SOUTHEAST ROCKFORD GROUNDWATER CONTAMINATION SUPERFUND SITE, ROCKFORD, ILLINOIS

DECLARATION FOR THE RECORD OF DECISION

SITE LOCATION AND HISTORY

The Southeast Rockford Groundwater Contamination Superfund Site (CERCLIS ID No. ILD981000417) is located in Rockford, Illinois and consists of three Operable Units. Operable Unit One (Drinking Water Operable Unit) provided some residents with a safe source of drinking water by connecting 283 homes to the city water supply. Operable Unit Two (Groundwater Operable Unit) addressed the area-wide groundwater contamination. An additional 264 homes were first connected to the city water supply system. A remedial investigation was then conducted to characterize the nature and extent of the groundwater contamination and to provide information on source areas responsible for contamination. This operable unit identified four areas that were the primary sources of groundwater contamination. These areas were identified as Source Areas 4, 7, 9/10 and 11.

Operable Unit Three (Source Control Operable Unit or SCOU) began as a State-lead action in May 1996 to select remedies for each of the Source Areas. Field investigations included soil borings and soil gas samples at all four areas, surface water and sediment sampling at Area 7 and groundwater monitoring well installation and sampling at area 9/10. Based on the results of these investigations, the Illinois Environmental Protection Agency (Illinois EPA) identified a series of cleanup alternatives and preferred options for the final remedies at the four areas. These alternatives and preferred options were published in a Proposed Plan that was presented to the public in July 2001. This Record of Decision (ROD) contains the actions, alternatives and preferred options of Operable Unit Three that will address contamination in the soil and leachate at Source Areas 4, 7, 9/10 and 11.

STATEMENT OF PURPOSE

This decision document contains the selected remedial actions for the Southeast Rockford Superfund Site, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based upon the contents of the administrative record for the Southeast Rockford Superfund Site. The United States Environmental Protection Agency (U.S. EPA), Region V supports the selected remedy on the Southeast Rockford Site.

ASSESSMENT OF THE SITE

The response action selected in the ROD is necessary to protect the public health, public welfare and the environment from actual releases of hazardous substances. Contaminated soils, non-aqueous phase liquid (NAPL), and leachate from Source Areas 4, 7, 9/10, and 11 constitute principal threats of continued contamination to the groundwater, unless remediated. Therefore, technologies in this ROD are designed to remediate the Source Areas and remove these principal threats. The remaining area-wide contamination will be remediated by the natural attenuation of groundwater.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy is comprised of treatment options for the four Source Areas. Definition of the entire site is the extent of groundwater contamination encompassing an area approximately three miles by two and a half miles that includes residential, light industrial, industrial and municipal properties. Remedy selection was based upon the nature and extent of contamination, as well as consideration of the types of and uses of the properties in each area. The remedies used in this ROD will accomplish the following results: (1) stop on-going contamination of the groundwater, thus protecting the water resources for future generations; (2) ensure that volatile organic compounds (VOCs) in soil gas do not move into the basements of nearby residences; (3) protect people from ingestion of contaminated groundwater; (4) reduce the risk of direct contact with contaminated soil or free product beneath the ground surface; and (5) assure the project is in compliance with the Operable Unit Two ROD provisions that required the controlling of groundwater-contamination sources.

Operable Unit Three will fulfill the requirements to reduce and control potential groundwater risks to the environment and bring all of the site's previously selected remedial actions into compliance with State groundwater protection laws. Operable Unit Three will also address contaminated soils, NAPL (non-aqueous phase liquid) and leachate that are principal threats and the primary causes of groundwater contamination at the four Source Areas.

Source Control Alternatives developed within the Operable Unit Three feasibility study (FS) and discussed within this ROD are separated into soil and leachate alternatives. In some cases, technologies designed to remediate soil, NAPL and leachate contamination are either not sufficient to protect human health and the environment, or they are not practical solutions. In these cases, technologies are considered to contain, rather than treat the resulting groundwater contamination. In order to simplify the ROD, technologies intended to contain contaminated groundwater in the immediate vicinity of the four primary source areas are considered leachate alternatives.

STATUTORY DETERMINATIONS

It is considered the opinion of the Illinois EPA (in consultation with U.S. EPA Region V) that the selected remedy is protective of human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate for this remedial action (or invokes an appropriate waiver), is cost-effective and utilizes permanent solutions and alternative treatment technologies (or resource recovery) to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. Because this remedy will result in hazardous substances remaining on-site at levels that will allow for limited use and restricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be protective of human health and the environment.

ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD (additional information can be found in the Administrative Record for the site):

? Chemicals of concern and their respective concentrations.
? Baseline risk represented by the chemicals of concern.
? Cleanup levels established for chemicals of concern and the basis for these levels.
? How source materials constituting principal threats are addressed.
? Anticipated land uses and current and potential future uses of groundwater addressed in the baseline risk assessment and ROD.
? Potential land and groundwater uses that will be available at the site as a result of the selected remedy.
? 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.
? Key factor(s) that led to selecting the remedy (how the selected remedy provides the best balance of tradeoffs with respect to the balancing, modifying, criteria key to the decision).

____________________________________ _______________

William E. Muno, Director Date
Superfund Division
U.S. EPA- Region V

____________________________________ _______________

Renee Cipriano, Director Date
Illinois EPA

DECISION SUMMARY
SOUTHEAST ROCKFORD GROUNDWATER CONTAMINATION SUPERFUND SITE, ROCKFORD, ILLINOIS

SITE NAME, LOCATION AND DESCRIPTION

The Southeast Rockford Groundwater Contamination Site is located in the southeast portion of Rockford, Illinois and covers an area approximately three miles long by two and one half miles wide. The contaminant plume in the groundwater with concentrations above 10 parts per billion (ppb) defines the boundaries of the Southeast Rockford Superfund Site, as defined by the Operable Unit Two ROD. The extent of the Southeast Rockford Groundwater Contamination Site is shown in Figure 1.

The area is a predominantly suburban residential area, with scattered industrial, retail and commercial operations throughout. Most of the building structures at this site are one- or two- story residential dwellings, but several industrial areas also exist along Harrison Avenue. There are also a substantial number of commercial and retail operations along Alpine Road, Eleventh Street and Kishwaukee Street. The topography of the site is essentially flat lying, with gradual sloping towards the Rock River. The four major identified source areas of groundwater contamination at the site are identified in the Operable Unit 2 ROD. Figure 1 also illustrates the general locations of the four major source areas. Other groundwater plumes in the area were investigated, but were not determined to be sources of the chlorinated VOCs found in residential wells.

Because of a relative abundance of groundwater resources, the City of Rockford's (the City’s) primary source of potable water is groundwater. Geology of the Southeast Rockford Groundwater Contamination Site consists of unconsolidated glacial deposits deposited upon Ordovician Age dolomite and sandstone. A buried bedrock valley over 200 feet in depth cut into the Ordovician bedrock units lies within the site boundaries and contains large unconsolidated sand and gravel deposits. The buried bedrock valley connects with the current position of the Rock River to the west of the site. Together, the unconsolidated glacial deposits and the bedrock units make up two different but hydraulically connected aquifers, both of which are used for potable water supplies. Unconsolidated sands and gravels, as well as the bedrock units contained within the Southeast Rockford Groundwater Contamination Superfund Site meet the requirements pursuant to Title 35 Illinois Administration Code Part 620.210 for Class I Potable Resource Groundwater. The site was proposed for inclusion on the National Priorities List (NPL) on June 24, 1988, and was formally added to the NPL on March 31, 1989 as a state-lead, federally funded Superfund site.

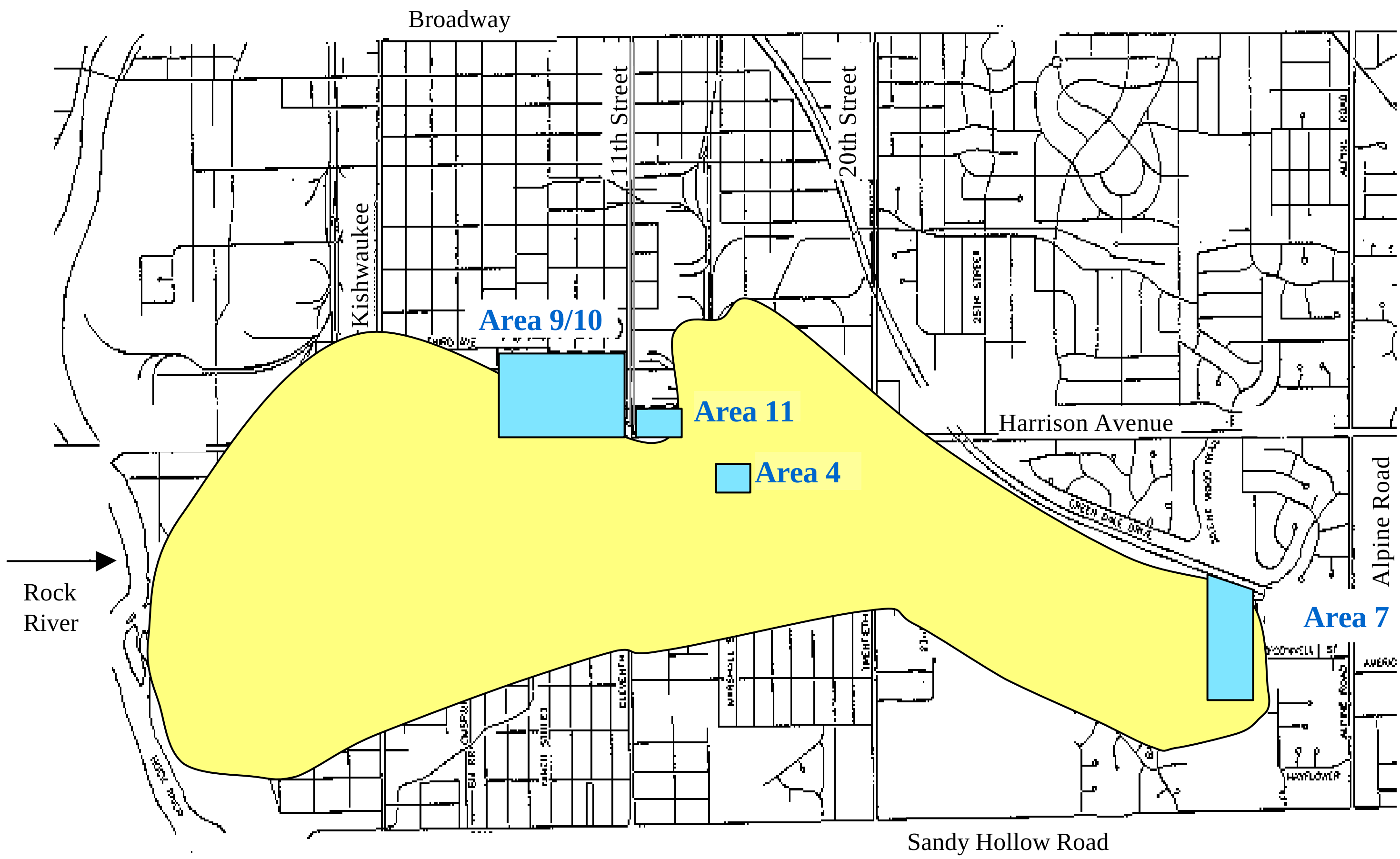

Figure 1. Map of Southeast Rockford Groundwater Contamination

SITE HISTORY

Early groundwater investigations by the State indicated that many private and municipal wells were impacted by chlorinated solvent contamination at levels exceeding federal health standards. Further investigations determined that the solvents were used by industries and were released directly into the environment from units such as storage tanks or from improper disposal practices. These investigations formed the basis of the NPL listing. During 1990, an emergency action by U. S. EPA resulted in 293 homes being connected to the City's municipal water supply system. This action was eligible for U. S. EPA emergency funding, because several residential wells had contaminant levels above removal action levels (RALs). The U.S. EPA determined the extent of the water well hook-ups with support from Illinois EPA.

The next course of action was to address residential wells whose contaminant levels were below RALs, but above federal health standards (Maximum Contaminant Levels or MCLs). Camp Dresser & McKee (CDM), under the direction of Illinois EPA, conducted a residential well- sampling investigation. This investigation became the first of three Operable Units to address site-related contamination. Pursuant to this study and its recommendations, a ROD was signed in June 1991. This ROD required an additional 264 homes to be connected to the City's municipal water supply and for the construction of a granular activated carbon (GAC) treatment system on one municipal well. The GAC unit was installed as a temporary measure that would be finalized in the second Operable Unit.

Between 1991 and 1994, an inclusive, two-phased remedial investigation (RI) was performed to define the nature and extent of groundwater contamination and to gather preliminary information on the source areas responsible for residential well contamination. These actions culminated in a second ROD signed in September 1995, that essentially required additional hookups to the City's water supply, groundwater monitoring, continued operation of the GAC unit installed in the first ROD and future source control measures at four major source areas of site-related groundwater contamination. Pursuant to a consent decree between the federal government, the state government and the City of Rockford signed in early 1998, the City of Rockford agreed to implement all provisions of the Operable Unit 2 ROD.

SITE ENFORCEMENT ACTIVITIES

Since the development of the 1995 ROD, there have been two major enforcement agreements developed between the U.S.EPA, Illinois EPA and parties associated with the Southeast Rockford site. The first of these was a consent decree entered by the federal district court in Rockford in April 1998. This decree required the City of Rockford to install water mains and services within the public right-of-way, provide needed connections to homes and businesses, supplement the previously existing groundwater well-monitoring network with new wells, and commence a long-term well-network sampling and analytical program. This work has entered the monitoring phase. Over 9200 feet of new water mains have been installed, and an additional 262 individual water service connections have been made. A total of nine new groundwater-monitoring wells were installed, with several of these located near the Rock River. The consent decree also required the payment of up to $200,000 by the City of Rockford to the State of Illinois and federal government, for future oversight costs.

The court entered the second consent decree in January 1999. This decree provided for the reimbursement of approximately $9.1 million dollars for past expenditures by the federal and state agencies that responded to the Southeast Rockford site, as well as a payment of approximately $5 million for a portion of future cleanup costs for Area 7. This innovative feature of the decree anticipates the need to perform remediation at Area 7, because unlike the other soil source areas of concern, it appears that waste materials were brought to Area 7 from other locations. The second consent decree was amended in September 2001 that resulted in the collection of an additional $140,000.

COMMUNITY PARTICIPATION OVERVIEW

In accordance with Section 117, 42 U.S.C. § 9617, of CERCLA, the Illinois EPA and the U.S. EPA held a public comment period from June 11 through August 20, 2001 to allow interested parties to comment on the Feasibility Study and Proposed Plan for the Source Control Operable Unit of the Southeast Rockford Groundwater Contamination Superfund site in Rockford, Illinois. The Illinois EPA presented the Feasibility Study and Proposed Plan at six informational meetings (two per day) on June 26, June 27 and June 28, 2001 and at a formal hearing held in two sessions on July 19, 2001. The informational meetings were held at the Villa Di Roma restaurant at 11th and Harrison Streets in

Rockford and the public hearing was held at the Brooke Road United Methodist Church at 1404 Brooke Road in Rockford.

A Responsiveness Summary is attached to the ROD to document the Illinois EPA's responses to comments received during the public comment period. These comments were considered prior to selection of the final remedy for the four major sources of contamination at the Southeast Rockford Superfund site. The remedy is detailed in Illinois EPA's ROD, with which the U.S. EPA concurs.

BACKGROUND OF COMMUNITY INVOLVEMENT AND CONCERNS

Illinois EPA has been responsible for conducting community relations activities during the investigation for the Drinking Water Operable Unit (Operable Unit One), Phase I and Phase II of the Remedial Investigation and Groundwater Feasibility Study (Operable Unit Two) and the Source Control Remedial Investigation and Feasibility Study (Operable Unit Three).

The site was first brought to the attention of the Illinois EPA by a citizen's complaint that plating waste had been dumped in an abandoned well. Subsequent tests of nearby private wells did not detect plating wastes but did find chlorinated solvents (commonly used in industry for degreasing purposes). A meeting held in 1984 by the Illinois Department of Public Health (IDPH) and the Illinois EPA drew a crowd of approximately 200. Continuing concerns by citizens, however, did not surface until the site was placed on the National Priorities List in 1989 and financial institutions began refusing home mortgages and improvement loans in the area.

During the first operable unit, many citizens resisted the idea of connections to the public water supply, because, in order to receive the hookup, they had to sign an agreement to be annexed into the City of Rockford (if their property became contiguous to city property). That issue is no longer a major concern, since nearly all of the area has now been annexed by the City of Rockford.

The City of Rockford has entered into two consent decrees with the State of Illinois and the United States of America regarding the Southeast Rockford Groundwater Contamination Superfund Site. The original consent decree was entered in federal court in April 1998. That consent decree required the City of Rockford to perform the remedial work required by the September 29, 1995 Groundwater ROD. The ROD included water main extensions and approximately 400 hookups to the City of Rockford's water supply system, groundwater monitoring and continued use of carbon treatment at one of the municipal water supply wells.

SCOPE AND ROLE OF THE RESPONSE ACTION AND OPERABLE UNITS

INTRODUCTION

The Southeast Rockford Groundwater Contamination Site encompasses an area approximately three miles by two and a half miles. The site is primarily defined by the extent of groundwater contamination over 10 ppb of total chlorinated VOCs, as shown in Figure 1. Property within the site boundaries is used for residential, light industrial, industrial and municipal purposes. Remedial actions conducted under Operable Units One and Two addressed the area-wide groundwater contamination, but required additional work at the four source areas. The site characteristics for the four source areas are described in the Section titled, **DESCRIPTION OF SOURCE AREAS.**

OPERABLE UNIT ONE

Because of the size and complexity of the groundwater contamination in the area, the Illinois EPA and U.S. EPA (the Agencies) organized activities at the site into smaller, more manageable groups of activities called Operable Units. The Illinois EPA and its consulting/engineering firm, Camp Dresser & McKee (CDM), began work under Operable Unit One with a remedial investigation. The primary focus of Operable Unit One was to address contamination in residential wells. An additional 117 private wells were sampled as a part of the Operable Unit One Remedial Investigation. The objective of this sampling event was to determine how many homes had wells with levels of VOCs below the time critical removal action cutoff, but above maximum contaminant levels (MCLs). Illinois EPA's sampling revealed that additional residences needed to be connected to the City's water supply system. A proposed plan for Operable Unit One was made public in March 1991. A ROD for Operable Unit One was signed on June 14, 1991. The ROD called for more residences to be connected to the municipal water supply system and for a temporary granular activated carbon (GAC) water treatment unit to be installed at one of Rockford’s municipal wells. The municipal well had been closed in 1985 due to unsafe levels of VOCs (CDM, 1990). The GAC unit was installed to assure sufficient potable water capacity for residents added to the City's water distribution system. By November 1991, an additional 264 homes were connected to city water. Between the U.S. EPA's time-critical removal action and Illinois EPA's Operable Unit One, a total of 547 homes received service connections to the City's water supply system. A Remedial Action Report, signed by U.S. EPA on December 21, 1992, certified that the selected remedy for Operable Unit One was operational and functional (Illinois EPA Operable Unit Two ROD).

OPERABLE UNIT TWO

Remedial Investigations for Operable Unit Two began in May 1991 under the direction of the Illinois EPA (CDM, 1992). The objective of the Operable Unit Two remedial investigation was to characterize the nature and extent of groundwater contamination throughout the site and to provide information on "source areas" that were responsible for the contamination (CDM, 1992). Because of the size and complexity of the site, the remedial investigation was conducted in two phases. Phase I activities expanded the original NPL boundaries into a larger study area within Southeast Rockford, encompassing approximately five square miles (CDM, 1993 1-2). Operable Unit Two, Phase I field activities included the following: 1) a 225-point soil gas survey; 2) the installation and sampling of 33 monitoring wells at 11 locations; and 3) the sampling of 19 Illinois State Water Survey Wells and 16 industrial wells (CDM, 1993 1-2). Fieldwork for Phase I was completed in October of 1991. Based on preliminary data, eight potential sources of groundwater contamination were identified (CDM, 1992).

Operable Unit Two, Phase II field activities were conducted from January 1993 to January 1994. The following activities were conducted during the Phase II investigation: (1) 212 soil gas points were sampled; (2) 44 monitoring wells were installed and 165 groundwater samples were obtained; (3) 55 soil borings were conducted and 126 soil samples were obtained; (4) 24 groundwater samples were obtained from residential wells; (5) 20 residential air samples were taken; and (6) two test pits were excavated in the study area (CDM, 1995 RI 1-1). Although several other groundwater plumes of contamination were identified, the Phase II investigation concluded that there were four primary source areas that were impacting the major plume that constitutes the site. The four primary source areas (Area 4, Area 7, Area 9/10, and Area 11) are identified in Figure 1.

Phase II activities included groundwater modeling that helped to determine future contaminant concentrations within the plume and projected general plume migration directions. The modeling indicated that contaminant levels for 1,1,1-TCA in the plume will remain at levels above its MCL of 200 ppb for 205 years, assuming that the four source areas are remediated. However, if the four source areas are not remediated modeling predicts that over 300 years will be necessary for remediation of the groundwater (CDM, 1995 FS 5-3).

Based on the results of the Remedial Investigation and Feasibility Study (RI/FS) conducted under Operable Unit Two, Illinois EPA issued a Proposed Plan on Operable Unit Two in July of 1995. The ROD for Operable Unit Two was signed on September 29, 1995. The major components of the selected remedy included: municipal water hook-ups for homes and businesses projected to have combined concentrations of 1,1,1-TCA and 1,1-Dichloroethane (1,1-DCA) at levels of 5 ppb or greater; groundwater monitoring for 205 years and future source control measures at the four primary source areas. Although source control was a component of the selected remedy within the Operable Unit Two ROD, the ROD stated that the actual technology to be used for source control measures would be addressed within Operable Unit Three.

OPERABLE UNIT THREE

Field work for the Operable Unit Three remedial investigation began under the direction of Illinois EPA on May 20, 1996. The investigation included: soil gas samples and soil borings at all four areas; surface water and sediment sampling at Area 7 and monitoring well installation and groundwater sampling at Area 9/10. In total, the Operable Unit Three investigation included:

? 68 soil gas samples;

? 13 soil borings with one soil sample per boring in Areas 4, 7, and 11 and two samples per boring in Area 9/10;
? Dye shaker testing for the presence of NAPL;
? 14 surface soil samples;
? Geoprobe groundwater screening at three locations;
? Installation of three monitoring wells; and
? Five groundwater samples (CDM, 2000 RI).

The results of the Operable Unit Three investigations, along with information obtained from previous investigations were used to characterize the four source areas as described within the section of this ROD entitled, **DESCRIPTION OF SOURCE AREAS**. Information obtained during previous investigations was used to generate the Operable Unit Three feasibility study, which in turn, provides the basis for this ROD.

SITE CHARACTERISTICS

INTRODUCTION

This ROD addresses the overall site remedy for the four major source areas that are contributing to the overall groundwater contamination within the Southeast Rockford Superfund Site. The four source areas encompass an area of three miles by two and a half miles, as shown in Figure 1. Groundwater contamination within this area has occurred in the sand and gravel aquifer that is contained within a buried bedrock valley. Generally the contamination follows the bedrock valley and the direction of groundwater flow is east to west, towards the Rock River. The problems within the Southeast Rockford Groundwater Contamination Superfund Site are complex and interrelated. As a result, The Illinois EPA has divided the remediation efforts into four source areas. Each Source Area is described in the following paragraphs.

