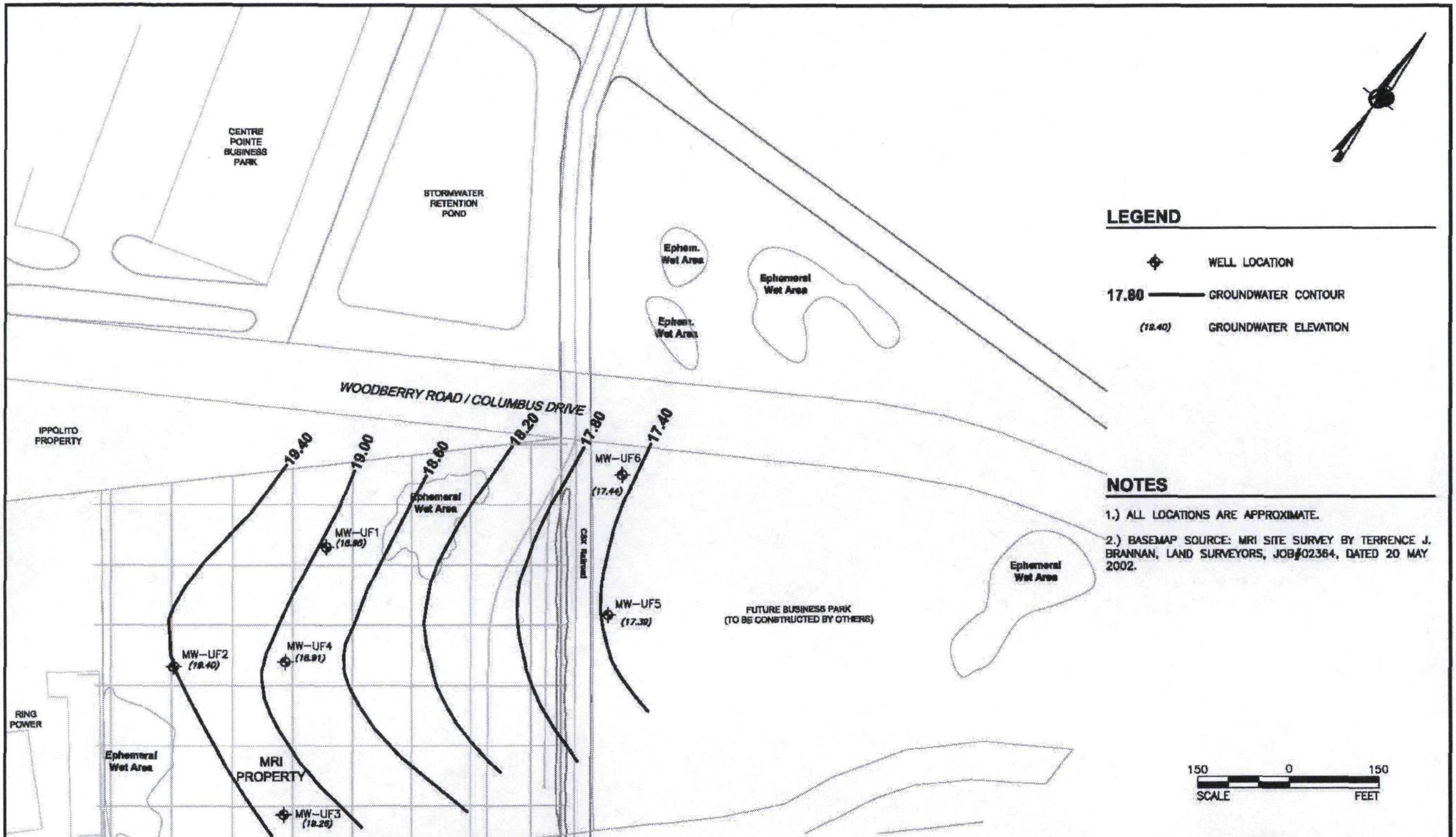
Figure 4
Conceptual Site Model
MRI Superfund Site
Tampa, Hillsborough County, Florida