AREA 4

Source Area 4 is situated in a mixed industrial, commercial and residential area located east of Marshall Street and south of Harrison Avenue. Area 4 is comprised of the former machine shop (Swebco Manufacturing, Inc.) located at 2630 Marshall Street and a residential trailer park (Barrett's) located on the northeast portion of Area 4. According to previous site investigation results, elevated concentrations of dichloroethane (TCA) were detected in soil at a depth of eight feet below ground surface (bgs) in the former machine shop loading dock and parking lot areas. Also, elevated concentrations of chlorinated VOCs were detected in several down-gradient groundwater monitoring wells. These groundwater results indicate that Area 4 is impacting the site-wide groundwater. No elevated concentrations of chlorinated VOCs were detected in the trailer park area.

AREA 7

Source Area 7 is primarily an open grassy area located at the east terminus of Balsam Lane. Area 7 encompasses a city park (Ekberg Park) and an open area containing wooded areas. Ekberg Park consists of a basketball court, tennis court, and a playground. The open field and wooded areas exist south of the park on a hillside that slopes to the north. Two small valleys merge at the base of the hill, allowing surface water to drain northward into an unnamed creek. Private residences border Area 7 on the east and southeast.

Part of Area 7's past history includes a gravel pit as shown on the Rockford South Quadrangle map (USGS 1976). Examination of aerial photographs since the 1950s indicates that various activities have occurred at this location. In particular, a 1970 aerial photo shows areas of excavation and disturbed ground in two large areas centered at about 600 and 1,300 feet east of the east end of Balsam Lane. A third suspect area is located along the small tributary valleys passing from southeast to northeast of Balsam Lane. In these valleys, debris and areas void of vegetation are visible on 1958, 1964 and 1970 aerial photos. In addition, the Illinois EPA and the U.S. EPA have received several past reports of illegal dumping in Area 7.

Based on previous site investigation results, elevated concentrations of ethylbenzene, toluene, xylene (ETX) and chlorinated VOCs were detected in soil in the northern portion of Area 7. The vertical extent of soil contamination extends to a depth of 27 to 29 feet. Chlorinated VOCs were also detected in shallow groundwater and surface water in the unnamed creek. The groundwater results indicate that Source Area 7 is impacting the site-wide groundwater.

AREA 11

Area 11 is located north of Harrison Avenue and east of 11th street. Historically, manufacturing activities in Area 11 included the production of paint and various varnish products for the furniture industry, as well as gears and rollers for newspaper presses. Presently, a restaurant, a machinery painting facility and a wood products supplier are active in Area 11.

The Area 11 groundwater contaminant plume consists primarily of aromatics (xylene, toluene and ethylbenzene), although elevated concentrations (up to 2,900 ppb) of several chlorinated VOCs are also present. Results from the Phase II remedial investigation (CDM 1995) indicate the presence of a NAPL within Area 11. A NAPL is a liquid usually comprised of hydrocarbons such as fuels or solvents that do not mix with groundwater in the aquifer. The NAPL within Area 11 is a light NAPL, as indicated by its presence near the top of the water table. The thickness of the NAPL in Area 11 is generally five to ten feet, but at some points, may approach 25 feet.

AREA 9/10

Area 9/10 is an industrial area that is bounded by 11th Street on the east, 23rd Avenue on the north, Harrison Avenue on the south and 6th Street on the west. This part of the study area has a long history of industrial activity that extends as far back as 1926. At that time, the Rockford Milling Machine and Rockford Tool companies merged to become the Sundstrand Machine Tool Company which is located at the northwest corner of 11th Street and Harrison Avenue (Lundin 1989). Industries in the area include Sundstrand Corporation's Plant #1, the former Mid-States Industrial facility, Nylint Corporation warehouse (formerly occupied by General Electric), Paoli Manufacturing, Rockford Products Corporation, Rohrbacher Manufacturing, and J. L. Clark.

According to previous investigations, an outdoor drum storage area associated with the former Sundstrand Plant #2 was located at the southwest corner of the Sundstrand parking lot (9th Street and 23rd Avenue). From 1962 to 1985, various 55-gallon drums of VOC-bearing materials including tetrachloroethene (PCE), TCA, toluene, acetone and methylene chloride were stored in this area. In addition, from 1962 through 1987, the dock area at Sundstrand Plant #1 housed approximately 14 underground storage tanks (USTs). These USTs were constructed of steel and contained solvents, cutting oils, fuel oil and jet fuel (JP4). The solvents included PCE, TCA and solvents that were used for parts cleaning.

DESCRIPTION OF SOURCE AREAS

SOURCE AREA 4

Source Area 4 is bounded by Harrison Avenue to the north, Alton Avenue to the south, and Marshall Street to the west (see Figure 2). Barrett's Mobile Home Park is located just east of the

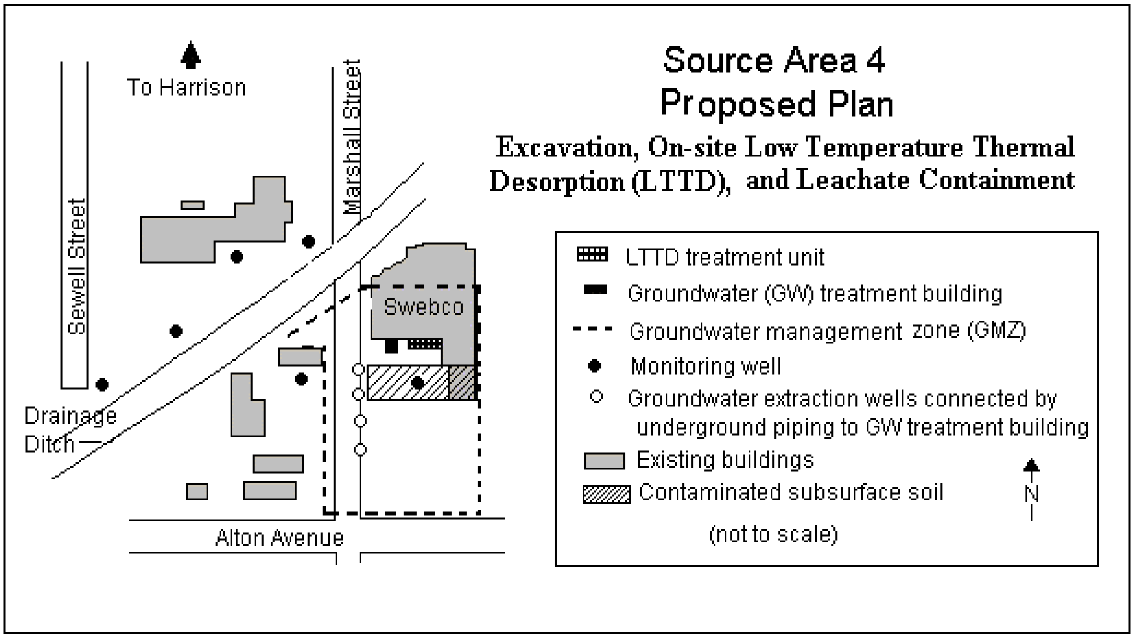

Figure 2. Source Area 4 Map

area. The source of contamination is believed to be leaking underground storage tanks beneath the parking lot of Swebco Manufacturing, Inc., located at 2630 Marshall Street (CDM, 1993 2-14). Swebco was a precision machining shop that produced metal parts. The property is approximately one acre in size and is currently zoned light industrial. The properties surrounding Area 4 are currently zoned either residential or light industrial and include small businesses and single-family homes. Officials with the City of Rockford Planning Division indicate the future plans for Area 4 and surrounding properties are consistent with current uses (Dust).

Illinois EPA Bureau of Land files indicate that Swebco Manufacturing, Inc. used three underground storage tanks. The underground storage tanks are located beneath the parking lot at the facility and available information indicates they are likely to be empty (CDM, 2000 RI 1-5). The contents of the tanks have been reported to be fuel oil and waste oil (CDM, 2000 RI 1-5). It is suspected that the waste oil may have contained 1,1,1-TCA, which is a noncarcinogen.

Soil borings performed within Area 4 to depths of approximately 30 feet bgs indicate the subsurface is largely comprised of medium grain sand (CDM, 1995 Appendix A). The borings also indicate that the sand is overlain with approximately five feet of silty topsoil in most areas. Groundwater is encountered at approximately 29 feet bgs (CDM, 2000 RI 3-1). Groundwater in the unconsolidated sediments beneath Area 4 flows in a west-northwest direction (CDM, 1995 RI 4-41).

During Phase II of the Operable Unit Two remedial investigation (December 1992), high concentrations of 1,1,1-TCA were found in soils beneath a parking lot at the Swebco facility (CDM, 1995 RI 4-37,4-41). Further investigation identified soil contamination at concentrations up to 510 parts per million (ppm) and appears to extend to a depth of 35 feet (CDM, 2000 RI 3-1). The extent of contaminated soils is an area approximately 50 by 75 feet, with the long axis oriented east-west (CDM, 2000 RI 3-1). Assuming a thickness of eight feet and an average 1,1,1-TCA soil concentration of 275 ppm, the volume of highly contaminated soil was estimated at 1,100 cubic yards, with a weight of 1,1,1-TCA at 977 pounds (CDM, 2000 RI 4-41). As 1,1,1-TCA from the contaminated soils are water soluble, contaminants from Area 4 are highly mobile in groundwater, as evidenced by high levels of 1,1,1-TCA (1 ppm) in down-gradient wells (CDM, 1995 RI 4-99). The cause of contamination is believed to be a single source which consists mostly of 1,1,1 TCA (CDM, 2000 RI 3-1). Table 1 shows the maximum concentrations of the contaminants of concern at Area 4.

Soil Gas and Indoor Air

Soil gas (air in the void spaces within soil) concentrations of 1,1,1-TCA at Area 4 range from below detection limits to 7.2 ppm (CDM, 2000 RI 3-3). Residential air sampling identified 1,1,1-TCA, TCE, PCE, 1,1-DCA, and 1,1-Dichloroethylene (1,1-DCE) in the indoor air of homes within the area (CDM, 1995 RI 4-83). The 1995 RI Report concluded that the results could not be directly correlated with groundwater contamination. The report also concluded that concentrations for all compounds were below health-based air guidelines available in 1995 (CDM, 1995 RI 4-85, 90). Because the majority of the indoor air samples with significant detections were those taken from sump pits in basements of homes in Area 4, IDPH recommended that the pits be filled to limit potential exposure. Contact with the owners of homes with sump pits indicated that many had taken the advice of IDPH and filled the pits.

U.S. EPA has recently begun to consider new air screening values. After reevaluating the indoor air data from homes near Area 4, U.S. EPA and Illinois EPA have decided to conduct additional air sampling in the homes to ensure that concentrations are below levels of concern. Illinois EPA plans to conduct the sampling and analysis during the remedial design phase, but actual fieldwork may not begin until sometime in 2002.

As part of the Five Year Review obligation to ensure that a remedy remains protective of health and the environment, Illinois EPA and U.S. EPA will continue to evaluate new developments in this field. When conducting future indoor air sampling, the Agencies will determine if homeowner activities or hobbies might have influenced sampling results. After accounting for such factors, the Agencies would consider a variety of possible responses such as checking soil gas pathways between the site and residence; determining whether additional measures should be taken to increase the capture zone of the area soil remedy and whether it may be appropriate to install air purifying canisters in the homes.

Table 1. Contaminants of Concern at Source Area 4

Contaminant[1]	SOIL (ppm)			GROUNDWATER (ppb)	
	Concentration Range in Soil		Remediation Goal	Concentration	MCL
	Above 10 feet	Below 10 feet			
Volatile Organics					
1,1-Dichloroethene	BDL	BDL	0.06 [2]	BDL-**10**J	7
1,1,1-Trichloroethane	BDL-0.11	BDL-**510.0**	9.118 [3]	BDL-**1,000**	200
Trichloroethene	BDL-0.025	BDL	0.06 [2]	BDL-**28**	5
Semivolatile					
Benzo (a) anthracene	BDL-**5.6**	BDL	0.9 [2]	NA	NA
Benzo(b)fluoranthene	0.06-**11**	BDL	1.38 [6]	NA	NA
Benzo(k)fluoranthene	0.07-**11**	BDL	1.85 [6]	NA	NA
Benzo(a)pyrene	BDL-**1.1**	BDL	0.23 [6]	NA	NA
Dibenzo(a,h)anthracene	BDL- **0.43**	BDL	0.09 [2]	NA	NA
Metals					
Beryllium	0.2-0.7	NA	1.51 [7]	NA	NA

Notes:

ppm - Parts per million or milligrams per kilogram
ppb - Parts per billion or micrograms per liter
MCL- Maximum Contaminant Level developed pursuant to Safe Drinking Water Act
BDL- Below detection limit of laboratory instruments or methods
NA - Compound was not analyzed or measured in laboratory
J - Value is estimated based on laboratory results
1 Only compounds that exceed Tier 1 screening level in soil or an MCL in groundwater are included in Table. Compounds in **bold** text are contaminants of concern for soil, and associated remediation objectives shall be attained through remediation. Remediation objectives shown for all other compounds are only for informational purposes. See section entitled "Remedial Action Objectives" for details.
2 Remediation Goal is the Tier 1 residential screening level for soil for direct contact.
3 Remediation Goal Calculated using equation R15 of TACO that takes attenuation into account.
4 Only Tier 1 residential screening levels for soil for direct contact are considered for semivolatiles because semivolatiles are not currently groundwater contaminants and are not expected to become groundwater contaminants.
5 Compound will be evaluated further through sampling during *remedial design*. Although compound exceeds Tier 1 residential screening level for soil for direct contact, it is not considered a chemical of concern at this time because semivolatiles' are prevalent in environment and not found in groundwater.
6 95% Upper Confidence Limit on background concentrations
7 Upper Tolerance Limit on site-specific beryllium background concentrations.

Surface Soils

Surface soil samples from Area 4 identified several VOCs including 1,1,1-TCA at concentrations up to 0.1 ppm (CDM, 1995 RI 4-34). Polynuclear Aromatic Hydrocarbons (PNAs), and compounds associated with pesticides and polychlorinated biphenyls (PCBs) were also identified in Area 4 soils. Concentrations of PCBs and pesticides found in Area 4 surface soils do not pose a threat to human health. Concentrations of individual PNAs ranged from non-detection (ND) to 16 ppm (CDM, 2000 RI Table 3-1). Concentrations of PCBs and pesticides ranged from ND to 0.100 ppm (CDM, 1995 RI 4-34) and ND to 0.026 ppm (CDM, 2000 RI Table 3-1).

Sub-Surface Soils

Sub-surface soil samples from approximately three to ten feet bgs surface at Area 4 showed higher concentrations of VOCs, PNAs and pesticides. Elevated concentrations of VOCs and PNAs were found primarily in two soil borings (SB4-1 and SB4-5) taken beneath the parking lot at the facility. Elevated concentrations in both borings were found around 30 feet bgs with individual VOCs (1,1,1-TCA) up to 510 ppm (CDM, 2000 RI 3-14) and PNAs, such as naphthalene, up to 3 ppm (CDM, 1995 RI 4-40). The highest concentration of an individual pesticide compound in the subsurface was 0.005 ppm (CDM, 1995 RI 4-40). Inorganic compounds were detected in Area 4 at levels below background.

Groundwater

Significant groundwater contamination exists beneath and down gradient of Area 4. Elevated levels of 1,1,1-TCA and TCE were identified in wells down gradient of the facility at concentrations of 1.0 ppm and 0.02 ppm, respectively. The potential pathways of contaminant migration include groundwater and void spaces in soils (e.g. soil gas). Soil gas concentrations of 1,1,1-TCA in the immediate vicinity of Area 4 range from below detection limits to 7.2 ppm (CDM, 2000 RI 3-3). Surface migration of contaminants is not likely, given that most of Area 4 is paved.

Non-Aqueous Phase Liquid (NAPL)

Soil boring SB4-202 taken in the northern part of Swebco's parking lot tested positive for the presence of a light non-aqueous phase liquid (LNAPL) directly above and within the top portion of the saturated zone. SB4-204 is believed to be right at the source of the area's contamination and contained 510 ppm of 1,1,1-TCA. LNAPL was found present at the source from 27 to 35 feet bgs and was not found in deeper portions of SB4-202 (CDM, 2000 RI 3-14). Soil boring SB4-202 encountered a low permeability clay layer from approximately 62 feet bgs through 65 feet bgs, where the boring was terminated. In most cases, compounds found at Area 4 are considered to be Dense Non-Aqueous Phase Liquids (DNAPLs). The physical and chemical properties of DNAPL compounds cause them to sink through the groundwater until geologic material with a low permeability (such as clay) is encountered. However, DNAPLs do not always present themselves as a phase separate from water and the presence of other less dense solvents may change the DNAPL compound's behavior in the subsurface (U.S. EPA, Groundwater). Visual examination and headspace analysis on soil samples obtained directly above the clay layer did not exhibit DNAPL presence (CDM, 2000 RI App. B).

SOURCE AREA 7

Source Area 7 is located in the most southeastern portion of the Southeast Rockford Superfund Site, northwest of the intersection of Alpine and Sandy Hollow Road. Specifically, Area 7 is located at the eastern end of Balsam Lane (see Figure 3). The area contains Ekberg Park, a

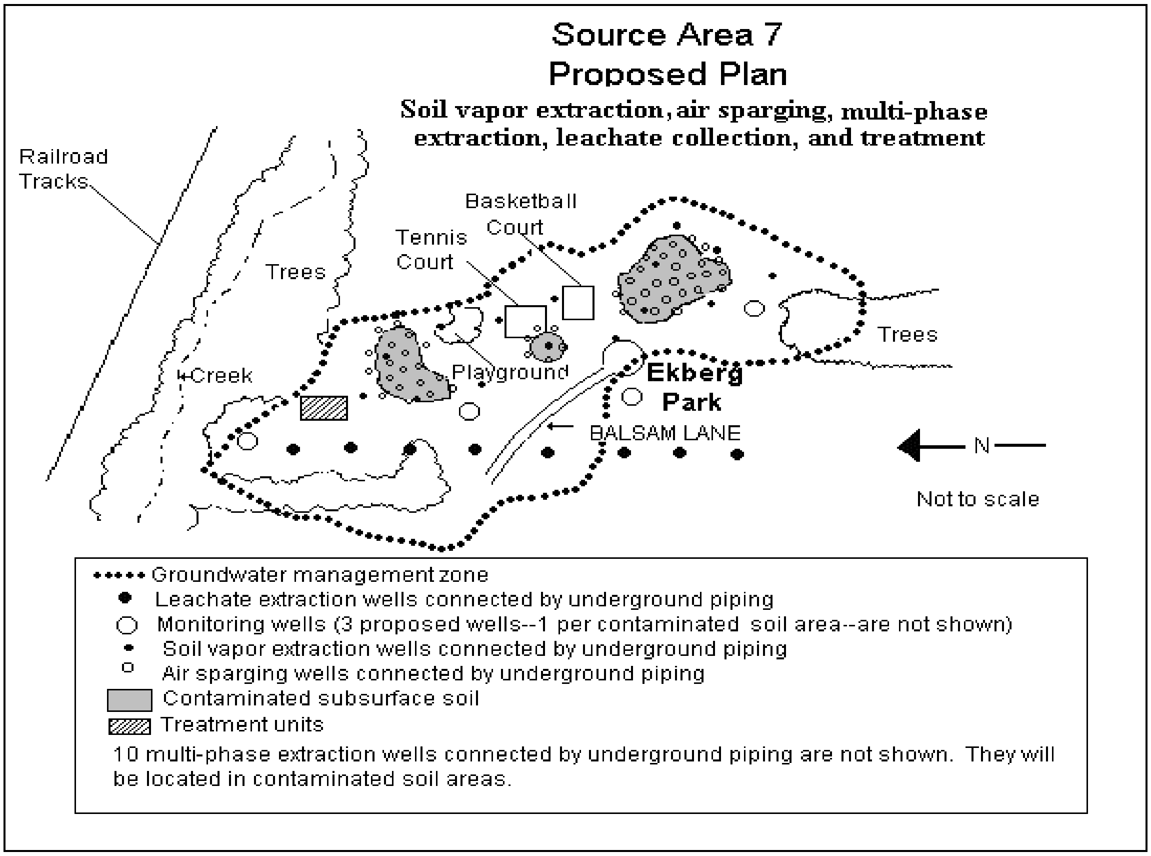

Figure 3. Source Area 7 Map

municipal park owned and maintained by the Rockford Park District. The park consists of open grassland, paved tennis and basketball courts, a children's playground, and a parking area. The park is zoned residential and the City's future plans are consistent with current use (Dust). Area 7 also includes privately owned agricultural land and wooded areas to the south and north of the park (Dust). Surface water drainage at Area 7 follows the area's topography that slopes downward from south to north. Two small valleys merge at the base of the hillside on the south of the area and feed into an unnamed creek that borders the north side of the site. Residential areas border the area to the east and west.

Elevated concentrations of VOCs in monitoring well number 106 (MW106) and aerial photographs showing ground surface excavations helped to identify Area 7 as an area of concern (CDM, 1995 RI 4-12). Part of Area 7 was once a gravel pit, as shown on historical maps compiled by the United States

Geological Survey. Examination of aerial photographs since the 1950s identifies areas of excavation and disturbed ground east of the end of Balsam Lane. In addition, U.S. EPA has received reports of illegal dumping in the area in the past (CDM, 2000 RI 1-5).

The geology at Area 7 consists of a heterogeneous combination of sands, silts, and clays that overlay dolomite bedrock. The heterogeneous nature of the geology at Area 7 correlates well with reports of past activities such as quarrying and land filling. Groundwater in both the upper unconsolidated and bedrock aquifer travels in a northwest direction. Depth to groundwater ranges from 36 feet at MW135 located south of the park, to 13 feet in MW134 within the park, to less than two feet in MW105 near the creek (CDM, 1995 RI Table 3-3).

Soil Gas and Indoor Air

Soil gas surveys completed in May 1992 and February 1993 identified 1,1,1-TCA, PCE and TCE at levels ranging up to 3.8 ppm, 1.1 ppm and 0.690 ppm respectively (CDM, 1995 RI 4-14, and 17). The highest concentration for the sum of 1,1,1-TCA, PCE and TCE concentrations in soil gas was 5.59 ppm obtained south of the basketball courts (CDM, 1995 RI 4-15). Soil gas data obtained in 1996 identified concentrations for the sum of 1,1,1-TCA, PCE and TCE ranging up to 460 ppm in areas north of the children's playground; however, the 1996 data were generated using different procedures than those used in 1992 and 1993.

Residential air sampling in the vicinity of Area 7 identified levels of 1,1,1-TCA, TCE and PCE, at levels less than those found in homes near Area 4. As with Area 4, results could not be directly correlated with groundwater contamination. Concentrations for most compounds were below that of indoor air studies conducted in other cities and all were below health-based air guidelines in place in 1995 (CDM, 1995 RI 4-85, 90).

U.S. EPA has recently begun to consider new air screening values. After reevaluating the indoor air data from homes near Area 4, U.S. EPA and Illinois EPA have decided to conduct additional air sampling in the homes to ensure that concentrations are below levels of concern. Illinois EPA plans to conduct the sampling and analysis during the remedial design phase, but actual fieldwork may not begin until sometime in 2002.

Test Pits

Three test pits were excavated in Area 7 in June 1993. The test pits revealed metal cans, other metal objects, glass bottles and miscellaneous trash. Soil samples taken from the test pits identified PCE ranging up to 22 ppm, 1,1,1-TCA up to 4 ppm, and TCE up to 3 ppm (CDM, 1995 RI 4-25). Table 2 identifies concentrations of contaminants of concern found in Area 7 soils and groundwater. Soil samples from each test pit were also analyzed for Toxicity Characteristic Leaching Procedure (TCLP) contaminants. Concentrations in the TCLP soil sample from test pit 2 exceeded the TCLP regulatory level for TCE and PCE at concentrations of 1.1 ppm and 0.7 ppm, respectively (CDM, 1995 RI 4-26).