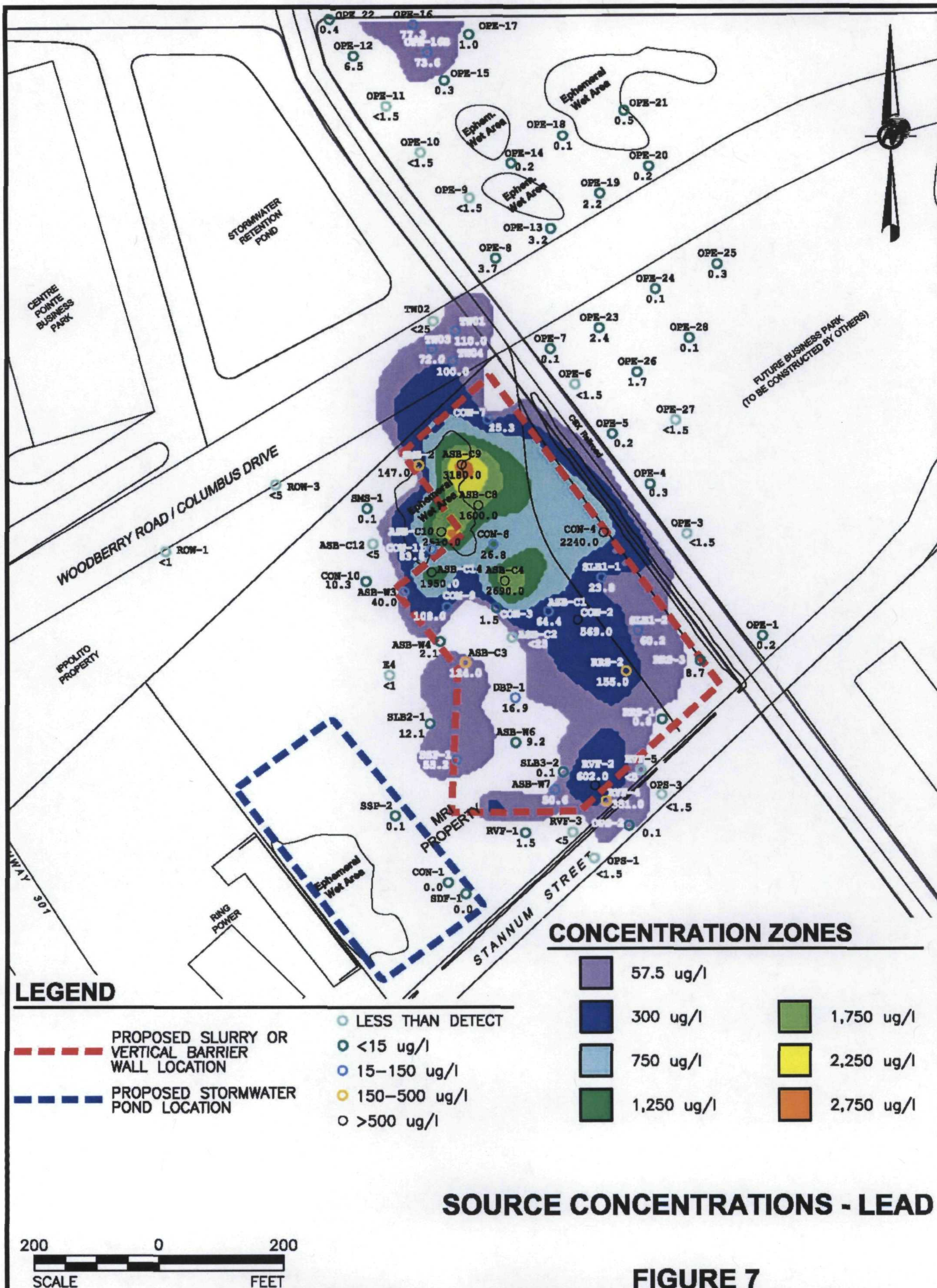
POTENTIOMETRIC MAP SURFICIAL AQUIFER - OCTOBER 2006 -

FIGURE 5



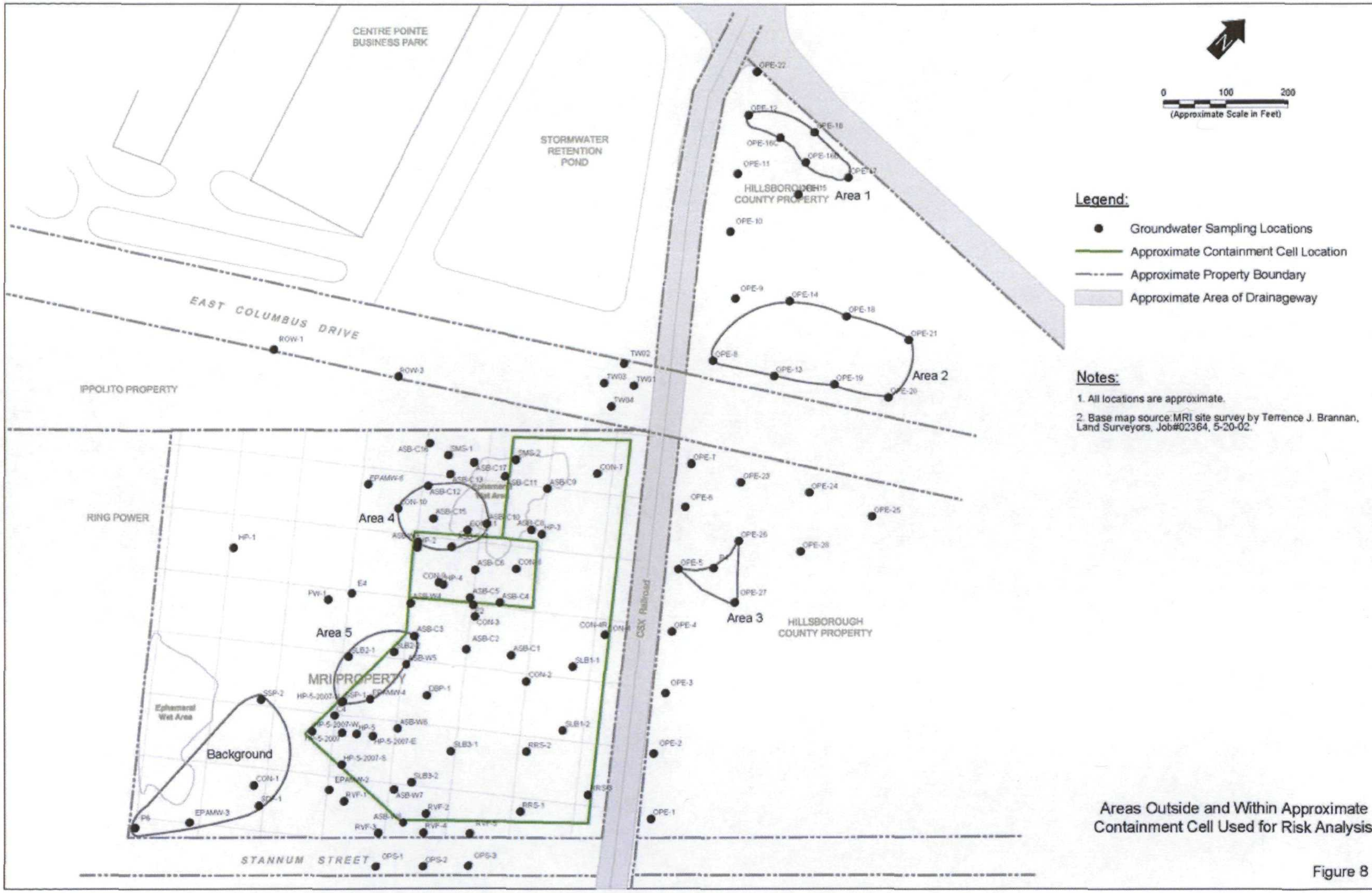
POTENTIOMETRIC MAP
UPPER FLORIDAN AQUIFER
- OCTOBER 2006 -

FIGURE 6



SOURCE CONCENTRATIONS - LEAD

FIGURE 7



Areas Outside and Within Approximate Containment Cell Used for Risk Analysis

Figure 8

CONCENTRATION

- 3,090 ug/l
- 2,750 ug/l
- 2,250 ug/l
- 1,750 ug/l
- 1,250 ug/l
- 750 ug/l
- 150 ug/l
- 15 ug/l

LEGEND

PROPOSED SLURRY OR VERTICAL BARRIER WALL LOCATION

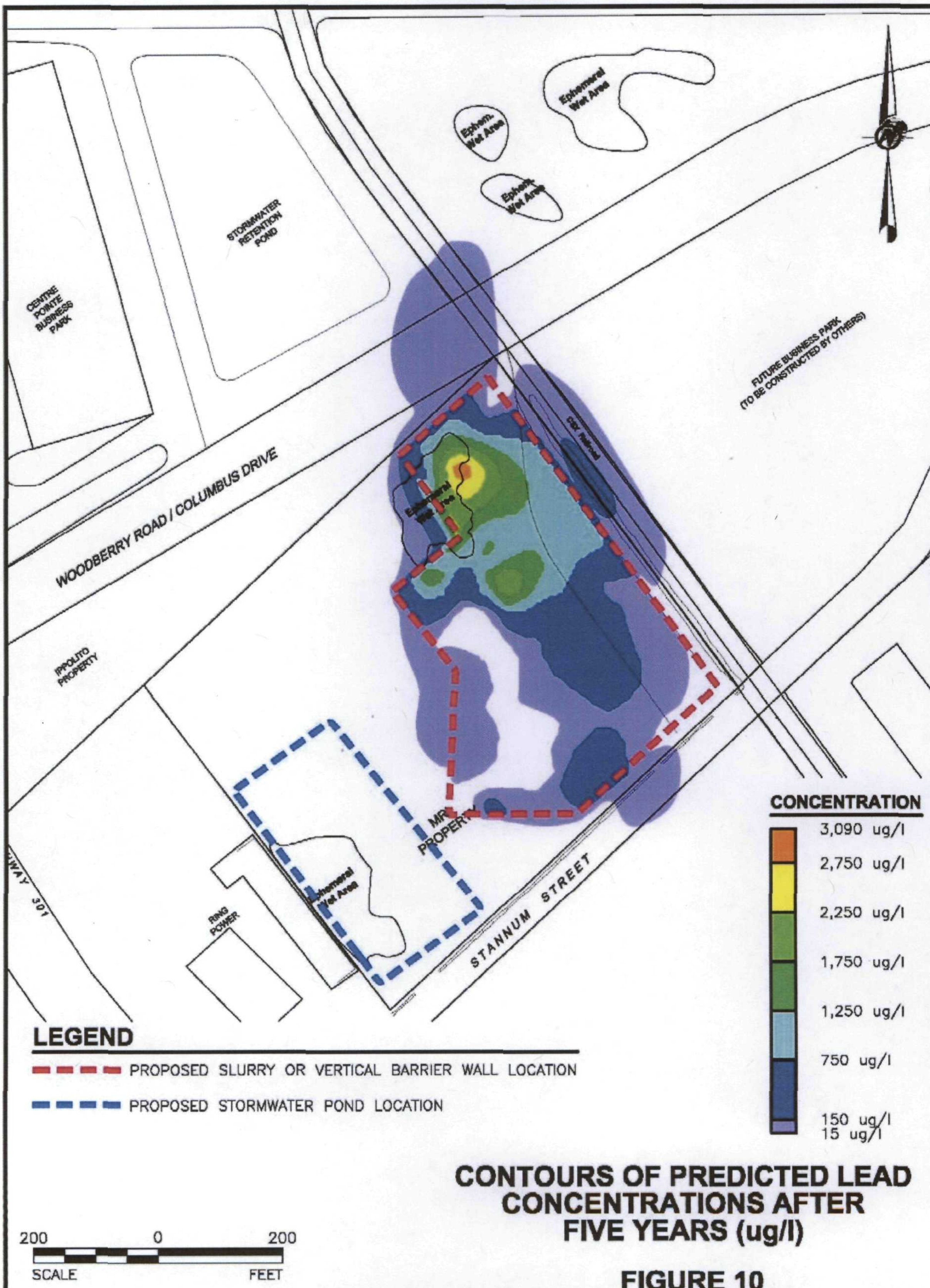
PROPOSED STORMWATER POND LOCATION