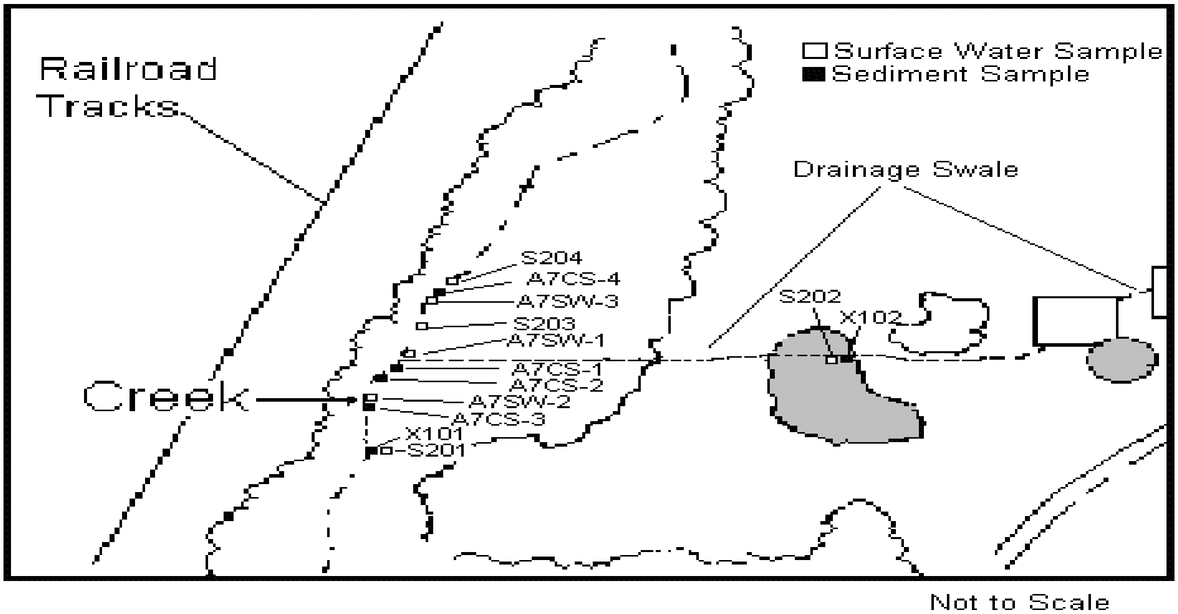

Figure 4. Source Area 7 Hot Spots

Surface Soils

Surface soil samples identified the presence of VOCs, PNAs, metals, and pesticides in surface soils. Surface soil concentrations of VOCs, which are the contaminants of primary concern, ranged up to 0.22 ppm of 1,2-Dichloroethylene (1,2-DCE), 0.04 ppm of 1,1,1 -TCA, 0.14 ppm of TCE, and 0.4 ppm of PCE (CDM, 1995 RI 4-32). One SVOC, bis(2-ethylhexyl)phthalate was detected in all surface samples and could be either due to laboratory contamination or plastics disposed of at the site (CDM, 1995 RI 4-32). With the exception of bis(2-ethylhexyl)phthalate, only two surface soil samples contained concentrations of PNAs, most notably benzo(a)pyrene at levels up to 0.17 ppm. All semi-volatile concentrations were below site-background. Metals concentrations in surface soils at Area 7 were compared to site-specific background concentrations for beryllium and thallium. Pesticide concentrations in surface soils are likely due to the agricultural activities in the area (CDM, 1995 RI 4-32).

Sub-Surface Soils

Twenty-four soil borings were conducted at Area 7 in order to characterize the nature and extent of contamination bgs in areas that were identified by soil gas and surface soil analysis (CDM, 1995 RI 4-43). The VOCs most often identified were TCA, PCE and xylene. The VOC 1,1,1-TCA was found at concentrations of 360 ppm from depths of 4 to 6 feet in sample SB7-24A, and 380 ppm from depths of 15 to17 feet in sample SB7-8D (CDM, 1995 RI 4-43). PCE was identified at levels ranging up to 260 ppm in sample SB7-8D. Xylene was identified at concentrations ranging up to 210 ppm in SB7-10A (CDM, 1995 RI 4-43).

Subsurface sampling results from past investigations identify three primary VOC source areas (hot spots) at Area 7. Figure 4 identifies the three hot spots located at Area 7. Notable concentrations of

total VOCs in the hot spot located at the southern portion of Area 7 (the southern hot spot) at the confluence of the surface water drainage ditches, extends from approximately 4 to 28 feet bgs. Significant concentrations of total VOCs in this area include: 441 ppm in SB7-14 at 4 feet bgs; 1,019 ppm in SB7-8 at 15 feet bgs; and 357 ppm in SB7-9 at 20 feet bgs (CDM, 1992 RI Figure 4-19). Notable concentrations of total VOCs in the hot spot located just west of the tennis courts (the central hot spot) extend from approximately 19 to 23 feet bgs. Concentrations of total VOCs in the central hot spot include 35 ppm in SB7-4 at 20 feet bgs (CDM, 1995 RI Figure 4-19). Lastly, significant concentrations of total VOCs were identified in the northern portion of Area 7, north and west of the playground area (the northern hot spot). Total VOC concentrations in the northern hot spot include: 627 ppm in SB-24 at 4 feet bgs; 17 ppm in SB7-202 at 11 feet bgs; and 875 ppm in SB7-201 at 25 feet bgs (CDM, 1995 RI
Figure 4-19). Significant contamination in the northern hot spot ranges from 3 to at least 28 feet bgs. The depth to which contamination extends in this area was not determined (the soil boring was terminated upon encountering a clay layer rather than risk spreading contamination deeper) (CDM, 1995 RI 3-20).

<u>NAPL</u>

Subsurface sampling results for VOCs that were obtained during the Operable Unit Two remedial investigation suggest the presence of NAPL in the northern and southern hot spots in Area 7. Specific tests designed to positively identify NAPL were not performed on soils in the southern hot spot. The investigation of this hot spot was conducted largely during the Operable Unit Two remedial investigation and work plans did not provide for specific tests for NAPL presence. However, PCE concentrations found in soil sample SB7-8D taken from soil boring SB7-8 suggest the presence of a NAPL (CDM, 1995 RI 4-48). The boring log also indicates an elevated headspace and a strong solvent odor for sample SB7-8D (CDM, 1995 RI Appendix A). Based on density, PCE detected within this sample would be expected to be present as a DNAPL. DNAPLs are also known as sinkers because if they are present at high concentrations they will sink in groundwater rather than float on top of the water table. However, VOCs that are less dense than PCE, such as xylene, naphthalene and 2-methyl naphthalene were also identified within soil boring SB7-8 at concentrations high enough to exist as NAPL (CDM, 1995 RI 4-48). At higher concentrations, these compounds would usually present themselves as an LNAPL and would float on or near the top of the water table, rather than sink. Headspace analyses noted in the boring log for SB7-8 shows the highest readings (130 ppm) at 15 feet bgs, just below the approximate depth at which the water table was encountered (CDM, 1995 RI Appendix A). Headspace analysis drops to 60 ppm at 25 feet bgs, and 11 ppm at 45 feet bgs where the boring was terminated. The decrease in headspace analysis, with depth away from the water table indicates that if a NAPL were present in this hot spot, it would likely present itself as an LNAPL. The decrease in headspace analysis with depth also helps to discount the presence of a DNAPL at this area, although it cannot be ruled out.

Table 2. Area 7 Contaminant Concentration Ranges and Preliminary Remediation Goals

Contaminant[1]	SOIL (ppm)					GROUNDWATER (ppb)	
	Concentration Range in Soil		Remediation Goals[2]			Concentration	MCL
	Above 10 feet	Below 10 feet	Proximal	Distal	Area-wide		
Volatile Organics							
Benzene [3]	BDL	BDL-0.22	0.03 [4]	0.03 [4]	0.8		
Chloroform [3]	BDL	BDL-0.57	0.0006 [4]	0.0006 [4]	0.3	BDL-23	
Chlorobenzene [3]	BDL	BDL-1.6	1.0 [4]	1.0 [4]	130		
1,1-Dichloroethene	BDL-0.003	BDL-**1.3**	0.06 [4]	0.06 [4]	700	BDL-**180**J	7
1,2-Dichloroethane	BDL-0.008	BDL-0.18	0.02 [4]	0.02 [4]	0.4	BDL-**13**	5
1,2-Dichloroethene(total)	BDL-**49.0**	BDL-**47.0**	0.941 [5,6]	11.582 [5,6]	1200	BDL-**5,900**	170 [6]
Ethylbenzene	BDL-26.0	BDL-31.0	57.347 [5]	144 [7]	400	BDL-**31,000**	700
Methylene Chloride	BDL-0.03	BDL-0.01	1695 [7]	1695 [7]	13		
Tetrachloroethene	BDL-**110.0**	BDL-**260.0**	1.465 [5]	94 [7]	11	BDL-**1, 200**	5
Toluene	BDL-23.0	BDL-23.0	255 [7]	255 [7]	650	BDL- 170	1,000
1,1,1-Trichloroethane	BDL-**360.0**	BDL-**460.0**	108.033 [5]	499 [7]	1200	BDL-**8,000**	200
1,1,2-Trichloroethane	BDL-0.004	BDL-0.46	0.619 [5]	56.315 [5]	1800	BDL	5
Trichloroethene	BDL-**24.0**	BDL-**130.0**	0.310 [5]	7.220 [5]	5	BDL-**650**	5
Vinyl Chloride	BDL	BDL	0.01 [4]	0.01 [4]	0.03	BDL-**75**	2
Xylenes (total)	BDL-**210.0**	BDL-**190.0**	119 [7]	119 [7]	410	BDL -1,100	10,000
Semivolatile Organics							
2,4-Dinitrotoluene [8]	BDL- 1.50	BDL	0.162 [5]	80.9 [5]	0.9	NA	NA
Metals							
Beryllium	0.13-0.66	NA	NC	NC	1.51 [9]	NA	NA
Pesticides							
Dieldrin [8]	BDL-0.036	BDL-0.002	NC	NC	0.004 [4]	NA	NA

Notes:

ppm - Parts per million or milligrams per kilogram
ppb - Parts per billion or micrograms per liter
MCL- Maximum Contaminant Level developed pursuant to Safe Drinking Water Act
J - Value is estimated based on laboratory results
BDL- Below detection limit of laboratory instruments or methods
NA- Compound was not analyzed or measured in laboratory
NC- Remediation objective not calculated

1 Only compounds that exceed Tier 1 screening level in soil or an MCL in groundwater are included in Table. Compounds in **bold** text are contaminants of concern for soil and associated remediation goals shall be attained through remediation. Remediation objectives shown for all other compounds are only for informational purposes.

2 Remediation goal split into three goals. Two are for protection of groundwater for two different "hot spots": Proximal is the hot spot closest to the *Groundwater Management Zone* boundary while distal is the hot spot farthest away. The third remediation goal is for direct contact with soil and applies to all of Area 7.

3 Benzene, chloroform and chlorobenzene are not considered chemicals of concern because they were only detected in a small percentage of soil samples (less than 2%).

4 Remediation goal is the Tier 1 residential screening level for soil for protection of groundwater.

5 Remediation goal calculated using equation R15 of TACO that takes attenuation into account.

6 No MCL is available for 1,2-Dichloroethene (total). Therefore, MCL for cis-1,2-Dichloroethene is used to calculate soil remediation objectives as well as to evaluate groundwater contamination.

7 *Soil Saturation Limit* used. TACO stipulates that remediation goals cannot exceed the soil saturation limit. Therefore, when equation R15 of TACO generated a remediation objective greater than the saturation limit, the saturation limit is used instead.

8 2,4-Dinitrotoluene and Dieldrin not included as a chemical of concern because they were not found in the groundwater. 2,4- Dinitrotoluene was detected in one out of three soil samples at concentrations above its Tier 1 residential screening level for ingestion. However, 2,4-Dinitrotoluene was not included as a chemical of concern for the following reasons: the concentration for 2,4- Dinitrotoluene was estimated; it was only detected at five feet below the ground surface; and, it was only detected in 1 out of 3 samples. The sample containing 2,4- Dinitrotoluene is within a hot spot to be addressed by proposed alternatives.

9 Site specific background value. For beryllium, the value is the Upper Tolerance Limit on background data.

The northern hot spot was investigated during Operable Unit Three and the work plan provided for testing designed to identify NAPL. Analysis performed on soil samples obtained in the northern hot spot within Area 7 positively identified NAPL. A total VOC concentration of 875 ppm was identified in the soil sample taken from SB7-201 at 25 feet bgs. NAPL in soils from 25 to 27 feet bgs from SB7-201 was identified visually. In addition, a shaker dye test was performed that confirmed the presence of NAPL from 25 to 27 feet bgs. SB7-201 was terminated at 27 feet, after the boring encountered a clay layer (CDM, 1995 RI 4-48). Many of the compounds detected in the sample obtained from 25 to 27 feet bgs are commonly associated with DNAPLS (U.S. EPA, Groundwater). Additionally, the presence of free product approximately 13 feet below the water table and directly above an impermeable clay layer are indicative of DNAPL.

Concentrations of total VOCs in the central hot spot located just west of the tennis courts are not indicative of NAPL, as evidenced by soil boring SB7-4. Concentrations of total VOCs in the central hot spot include 35 ppm in SB7-4 at 20 feet bgs (CDM, 1995 RI Figure 4-19). Concentrations greater than 1% of a contaminant's solubility are strongly indicative of the presence of NAPL. These concentrations were shown by the shaker dye tests performed in the area (CDM, 1995 RI Appendix A). Headspace analysis results indicate that the most highly contaminated zone within SB7-4 is 20 feet bgs (approximately 10 feet below the water table), and headspace analysis results decrease down to zero at 37 feet bgs helping to rule out the possibility for DNAPL (CDM, 1995 RI Appendix A).

<u>Groundwater</u>

Groundwater samples taken from monitoring wells MW135 and MW106A (located down gradient from Area 7) had concentrations of 1,1,1-TCA at 8 ppm and 7.9 ppm, respectively. Other VOCs detected in the groundwater (down gradient of Area 7) include PCE, TCE, 1,2-DCE (total), vinyl chloride and ethyl benzene. Table 2 identifies concentrations of primary contaminants of concern identified within the groundwater near Area 7.

Surface Water and Sediment

In June 1996, samples were taken from surface water and sediments in the unnamed creek at the north end of Area 7. This was necessary to determine if past activities had affected the creek. Figure 4 illustrates Area 7 surface water and sediment sampling locations. Four creek sediment samples were obtained during the Operable Unit Three remedial investigation. Only one VOC, 1,2-dichloropropane (1,2-DCP) was identified within the sediment. Concentrations of 1,2-DCP ranged up to 0.007 ppm (CDM, 2000 RI 3-22). The PNAs fluoranthene, pyrene, benzo (a) anthracene and chrysene were detected in every sediment sample (CDM, 2000 RI 3-26). Pesticides and PCBs were also detected in the creek sediment

Three surface water samples were obtained from the creek. Six VOCs were detected, 1,1,1-TCA, TCE, 1,1-DCA, 1,1-DCE, 1,2-DCE and chloroethane. There was no discernable pattern in the distribution of contaminants detected in surface water samples. Total VOCs were identified at 0.09 ppm upstream, as compared to 0.065 ppm downstream. Total VOCs in surface water at the confluence of the surface water drainage ditch and the unnamed creek were 0.111 ppm (CDM, 2000 RI 3-26).

On December 16, 1998, Illinois EPA obtained additional samples of the surface water and sediments within the creek. The objective of the sampling event was to provide more information regarding the type and source of contaminants. A total of six samples were taken from the creek - two sediment samples and four surface water samples. Sampling locations for this event are also identified within Figure 4. The December 1998 sampling event identified several compounds that were not detected during the 1996 investigation (Takas). In addition, higher concentrations of several compounds that had been previously detected were identified (Takas). Table 3 summarizes the concentrations of contaminants identified in the sediment during both the 1996 and 1998 investigations. Table 4 summarizes the concentrations of contaminants identified in the surface water during both the 1996 and 1998 investigations. Construction activities on the property south of the creek have resulted in an altering of the creeks natural drainage. Additional sampling may be required because of these activities.

Table 3. Area 7 Creek Sediment Concentrations and Ecological Benchmarks (mg/kg)

Analyte	Sample Locations						Benchmark
	X102	A7CS-4	A7CS-1	A7CS-2	X101	A7CS-3	
Naphthalene (A)	ND	ND	ND	ND	**0.063** (1)	ND	0.0346 (2,3)
Acenaphthene (A)	ND	ND	ND	ND	**0.170**	ND	0.00671 (2,3)
Dibenzofuran (A)	ND	ND	ND	ND	0.091	ND	-
Fluorene (A)	ND	ND	ND	ND	0.180	ND	0.010 (4)
Anthracene (A)	ND	ND	ND	ND	0.240	ND	0.03162 (5)
Carbazole (A)	ND	ND	ND	ND	0.310	ND	-
Fluoranthene (B)	ND	0.590	0.240 J	0.092 J	1.600	0.120 J	0.03146 (4)
Pyrene (B)	ND	0.140 J	0.086 J	0.042 J	1.300	0.100 J	0.04427 (4)
Benzo(a)anthracene (B)	ND	0.230 J	0.120 J	0.038 J	0.690	0.054J	0.0317 (2)
Chrysene (B)	ND	0.270 J	0.130 J	0.044 J	0.740	0.069 J	0.02683 (4)
Benzo(b) fluoranthene (B)	ND	0.510	0.250J	0.094 J	0.870	0.120J	-
Benzo(a)pyrene (B)	ND	**0.054 J**	ND	ND	0.590	ND	0.0319 (2)
Indeno(1,2,3-cd) pyrene (A)	ND	ND	ND	ND	0.440	ND	0.01732 (4)
Dibenzo(a,h)anthracene (A)	ND	ND	ND	ND	0.110	ND	0.00622 (2,3)
Benzo(g,h,i)perylene (A)	ND	ND	ND	ND	0.390	ND	0.170 (6)
Di-n-butylphthalate (A)	0.110	ND	ND	ND	ND	ND	-
Chloromethane (A)	ND	ND	ND	ND	.013	ND	
Vinyl chloride (A)	0.028	ND	ND	ND	ND	ND	-
Chloroethane (A)	0.014	ND	ND	ND	ND	ND	-
Acetone (A)	0.029	ND	ND	ND	.014	ND	-
1,1-Dichloroethane (A)	0.110	ND	ND	ND	ND	ND	-
1,2-Dichloroethane (total) (A)	0.190	ND	ND	ND	ND	ND	-
1,1,1-Trichloroethane (A)	0.062	ND	ND	ND	ND	ND	-
Heptachlor epoxide (A)	ND				**0.0026**		0.00060 (2)
Barium (A)	101.00	--	--	--	16	--	-
Calcium (A)	8530	--	--	--	29100	--	-
Cobalt (A)	5.10	--	--	--	ND	--	-
Iron (A)	13400.00	--	--	--	6690	--	-
Potassium (A)	1320.00	--	--	--	ND	--	-
Magnesium (A)	5210	--	--	--	14400	--	-
Sodium (A)	551.00	--	--	--	247	--	-
Lead (A)	**88.90**	--	--	--	ND	--	30.20 (3)
Vanadium (A)	31.20	--	--	--	12.1	--	-

Notes:

A Compound not evaluated in March 1999 Ecological Risk Assessment and exceeds existing screening benchmark or no benchmark exists
B Compound detected at concentration higher than that which was evaluated in March 1999 Ecological Risk Assessment
J Value is estimated based on laboratory results
1 Concentrations shown in **bold** exceed ecological screening benchmark
2 Canada interim = Canadian Sediment Quality Guidelines for the Protection of Aquatic Life - Interim Freshwater Sediment Quality Guidelines (ISQGs) http://www.ec.gc.ca/ceqg-rcqe/sediment.htm
3 Florida threshold = Florida Department of Environmental Protection, Office of Water Policy - Sediment Quality Assessment Guidelines (SQAGs) Threshold Effect Levels http://www.dep.state.fl.us/dwm/documents/sediment/default.htm (Table 5, p.77)
4 NOAA lowest threshold = National Oceanic and Atmospheric Administration Screening Quick Reference Tables (SQUIRTs) - Freshwater Sediment Lowest ARCs *H. azteca* Threshold Effect Level (TEL) http://response.restoration.noaa.gov/living/SQuiRT/SQuiRT.html
5 ARCS probable = Assessment and Remediation of Contaminated Sediments (ARCS) Program of National Biological Service for U.S. EPA Great Lakes National Program Office - Probable Effect Concentration (PEC) http://www.hsrd.ornl.gov/ecorisk/reports.html (sediment report, Table 4, p.17)
6 Ontario low = Ontario Ministry of the Environment - Lowest Effect Level http://www.hsrd.ornl.gov/ecorisk/reports.html (sediment report, Table 4, p.17)

Table 4. Surface Water Contaminant Concentrations and Ecological Screening Benchmarks (ug/L)

	Sample Locations							
Analyte	S202	S204	A7SW-3	S203	A7SW-1	A7SW-2	S201	**BENCHMARK**
bis(2-Ethylhexyl) phthalate (A)	ND	ND	ND	13.00	ND	ND	ND	-
Vinyl chloride (A)	48 J	ND	ND	ND	ND	ND	ND	-
Chloroethane (B)	87 J	ND	10	ND	ND	ND	ND	-
Acetone (A)	ND	ND	ND	ND	ND	ND	17.00	-
1,1-Dichloroethene (B)	88	ND	ND	ND	1 J	ND	ND	-
1,1-Dichloroethane (B)	1300.00	ND	30	ND	19	13	ND	-
1,2-Dichloroethene (B)	2200.00	ND	42	ND	54	31	ND	-
Chloroform (A)	10.00	ND	ND	ND	ND	ND	ND	-
Trichloroethene (B)	22.00	ND	1J	ND	1J	ND	ND	-
Xylene (total) (A)	21.00	ND	ND	ND	ND	ND	ND	-
Aluminum (A)	6310	27900.00	**--**	**7770**	--	--	42.8	5-100.00 (3)
Chromium (A)	7.4	**46.90** (7)	--	14.0	--	--	ND	11, 74 (5)
Copper (A)	9.6	84.90	--	**43.2**	--	--	ND	9.00 (5)
Iron (A)	9946	527000	--	**251000**	**--**	**--**	**6650**	1000.00 (5)
Lead (A)	11.5	108	--	**54.4**	--	--	ND	2.50 (5)
Antimony (A)	ND	**7**	--	**3.7**	--	--	ND	3.0 (6)
Zinc (A)	49	**340**	**--**	**193**	--	--	7.6	120.00 (5)

Notes:

A Compound not evaluated in March 1999 Ecological Risk Assessment and exceeds existing screening benchmark or no benchmark exists

B Compound detected at concentration higher than that which was evaluated in March 1999 Ecological Risk Assessment

J Value is estimated based on laboratory results

1 Concentrations in **bold** exceed ecological screening benchmark

2 Illinois EPA Water Quality Criteria

3 Canada = Canadian Water Quality Guidelines for the Protection of Aquatic Life - Freshwater Water Quality Guidelines
http://www.ec.gc.ca/ceqg-rcqe/water.htm

4 NOAA = National Oceanic and Atmospheric Administration Screening Quick Reference Tables (SQUIRTs) - Freshwater Acute
http://response.restoration.noaa.gov/living/SQuiRT/SQuiRT.html

5 AWQC = U.S. EPA - Ambient Water Quality Criteria Freshwater Criterion Continuous Concentration (CCC) National Recommended Water Quality Criteria - Correction EPA 822-Z-99-001 April 1999. For chromium, 11ug/L and 74ug/L are the criteria for Chromium +3, and Chromium +6, respectively.

6 NOAA = National Oceanic and Atmospheric Administration Screening Quick Reference Tables (SQUIRTs) - Freshwater Chronic http**://response.restoration.noaa.gov/living/SQuiRT/SQuiRT.html**

7 Concentration is for Chromium +3

SOURCE AREA 9/10

Source Areas Nine and Ten have been combined and evaluated together as Area 9/10. Area 9/10 is an industrial area that is bounded by Eleventh Street on the east, Twenty-third Avenue on the north, Harrison Avenue on the south and sixth street on the west. The properties to the immediate north of Area 9/10, across Twenty-third Avenue, are residential and are zoned as such. South of Area 9/10, across Harrison Avenue, properties are used for both commercial and residential purposes. Area 9/10 is zoned as light industrial, while the properties to the south are zoned mixed residential and commercial (Dust). Future uses for Area 9/10 and adjacent properties planned by the City of Rockford are consistent with current uses (Dust). Figure 5 provides graphical information for Area 9/10. Problems regarding site access and concern over underground utilities at Area 9/10 have limited past investigations and their ability to provide complete and accurate information about the sources located in this area.

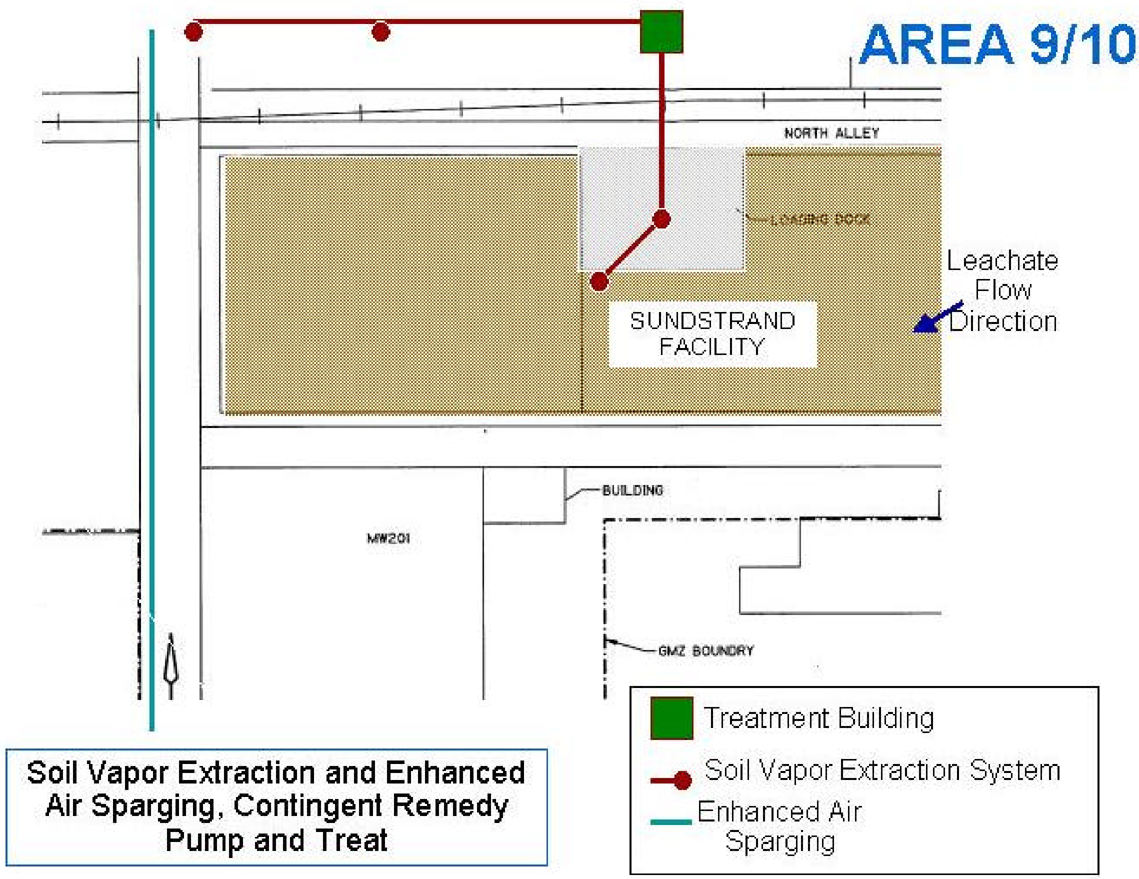

Figure 5. Source Area 9/10 Map

Area 9/10 has a history of industrial activity that extends back as far as 1926, when the Rockford Milling Machine and Rockford Tool companies merged to become the Sundstrand Machine Tool Company, located at the northwest corner of Eleventh Street and Harrison Avenue (Lunden). Current industries that operate in the area include Sundstrand Corporation's Plant #1, Paoli Manufacturing, Rockford Products Corporation, and J.L. Clark. Mid-States Industrial Company (also known as

Rockford Power Machinery) Nylint Corporation, and Rohrbacher Manufacturing were also primary facilities in the area, but are no longer in operation (CDM, 2000 RI 1-7, 3-55).
The geology at Area 9/10 is unconsolidated sand and gravel to a depth of at least 101 feet bgs, as determined by SB9/10-201. No clay or silt units were encountered (with the exception of some fill material within eight feet of the ground surface) in the borings conducted by CDM for the Operable Unit Three investigation. Information from boring logs for two borings conducted near the intersection of Ninth and Harrison Avenue indicate that the unconsolidated sand and gravel in Area 9/10 continues to approximately 235 feet bgs, where bedrock is encountered. One of the boring logs from Illinois State Geological Survey well records identifies a till unit from 120 to 130 feet bgs. Borehole drilling just west of Area 9/10 at the intersection of Twenty-third Avenue and Fourth Street indicated that the unconsolidated sediments are at least 169 feet thick, with a 12-foot-thick clay unit from 132 to 144 feet bgs. The water table at Area 9/10 is generally encountered between 30 and 35 feet bgs (CDM, 2000 RI 3-55, 57).

Investigation results, summarized below, indicate that significant sources of VOC contamination exist within Area 9/10. Four primary potential source locations within Area 9/10 were investigated and are discussed below.

Sundstrand Plant #1
Available information regarding Sundstrand Plant #1 (Illinois EPA *104e Requests*; Harding Lawson Associates 1992) documents the existence of three major potential source areas at the facility: (1) the Outdoor Storage Area; (2) the loading dock; and (3) the Waste Recycling Area. Additional sources of contamination include underground storage tanks (USTs) located throughout the facility and other historical solid waste management units (SWMUs). Some of the other SWMUs contained within the facility include a wastewater treatment plant, an old plating area, a sodium dichromate line, an old dichromate line and an old drum wash area. The Outdoor Storage Area, formerly located at the southwest corner of Ninth Street and Twenty-third Avenue, was used to store VOCs. Soils located below this area had elevated concentrations of VOCs. Additionally, an underground storage tank (UST) adjacent to the Outdoor Storage Area was used to store VOCs.

During its history, Plant 1 has contained numerous USTs related to different activities at the facility. These USTs ranged in capacity from 500 gallons to 10,000 gallons, and numbered up to 40 USTs at any one time. Records indicate that many old USTs have been removed or abandoned in place for a variety of reasons, including leaking tanks. Construction of some of the USTs and their associated piping systems include many that were made of steel. The loading dock at Plant #1 has contained approximately 14 USTs at various times between 1962 and 1987. USTs at Plant 1 contained a variety of materials including: chlorinated solvents, stoddard solvent; cutting oils; fuel oils; lapping oil; 1318 oil; rust oil; DTE 25 oil; mineral spirits (7024 or Naphthol spirits); petroleum naphtha; gasoline; and jet fuel (JP4, JP5, and JP8). Some of the tanks within the facility were used to contain waste materials such as: used JP4; used 7024; waste oil; and solvents (PCE, TCE, 1,1,1-TCA, Stoddard). The Waste Recycling Area is the third potential source at Sundstrand's Plant #1. The Waste Recycling Area is located inside the facility, and is up gradient of the west end of the Nylint building (CDM, 2000 RI 3-75,76).

Mid-States Industrial
A drum storage area at the Mid-States Industrial facility (formerly Rockford Power machinery) is another potential source at Area 9/10. Trichloroethene was identified in the shallow soils in this vicinity up to 67 ppm (Fehr-Graham Associates, 1989).

Nylint
Investigations were conducted at the property leased by Nylint during the Operable Unit Three remedial investigation. High concentrations of 1,1,1-TCA were found in soil gas at the west end of the building, suggesting a potential nearby source. Soils samples from the area did not detect elevated VOCs, indicating that soil gas is either migrating from an adjacent area (where soil samples were not collected), or that volatilization from the groundwater is responsible for observed soil gas concentrations (CDM, 2000 RI 3-76).

Rockford Products
Elevated concentrations of VOCs in soil gas (greater than 1,000 ppb) at the Rockford Products facility on Ninth Street indicate this is a potential source. As with Nylint, soil samples from the area did not detect elevated VOCs, indicating that soil gas is either migrating from an adjacent area (possibly beneath the building) or volatilizing from the groundwater. It should be noted that the location of elevated soil gas concentrations is down gradient from Sundstrand Plant #1's Outdoor Storage Area. Migration of VOCs from the Outdoor Storage Area and volatilization from the groundwater could be the cause of elevated soil gas concentrations. Information currently available does not allow for a determination of all sources of contamination in Source Area 9/10.

Soil Gas
The soil gas investigation conducted as a part of the Operable Unit Three investigation identified several portions of Area 9/10 with distinctly high soil gas concentrations. The areas are: 1) west and northwest of the Sundstrand plant (the southeast corner of Twenty-third Avenue and Ninth street); 2) immediately south of the Sundstrand Plant and in the Rockford Product parking lot; 3) immediately north of the Rockford Products building on Ninth Street; 4) the west end of the Nylint building; 5) the Mid-States Industrial facility and 6) the intersection of Ninth Street and Harrison Avenue. Elevated concentrations of chlorinated compounds detected in soil gas include: PCE; TCE; 1,1,1-TCA; 1,2-DCE; 1-1-DCA; and vinyl chloride. Non-chlorinated VOCs detected include BTEX (benzene, toluene, ethylbenzene, and xylene) compounds that were ubiquitous, in small-to-moderate amounts. Table 5 includes total VOCs detected within the soil gas of Area 9/10. (CDM Operable Unit Three RI 3-57).

The soil gas distribution for PCE indicates the presence of significant concentrations (0.100 ppm) on the northwest, west and southwest sides of the Sundstrand Plant on Ninth Street, and in the area just north of Rockford Products, at the intersection of Ninth Street and Harrison Avenue. Trichloroethene concentrations in soil gas greater than 0.100 ppm were found at the southwest corner of the Mid-States building and at the west end of the Nylint building. Concentrations of 1,1,1-TCA were the most significant and pervasive of any soil gas compound in Area 9/10. The largest area of elevated TCA (greater than 0.100 ppm) occurs just south of the west part of Sundstrand Plant #1 and extends south-

southwest across Rockford Products parking lot. The distribution of 1,1,1-TCA closely resembles that of total VOCs shown on Figure 7, Table 7 of CDM Operable Unit Three RI 3-57.

No indoor air analysis was performed in Area 9/10, because the area is mostly industrial and the homes in the area appear to be outside significant areas of groundwater contamination. Also, soil gas concentrations near the homes are low.

Surface Soils

A total of four surface soil samples were obtained in Area 9/10. The only VOC detected was methylene chloride (a common laboratory contaminant). A total of 20 PNAs were detected, including phenanthrene, fluoranthene, pyrene and chrysene. Dieldrin and gamma-Chlordane were the pesticides most often detected. Concentrations of detected metals were not remarkable. Table 5 summarizes the results of Area 9/10 investigations.

File searches revealed records of soil contamination from chlorinated solvents including tetrachloroethylene (PCE), trichloroethene (TCE), 1,1,1-trichloroethane, 1,1 dichloroethene, 1,2 dichloroethane and 1,1,2 trichloroethane. Additional contamination exists in the soil from the release of petroleum fuels such as JP4, JP7, mineral spirits, fuel oil and BTEX compounds. Metals have also been detected in sufficient quantities to be considered a threat to groundwater.

Sub-surface Soils

In areas where access was attainable, analysis of sub-surface soils indicate low concentrations of total VOCs. In soils above the water table, a maximum of 0.050 ppm of total VOCs was identified. The only detections of chlorinated VOCs in soil above the water table occurred at the Sundstrand Plant in borings SB9/10-134, SB9/10-135 and SB9/10-137. Tetrachloroethene, methylene chloride and TCE were the primary chlorinated VOCs detected in soils above the water table. The highest concentration of chlorinated VOCs below the water table was 0.154 ppm, and that was in the soil within the top ten feet beneath the water table (39 to 41 feet bgs). The primary chlorinated VOCs detected in this sample were 1,1,1-TCA and 1,2 DCE. Table 5 summarizes the results of investigations in Area 9/10 (CDM, 2000 RI 3-61,67).

Groundwater

Of all the sources investigated, the plume of groundwater contamination emanating from Area 9/10 has the third highest VOC concentration in the Southeast Rockford Groundwater Contamination Superfund Site (CDM, 1995 RI 4-137). Previous investigations have identified Area 7 as having the highest concentrations of groundwater contamination, followed by Area 8, which had the second highest concentrations. The Operable Unit Two remedial investigation determined that groundwater contamination from Area 8 was not contributing to the overall Southeast Rockford groundwater contamination problem and was dropped from consideration as a part of the Superfund site.

Five monitoring wells in Area 9/10 were sampled as a part of the Operable Unit Three remedial investigation. VOCs were detected in all five locations. Total VOCs above detection limits for two up-gradient wells, MW202 and MW203, were 0.017 ppm and 0.009 ppm, respectively (CDM, 2000 RI

Figure 3-34). Monitoring wells MW-5 and MW-4 were installed at the former Mid-States building (formerly Rockford Power Machinery) for a previous study in 1991 (Fehr-Graham & Associates). Total VOCs above detection limits in wells MW-5 and MW-4 (which are immediately down gradient of the former Mid-States building) are 0.028 ppm and 0.043 ppm, respectively. Groundwater samples obtained from monitoring well MW201 (installed down gradient of Sundstrand Plant #1) contained 18.27 ppm total VOCs above detection limits. Table 5 summarizes the results of past Area 9/10 groundwater investigations (CDM, 2000 RI 3-67, Figure 3-34).

NAPL

The concentration of 12 ppm of 1,1,1-TCA in MW201 indicates that NAPL is likely present in Area 9/10, based on the aqueous solubility limit of 1,1,1-TCA. Field studies have shown that groundwater concentrations greater than 1 percent of a contaminant's solubility are strongly indicative of the presence of NAPL (National Research Council). The concentration of 1,1,1-TCA in MW201 represents 0.8 to 4 percent of its aqueous solubility limit. The source of the dissolved 1,1,1-TCA is located a short distance up gradient (northeast) of the well, between the north end of the Rockford Products parking lot (east of 9th Street) and the Mid-States Industrial property. Furthermore, given the dominance of chlorinated VOCs, which are denser than water, it is likely that a DNAPL is present in the vicinity of MW201. Dye testing did not reveal the presence of DNAPL in the shallower portions of the unconsolidated aquifer. However, DNAPL would not be expected to be present in the more shallow portions of the aquifer, because no confining units are present in the top 100 feet of the aquifer (CDM, 2000 RI 3-77). Further research has revealed that numerous releases of petroleum based fuels (JP4, mineral spirits, and fuel oil) and chlorinated solvents from USTs have occurred within Area 9/10. Information submitted to the Illinois EPA (in reports) reveals that LNAPL related to these releases exists or has existed floating on the water table.

Table 5. AREA 9/10 Contaminant Concentration Ranges and Preliminary Remediation Goals

Contaminant[1]	SOIL (ppm)			GROUNDWATER (ppb)	
	Concentration Range in Soil		Remediation Goal	Concentration	MCL
	Above 10 feet	Below 10 feet			
Volatile Organics					
1,1-Dichloroethene	BDL	0.002	0.06 [2]	BDL-**850**	7
1,2-Dichloroethane	BDL	BDL	0.02 [2]	BDL-**6** J	5
1,2-Dichloroethene (total)	BDL	BDL	0.4 [3]	BDL-**4600**	NA
Ethylbenzene	BDL	BDL	13 [2]	BDL-19	700
Methylene Chloride	0.002-0.003	0.003-0.048	0.02 [2]	BDL	5
Tetrachloroethene	BDL	0.002-0.046	0.06 [2]	BDL-**50** J	5
1,1,1-Trichloroethane	BDL	0.001-0.050	2 [2]	BDL-**12,000**	200
1,1,2-Trichloroethane	BDL	0.006	0.02 [2]	BDL-**60** J	5
Trichloroethene	BDL	0.001-0.002	0.06 [2]	BDL-**140**	5
Vinyl Chloride	BDL	BDL	0.01 [2]	BDL-**14**	2
Semivolatile Organics					
Benzo(a)anthracene [4, 5]	0.330-**2.30**	BDL	.9 [6]	BDL	NA
Benzo (b) Fluoranthene [4, 5]	0.420-**2.80**	BDL	.9 [6]	BDL	NA
Benzo(a)pyrene [4, 5]	0.260-**1.70**	BDL	.3 [7]	BDL	NA
Indeno(1,2,3-cd)pyrene [4, 5]	0.230-**1.30**	BDL	.9 [6]	BDL	NA
Metals					
Beryllium	0.06-0.090	NA	1.51 [7]	BDL	4
Pesticides					
Dieldrin [8]	0.004-**0.054**	BDL-0.002	0.004 [9]	BDL	NA

Notes:

ppm - Parts per million or milligrams per kilogram
ppb - Parts per billion or micrograms per liter
MCL- Maximum Contaminant Level developed pursuant to Safe Drinking Water Act
J - Value is estimated based on laboratory results
BDL- Below detection limit of laboratory instruments or methods
NA- Compound was not analyzed or measured in laboratory
1 Only compounds that exceed Tier 1 screening level in soil or an MCL in groundwater are included in Table. Remediation objectives shown for all other compounds are only for informational purposes.
2 Remediation Objective is the Tier 1 residential screening level for soil for protection of groundwater.
3 Remediation objective for cis-1,2-Dichloroethane, no objective exists for total 1,2-Dichloroethane
4 Only Tier 1 residential screening levels for soil for direct contact are considered for semivolatiles because semivolatiles are not currently groundwater contaminants and are not expected to become groundwater contaminants.
5 Compound will be evaluated further through sampling during remedial design. Although compound exceeds Tier 1 residential screening level for soil for direct contact, it is not considered a chemical of concern at this time because semivolatiles' are prevalent in environment and not found in groundwater.

6 Remediation Objective is the Tier 1 residential screening level for soil for direct contact.
7 Site specific background value. For beryllium, the value is the Upper Tolerance Limit on background data.
8 Dieldrin not included as a chemical of concern because it was not found in the groundwater. Surface concentration is below Tier 1 residential screening level for soil for direct contact.
9 Remediation Objective is the Tier 1 residential screening level for soil for protection of groundwater.

Source Area Eleven

Source Area Eleven (Area 11) is located east of Eleventh Street at the corner of Eleventh Street and Harrison Avenue (see Figure 6). Area 11 is bordered on the east and west by industrial facilities. Properties to the immediate north are industrial, while land uses further north (north of Twenty-third Avenue) include industrial mixed with some residences. South of Area 11 across Harrison Avenue, properties are used for both commercial and residential purposes. Area 11 continues to be dominated by industrial activities and is comprised of several industrial properties and one commercial property. The Area is zoned light industrial and commercial (Dust). Future uses planned by the City of Rockford are consistent with current uses as light industrial (Dust).

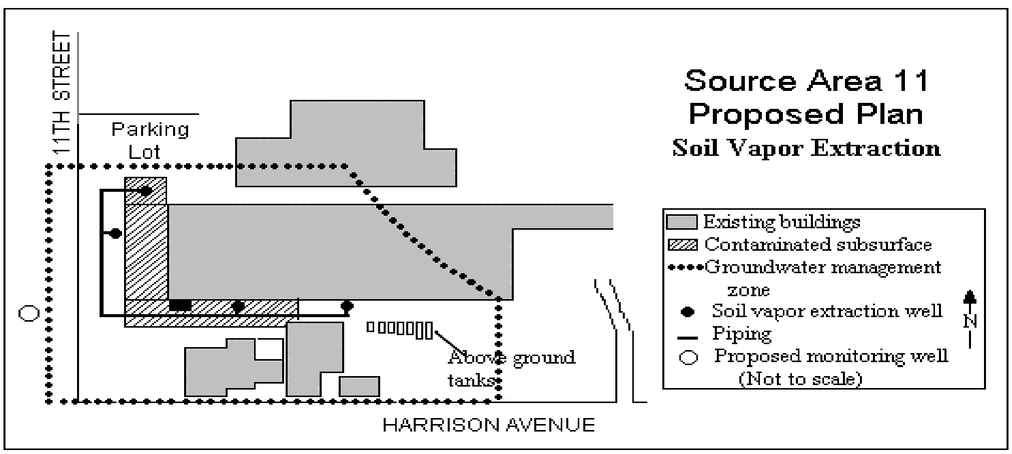

Figure 6. Source Area 11 Map

The geology at Area 11 is unconsolidated sand and gravel to a depth of at least 62 feet bgs, as evidenced by SB11-202 (CDM, 2000 RI Appendix D). Information from boring logs for two borings conducted approximately one block east of Area 11 near the intersection of Ninth and Harrison Avenue indicate that the unconsolidated sand and gravel in the general area continues to approximately 235 feet bgs where bedrock is encountered (CDM, 2000 RI 3-55, 57). One of the boring logs from Illinois State Geological Survey well records identifies a till unit from 120 to 130 feet bgs (CDM, 2000 RI 3-55, 57). The water table at Area 11 was encountered at approximately 20 to 25 feet bgs during the Operable Unit 2 investigation and closer to 30 to 34 feet bgs during the during Operable Unit Three investigation (CDM, 1995 RI Appendix A, CDM, 2000 RI Appendix D).

Area 11 currently includes the Rohr Manufacturing facility (formerly Rockwell Graphics Systems), H and H Wood Products and Pallets, Villa Di Roma Restaurant and adjacent parking lots. Historically, Rockford Varnish, Rockford Coatings and Rockwell Graphics Systems have conducted manufacturing activities in Area 11 (CDM, 2000 RI 1-6).

The Rockford Coatings Corporation, formerly located at 1620 Harrison Avenue, manufactured several paint products including enamels, lacquers and water-based paints. Whether or not chlorinated solvents were used at the facility is unknown. The Rockford Coatings Corporation discontinued operations in 1983 (CDM, 2000 RI 1-6).

Rockford Varnish Company, formerly located at 11th and Harrison Avenue, manufactured varnish and related products for the furniture industry from 1906 until 1983. Rockford Varnish used VOCs, including chlorinated solvents, in its operations and stored these compounds on site in approximately eight aboveground storage tanks. Groundwater sampling results near the facility indicate chlorinated solvent contamination (CDM, 2000 RI 1-6).