200 0 200

SCALE FEET

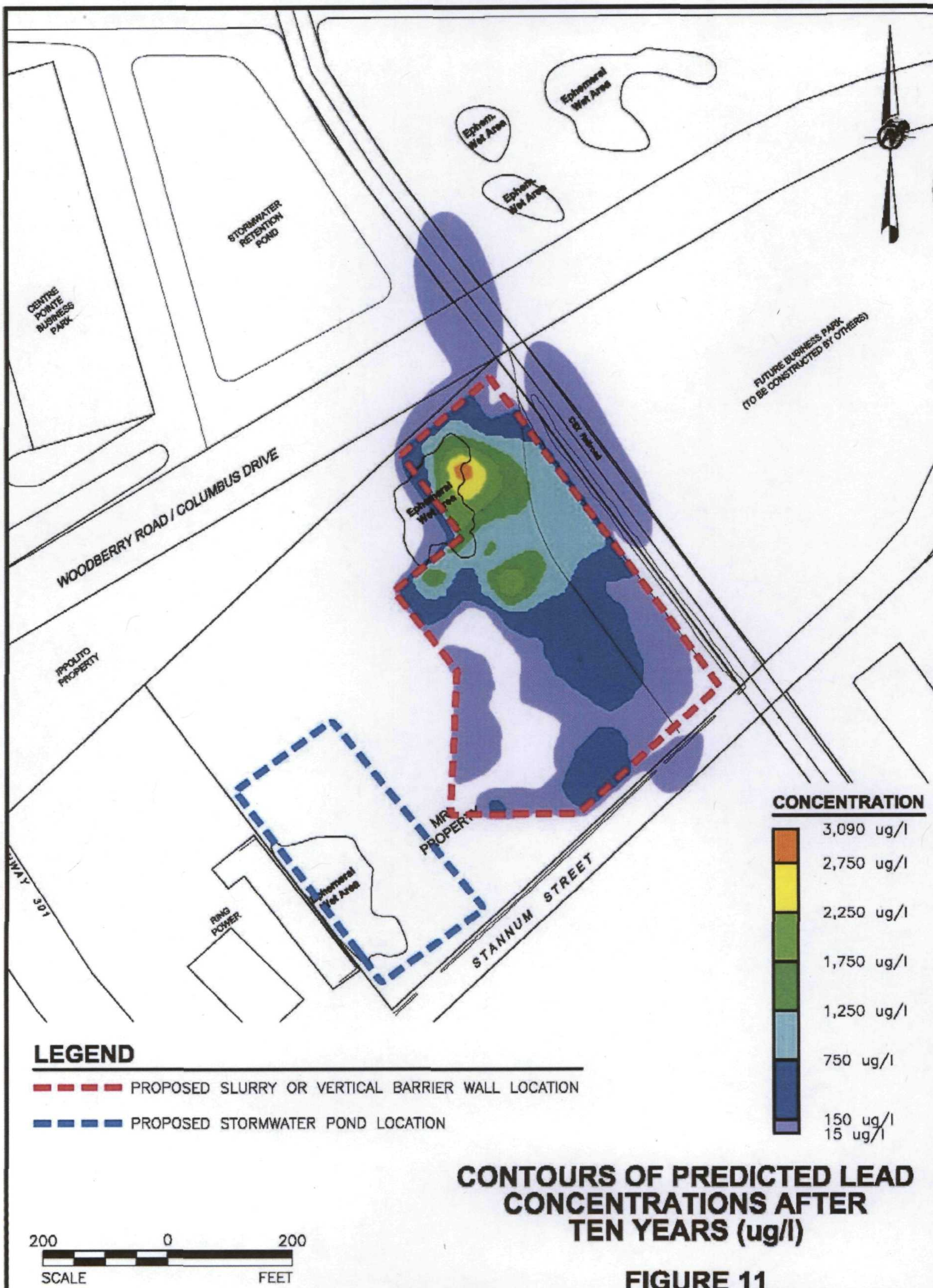
CONTOURS OF PREDICTED LEAD CONCENTRATIONS AFTER ONE YEAR (ug/l)