Rockwell International Graphics, formerly located at 2524 11th Street, manufactured gears and rollers for newspaper presses until approximately 1991. The facility used 1,1,1-TCA for cleaning rollers until 1983. Areas of concern near the former Rockwell facility include a dumpster located south of Rockwell that apparently leaked cutting oils onto the ground surface and a pit to the north of the property that contained standing water with an oil sheen. The Rockwell facility is now owned by P.H. Partners Co., who leases it to Rohr Manufacturing. Present operations include painting industrial equipment (CDM, 2000 RI 1-6).

Several contaminant release and migration pathways exist in Area 11. One potential contaminant source is the eight aboveground storage tanks that previously contained VOCs (including chlorinated solvents) at the former Rockford Varnish Facility. Potentially leaking tanks and aboveground piping may have released contaminants to the vadose zone of the soil (region just below ground surface where soil pores are filled with air and small amounts of water). Also, a bunker reportedly used by Varnish Company is located in the railroad right-of-way south of the former Rockwell property. This bunker has previously seeped a tar-like substance. Historical reports indicate that a dumpster used by Rockwell Graphics leaked cutting oils onto the ground surface and that a pit to the north of Rockwell contained standing water with an oil sheen (CDM, 2000 RI 3-33).

Investigations conducted at Area 11 identified two distinct zones of subsurface contamination. One zone is located on the western margin of Area 11, centralized beneath Rohr Manufacturing and extending to areas north, south, and west of the building. Soil samples within this zone indicated elevated concentrations of toluene, ethylbenzene, xylene and acetone, as well as the presence of NAPL. A second zone of contamination exists near the aboveground storage tanks to the northeast of the former Rockford Varnish building. Soil samples in this zone identified elevated concentrations of toluene, xylenes and PCE. Within both zones of elevated contamination, the high levels of BTEX masked lower levels of chlorinated VOCs that were likely present. Table 6 summarizes the results of past investigations in Area 11 (CDM, 2000 RI 3-45, 3-51 to 3-53).

<u>Soil Gas</u>
A soil gas survey was conducted at Area 11 during the 1996 Operable Unit 3 remedial investigation to delineate the extent of VOC contamination and to identify any hot spots. A total of 54 soil gas samples

were collected. Total concentrations of BTEX in the western zone of contamination ranged from 0.041 ppb to 2.25 ppm. Toluene and xylene are the primary contributors to the total BTEX concentration. Total chlorinated VOCs in the western zone ranged from less than 0.007 ppm to 0.077 ppm. Primary contributors to total chlorinated VOC concentrations appear to be 1,1,1 TCA and PCE. Chlorinated VOC concentrations in the soil gas may be understated due to the presence of elevated BTEX in some samples (CDM, 2000 RI Appendix D).

Total BTEX concentrations in the central zone of contamination ranged from less than 0.006 ppm to 0.180 ppm. Toluene and xylene are the primary contributors to the total BTEX concentration in this zone as well. Total chlorinated VOCs in the central zone ranged from less than 0.010 ppm to 0.224 ppm. Primary contributors to total chlorinated VOC concentrations appear to be 1,1,1 TCA and PCE. As with the western zone, chlorinated VOC concentrations in the soil gas may be understated due to the presence of elevated BTEX in some samples (CDM, 2000 RI Appendix D).

One notable concentration of total chlorinated VOCs in soil gas was located on the north side of the right-of-way at the southeast corner of Rohr Manufacturing. Concentrations of total chlorinated VOCs in the soil gas sample obtained from this area reached approximately 1.049 ppm (CDM, 2000 RI Appendix D).

No indoor air analysis was performed in Area 11 because of the industrial nature of the area and the distance to homes.

<u>Surface Soils</u>
Seven surface soil samples were obtained from Area 11 in locations where elevated VOC concentrations in soil gas were identified. The results are included in Table 6. Surface soil samples identified PNAs, pesticides, PCBs and metals. Volatile Organic Compounds were not detected in surface soils samples. The concentration of PNAs identified ranged from 0.042 ppm to 440 ppm. Several PNAs (phenanthrene, fluoranthene, benzo(a)anthracene, chrysene, bis(2ethyl-hexyl)phthalate, benzo(b)fluoranthene and benzo(k)fluoranthene) were detected in all seven samples. Several pesticides were identified, ranging in concentrations from 0.003 ppm to 0.180 ppm. The pesticides most often detected were Dieldrin, Methoxychlor and alpha-chlordane. Concentrations of PCBs ranging from 0.031 ppm to 0.530 ppm were detected. Metals were identified at concentrations similar to background in most cases (CDM, 2000 RI Table 3-11).

<u>Sub-Surface Soils</u>
Seventeen soil borings were conducted at Area 11. Sub-surface sampling results are summarized in Table 6. VOCs, PNAs, pesticides and metals were identified in sub-surface soils in this area. Concentrations of VOCs ranged from 0.004 ppm to 2,300 ppm. The VOCs most often detected were xylene, toluene, ethylbenzene, and acetone. Sub-surface soils collected from SB11-203 in the western portion of Area 11 and north of the Rohr Manufacturing building at depths from 39-41 feet bgs tested positive for NAPL. Soils from SB11-203 contained toluene (180 ppm), ethylbenzene (20 ppm), xylenes (110 ppm), and acetone (5.1 ppm). In order to quantify these concentrations of VOCs in the laboratory, the detection limit for chlorinated VOCs (1,1,1 TCA and PCE) was raised to 13 ppm.

Therefore, chlorinated compounds may be present at concentrations less than 13 ppm. Soil samples were also taken from SB11-202 from 39-41 feet bgs and tested positive for NAPL. SB11-202 was also located in the western portion of Area 11 but was south of the Rohr Manufacturing building. Concentrations of VOCs within this sample were similar to that of SB-203. Detection limits for chlorinated VOCs were also raised in this sample, to 27 ppm for 1,1,1 TCA and PCE. The thickness of non-chlorinated VOC contamination in the western zone ranges from 12 to 24 feet in an area measuring about 17,000 square feet (CDM, 2000 RI 3-45, 3-51 to 3-53).

Sub-surface samples were also taken from the central portion of Area 11 (the central zone of contamination) near the aboveground storage tanks northeast of the former Rockford Varnish facility. Elevated concentrations of VOCs were also identified within this area, with 290 ppm of toluene and 17 ppm of xylene at 35 feet bgs. The VOC contamination in this zone is limited to the area around and west of the aboveground tanks. Although PCE was detected in sub-surface soils at concentrations of .046 ppm at 20 feet bgs, it is not suspected that the above ground tanks are a source. Levels of chlorinated VOCs in this area are likely due to lateral migration of gases and volatilization from groundwater. The extent of non-chlorinated VOC contamination in this zone extends from 35 feet bgs to an undetermined depth. The area of VOC contamination measures approximately 6,000 square feet (CDM, 2000 RI 3-50, 3-51).

Subsurface concentrations of pesticides, and PNAs were significantly lower than levels found in surface samples and were also detected less frequently. A concentration of PNAs identified in subsurface soils ranged from 0.045 ppm to 1.9 ppm. Concentrations of pesticides ranged in concentrations from 0.001 ppm to 0.009 ppm (CDM, *Risk* Table 10).

Table 6. AREA 11 Contaminant Concentration Ranges and Preliminary Remediation Objectives

Contaminant[1]	SOIL (ppm)			GROUNDWATER (ppb)	
	Concentration Range in Soil		Remediation Goal	Concentration	MCL
	Above 10 feet	Below 10 feet			
Volatile Organics					
Benzene	BDL	BDL-**1.5**	0.189 [2]	BDL-**23**	5
Ethylbenzene	BDL	BDL-**590**	7.983 [2]	BDL-**3,900**	700
Methylene Chloride	BDL	BDL-2.9	2303 [3]	BDL	5
Toluene	BDL	BDL-**1,400**	638 [3]	BDL-**310,000**	1,000
Trichloroethene	BDL	BDL-**0.41**	0.051 [2]	BDL-**170**	5
Xylenes (total)	BDL	BDL-**2,300**	312 [3]	BDL-**16,000**	10,000
Semivolatile Organics					
Carbazole [4, 5]	BDL- **67**	BDL	32 [6]	BDL	NA
Benzo(a)anthracene [4, 5]	0.069-**200**	BDL	.9 [6]	BDL	NA
Chrysene [4, 5]	0.052-**240**	BDL	88 [6]	BDL	NA
Benzo (b) Fluoranthene [4, 5]	0.086-**220**	BDL	.9 [6]	BDL	NA
Benzo (k) Fluoranthene [4, 5]	0.046-**130**	BDL	.9 [6]	BDL	NA
Benzo(a)pyrene [4, 5]	0.096-**150**	BDL	.3 [7]	BDL	NA
Indeno(1,2,3-cd)pyrene [4, 5]	0.063-**120**	BDL	.9 [6]	BDL	NA
2-Methylphenol	BDL-0.031	BDL-0.580	16,827 [3]	BDL	NA
Metals					
Beryllium	0.035-0.070	NA	1.51 [7]	**153**	4
Pesticides					
Dieldrin [8]	BDL-0.010	BDL-0.002	0.004 [9]	BDL	NA

Notes:

ppm - Parts per million or milligrams per kilogram
ppb - Parts per billion or micrograms per liter
MCL- Maximum Contaminant Level developed pursuant to Safe Drinking Water Act
J - Value is estimated based on laboratory results
BDL- Below detection limit of laboratory instruments or methods
NA- Compound was not analyzed or measured in laboratory
1 Only compounds that exceed Tier 1 screening level in soil or an MCL in groundwater are included in this Table. Compounds in bold text are contaminants of concern for soil, and associated remediation objectives shall be attained through remediation. Remediation goals shown for all other compounds are only for information purposes.
2 Remediation goal Calculated using equation R15 of TACO that takes attenuation into account.
3 Soil Saturation Limit used. TACO stipulates that remediation objectives cannot exceed the soil saturation limit. Therefore, when equation R15 of TACO generated a remediation goal greater than the saturation limit, the saturation limit is used.

4 Only Tier 1 residential screening levels for soil for direct contact are considered for semivolatiles because semivolatiles are not currently groundwater contaminants and are not expected to become groundwater contaminants.
5 Compound will be evaluated further through sampling during remedial design. Although compound exceeds Tier 1 residential screening level for direct soil contact, it is not considered a chemical of concern at this time because semivolatiles are prevalent in the environment and not found in groundwater.
6 Remediation goal is the Tier 1 residential screening level for direct soil contact.
7 Site-specific background value. For beryllium, the value is the Upper Tolerance limit on background data.
8 Dieldrin not included as a chemical of concern because it was not found in groundwater. Surface concentration is below Tier 1 residential screening level for soil for direct contact.
9 Remediation goal is the Tier 1 residential screening level for soil for protection of groundwater.

Groundwater

Groundwater analysis performed on samples taken from wells IW10, IW11 and MW128 indicate the presence of VOCs and metals in groundwater down gradient of Area 11. Area 11 is a significant source of non-chlorinated VOC groundwater contamination. Area 11 has the highest and most extensive concentrations of BTEX compounds found in the groundwater. Concentrations of 2 ppm (estimated) ethylbenzene, 310 ppm toluene, and 9.5 ppm xylene were identified in groundwater in the area. Although Area 11 does contribute chlorinated VOC contamination to the groundwater, it appears to be limited in extent and concentration. Concentrations of TCE (0.170 ppm) were higher down gradient of Area 11 than those found up gradient. The chlorinated VOC 1,1,1-TCA was also found in Area 11 groundwater at concentrations up to 0.860 ppm, but could be the result of the Area 4 plume. Table 6 summarizes contaminant concentrations found in groundwater down gradient of Area 11 (CDM, 1995 RI 4-105,106, 118 and Appendix H).

NAPL

The western zone (in the western margin of Area 11) is centralized beneath Rohr Manufacturing. NAPL was detected in the western zone during field screening of SB11-203 soil samples from 39 to 43 feet bgs. A combination of black staining of soils and Sudan IV dye testing confirmed the presence of NAPL in samples taken from 39 to 43 feet bgs. Similar conditions were identified in SB11-202 from 39 to 45 feet bgs. The NAPL in both soil borings was determined to be LNAPL because of its presence within the upper part of the saturated zone. Headspace analysis conducted on samples taken beneath 45 feet bgs in each boring decreased significantly with depth, indicating that DNAPL is not likely to be present in this zone (CDM, 2000 RI 3-45, 51, 52, and Appendix D).

Sub-surface soil samples taken in the central zone of contamination (near the aboveground storage tanks) indicate that VOC contamination in this zone begins at approximately 35 feet bgs. Past investigations in this zone have indicated the possibility for NAPL, but it was not positively identified. Headspace analysis on samples obtained from soil borings SB11-4 and SB11-8, which were advanced during phase II of the Operable Unit Two investigation, indicates the greatest degree of VOC contamination at depths of approximately 35 to 42 feet bgs. Soil samples SB11-4G and SB11-8G taken from these depths indicate the possibility for NAPL. However, no staining is noted in the soil boring logs and the Sudan IV dye test was not performed during the Operable Unit Two investigation. Regarding the possibility for DNAPL, while minor DNAPL components do exist within soil samples, headspace analysis below 42 feet decrease significantly indicating that DNAPL is probably not present within this zone (CDM, 1995 Operable Unit Two RI 4-66, 4-70, Table 4-4, Appendix A).

The total depth of VOC contamination near the storage tanks cannot be positively determined based on laboratory analysis of soil. However, soil analysis from samples taken near this zone coupled with headspace analysis indicates that it is likely to be approximately 10 feet thick, extending from approximately 35 to 45 feet bgs (CDM, 2000 RI 3-53).

CURRENT AND POTENTIAL FUTURE LAND AND RESOURCES USES

The area included within the Southeast Rockford Groundwater Contamination Site currently includes industrial, commercial and residential property. Industrial property use ranges from what would be considered light-manufacturing facilities up to large facilities that contain multiple underground storage tanks and units utilized in large manufacturing operations. Commercial facilities include shopping facilities such as grocery stores and fast food restaurants that are used as part of normal family activities, including churches and a community center. Residential areas are mixed throughout the entire site, including parks and other recreational facilities. Future uses of the entire area will likely remain the same as they are today.

Source Area 4 is described as an industrial/commercial area in Southeast Rockford that includes the former Swebco Manufacturing located at 2630 Marshall Street. Swebco manufactured precision machine metal parts and was considered to be zoned for light industrial. It was located in an area that included small businesses and single-family homes. Property surrounding Area 4 is currently zoned either residential or light industrial. The City of Rockford has indicated to the Illinois EPA that future property use will be consistent with current use.

Area 7, located in the southeastern portion of the site, was determined to be an illegal dumpsite. The former dumpsite includes Ekberg Park, a municipal park located at the end of Balsam Lane, owned and maintained by the Rockford Park District. Pine Manor subdivision, which contains single-family homes, occupies a position to the northwest of the park. Both Pine Manor subdivision and Ekberg Park are zoned residential and the future plans for these two areas are consistent with current use. Areas to the north, east and south of Area 7 contain undeveloped real estate. However, discussions with Mr. Glen Ekberg, the owner of the property to the north of the park, indicate that this property is in the beginning phases of commercial development.

Area 9/10 is an industrial area, with history of this type of activity dating back as far as 1926. Located in the area of Harrison Avenue and Ninth Street, it is zoned as industrial and is designated to remain that way. However, the areas north of Twenty Third Avenue and directly south of Area 9/10 are primarily residential single-family homes. The City of Rockford has indicated the future use of the property in this area is consistent with current use for Area 9/10.

Area 11 is located on the corner of Eleventh Street and Harrison Avenue and is bordered on the west and east by industrial facilities. Currently, Area 11 is dominated by industrial facilities but does contain one commercial property. Property to the north of Twenty Third Avenue and south of Area 11 consists of a mix of residential, commercial and industrial properties. Currently, the zoning of Area 11 is light industrial and commercial, and future zoning plans are for the area to remain light industrial.

Contaminated groundwater was detected in municipal wells owned by the City of Rockford in 1981, resulting in the closing of several wells. Currently, one City of Rockford municipal well (located within the designated site) is using granulated activated carbon (GAC) filters to remove VOCs from potable water. The GAC unit assures that sufficient potable water supplies exist for residents within Rockford.

Residents with contaminated wells were given the opportunity to hook up to the City of Rockford Municipal water system as part of a time critical removal action in 1991. Through the source control measures and natural attenuation of the groundwater, it is estimated that approximately 200 years will be necessary for complete remediation of the groundwater and to return it to natural conditions. Remedial activities for treatment of soil and leachate at the source areas are expected to continue for approximately twenty-five years. During this time period and after source removal has been completed, groundwater monitoring will continue to assess the quality of the groundwater. The goal of the proposed remedies for the source areas, along with natural attenuation, is to reduce the risk to human health and return the groundwater to a natural, potable drinking water source.

SUMMARY OF SITE RISKS

Risks to human health and the environment caused by contamination from Source Areas 4, 7, 11, and 9/10 (in the form of chlorinated solvents) were first detected in private drinking water wells. Therefore, an evaluation was performed through a risk assessment process. This process characterizes current and future threats or risks to human health and the environment posed by contaminants at the site. The risks to human health and the risks to the environment are usually evaluated separately for each site. A human health risk assessment was conducted for all four source areas, and is discussed below in the section entitled **Human Health Risks**.

Because of the industrial nature of Source Areas 4, 11 and 9/10, the Illinois EPA and U.S. EPA determined it was only necessary to evaluate risks to the environment (often called ecological risks) for Area 7. The results of the ecological risk assessment for Area 7 are discussed below in the section entitled **Summary of Ecological Risk Assessment**.

The calculation of risks to human health and the environment posed by surface water and sediments in the creek running north of Area 7 was problematic. Concentrations of several contaminants (PNAs and VOCs) in the surface water and sediment at Area 7 and their locations in relationship to the area suggest another source may be present upstream. Results of a focused sampling event conducted in December 1998 provided more information regarding the presence of contaminants in the creek, but were unable to establish the contribution of upstream sources to Area 7.

The Agencies determined that it would be more efficient to further evaluate the creek running north of Area 7 during the design phase of the project. The design phase will likely occur in 2002. If the evaluation of risks to human health and the environment conducted during the design phase identifies the need for remediation in addition to that outlined within this ROD, the remedy would be appropriately altered. Depending on the significance of the change in remedy, the Agencies may be required to hold additional public meetings and allow public comment on the new remedy.

SUMMARY OF HUMAN HEALTH RISK ASSESSMENT

The National Contingency Plan (NCP) establishes an expectation that U.S. EPA will use treatment to address principal threats posed by a site wherever practicable (NCP, 40 CFR §300.430(a)(1)(iii)(A)). The term "principal threat" refers to source materials that are considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur (U.S. EPA, Guide 6-40). Remedial investigations conducted at the site have identified principal threat wastes at all four source areas (Area 4, Area 7, Area 9/10, and Area 11). Residual NAPL was positively identified at Areas 4, 7, and 11 (CDM, 2000 RI). At Area 9/10, groundwater concentrations were identified that were indicative of a significant source of groundwater contamination and NAPL presence (CDM, 2000 RI 3-77). The following text summarizes information identifying the principal threats at each Source Area.

Human health risks posed by Source Areas 4, 7, 11, and 9/10 were evaluated and described within the "*Southeast Rockford Source Control Operable Unit Risk Assessment Report*," dated April 2000. The risk assessment utilized Illinois EPA's Tiered Approach to Corrective Action Objectives (TACO) at 35 Ill. Adm. Code Part 742, to evaluate risks. TACO is a set of State of Illinois regulations that specify methods for developing remediation objectives and identifying chemicals of concern. The human health risk assessment conducted at this site used TACO Tier 1 screening values, as well as Risk Assessment Guidelines for Superfund (RAGS) - site specific remediation objectives to evaluate human health risks at each source area.

The risk assessment evaluated three exposure pathways at each source area. An exposure pathway is a means by which a person may come in contact with site contaminants. The three exposure pathways evaluated in the risk assessment are: (1) Direct contact with soil (including ingestion of soils and inhalation of vapors from soils); (2) Chemicals transferring (leaching) from soils into groundwater; and (3) Ingestion of vegetables grown at Area 7. The third exposure pathway was included because portions of Area 7 were used for agricultural purposes.

The major contaminants of concern (COCs) for soil in each source area, as identified by the RI and the Risk Assessment are listed in Table 7. Contaminants of concern are compounds that are present at the site in sufficient quantities to present an unacceptable risk to human health or the environment. Contaminants of concern were identified by comparing concentrations identified within the soil or leachate at each area to preliminary remediation goals. The preliminary remediation goals (PRGs) for this site were generated in accordance with 40 CFR § 300.430 (e)(2)(i) of the National Contingency Plan.

The risk assessment identified conditions at all four source areas that constitute a potential or actual threat to human health or the environment. Concentrations of contaminants present in soil at Areas 4, 7, and 11 exist at levels that are not protective of human health for groundwater consumption. The risk assessment also identified soils at Area 7 that exceed direct contact PRGs for TCE and PCE. In cases where the site concentration exceeds levels protective of human health and the environment, risks to human health are considered unacceptable and remedial alternatives have been developed to address the issue.

Table 7. Contaminants of Concern in Soil

Area 4	Area 7	Area 11	Area 9/10
1,1,1-Trichloroethane	1,1-Dichloroethene	Benzene	None identified
	1,2-Dichloroethene (total)	Ethyl benzene	
	Tetrachloroethene	Toluene	
	1,1,1-Trichloroethane	Xylenes (total)	
	Trichloroethene		
	Xylenes (total)		

As indicated in Table 7, no COCs were identified for Area 9/10. The investigation at Area 9/10 was impeded, due to limited access and concern for underground utilities in the area. Although no soil samples were obtained that identified soil concentrations above PRGs, remediation is still being considered for this area. Groundwater concentrations beneath Area 9/10 were among the highest identified within the Southeast Rockford study area. The concentration of 12 ppm of 1,1,1-TCA in MW201 indicates that NAPL is likely present in Area 9/10, based on the aqueous solubility limit of 1,1,1-TCA. The likelihood that NAPL is present at Area 9/10 constitutes a principal threat. In accordance with the NCP at §300.430(a)(1)(iii)(A), this ROD formulates treatment alternatives that will address the principal threats posed at each source area.

In accordance with the NCP at 40 CFR §300.430(a)(1)(iii)(A), this proposed plan formulates treatment alternatives that will address the principal threats at each source area, except for the PNAs that were identified as COCs in Areas 4, 11, and 9/10. PNAs are not included in Table 7 as COCs and were intentionally not addressed by the alternatives discussed within this ROD. Additional data are required to determine if PNAs are truly COCs, or are simply contamination from activities not related to the management of hazardous materials. For example, the presence of PNAs in areas with parking lots could be attributed to the asphalt that contains PNAs. Additionally, PNAs would be expected in areas where vehicles may leak motor oil or where scrap wood or other materials are burned. Because PNAs were only detected in a few groundwater samples and their presence in soils may be from normal industrial activities, PNAs are not addressed in this ROD. Additional samples will be obtained in Areas 4, 11 and 9/10 during the remedial design phase that will be conducted in 2002. If the evaluation identifies the need for remediation in addition to that outlined in this ROD, the remedy would be appropriately altered. Depending on the significance of the change in remedy, the Agencies may be required to hold additional public meetings and allow public comment on the new remedy.

In order to be protective, Illinois EPA chose to assume that all of the source areas were, or could become residential areas. Area 7 is currently zoned residential. Areas 4, 9/10 and 11 are all zoned industrial and city plans are consistent with current use. However, because residential areas were nearby Areas 4, 9/10 and 11, and because access to these areas was not entirely limited, residential exposures could occur. Table 8 illustrates the potentially exposed populations at each source area and the estimated associated risks as identified in the Risk Assessment:

Table 8. Exposed Population at Source Areas

Source Area	Exposed Population [1]	
	Resident -Direct Contact	Resident- Protection Of Drinking Water
Area 4	Less than $1x10^{-6}$ and *Hazard Index* of 1[2]	**Greater** than $1x10^{-6}$ or Hazard Index of 1
Area 7	**Greater** than $1x10^{-6}$ or Hazard Index of 1	**Greater** than $1x10^{-6}$ or Hazard Index of 1
Area 9/10[3]	Less than $1x10^{-6}$ and Hazard Index of 1	Less than $1x10^{-6}$ and Hazard Index of 1
Area 11	Less than $1x10^{-6}$ and Hazard Index of 1	**Greater** than $1x10^{-6}$ or Hazard Index of 1

Notes:

1 The site worker scenario was not evaluated separately from the residential scenario. If concentrations of COCs are protective for residents, it is assumed that concentrations are also protective for site workers since time spent at site would be less.

2 Human health risks are usually evaluated as carcinogenic (those compounds that can cause cancer), and non-carcinogenic (those compounds that can cause harm, but not cancer). For carcinogenic risks, risks are usually quantified as a unit less probability of a person getting cancer. U.S. EPA's generally acceptable risk range for site-related exposures is 10^{-4} to 10^{-6}. The potential for non-carcinogenic effects is evaluated by the ratio of exposure to toxicity, called the Hazard Quotient. Adding all of the Hazard Quotients together generates the Hazard Index. A Hazard Index less than 1 is considered acceptable in that toxic effects are unlikely.

3 The investigation at Area 9/10 was impeded due to limited access and concern over underground utilities in the area.

As mentioned previously, Illinois EPA was unable to quantitatively evaluate human health risks to residents who were exposed to creek surface water and sediments in Area 7. Data obtained from the creek were inconclusive, as the Agencies were unable to identify off-site impacts to the creek. Due to the intermittent nature of the creek and its shallow depths, risks to individuals wading in the creek are expected to be low. However, additional data will be obtained from the creek and risks to human health will be quantitatively evaluated during the design phase.

SUMMARY OF ECOLOGICAL RISK ASSESSMENT

AREA 7

A screening-level ecological risk assessment (ERA) was conducted for Area 7. The ERA focused on the creek running north of Area 7. The ERA's primary purpose was to identify contaminants in the surface water and sediment of the creek that could result in adverse effects to present or future ecological receptors. Receptors are plants or animals that could be impacted by contamination. The overall approach for the ERA at this site was to: 1) Identify chemicals of potential concern (COPC); 2) Identify potential receptors; 3) Identify Exposure Scenarios and 4) Compare measured concentrations in surface water and sediments to concentrations in laboratory tests (ecological screening benchmarks or screening ecotoxicity values) that did not result in significant effects to relevant and sensitive test species (CDM, Ecological).

The results of the ERA determined that at the screening level, risks to organisms (benthic, aquatic and semi-aquatic) living in or nearby the creek were either low or not present at all. However, concentrations of several contaminants (PNAs and VOCs) and their locations in relationship to the site concerned the Agencies. The results did not provide any clear trends because, at some times, concentrations were higher upstream than downstream. This suggests another source may be present upstream.

On December 16, 1998 (after the ecological risk assessment had been conducted), Illinois EPA obtained additional samples of the surface water and sediments within the creek. The objective of the sampling event was to provide more information regarding the type and source of the contaminants in the creek. Results of the December 1998 sampling event identified several compounds that were not detected during the 1996 investigation, and higher concentrations of several compounds that had been previously detected. Tables 3 (sediment) and 4 (surface water) compare measured concentrations in the field in 1996 and 1998 to screening ecotoxicity values to identify compounds that could potentially result in adverse affects to organisms in Area 7.

Upon evaluation of the 1996 and 1998 data, in conjunction with screening ecotoxicity values, the Agencies determined that a more in-depth analysis of ecological risk in Area 7 was necessary. However, because there may be an additional upstream source and the data from the creek is inconclusive, the Agencies determined that it would be more efficient to further evaluate Area 7 during the design phase of the project. The design phase will likely occur in 2002. If the ecological risk evaluation conducted during the design phase identifies the need for remediation in addition to that outlined within this ROD, the remedy would be appropriately altered. Depending on the significance of the change in remedy, the Agencies may be required to hold additional public meetings and allow public comment on the new remedy.

Rock River

The ecological risk assessment conducted for this Operable Unit did not specifically address the impacts that the four Source Areas would have on the Rock River. This assessment was conducted under the RI/FS for Operable Unit Two. Modeling was conducted on the impacts of groundwater contaminant concentrations on the Rock River through 30- and 50-year scenarios. Both scenarios showed concentrations of chlorinated VOCs entering the river. However, the modeling indicated that even if the four source areas were not remediated, concentrations would not exceed surface water criteria and in fact, are expected to be two orders of magnitude below the criteria. The 50-year scenario did indicate that source area remediation to MCLs occurring within a 10- to 20-year time span would result in measurable reductions in contaminant mass entering the river (CDM, 1995 FS Appendix C). A follow-up review of the modelling and any available analytical data of discharges to the Rock River is planned. This will allow the Illinois EPA to develop a program for monitoring any environmental changes that can be attributed to the plume.

Based on the evaluation of human health and ecological risks, it is the Illinois EPA's judgment that the Preferred Alternative or one of the other active remediation measures considered in this ROD is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances.

REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) provide a general description of what the proposed alternative will accomplish. The following RAOs apply to all four Source Areas:

? Prevent the public from ingestion of soil, and direct contact with soil containing contamination in excess of state or federal standards or that poses a threat to human health;

? Prevent the public from inhalation of airborne contaminants in excess of state or federal standards or that pose a threat to human health; and

? Prevent the further migration of contamination from the source area that would result in degradation of site-wide groundwater or surface water to levels in excess of state or federal standards, or that pose a threat to human health or the environment[1].

Area 7, because of its unique characteristics as a park containing a creek, has these RAOs in addition to the general RAOs listed above:

? Prevent the public from ingestion and direct contact with surface water containing contamination in excess of state or federal standards or that poses a threat to human health;

? Prevent the migration of contamination from Source Area 7 that would result in degradation of surface water and sediment in the unnamed creek to levels in excess of state or federal standards or that pose a threat to human health or the environment; and

? Prevent the ingestion of vegetables from Source Area 7 through the implementation of appropriate institutional controls.

Expected Outcomes of Each Alternative

Preliminary Remediation Goals (PRGs) are identified for each Source Area in Table 1 (Area 4), Table 2 (Area 7), Table 5 (Area 9/10), and Table 6 (Area 11). The PRGs for each area address concentrations of COCs within source materials (contaminated soil, NAPL or leachate).

Soil

The PRGs for soil are based on concentrations designed to be protective of human health for: direct contact with soil (ingestion of soils and inhalation of vapors from soils); ingestion of vegetables grown in the soil; and groundwater ingestion (chemicals leaching from soils into groundwater, causing concentrations in groundwater to exceed either MCLs - if they are available - or risk-based

[1]It should be noted that contaminant migration from the source areas has already resulted in site-wide groundwater contamination in excess of state standards. The RAO is intended to remediate each source area in order to prevent **further** migration of contaminants from the source area.

groundwater concentrations). The soil PRGs protective of direct contact and groundwater ingestion are established in accordance with the TACO regulations. Soil PRGs protective of ingestion of vegetables were calculated in a manner outside the scope of the TACO regulations (Tier 3 analysis) that was approved by Illinois EPA and U.S. EPA.

Leachate

The Operable Unit Two ROD required source control measures to reduce and control potential groundwater risks to the environment. Based on the Operable Unit Two ROD requirement and because 100% source removal (soil, NAPL, or leachate removal) was impracticable at the four source areas, RAOs were developed with the intent of preventing further migration of contamination from the source area that would increase site-wide groundwater concentrations. These RAOs and resultant alternatives are identified as leachate alternatives and are intended to contain contaminants that have reached the groundwater, because capture at the source was either insufficient or impracticable. In order to simplify the decision-making process, these RAOs and containment alternatives are all identified as leachate alternatives rather than creating numerous sets of alternatives for every possible media (NAPL, leachate, and highly contaminated groundwater) encountered within the four source areas.

As noted previously, site-wide groundwater is already contaminated at levels above state standards, but contaminant levels will begin to decrease due to natural attenuation processes after source area remediation takes place. Source remediation in addition to the creation of a groundwater management zone (GMZ) will achieve PRGs for the leachate. Four separate GMZs (one at each source area) will be established pursuant to Illinois groundwater regulations at 35 Ill. Adm. Code Section 620.450. These regulations allow for the creation of a GMZ as a three-dimensional region containing groundwater being managed, mitigating impairment caused by contamination. The GMZ boundary becomes a perimeter around the site, similar to an imaginary fence, where on the outside of the boundary, groundwater must meet state standards. The four GMZs will encompass the hot spots (and locations surrounding the hot spots) where remediation has, or will have a measurable effect in reducing contaminant concentrations. The PRGs for leachate are based on federal MCLs and must be met at the GMZ boundary. This requirement conforms to the requirements set forth in the Operable Unit Two ROD, i.e., aquifer restoration to drinking water quality and compliance with state drinking water standards.

Intended Use of Preliminary Remediation Goals

Preliminary Remediation Goals finalized within this Record of Decision are then known as remediation goals. Remediation goals (and PRGs prior to ROD completion) for soil protective of direct contact with soil, ingestion of vegetables grown in soil and protective of groundwater are used as criteria, or points of reference within the ROD. These criteria, or points or reference are used to identify technologies applicable to each source area and to identify the extent of the hot spots that the technologies must address. Remediation goals for soil protective of direct contact with soil and ingestion of vegetables grown in soil shall be met in soils at each source area. However, soil remediation goals for protection of groundwater may be superseded by valid and complete empirical data, i.e., groundwater analyses that indicate that Applicable or Relevant and Appropriate Requirements (ARARs) are consistently met at the GMZ boundary[2]. For example, if a remediation system at an area of concern has been in operation for a reasonable amount of time and groundwater data show that ARARs are being met at the GMZ, the operation of the system could be discontinued (even though soil concentrations are above the PRGs for protection of groundwater).

[2]The terms "Applicable or Relevant and Appropriate Requirements" and "groundwater management zone" are discussed more fully within the **DESCRIPTION OF ALTERNATIVES** section.

SUMMARY OF REMEDIAL ALTERNATIVES

The remedy evaluation process conducted by the agencies compared a number of potential action alternatives and a no-action alternative for each Source Area. Upon a thorough screening of a wide spectrum of in-place (in situ) and above ground (ex-situ) remedial alternatives, the alternatives discussed below were selected for detailed analysis and subjected to evaluation under nine NCP criteria. Remedial alternatives that deal with the site contamination in situ as well as those that treat contaminants after excavation (ex-situ) were evaluated.

Soil alternatives have been developed for Area 4, Area 7, Area 9/10 and Area 11. U.S. EPA has developed a presumptive remedy for soils contaminated by VOCs. Presumptive Remedies are preferred technologies for common categories of sites based on historical remedy selection and engineering studies (U.S. EPA, *Presumptive*). Upon evaluation of U.S. EPA's directive on presumptive remedies for soils contaminated by VOCs, the Agencies determined that the presumptive remedy approach is appropriate for addressing the types of contaminants found in the source areas at the Southeast Rockford site. The directive produced by U.S. EPA identified three technologies as presumptive remedies for VOCs in soil: soil vapor extraction (SVE); thermal desorption and incineration. Of the three technologies, U.S. EPA has identified SVE as the preferred presumptive remedy. The source area presumptive remedies considered practical for this site include SVE and thermal desorption (incineration is usually not a cost-effective remedial alternative unless the site is large, with large amounts of waste needing treatment). SVE works by sucking out the contaminated air that exists in the soil pores beneath the surface. As the contaminated soil pore air is removed, more volatile compounds move from the soil into the soil pores, thereby cleaning up the soil as well as the soil pores. Thermal treatment involves treating the soil by heating it up to a certain temperature where contaminants would volatilize off the soils. Soil remedies have been assembled into remedial alternatives for each source area and are discussed below. In addition to the presumptive remedies for soil, ex-situ bioremediation has also been considered at Area 7 as an alternative to thermal desorption of excavated material.

Contaminated leachate above PRGs is also present at the GMZ boundary at Area 4, Area 7 and Area 9/10. Areas 4, 7 and 9/10 each have contaminated leachate at the GMZ boundary, and the likely presence of NAPL. The U.S. EPA presumptive remedy for VOCs in soil does not address contaminated leachate. Therefore, remedial alternatives were developed and evaluated for leachate that is outside the domain envisioned by the presumptive remedy guidance for VOCs.

No leachate alternatives were developed for Area 11. Although Area 11 has contaminated leachate and LNAPL at the interior of the area, computer modeling conducted for Area 11 indicated that natural processes would meet RAOs for leachate at the site boundary in this area. However, predicting the movement of LNAPLs in the subsurface is complicated. The computer and mathematical models used for this superfund site can only account for the movement of dissolved contaminants and cannot account for the movement of LNAPLs. Concerns also exist at Area 11 regarding high concentrations of BTEX contaminants possibly masking the presence of chlorinated VOCs. In order to provide real data regarding the degradation of contaminants near the site boundary, approximately four additional monitoring wells will be installed during the design phase. If analysis indicates contaminants are not degrading to levels near MCLs, air sparging will be considered in addition to SVE. Air sparging is included as an alternative to deal with leachate contamination at Areas 4, 7 and 9/10. Air sparging has the added benefit of enhancing biodegradation in both groundwater and vadose zone soils and will address the concerns and RAOs for Area 11.

Every alternative that was selected for detailed analysis for the four source areas is described below in the section entitled **DESCRIPTION OF ALTERNATIVES**. The alternatives that are proposed by the Agencies are identified in Table 9.

Table 9. Proposed Alternatives

Area	Media	Name	Alternative Description
Area 4	Soil	SCS-4D	Excavation, on-site Low Temperature Thermal Desorption
	Leachate	SCL-4B	Leachate containment with collection and treatment, surface water discharge, monitoring, restriction on groundwater usage
Area 7	Soil	SCS-7E	SVE and air sparging[1] at source
	Leachate	SCL-7B	Multi-phase extraction (MPE)[2] , leachate containment with collection and treatment, surface water discharge, monitoring, restriction on groundwater usage
Area 9/10	Soil	SCS-9/10C	SVE
	Leachate	SCL-9/10E	Enhanced Air Sparging[3], monitoring, restriction on groundwater usage
Area 11	Soil	SCS-11C	SVE
	Leachate	SCL-11A	No Action

Notes:

1 Air sparging is a process by which air is injected into the contaminated groundwater. The bubbles generated extract volatile contaminants from the groundwater as they rise to the surface.

2 Multi-phase extraction (MPE) is a remedial technology whereby soil vapors and groundwater are extracted at the same time through the same extraction point. MPE is an enhancement of SVE (SVE just extracts soil vapors).

3 Enhanced Air Sparging - air would be injected into the subsurface to volatilize the contaminant vapors to the vadose zone where they would be removed by vacuum extraction

An alternative that consists of no active remediation (No-Action Alternative) was developed for each source area. The NCP requires a No-Action alternative to be included in the detailed analysis to provide a baseline for comparison to the other alternatives. It should be noted that for the leachate alternatives, a *true,* No Action Alternative could not be developed because groundwater monitoring was required within the 1995 Operable Unit Two ROD. Therefore, for leachate, the No Action Alternative must include one action, that of groundwater (or leachate) monitoring.

Common Elements

Under each alternative, the assumption is made that the City of Rockford's ordinance prohibiting the installation of private wells will be enforced. Also, each alternative requires that a GMZ per 35 Ill.

Adm. Code Part 620 be established. Illinois groundwater regulations at 35 Ill. Adm. Code Section 620.450 allow for the creation of a GMZ as a three-dimensional region, containing groundwater being managed, to mitigate impairment caused by contamination. The GMZ boundary becomes a perimeter around the site, similar to an imaginary fence, where on the outside of the boundary, groundwater must meet state standards. The GMZ will remain in effect, providing controls such as remediation, management and monitoring continue at the source area. During the time the GMZ is in effect, State groundwater standards will not be applicable within the GMZ. In addition to source area monitoring, site-wide groundwater monitoring will continue, as required by the Operable Unit Two ROD. Because groundwater monitoring was required within the Operable Unit Two ROD, leachate alternatives entitled "No Action" do include monitoring and will incur some costs.

Within the Southeast Rockford Groundwater Contamination Site there are ten known properties that lie within areas of contaminated groundwater that are using private wells as a water supply. Property owners were notified of the existing situation regarding contaminated groundwater in the area by the U.S. EPA and the City of Rockford and chose not to connect to the City of Rockford water supply system. City of Rockford officials made further attempts and hookup services were denied by the property owners.

Institutional Controls

In order to be protective of human health and the environment, several alternatives described within this ROD require use or access restrictions on contaminated properties within the boundaries of the source area. Use restrictions or access restrictions would be implemented through the use of institutional controls. Institutional controls are administrative or legal constraints that minimize the potential for exposure to contamination by limiting land or resource use. Specific actions taken at sites to restrict access or use could include: Governmental Controls - such as zoning restrictions or ordinances; Proprietary Controls - such as easements or covenants; Enforcement Tools - such as consent decrees or administrative orders; and Informational Devices- such as deed notices or state registries. Several types of access or use restrictions employed simultaneously can increase the effectiveness of institutional controls. The Agencies plan to pursue multiple types of institutional controls at each source area. The approved feasibility study (FS) dated September 5, 2000 discusses institutional controls generally, but often refers to them as "deed restrictions". This ROD refers to institutional controls by name or by the terms "access restrictions" or "use restrictions."

Modeling

In order to help assess each alternative's impact and effectiveness in remediating the soil and leachate contamination at each source area, the computer model BIOSCREEN (U.S. EPA 1996) was used. BIOSCREEN is a program that considers the amount and type of contaminants at a source area and simulates the spread and degradation of those contaminants over time and distance. The program can also consider the impact an alternative would have on the spread and degradation of contaminants at a source area. BIOSCREEN was applied to each alternative to calculate the approximate time (in years) that it would take for the contaminants present at each source area to meet remedial goals at the GMZ boundary[3]. It is important to note that BIOSCREEN is just a screening model and has certain assumptions built into the program. BIOSCREEN was used at this site to provide general criterion with which to compare the different alternatives. The results of BIOSCREEN, or any screening model cannot be used to predict the exact time it will take for a source area to meet remediation goals. At Areas 4, 7, and 11 each alternative was evaluated individually by BIOSCREEN, assuming that no other alternatives will be selected for that source area. At Areas 4, 7 and 9/10, two remedial alternatives are being proposed, one to address soil contamination, and one to address leachate contamination. Because BIOSCREEN only accounted for a single alternative at each area, and two alternatives are actually being proposed for each area (one for soil and one for leachate), the estimated time frame to achieve remediation action objectives is likely overestimated.

Alternatives Involving Thermal Treatment

Several soil treatment alternatives evaluated for Areas 4, 7 and 11 involve thermal treatment technologies. Thermal treatment technologies address contamination with heat. A common concern regarding some thermal treatment technologies is the formation of products of incomplete combustion such as dioxins or furans. Under certain conditions, the addition of heat to chlorinated organic compounds in the presence of oxygen can produce dioxins and furans. Chlorinated VOCs are present in the soils at Areas 4 and 7. If an alternative is selected that involves thermal treatment, each unit will be pre-tested on site prior to full-scale operation. The pre-test is often called a "proof-of-performance" test. During the proof-of-performance test, air emissions from the stack will be sampled for: total volatile organic compounds; dioxins; and pH. Several other parameters will also be measured during the proof-of-performance testing to ensure that conditions are adequate for destruction of VOCs. These parameters are measured at specific locations within the treatment system and are specific to each type of technology. During the proof-of-performance test, measurements of these parameters are noted and compared with emission rates of various compounds. These measurements are then used as a guide to show that conditions within the treatment system are optimal for efficient system operation and VOC destruction. Following the proof-of-performance test, results from the air sampling for dioxins and furans will be evaluated in a risk assessment to ensure that the treatment systems operate in a manner protective of human health and the environment. If the results of the proof-of-performance tests show that the thermal treatment units are operating properly, full-scale operation will begin. During the proof-of-performance test, as well as full-scale operation, continuous monitoring (of temperature, pH and volatile organic material) will be conducted on each thermal treatment unit. Continuous monitoring will ensure that the unit is running properly and within the correct temperature range to ensure efficient contaminant destruction. In addition, specific air monitoring will occur at scheduled intervals to ensure that, if dioxins and furans are produced, the levels emitted will be protective of human health and the environment.

[3]Due to the lack of information on contaminants in Source Area 9/10, Contaminant spread and dilution could not be accurately modeled.

If a thermal treatment technology is chosen for Area 11, a proof-of-performance test and continuous monitoring will also be implemented there. However, because contaminants are almost entirely non-chlorinated, dioxin/furan testing will be much less intensive.

Thermal treatment at three source areas would also involve a surface water discharge (on site at Areas 4 and 7, off site at Area 11). Water may be utilized in the scrubber unit in combination with a neutralizing material such as calcium sulfate. The water and calcium sulfate serve to remove hydrochloric acid and chlorine gases formed in the thermal treatment unit and will prevent these gases from being vented into the atmosphere. Scrubber water would then be treated for pH and discharged to surface water. Water discharged to the environment would be periodically monitored to ensure it meets the substantive requirements of the National Pollutant Discharge Elimination System (NPDES) regulations.

DESCRIPTION OF THERMAL TREATMENT UNITS

Two types of thermal treatment technologies are included as alternatives within this ROD: catalytic oxidation and Low Temperature Thermal Desorption (LTTD). Catalytic Oxidation is a thermal treatment process that destroys contaminants at low temperatures (compared to most thermal processes) through the use of a catalyst. LTTD is a thermal treatment process that heats up contaminated media in order to volatilize off the contaminants, rather than destroy them. Both thermal treatment technologies are discussed in more detail in the following paragraphs.

Catalytic Oxidation

The catalytic oxidation unit would treat vapors containing compounds extracted from contaminated soil or water. Within the catalytic oxidation unit, oxidation of the organic compound occurs whereby oxygen reacts with the compound containing carbon and hydrogen to form primarily carbon dioxide and water. Oxidation of a chlorinated compound within the catalytic oxidation unit results in the formation of primarily carbon dioxide and hydrochloric acid. The presence of the catalyst, typically a precious metal formulation (platinum or palladium), facilitates the oxidation reaction. The catalyst increases the rate of reaction without being used up in the reaction. Because the catalyst increases the rate of reaction, the reaction can occur at lower temperatures. As such, catalytic oxidation units operate at much lower temperatures (approximately 890º F to 1000º F[4]) than thermal incineration systems (that operate at approximately 1000º F to 1400º F). The primary components of the catalytic oxidation unit are: a liquid/vapor separator, a heat exchanger; a burner (to indirectly pre-heat vapor to 890º F); a catalytic oxidation unit; and a scrubber. Liquid collected in the liquid/vapor separator will be taken off site for disposal at a permitted facility. Water used in the scrubber unit to treat vapor for pH, will itself be treated for pH and discharged to near-by surface water. Discharged water would be monitored periodically to ensure it meets the substantive requirements of the NPDES regulations.