FIGURE 9



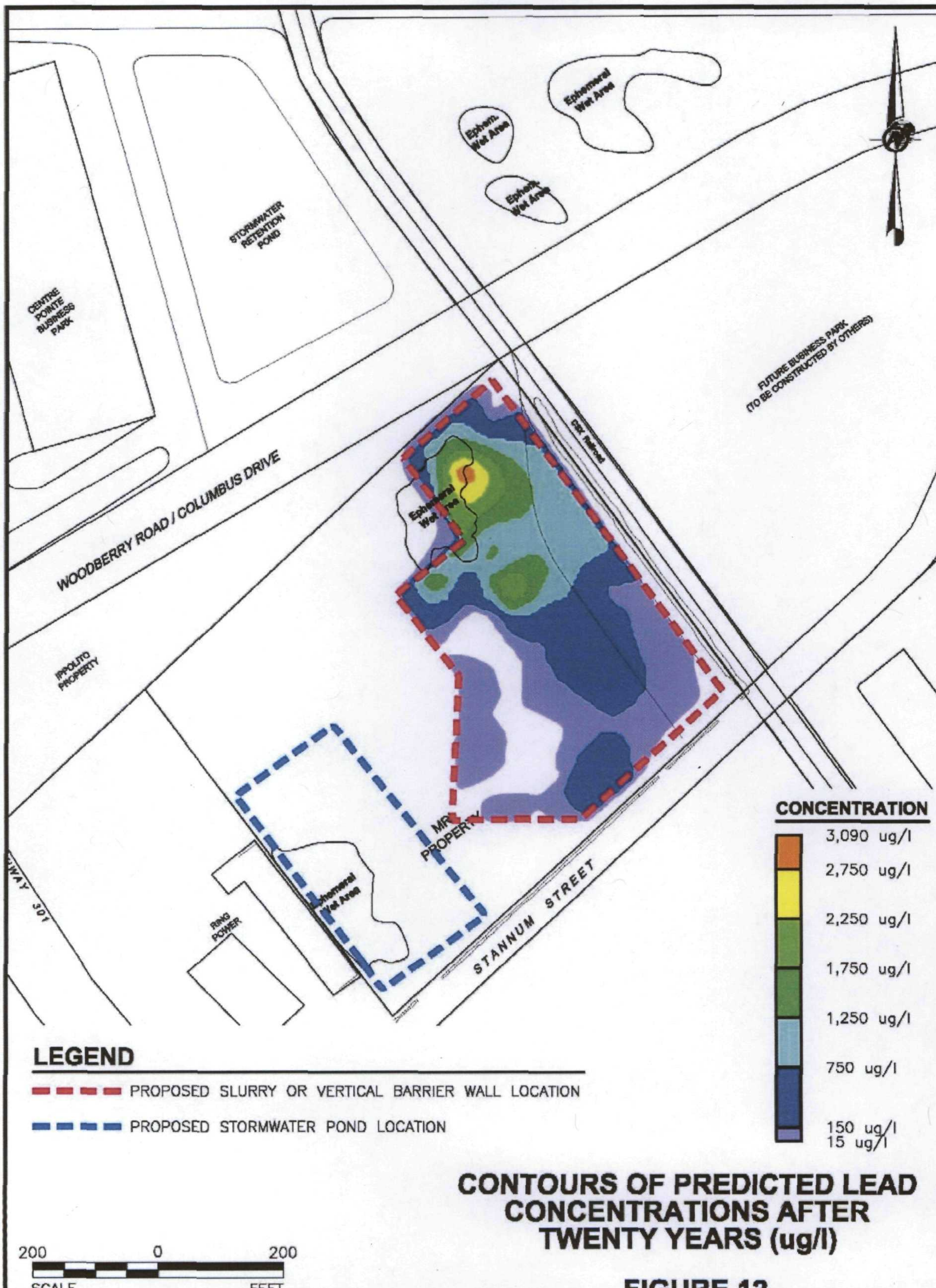
CONTOURS OF PREDICTED LEAD CONCENTRATIONS AFTER FIVE YEARS (ug/l)

FIGURE 10



CONTOURS OF PREDICTED LEAD CONCENTRATIONS AFTER TEN YEARS (ug/l)

FIGURE 11



CONTOURS OF PREDICTED LEAD CONCENTRATIONS AFTER TWENTY YEARS (ug/l)

FIGURE 12

CONTOURS OF PREDICTED LEAD CONCENTRATIONS AFTER FORTY YEARS (ug/l)

200 0 200
SCALE FEET

FIGURE 13

Excavation Areas and Proposed Slurry or Vertical Barrier Wall Location
MRI Superfund Site
Hillsborough County, Tampa, Florida

Figure 14

Y:\EPA\048710\MRI Tampa\GIS\Figures\Figure 15 Contaminants of Concern in Groundwater Above Cleanup Goals.mxd

N

0 100 200 400

Feet

NAD83 HARN StatePlane Florida West FIPS 0902 in Feet

Contaminants of Concern in Groundwater Above Cleanup Goals
MRI Superfund Site
Hillsborough County, Tampa, Florida

Figure 15

APPENDIX A

RESPONSIVENESS SUMMARY

A.1 Overview and Summary

This Responsiveness Summary documents public comments and EPA responses to comments on the Proposed Plan for remediation of OU2 (Ground Water) at the Site.

Comment #1

From FDEP's letter dated May 12, 2008

The Department has completed the review of the revised Proposed Plan for the MRI Site dated April 2008, and note that specific cleanup standards have not been included for certain contaminants as previously identified by FDEP. This remains as an outstanding issue that both EPA and FDEP previously discussed in teleconference on March 19, 2008. At that time, EPA stated that several contaminants at the MRI site, namely aluminum, iron, molybdenum, tin and vanadium, would not be included in the MRI Record of Decision (ROD) or Proposed Plan since these contaminants are not "hazardous substances" as that term is defined by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) at Section 101(14).