[4] Global Technologies Proposal for CDM May 11, 2000

LTTD

LTTD would treat soils after excavation. The LTTD unit would be direct-fired and would operate at temperatures up to approximately 900º F, which is sufficient to convert the contaminants in the soil to the vapor phase. The LTTD unit is not intended to destroy organic contaminants, but rather to physically separate contaminants from the soil. After contaminants are removed from the soil, the vaporized contaminants are then directed through a bag house to remove particulate matter prior to being introduced to the afterburner. The concentrations of contaminants are expected to be high to require the use of an afterburner. The afterburner is a separate unit that operates at temperatures between 1,600º F and 1,800º F, which is sufficient to convert the contaminants to primarily carbon dioxide, water vapor, and hydrochloric acid. A scrubber would be used to treat the vapor for pH prior to release to the environment. Scrubber water would then be treated for pH and discharged to near-by surface water. Water discharged to the environment would be monitored periodically to ensure it meets the substantive requirements of the NPDES regulations.

Potential ARARs for both thermal treatment technologies include:

? 35 Ill Adm. Code Section 215.301 Section 215.301 states that "no person shall cause or allow the discharge of more than 3.6 kg/hr (8 lbs/hr) of organic material into the atmosphere from any emission unit..." and is applicable to both thermal units;

? Clean Air Act, Section 112(a) Section 112(a) requires that in order to be considered a "minor" source, the emissions of Hazardous Air Pollutants (HAPs)[5] as listed in Section 112(b) of the Clean Air Act (CAA) shall not exceed 10 tons per year of a single HAP or 25 tons per year of any combination of such HAPs; and

? 40 CFR 63.1203 Relevant portions of the standards at 40 CFR 63.1203, which are applicable to hazardous waste incinerators, will be applied to the thermal units identified within this ROD.

[5] Hazardous Air Pollutants as identified within Section 112(b) of the Clean Air Act.

DESCRIPTION OF ALTERNATIVES FOR SOURCE AREAS

Every alternative selected for detailed analysis for the four source areas is described in this section. The description for each alternative includes costs divided into three categories: Capital (costs to construct the remedy); Annual Operation and Maintenance (O&M) (costs necessary to keep remedy operational after construction is complete); and, Total Present Worth (present value of all costs to be incurred over the life of the remedy, assuming a 30-year period pursuant to CERCLA guidance). In addition, the description for each alternative includes discussion of key ARARs that differ from those required by other alternatives. ARARS are generally requirements that must be met regarding either a contaminant that is present, an action being conducted or the location of the source area. The ARARs specified for the entire Southeast Rockford Groundwater Contamination Superfund Site are described more fully.

SOURCE AREA 4

Source Area 4 – Soil

SCS-4A: No Action

For Alternative SCS-4A, no active measures would be undertaken to control or remediate the soil. No use or access restrictions would be imposed. Soil contaminants would remain on-site and would not be reduced in volume, treated or contained. Computer modeling predicted that the time to meet state groundwater standards at the GMZ under this alternative would be approximately 60 to 70 years. There are no costs to implement this alternative.

SCS-4B: Limited Action (restrictions on groundwater and land usage)

Alternative SCS-4B includes placing use restrictions on the contaminated area to prevent installation of drinking water wells and future site development within the soil source area. Soil contaminants would remain on site and would not be reduced in volume, treated or contained. The time to reach state groundwater standards at the GMZ under this alternative would be the same as Alternative SCS-4A, approximately 60 to 70 years. Future source area development would be restricted for approximately 60 to 70 years, when the RAOs would be met. The estimated costs for this alternative are as follows:

Capital: $28,000
Annual O&M: $0
Total Present Worth: $28,000

SCS-4C: Soil Vapor Extraction with vapor treatment by catalytic oxidation

Under this alternative, contaminated soils would be remediated in situ via a SVE system that is the preferred presumptive remedy for soils contaminated with VOCs. A blower would provide a source of negative pressure to extract vapors from the subsurface through a series of wells connected by underground piping. Due to the presence of residual NAPL and a possible scenario of air sparging with steam injection as the remedial action for leachate control, it has been assumed that the wells would be constructed of carbon steel. A pilot-testing program would be conducted prior to the design and construction of the SVE system to determine well spacing and well construction details. The SVE system would treat all contaminated soils at the site above the water table to remediation goals. Pockets of highly contaminated soils or pockets of NAPL would increase the remediation time frame. Given the presence of residual NAPL at this source area, it is expected that significant quantities of contaminated vapors would be extracted. Vapors extracted from soil would go into a liquid vapor separator. The liquid would be collected in a tank and sent off site for proper treatment and disposal. The vapors would be treated with a catalytic oxidation unit. The time to reach state groundwater standards at the GMZ under this alternative would be approximately 20 to 30 years. It would take approximately 20 to 30 years to meet RAOs for this alternative. The estimated costs for this alternative are as follows:

Capital:	$479,000
Annual O&M:	$135,160
Total Present Worth:	$2,156,000

SCS-4D: Soil Excavation and On-Site Thermal Treatment with low-temperature thermal desorption followed by an afterburner.

Alternative SCS-4D is the proposed alternative for soil remediation at Area 4. LTTD is a presumptive remedy for VOCs in soil, although it is not U.S. EPA's preferred technology. Under this alternative, approximately 2,800 cubic yards of contaminated soils would be excavated and VOCs would be removed through on-site thermal treatment in a LTTD unit. Soil gas analysis indicates that a portion of contaminated soil may be present beneath the former Swebco building. Excavation of soil beneath the building would likely require part of the structure to be demolished and re-built following project completion. Costs for partial building demolition and reconstruction have been included for this alternative.

The majority of the contaminated soil is located below the water table. Therefore, Alternative SCS-4D would include the installation of well points for dewatering at a flow rate of 15 gallons per minute (gpm) to lower the water table to expose the residual NAPL. The water collected during the dewatering process will be contained on site in two 21,000-gallon carbon steel tanks. The tanks would be transported to an appropriate disposal facility at a frequency to be determined during the design phase. The soil would then be excavated and stockpiled for processing. Due to the levels of VOCs expected during excavation, the cost to install a temporary enclosure over the excavation for emissions control has been included. Contaminated vapors would be collected from the temporary enclosure and directed to the afterburner used in conjunction with the LTTD unit.

Excavated soils would first be screened to remove particles greater than four inches in size and then conveyed to the primary treatment unit where the contaminants would be thermally desorbed from the soil and destroyed in the afterburner. Thermally treated soil would then be conveyed to a process unit that cools and re-hydrates the soil. The soil would be stockpiled for testing to ensure that the clean-up goals have been achieved. Production rate of this system is approximately 15 tons per hour, depending on soil type and moisture content. Based on this rate, it would take approximately one month to thermally process the soil. Excavation would be backfilled upon completion of treatment of soil to acceptable levels and would take approximately 5 to 15 years to meet RAOs for this alternative. Estimated costs for this alternative are as follows:

Capital:	$2,121,000
Annual O&M:	$1,000
Total Present Worth:	$2,121,000

<u>Source Area 4 – Leachate</u>

Currently, no groundwater wells (potable or non-potable) exist within the GMZ of Area 4. All Area 4 leachate remedies include institutional controls to restrict groundwater usage within the GMZ, as well as installation of monitoring wells and implementation of a groundwater and leachate-monitoring program. Groundwater and leachate would be monitored at predetermined intervals for 30 years per RCRA (Resource Conservation and Recovery Act) post-closure groundwater monitoring requirements. Monitoring will typically consist of collecting groundwater and analyzing for VOCs and, where appropriate, parameters that measure biological activity.

SCL-4A: No Action (leachate monitoring, restrictions on groundwater usage)

This alternative would consist of no action with leachate monitoring and institutional controls on groundwater usage for Area 4. Although leachate concentrations would continue to attenuate naturally, this alternative would not comply with RAOs for 60 to 70 years. Estimated costs for this alternative are as follows:

Capital:	$54,000
Annual O&M:	$7,000
Total Present Worth:	$269,000

SCL-4B: Hydraulic Containment (leachate monitoring, leachate containment/collection and treatment and on-site surface discharge, and groundwater use restrictions)

Alternative SCL-4B is the proposed alternative for leachate remediation at Area 4 and would include installation of a leachate containment system, monitoring of the source area leachate and groundwater and implementation of groundwater use restrictions. As part of the leachate containment system, four leachate extraction wells, piping, controls and an air-stripping unit would be installed. Leachate would be extracted from the extraction wells by submersible pumps and directed to an air-stripping unit at a rate of approximately 20 gpm. An air-stripping unit would treat the collected leachate and discharge the treated effluent to an on-site storm water ditch located approximately 200 feet north of the source. The effluent would be monitored periodically for VOCs to confirm that the leachate is treated to acceptable levels.

The treatment method for vapors stripped from the leachate in the air-stripping unit would depend on which soil alternative is implemented. Vapors would be directed to the catalytic oxidation unit if SCS-4C were the chosen soil alternative. Vapors generated by the air-stripping unit as a part of this alternative would be treated by GAC in combination with all other soil alternatives.

This alternative would comply with RAOs after approximately 35 to 45 years. Estimated costs for this alternative account for vapor treatment by GAC and are as follows:

Capital:	$249,000
Annual O&M:	$47,000
Total Present Worth:	$1,117,000

SCL-4C: Install Injection Wells Along Northwestern Boundary of the GMZ/Install Air Sparging Unit/Inject Air/Restriction On Groundwater Usage

Alternative SCL-4C includes the installation of air injection wells and an air-sparging unit. The injection wells would be installed down gradient along the northwestern boundary of the GMZ and screened in the saturated zone. Air would be injected into the subsurface to volatilize the contaminant vapors to the vadose zone, where they would be removed by vacuum extraction. The air sparging system would be required to operate in conjunction with an SVE system, as described in alternative SCS-4C. Vapors produced by air sparging would be collected in the SVE system and directed to the catalytic oxidation unit. Air sparging without SVE would cause migration of the vapors away from the site and might create unacceptable risks to human health and the environment. This alternative would comply with RAOs after approximately 15 to 25 years. The estimated costs for this alternative are as follows:

Capital:	$2,037,000
Annual O&M:	$57,000
Total Present Worth:	$2,522,000

SCL-4D: Reactive Barrier Wall/Leachate Monitoring/Groundwater Use Restrictions

Alternative SCL-4D would include the installation of a 300-foot reactive barrier wall to an average depth of 60 feet bgs down gradient of the source area (on the northwestern boundary of the GMZ). The reactive barrier wall would have a thickness of 2 feet, be comprised of a permeable reactive iron media and be positioned such that it is able to treat the corresponding leachate plume. As the contaminated leachate moved passively through the treatment wall, the contaminants would be removed by sorption onto the iron media. During reactive wall construction, two jetting wells would be installed within the iron media. These jetting wells would allow for rejuvenating the iron media by flushing out solids or biological growth that could foul or clog the reactive wall. The implementation of this alternative would likely be more difficult than the other leachate alternatives, due to required depth of excavation and the presence of underground utilities. This alternative would comply with RAOs for leachate down gradient of the wall immediately upon completion of installation. However, soil concentrations up gradient of the wall would not meet RAOs for some time. The estimated costs for this alternative are as follows:

Capital:	$5,659,000
Annual O&M:	$7,000
Total Present Worth:	$5,911,000

SCL-4E: Install Injection Wells Along the Northwestern Boundary of the GMZ and Within the Source Area/Install Air Sparging Unit/Inject Air Restriction On Groundwater Usage

Alternative SCL-4E includes the same elements as SCL-4C. In addition to the air injection wells installed at the GMZ boundary under SCL-4C, this alternative would include air injection wells located at the source. The addition of air injection wells at the source make this alternative more effective, but more costly than alternative SCL-4C. This alternative would comply with RAOs after approximately 10 to 20 years. The estimated costs for this alternative are as follows:

Capital:	$2,306,000
Annual O&M:	$57,000
Total Present Worth:	$2,796,000

<u>SOURCE AREA 7</u>

<u>Source Area 7 – Soil</u>

SCS-7A: No Action

For Alternative SCS-7A, no remedial actions would be undertaken. Soil contaminants would remain on site and would not be reduced in volume, treated or contained. Computer modeling predicted that the time to meet state groundwater standards at the GMZ under this alternative would be approximately 80 to 90 years. There are no costs to implement this alternative.

SCS-7B: Limited Action (restrictions on soil usage)

Alternative SCS-7B includes placing access and use restrictions on contaminated soils. Access and use restrictions would be instituted to prevent future site development. Warning signs and fencing would be installed to discourage unauthorized persons from excavating soils. As with SCS-7A, soil contaminants would remain on site and would not be reduced in volume, treated or contained. This alternative would not comply with RAOs for 80 to 90 years. Estimated costs for this alternative are as follows:

Capital:	$69,000
Annual O&M:	$200
Total Present Worth:	$275,000

SCS-7C: Soil Excavation with Ex-Situ, Biological Treatment in Biopiles

Under this alternative, contaminated soils would be excavated and treated on site. Alternative SCS-7C would include dewatering and excavation of approximately 57,000 cubic yards of material for on-site biotreatment. Although bioremediation is not a presumptive remedy for VOCs in soil, this technology would achieve remediation goals. Alternative SCS-7C would include the installation of well points for dewatering at a flow rate of 10 gpm to lower the water table to expose the residual NAPL. Water collected during the dewatering process would be contained on site in two 21,000-gallon carbon steel tanks and transported to an appropriate disposal facility at a frequency to be determined during the design phase. Soil would then be excavated and stockpiled for processing. Due to the levels of VOCs expected during excavation, the cost to install a temporary enclosure over the excavation has been included. Contaminated vapors would be collected and passed through granular activated carbon prior to release to the atmosphere.

Excavated soil would be screened to remove all particles greater than two inches in size, although slightly larger particle sizes may be allowable. On-site staging areas would be constructed and soils would be piled on high-density polyethylene (HDPE) liners with fine sand layers above and below to maintain liner integrity. Approximate soil pile dimensions would be six feet tall with the base of the pile measuring 16 feet across and the top of the pile measuring five feet across. Water and nutrients (nitrogen and phosphorus) would be added periodically, as needed, for optimal biological activity. In addition, pH would be controlled by the addition of lime and/or acid. Piping would be installed below the piles within the fine sand layer above the HDPE lines to collect leachate produced by the piles. Following collection, the leachate would be recycled and used for watering the piles, as previously described. A mechanical mixer would blend the soil to enhance microorganism/contaminant interactions and aeration, thereby enhancing biodegradation rates of contaminants. Soils that meet the remediation goals would be placed back into the excavated areas upon approval by the Agencies. Estimated duration for the treatment of the 57,000 cubic yards of soil would be approximately 5 years. Although actual soil treatment would be completed in 5 years, this alternative would comply with RAOs after approximately 15 to 25 years when ARARs are met at the GMZ. Estimated costs for this alternative are as follows:

Capital:	$15,647,000
Annual O&M:	$627,000
Total Present Worth:	$18,218,000

SCS-7D: Excavation and On-Site Thermal Treatment with low-temperature thermal desorption followed by afterburner

Under this alternative, approximately 57,000 cubic yards of contaminated soils would be excavated for on-site thermal treatment via a LTTD unit. LTTD is a presumptive remedy for VOCs in soil, although it is not U.S. EPA's preferred technology. In this alternative, soils excavation, site dewatering/treatment and excavation enclosure would all be performed as described for alternative SCS-7C. Excavated soils would be screened to remove particles greater than four inches in size and then conveyed to the LTTD unit. Following the primary treatment unit where the contaminants would be vaporized from the soil, contaminant vapors would be destroyed in the afterburner. Treated soil would then be conveyed to a process unit that cools and re-hydrates the soil and stockpiles the soil for testing (to ensure that the clean-up goals have been achieved). The production rate of this system ranges from 80 to 120 tons per hour, depending on soil type and moisture content. Based on this rate, the estimated duration of the thermal treatment would be eight months. Although actual soil treatment would be completed in eight months, this alternative would comply with RAOs after approximately 10 to 20 years. Estimated costs for this alternative are as follows:

Capital:	$15,124,000
Annual O&M:	$85,000

Total Present Worth: $15,209,000

SCS-7E: Soil Vapor Extraction and Air Sparging System with vapor treatment by catalytic oxidation

Alternative SCS-7E is the proposed alternative for soils at Area 7. SVE is the preferred presumptive remedy for soils contaminated with VOCs. This alternative would combine soil vapor extraction and air sparging technologies to address contaminants in unsaturated and saturated soil and leachate in Source Area 7. Under this alternative, unsaturated and saturated contaminated soils would be remediated in situ via a vapor extraction system. This alternative would consist of the installation of a series of wells connected by an underground piping system. A blower would provide a source of negative pressure to extract vapors from the subsurface. Sixteen vacuum extraction wells would be placed in the suspected source areas. Extraction wells would be constructed to a depth of up to 25 feet and screened in the vadose zone, where they would extract volatile contaminants from the unsaturated zone, as well as some leachate contaminants, which are able to volatilize from the surface of the water table. The estimated flow rate for the SVE system would be 1200 standard cubic feet per minute (scfm). A pilot test would be conducted prior to system design to determine well construction, extraction flow rate, and spacing.

The air sparging system would be constructed to volatilize VOCs from saturated soils and leachate through the injection of air and the collection of VOCs using vapor extraction wells. A total of 53 air sparging wells would be constructed to a depth of 50 feet bgs. Camp Dresser and McKee has assumed a radius of influence of 25 feet for the air sparging wells. Two air compressors would be used to inject air to the subsurface, each at a rate of 400 scfm, for a total of 800 scfm. However, a pilot study would be conducted to verify flow rate and the radius of influence prior to full-scale implementation.

Given the presence of residual NAPL, it is expected that significant concentrations of contaminated vapors would be extracted. The extracted vapors would be treated with a catalytic oxidation unit. Carbon adsorption would not be a cost-effective technology for treating the vapor upon startup of the soil vapor extraction systems. However, carbon adsorption could be used to address contaminants in the vapor after contaminant levels were reduced by catalytic oxidation for a period of up to six months to one year. This alternative would comply with RAOs after approximately 15 to 25 years. Estimated costs for this alternative are as follows:

Capital: $3,071,000
Annual O&M: $320,000
Total Present Worth: $5,624,000

Source Area 7 – Leachate

Area 7 leachate remedies include institutional controls on groundwater usage within the GMZ, as well as installation of monitoring wells and implementation of a groundwater and leachate-monitoring program. Groundwater and leachate would be monitored at predetermined intervals for 30 years per RCRA post-closure groundwater monitoring requirements. Monitoring would typically consist of collecting groundwater and analyzing for VOC and, where appropriate, parameters that measure biological activity.

SCL-7A: No Action (leachate monitoring and restrictions on groundwater)

This alternative would consist of no action, with leachate monitoring and institutional controls on groundwater usage for Area 7. Leachate concentrations would continue to attenuate naturally. This alternative would comply with RAOs after approximately 80 to 90 years. Estimated costs for this alternative are as follows:

Capital:	$67,000
Annual O&M:	$9,000
Total Present Worth:	$347,000

SCL-7B: Multi-Phase Extraction/Leachate Containment/Collection with Treatment by Air Stripping/On-site Surface Discharge/Groundwater Use Restrictions

Alternative SCL-7B is the proposed alternative for Area 7 leachate. This alternative was designed to complement soil alternative SCS-7E and would include the installation of a multi-phase extraction (MPE) system in the source and a leachate containment system along the down-gradient side of the GMZ. The leachate containment system would consist of eight leachate extraction wells, a central pump station, an air-stripping unit, piping and controls. Source area leachate would be collected via the leachate extraction wells to be located northwest of the park play ground area. The leachate would be extracted and pumped to the air-stripping unit at a rate of 10 gpm, with the treated effluent from the air stripper discharged to the unnamed creek located approximately 450 feet north of the source. The treated effluent would be periodically monitored to confirm discharge criteria are being met. Vapors from the air-stripping unit would be treated in the catalytic oxidation unit installed as a component of Alternative SCS-7E.

Ten MPE wells (approximately 25 feet deep) would be installed in the source and connected by underground piping to a central vacuum pump/vapor treatment system enclosure. The enclosure would include an air/water separation system, with the water pumped to the leachate containment system air stripper. Air from the air/water separation system would be sent to the catalytic oxidation unit. This alternative would comply with RAOs after approximately 30 to 40 years. Estimated costs for this alternative are as follows:

Capital:	$1,435,000
Annual O&M:	$128,000
Total Present Worth:	$2,637,000

SCL-7C: Reactive Barrier Wall/Leachate Monitoring/ Groundwater Use Restrictions

Alternative SCL-7C would include the installation of a two-foot-thick reactive barrier wall that would consist of a funnel and gate system. The funnel wall component of the funnel and gate system would direct the contaminated leachate plume to the reactive treatment wall. The reactive barrier wall is comprised of a permeable reactive iron media that would be able to treat the corresponding leachate contaminants to acceptable levels. The reactive wall would include jetting wells that would flush out particulate matter or biological growth that could clog or foul the iron media. Alternative SCL-7C also requires the installation of 310- and 420-foot funnel walls north and west of the source area leachate plume. The two funnel walls would be joined together with a 210-foot reactive gate positioned between the walls. The western funnel wall would be tied into bedrock at approximately 50 feet bgs, while the northern funnel wall and reactive gate would be extended to a depth of 80 feet bgs. This alternative would comply with RAOs for leachate on the down-gradient side of the wall immediately, upon completion of installation. However, soil concentrations up gradient of the wall would not meet RAOs for some time. Estimated costs for this alternative are as follows:

Capital:	$4,104,000
Annual O&M:	$8,000
Total Present Worth:	$4,391,000

SOURCE AREA 9/10

The description of each alternative for Areas 4 and 7 contains estimates based on computer modeling of the time required to meet state groundwater standards at the GMZ boundary. However, no computer modeling could be performed for Area 9/10 soil and leachate alternatives, because of the inability to gather data in the area. Therefore, the time to meet RAOs under each alternative for Area 9/10 is discussed qualitatively, in comparison to one another.

<u>Source Area 9/10-Soil</u>

SCS-9/10A No Action

For alternative SCS-9/10A, no remedial actions would be undertaken. Soil contaminants would remain on-site and would not be reduced in volume, treated, or contained. There are no costs to implement this alternative.

SCS-9/10B Limited Action (restrictions of future development)

Alternative SCS-9/10B includes placing use restrictions on the contaminated area to prevent future site development. As with SCS-9/10A, soil contaminants would remain on-site and would not be reduced in volume, treated or contained. This alternative would take the same amount of time as alternative SCS-9/10A to reach RAOs. Estimated costs for this alternative are as follows:

Capital:	$28,000
Annual O&M:	$0
Total Present Worth:	$28,000

SCS-9/10C: Soil Vapor Extraction with vapor treatment using activated carbon

Alternative SCS-9/10C is the proposed alternative for soils at Area 9/10. Under this alternative, contaminated soils would be remediated in situ via a SVE system. SVE is the preferred presumptive remedy for soils contaminated with VOCs. This alternative would consist of the installation of a series of wells connected by an underground piping system. A blower would provide a source of negative pressure to extract vapors from the subsurface. Extraction wells would be screened in the vadose zone, where they would remove the contaminants from the unsaturated zone, as well as leachate contaminants that might diffuse from the surface of the water table. A pilot program would be conducted prior to the design of the SVE system to determine well spacing and in situ air permeability.