Regardless of how these contaminants are characterized by federal law, Florida law requires that rehabilitation of contaminated sites ensure that all contaminants meet the applicable target levels. Thus, the specific target levels for these substances are state requirements applicable to this cleanup and therefore should be included in both the Proposed Plan and in the ROD as state ARARs. Florida Global Risk Based Corrective Action (RBCA) governs cleanups at sites resulting from a discharge of pollutants or hazardous substances as noted in Section 376.30701(1)(b), Florida Statutes. Once that discharge has been established, site cleanup activities must address each contaminant not just the substances that are defined as hazardous substances or pollutants. See Section 376.30701(2)(c), Fla. Stat., (requiring that "the site-specific cleanup goal is that all contaminated sites being cleaned up pursuant to this section ultimately achieve the applicable cleanup target levels" provided in this subsection) and Florida Administrative Code Rule 62-780.150(4) (stating that "this chapter and CTLs developed pursuant to this chapter apply to cleanups conducted by persons legally responsible for site rehabilitation of contaminated sites").

In regards to the MRI site discharge of a hazardous substance has been documented. Therefore, Section 376.30701, Fla. Stat., and Fla. Admin. Code Chapt. 62-780 regulate the cleanup of the MRI site. Theses regulations require that all contaminants at the MRI site, including aluminum, iron, molybdenum, tin, and vanadium, meet cleanup target levels. Listed below are the cleanup target levels for specific contaminants.

Aluminum 7000 μg/l Health Based CTL

Iron	4200 µg/l Health Based CTL
Molybdenum	350 µg/l (poor quality criteria)
Tin	42000 µg/l (poor quality criteria)
Vanadium	490 µg/l (poor quality criteria)

The Department requests that EPA include these contaminants and cleanup target levels in the Record of Decision for the MRI Site as applicable state requirements.

Response:

During a March 19, 2008, conference call, EPA and FDEP discussed the relative authorities between the federal CERCLA statute and Florida statutes and regulations. During that call, EPA explained that, in section 104 of CERCLA, Congress gave EPA the authority to respond to releases or threats of releases of "hazardous substances" as that term is defined in section 101(14) of CERCLA and also gave EPA the authority to respond to releases or threats of releases of "pollutants or contaminants" as defined in section 101(33) that "may present an imminent and substantial danger to the public health or welfare. . . ." 42 U.S.C. § 9604(a). EPA's authority to respond to any given release or threat of release is governed by CERCLA and cannot be abridged or expanded beyond what Congress has authorized. Therefore, site-specific circumstances can exist where EPA has limited authority to respond to a particular release or threat of a release despite the fact that the State may have additional or greater authorities at its disposal. Further, any limitations on EPA response authority, to the extent such limitations may exist in a particular situation, cannot be usurped by characterizing additional State authorities as applicable or relevant and appropriate requirements (ARARs). Section 121(d) of CERCLA governs "remedial actions selected" by EPA and requires that such remedial actions attain ARARs. Hence, the authority to select a remedial action for a given release or threat of release must be established as a prerequisite to attaining any potential ARARs when taking such action. 42 U.S.C. § 9621(d).

With respect to the MRI Site, Region 4 has determined that it is appropriate to include the "pollutants or contaminants" aluminum, iron, molybdenum, tin and vanadium in the list of contaminants of potential concern (COPCs) for the MRI Site and evaluate them using Region 4's Risk Analysis approach. For the reasons explained below, of these five COPCs, only aluminum will be retained as a contaminant of concern (COC) for the final ROD.

The primary area of the MRI Site at issue relates to the natural attenuation of contaminants outside the slurry or vertical barrier walls. EPA evaluated all areas on and off of the MRI property that could represent a problem. The focus of the risk evaluation was the COPCs that have been detected outside the limits of the proposed slurry or vertical barrier walls. Five wells were identified that had elevated concentrations of COPCs. In order to determine if these were simply outliers or representative of a more general problem, the data from these wells were grouped together with nearby wells. The five areas of interest and the locations representative of background are shown on Figure 8.

The data used in EPA's risk evaluation are presented in the Development of Goals for Soil Based Technical Memorandum (EKI, 2007b) and the OU2 Feasibility Study (EKI, 2008). To perform the risk evaluation, the sample locations with detected concentrations of COPCs located outside the limits of the proposed containment cell were grouped together as described above. The COPC concentrations detected in the grouped sample locations were averaged. These average concentrations were compared to the background average concentrations and to the levels in Table 6. This approach is consistent with the EPA Region 4 approach for calculating Exposure Point Concentrations (EPCs) for ground water as part of the risk management process.

Table 7 shows a comparison of COPCs (manganese, molybdenum, and tin) to the cleanup goals presented in Table 6. As seen from the table, manganese, molybdenum, and tin are not present above risk-based cleanup goals corresponding to a HQ of 1 in any of the five areas identified on Figure 8 or within the limits of the proposed containment cell. For this reason, manganese, molybdenum, and tin are not considered COCs. It is worth noting that molybdenum and tin are not found at levels above FDEP's proposed cleanup target levels (CTLs).

Table 8 contains the same comparison for the remaining COPCs. As shown in Table 8, nine COPCs do not exceed their applicable cleanup goals (HQ of 1 or MCL) in any of the five areas outside the proposed containment cell. These COPCs include antimony, beryllium, cadmium, cyanide, iron, mercury, nickel, selenium and vanadium. The remaining seven COPCs, aluminum, arsenic, chromium, fluoride, lead, sodium, and thallium, do exceed their respective cleanup goals in one or more areas outside the proposed containment cell. Therefore, these COPCs are retained as COCs.

Based on the Risk Analysis, the final COCs chosen for the MRI Site are aluminum, arsenic, chromium, fluoride, lead, sodium, and thallium. The cleanup goals for the final COCs are shown in Table 9. Since some of these COCs are only present above cleanup goals on the MRI property, EPA may reevaluate their risk after construction and final location of the slurry or vertical barrier walls. Based on site-specific conditions, institutional controls required as part of the remedy, and the current and anticipated future industrial land use of the MRI and surrounding properties, it is EPA's position that the selected groundwater cleanup goals are appropriate for the MRI Site and will be protective of human health and the environment.

Comment #2

From Karen Gruebel's Memorandum dated May 13, 2008
(Erler & Kalinowski, Inc. on behalf of MRC Holdings, Inc.)

Using the ground water cleanup goals of 150 ug/L lead, 100 ug/L arsenic, 2,000 ug/L cyanide, and 1,600,000 ug/L sodium (Table 2 of the EPA Proposed Plan, dated April 2008), there is no ground water on Hillsborough County Property that requires cleanup. The extent of chemicals of concern shown on Figure 2 of the Proposed Plan does not reflect the cleanup goals given in Table 2 of the EPA Proposed Plan.

Response:

The ground water cleanup goals presented in the EPA Proposed Plan for arsenic, lead, and sodium were listed at ten times the federal and State maximum contaminant levels (MCLs) for potential drinking water sources based on the designation of the ground water in the vicinity of the MRI Site as low yield or poor quality. These goals were derived in error from Chapter 62-780.680(2)(c) F.A.C. which provides for alternative cleanup target levels for low yield or poor quality ground water within the MRI property boundaries only. Chapter 62-780.680(2)(c) does not contemplate allowing such deviations from MCLs beyond the MRI property boundaries. Further, despite the designation of the ground water in the vicinity of the MRI Site as low yield or poor quality, it is nevertheless classified as G-II, an actual or potential drinking water source. Therefore, the listing of cleanup goals in the Proposed Plan at ten times the federal and State MCLs was erroneous. As correctly indicated in Table 12, the relevant and appropriate standards for actual or potential sources of drinking water are the federal and State primary MCLs. This conclusion and correction is consistent with the findings presented in the EPA approved OU2 Feasibility Study Report prepared by Erler & Kalinowski, Inc. on behalf of MRC Holdings, Inc.

Comment #3

From Karen Gruebel's Memorandum dated May 13, 2008
(Erler & Kalinowski, Inc. on behalf of MRC Holdings, Inc.)

The soil cleanup goal for lead to protect to ground water, 148 mg/kg give in Table 3 of the EPA Proposed Plan, does not reflect the current ground water cleanup goal of 150 ug/L lead. The goal of 148 mg/kg was calculated assuming an allowable lead concentration in ground water of 15 ug/L.

Response:

Because the use of ground water cleanup goals at ten times the federal and State primary MCLs is not appropriate for the MRI Site as explained in the response to Comment #2, this issue is moot.