Vapors collected from the SVE unit would be treated through the use of activated granular carbon. Activated granular carbon could be used to treat vapors at this area (as opposed to catalytic oxidation at Areas 4 and 7) because of the lower-expected concentrations of contaminants from soils. The vapor treatment scenario may have to be reevaluated based upon additional data collection from Area 9/10 and the results of the SVE pilot program. This alternative would meet RAOs in the shortest period of time of all other Area 9/10 soil alternatives. Estimated costs for this alternative are as follows:

Capital:	$225,000
Annual O & M:	$329,000
Total Present Worth:	$4,308,000

<u>Source Area 9/10 – Leachate</u>

All Area 9/10 leachate remedies include institutional controls on groundwater usage within the GMZ, installation of monitoring wells and implementation of a groundwater and leachate monitoring program. Groundwater and leachate would be monitored at predetermined intervals for 30 years, per RCRA post-closure groundwater monitoring requirements. Monitoring would typically consist of collecting groundwater and analyzing for VOCs and, where appropriate, parameters that measure biological activity.

SCL-9/10A: No Action (leachate monitoring and restrictions on groundwater usage)

This alternative would consist of no action with leachate monitoring and institutional controls on groundwater usage. Leachate concentrations would continue to attenuate naturally. Future source area development would be restricted for the longest period time under this alternative, as it would take the longest to reach RAOs. Estimated costs for this alternative are as follows:

Capital:	$60,000
Annual O&M:	$5,000
Total Present Worth:	$217,000

SCL-9/10B: Hydraulic Containment (leachate monitoring, leachate containment collection and treatment by air stripping, off-site surface discharge and groundwater use restrictions)

The Hydraulic Containment alternative would include installation of a leachate containment system. As part of the leachate containment system, 55 leachate extraction wells, piping, controls and an air-stripping unit would be installed. Wells would be used, rather than a deep trench to protect the adjacent building structure. Source-area leachate would be collected in leachate extraction wells installed west and south of the Sundstrand Plant #1. Extracted leachate would be sent via pumps to the air-stripping unit at a rate of 50 gpm. Vapors collected from the air-stripping unit would be treated by granular activated carbon and released to the atmosphere. Treated water from the air-stripping unit would be discharged off site to a storm water ditch located approximately 2,000 feet south of the source. This leachate alternative would achieve RAOs more quickly than SCL-9/10A, but not as quickly as the air sparging conducted under alternative SCL-9/10C. Estimated costs for this alternative are as follows:

Capital:	$1,326,000
Annual O&M:	$42,000
Total Present Worth:	$2,440,000

SCL-9/10C: Install Injection Wells along the Southwestern GMZ Boundary/Install Air Sparging Unit/Inject Air/Restriction On Groundwater Usage

Alternative SCL-9/10C includes the installation of air injection wells (along the southwestern boundary of the GMZ) and an air-sparging unit. Injection wells would be installed along the GMZ boundary to contain and treat the source area leachate. Air would be injected into the subsurface to volatilize the contaminant vapors to the vadose zone, where they would be removed by vacuum extraction. The air sparging system would be required to operate in conjunction with an SVE system such as described in alternative SCS-9/10C. Vapors produced by air sparging would be collected in the SVE system. This alternative would achieve RAOs in a short amount of time, but slightly longer than that required by SCL-9/10E. Estimated costs for this alternative are as follows:

Capital:	$2,293,000
Annual O&M:	$65,000
Total Present Worth:	$3,208,000

SCL-9/10D: Reactive Barrier Wall/Leachate Monitoring/Restrictions on Groundwater Usage

SCL-9/10D was the proposed alternative for leachate at Area 9/10. Alternative SCL-9/10D would include the installation of a reactive barrier wall that would consist of a funnel and gate system. The reactive barrier system would be constructed of iron media to treat the leachate as it flows through the reactive wall. Reactive barrier wall construction would include jetting wells to flush-out particulate matter or biological growth that could foul or clog the iron media. This alternative would comply with RAOs for leachate immediately upon completion of installation. However, soil concentrations up gradient of the wall would not meet RAOs for some time. Estimated costs for this alternative are as follows:

Capital:	$3,329,000
Annual O&M:	$5,000
Total Present Worth:	$3,523,000

SCL-9/10E: Install Injection Wells Along Boundary of the GMZ and Source Area/Install Air Sparging Unit/Inject Air/Restriction On Groundwater Usage

Alternative SCL-9/10E is essentially the same as Alternative SCS9/10C, except that additional air sparging wells would be installed at the source area in addition to the GMZ boundary. As with Alternative SCS-9/10C, the air sparging system would be required to operate in conjunction with an SVE system as described in alternative SCS-9/10C. Vapors produced by air sparging would be collected in the SVE system. This alternative would achieve RAOs in a relatively short amount of time, second only to Alternative SCL-9/10D. Estimated costs for this alternative are as follows:

Capital:	$2,697,000
Annual O&M:	$65,000
Total Present Worth:	$3,619,000

SOURCE AREA 11

Computer modeling performed for Area 11 predicted that for any alternative, dissolved contaminants would meet state groundwater standards at the GMZ boundary prior to intersecting the GMZ boundary. However, free product NAPL exists at the interior of the site and represents a principal threat. With the exception of SCS-11A (No Action), the alternatives evaluated for Area 11 are designed to address overall soil contamination, including free product NAPL.

<u>Source Area 11 – Soil</u>

SCS-11A: No Action

For Alternative SCS-11A, no remedial actions would be undertaken. Soil contaminants would remain on-site and would not be reduced in volume, treated or contained. Free product NAPL is present at the interior of Area 11 and soil remediation objectives would not be met for some time. This alternative would take the longest amount of time to meet soil remediation objectives and RAOs at the interior of the site. There are no costs to implement this alternative.

SCS-11B: Limited Action (restrictions on future site development)

Alternative SCS-11B includes placing use restrictions on the contaminated area. Institutional controls would be implemented to prevent future site development. As with alternative SCS-11A, soil contaminants would remain on site and would not be reduced in volume, treated or contained. This alternative would require the same amount of time to achieve soil remediation objectives and RAOs as alternative SCS-11A. The estimated costs for this alternative are as follows:

Capital:	$28,000
Annual O&M:	$0
Total Present Worth:	$28,000

SCS-11C: Soil Vapor Extraction with vapor treatment, using catalytic oxidation

This is the proposed alternative for Area 11 soils. Soil Vapor Extraction is the preferred presumptive remedy for soils contaminated with VOCs. Under this alternative, contaminated soils would be remediated in situ via a vapor extraction system. This alternative would consist of the installation of a series of wells connected by an underground piping system. A blower would provide a source of negative pressure to extract vapors from the subsurface. Five vacuum- extraction wells would be placed in the source area. The extraction wells would be screened in the vadose zone, where they would remove volatile contaminants from the unsaturated zone, as well as some leachate contaminants that may diffuse from the surface of the water table. Due to the presence of NAPL, it has been assumed that the wells would be constructed of carbon steel in case steam injection is required. A pilot program would be conducted prior to system design to determine well construction, spacing and in situ air permeability.

Given the presence of residual NAPL, it is expected that significant quantities of contaminated vapors would be extracted. The vapors would initially be treated with a catalytic oxidation unit. Carbon adsorption would not be a cost-effective technology for treating the vapor upon startup of the soil vapor extraction system. It is possible that carbon adsorption could be used to address contaminants in the vapor after contaminant concentration levels were reduced by using catalytic oxidation for a period of six months to one year. This alternative would achieve soil remediation objectives and RAOs in the shortest amount of time of all alternatives evaluated for Area 11. Estimated costs for this alternative are as follows:

Capital:	$543,500
Annual O&M:	$212,880
Total Present Worth:	$3,185,500

<u>Source Area 11 – Leachate</u>

No remedial alternatives (with the exception of the No Action Alternative) were developed for Area 11 leachate. The BIOSCREEN results indicate that even though LNAPL is present in the interior of the area, groundwater would meet state groundwater standards at the GMZ boundary. BIOSCREEN accounted for the 150 feet between the hot spot at Area 11 and the GMZ boundary. Modeled concentrations of benzene, xylene and TCE dropped below groundwater standards within 75 feet down gradient of the elevated soil concentrations (CDM, 2000 RI Appendix B). However, due to the presence of free product NAPL at the interior of the site, institutional controls on groundwater usage within the GMZ would be implemented, approximately four monitoring wells would be installed and a groundwater and leachate monitoring program would be executed.

SCL-11A: No Action (leachate monitoring and restrictions on groundwater usage)

This alternative would consist of no action with leachate monitoring and institutional controls on groundwater usage. Leachate concentrations would continue to attenuate naturally. The groundwater and leachate would be monitored at predetermined intervals for 30 years per RCRA post-closure groundwater monitoring requirements. Monitoring would typically consist of collecting groundwater and analyzing for VOCs and, where appropriate, parameters that measure biological activity. Future area development would be restricted under this alternative. Estimated costs for this alternative are as follows:

Capital:	$54,000
Annual O&M:	$8,000
Total Present Worth:	$297,000

COMPARATIVE ANALYSIS OF ALTERNATIVES

This section explains the Illinois EPA's rationale for selecting the preferred alternatives. The U.S. EPA has developed nine criteria to evaluate remedial alternatives to ensure that important considerations are factored into remedy-selection decisions. These criteria are derived from the statutory requirements of CERCLA Section 121, as well as other technical and policy considerations that have proven to be important when selecting remedial alternatives. The nine criteria are identified and described in the chart below.

The FS for Operable Unit Three presented detailed analysis for 28 different alternatives. Because the two Modifying Criteria cannot be fully evaluated until public comment is received, they were not evaluated in the FS. The reader is urged to read the responsiveness summary for more detailed discussion of public comment received. Detailed analysis of the remaining 7 criteria for each alternative is summarized below. Due to the large number of alternatives, an in-depth, detailed analysis for each is not provided. Additionally, the alternatives are evaluated in groups, by source area and media (soil or leachate). The No Action Alternative will only be discussed for Area 11 leachate, as it failed to be protective of human health and the environment in all other cases. References to all alternatives in discussions below should be considered to exclude the No Action Alternative, as well as any other alternatives specific to the subject source area and media that do not meet threshold criteria.

DESCRIPTION OF EVALUATION CRITERIA

Threshold Criteria

The two most important criteria are statutory requirements that must be satisfied by any alternative in order for it to be eligible for selection.

1. **Overall protection of human health and environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls or institutional controls.

2. **Compliance with *ARARs*** addresses whether or not a remedy will meet all of the **A**pplicable or **R**elevant and **A**ppropriate **R**equirements of other Federal and State environmental statutes and/or provide grounds for invoking a waiver.

Primary Balancing Criteria

Five primary balancing criteria are used to identify major trade-offs between remedial alternatives. These trade-offs are ultimately balanced to identify the preferred alternative and to select the final remedy.

1. **Long-term effectiveness and permanence** refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

2. **Reduction of toxicity, mobility, or volume through treatment** is the anticipated performance of the treatment technologies that may be employed in a remedy.

3. **Short-term effectiveness** refers to the speed with which the remedy achieves protection, as well as the remedy's potential to create adverse impacts on human health and the environment that may result during the construction and implementation period.

4. **Implementability** is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.

5. **Cost** includes capital and operation and maintenance costs.

Modifying Criteria
These criteria may not be considered fully until after the formal public comment period on the Proposed Plan and RI/FS Report are complete. However, Illinois EPA and U.S. EPA work closely with the community throughout the project.

1. **State Acceptance** indicates whether, based on its review of the RI and Proposed Plan, the State concurs with, opposes or has no comment on the preferred alternative. While the NCP speaks in terms of State Acceptance, in this instance, Illinois EPA is the lead agency, with the support of the U.S. EPA. Hence, for this case, the term "Support Agency" is more appropriate.

2. **Community Acceptance** will be assessed in the Record of Decision following a review of the public comments received on the RI report and the Proposed Plan

<u>AREA 4 SOIL</u>

In addition to the No Action alternative, Alternative SCS-4B will not be discussed within this section because it failed to meet either of the threshold criteria. A summary of the detailed analysis for Area 4 Soil is provided below for Alternatives SCS-4C (SVE) and SCS-4D (Excavation with LTTD).

Overall Protection of Human Health and the Environment
Both SCS-4C and SCS-4D are protective of human health and the environment. SCS-4D achieves soil remediation objectives in less than 1 year.

Compliance with ARARs
Both alternatives comply with ARARs.

Long-term Effectiveness and Permanence
Alternative SCS-4D is more permanent (soils are removed and treated) than SCS-4C and has less residual risk once excavation is complete. Also, SCS-4D does not require any long-term operation and maintenance, whereas the SVE system under SCS-4C would require maintenance until remediation objectives are met after approximately 20 - 30 years.

Reduction of Toxicity, Mobility, or Volume through Treatment
Alternative SCS-4D achieves a higher degree of reduction of toxicity, mobility and volume of contaminants as opposed to SCS-4C. Under SCS-4D, greater than 90% of contaminant mass would be removed as compared to 85% removal using SCS-4C.

Short-term Effectiveness
Alternative SCS-4C results in a smaller short-term health risk to on-site workers and the surrounding community, as the contaminants are left in place. Under the SCS-4D, the contaminants would be excavated, providing more of an opportunity for exposure, but improved rate of contaminant removal.

Implementation
Both alternatives are technically easy to implement. Some space considerations must be made with alternative SCS-4D, as the treatment unit will be larger than that under SCS-4C.

Cost
The total present worth costs for Alternative SCS-4C is $2,156,000 as compared to SCS-4D's $2,121,000.

AREA 4 LEACHATE

The summary of the detailed analysis for Area 4 Leachate is provided below for Alternatives SCL-4B (Hydraulic Containment); SCL-4C (Air Sparging at GMZ Boundary); SCL-4D (Reactive Barrier Wall) and SCL-4E (Air Sparging at Source and GMZ Boundary).

Overall Protection of Human Health and the Environment
All alternatives evaluated for Area 4 Leachate are protective of human health and the environment. However, only SCL-4D stops contaminants entirely (and in an immediate manner) from moving outside the GMZ boundary for Area 4.

Compliance with ARARs
All alternatives comply with ARARs. Alternative SCL-4D complies with ARARS in the shortest amount of time.

Long-term Effectiveness and Permanence
All alternatives require some degree of operation and maintenance. Alternative SCL-4E is the most effective as it addresses contaminants within hot spots.

Reduction of Toxicity, Mobility, or Volume through Treatment
Alternative SCL-4B provides the least reduction in toxicity, mobility and volume of contaminants as opposed to all others. Alternative SCL-4D provides the highest degree of reduction in toxicity, mobility and volume of contaminants, as contaminants are treated while passing through the reactive barrier wall.

Short-term Effectiveness
All alternatives cause limited exposure to subsurface contaminants during construction. Alternative SCL-4D is the most effective in the short term.

Implementation
Alternative SCL-4D is the most difficult to implement due to excavation and dewatering requirements. Alternative SCL-4B is the easiest.

Cost
The total present worth costs for Area 4 Leachate alternatives are as follows: SCL-4B ($1,117,000); SCL-4C ($2,522,000); SCL-4D ($5,911,000); SCL-4E ($2,796,000).

AREA 7 SOIL

In addition to the No Action Alternative, Alternative SCS-7B will not be discussed within this section because it failed to meet either threshold criterion. The summary of the detailed analysis for Area 7 Soil is provided below for Alternatives SCS-7C (Excavation and Biological Treatment); SCS-7D (Excavation and On-site Low Temperature Thermal Desorption) and SCS-7E (Soil Vapor Extraction and Air Sparging).

Overall Protection of Human Health and the Environment
All alternatives evaluated for Area 7 Soil are protective of human health and the environment. However, SCS-7C and SCS-7D achieve soil preliminary remediation goals in 2 years or less, as opposed to the 15 to 20 years required for SCS-7E.

Compliance with ARARs
Alternative SCS-7D complies with ARARS immediately upon the completion of excavation. All other alternatives would require additional time to meet ARARs.

Long-term Effectiveness and Permanence
All alternatives provide adequate effectiveness and permanence. Alternative SCS-7E is the least effective and permanent, because contaminants are treated in situ, and therefore rely on operation and maintenance of a SVE system. Alternative SCS-7D is the most permanent, as contaminants would be excavated and thermally destroyed above ground.

Reduction of Toxicity, Mobility, or Volume through Treatment
All alternatives would provide adequate reduction in toxicity, mobility and volume of contaminants. Alternative SCS-4E would provide the least reduction in toxicity, mobility and volume of contaminants (approximately 85%) as opposed to all others. However, after extraction, the thermal treatment unit would provide greater than 95% reduction in contaminant volume within the vapors. Alternative SCS-7D would provide the largest overall reduction in toxicity, mobility and volume of contaminants at greater than 90% effectiveness.

Short-term Effectiveness
Alternatives SCS-7C and SCS-7D are very effective in the short term, as contaminants would be removed through excavation. However, these alternatives also have the highest short-term risks to on-site workers and the community, as VOCs could be released during the excavation.

Implementability
All alternatives would be relatively easy to implement and are technically feasible.

Cost
The total present worth costs for Area 7 Soil alternatives are as follows: SCS-7C ($18,218,000); SCS-7D ($15,209,000) and SCS-7E ($5,624,000).

AREA 7 LEACHATE

A summary of the detailed analysis for Alternatives SCL-7B (Multi-phase Extraction/ Leachate Containment and Treatment) and SCL-7C (Reactive Barrier Wall) is provided below.

Overall Protection of Human Health and the Environment
Both alternatives evaluated for Area 7 Leachate are protective of human health and the environment. However, only SCL-7C, the reactive barrier wall, stops contaminants entirely (and in an immediate manner) from moving outside the GMZ boundary for Area 7.

Compliance with ARARs
Both alternatives comply with ARARs. Alternative SCL-7D complies with ARARS in the shortest amount of time.

Long-term Effectiveness and Permanence
Both alternatives would provide an adequate degree of effectiveness and permanence. Alternative SCL-7B would provide a higher degree of permanence, as the NAPL is addressed directly through extraction.

Reduction of Toxicity, Mobility, or Volume through Treatment
Alternative SCL-7B would provide the greatest reduction in toxicity, mobility and volume of contaminants, as treatment occurs within the hot spots.

Short-term Effectiveness
Alternative SCL-7C is the most effective in the short term, as contaminants would be treated immediately as they pass through the barrier wall.

Implementation
Alternative SCL-7C is the most difficult to implement due to excavation and dewatering requirements to install the wall within the trench.

Cost
The total present worth costs for Area 7 Leachate alternatives are as follows: SCL-7B ($2,637,000) and SCL-7C ($4,391,000).

AREA 9/10 SOIL

In addition to the No Action Alternative, Alternative SCS-9/10B will not be discussed within this section because it failed to meet either threshold criteria. A summary of the detailed analysis for Alternative SCS-9/10C (Soil Vapor Extraction) is provided below.

Overall Protection of Human Health and the Environment
Alternative SCS-9/10C is the only alternative that is protective of human health and the environment.

Compliance with ARARs
Alternative SCS-9/10C would comply with ARARS in a reasonable time frame.

Long-term Effectiveness and Permanence
Alternative SCS-9/10C is the most effective and permanent, although contaminants would be treated in situ, and therefore would rely on operation and maintenance of a SVE system.

Reduction of Toxicity, Mobility, or Volume through Treatment
Alternative SCS-9/10C would provide the greatest reduction in toxicity, mobility and volume of contaminants (approximately 85%) as opposed to all others.

Short-term Effectiveness
Alternative SCS-9/10C would provide a medium level of short-term effectiveness. The SVE system would require a certain amount of time to achieve remediation goals. Short-term risks to on-site workers and the community would be minimal, as soils would be treated in situ.

Implementation
Soil Vapor Extraction under SCS-9/10C would be relatively easy to implement, however, space considerations exist.

Cost
The total present worth costs for Alternative SCS-9/10C is $4,308,000.

AREA 9/10 LEACHATE

A summary of the detailed analysis for Area 9/10 Leachate is provided below for Alternatives SCL-9/10B (Hydraulic Containment); SCL-9/10C (Air Sparging at GMZ Boundary); SCL-9/10D (Reactive Barrier Wall) and SCL-9/10E (Air Sparging at Source and GMZ Boundary).

Overall Protection of Human Health and the Environment
All alternatives evaluated for Area 9/10 Leachate are protective of human health and the environment. However, SCL-9/10E would remediate the contamination to a level where natural attenuation will allow ARARs to be met outside the GMZ boundary for Area 9/10.

Compliance with ARARs
All alternatives comply with ARARs. Alternative SCS-9/10E complies with ARARS in an appropriate time frame.

Long-term Effectiveness and Permanence
All alternatives require some degree of operation and maintenance. Alternative SCL-9/10E best meets this criterion, as the degree of residual risk after remediation objectives are achieved would be small. This is because SCL-9/10E would address contaminants within hot spots.

Reduction of Toxicity, Mobility, or Volume through Treatment
Alternative SCL-9/10E would provide enough reduction in toxicity, mobility and volume of contaminants to allow ARARS to be met in the time frame set forth in this ROD.

Short-term Effectiveness
All alternatives cause limited exposure to subsurface contaminants during construction. Alternative SCL-9/10E is effective in the short term.

Implementation
Alternative SCL-9/10E is difficult to implement due to excavation and dewatering requirements. Alternatives SCL-9/10C, SCL-9/10D and SCL-9/10E all face some difficulty, due to construction beneath 9th Street. Alternative SCL-9/10B would be the easiest to implement.

Cost
The total present worth costs for Area 9/10 Leachate alternatives are as follows: SCL-9/10B ($2,440,000); SCL-9/10C ($3,208,000); SCL-9/10D ($3,523,000) and SCL-9/10E ($3,619,000).

The Contingent Remedy for Leachate Area 9/10 is SCL-9/10B (Hydraulic Containment/Leachate Containment/Collection and Treatment by Air Stripping). SCL-9/10B by itself is a limited action that meets necessary requirements for overall protection of human health and the environment. However, this alternative would not meet ARARS as quickly as SCL-9/10E enhanced air sparging so it was not selected for the preferred remedy. This alternative, while providing some protection to down-gradient receptors, by itself would comply with ARARs at the property boundary. However, as a contingent remedy used if necessary in conjunction to SCL-9/10E to address NAPL or higher concentrations of contaminated leachate it will assist in the meeting of ARARs through source reduction in the proposed time frames.

Overall Protection of Human Health and the Environment
All alternatives evaluated for Area 9/10 Leachate are protective of human health and the environment. However, SCL-9/10B would remediate the contamination to a level where natural attenuation will allow ARARs to be met outside the GMZ boundary for Area 9/10.

Compliance with ARARs
All alternatives comply with ARARs. Alternative SCS-9/10B complies with ARARS in an appropriate time frame it is not as effective as the preferred remedy of SCL-9/10E. Therefore it is proposed only as a contingent remedy to the proposed leachate remedy.

Long-term Effectiveness and Permanence

All alternatives require some degree of operation and maintenance. Alternative SCL-9/10B meets this criterion, as the degree of residual risk after remediation objectives are achieved would be small. This is because SCL-9/10B would address contaminants within hot spots.

Reduction of Toxicity, Mobility, or Volume through Treatment
Alternative SCL-9/10B would provide sufficient reduction in toxicity, mobility and volume of contaminants to allow ARARS to be met at the designated GMZ boundaries in the time frame set forth in this ROD.

Short-term Effectiveness
All alternatives cause limited exposure to subsurface contaminants during construction. Alternative SCL-9/10B is effective in the short term at the property boundaries where it would be implemented, but not as effective in contaminant control down-gradient from the source area. The proposed remedy SCL-9/10E is considerably more effective and SCL-9/10B would be designed to supplement and assist SCL-9/10E if construction is necessary.

Implementation
Alternative SCL-9/10B would be the easiest to implement, however would face some problems from the placement of the extraction wells and utilities. Alternatives SCL-9/10C, SCL-9/10D and SCL-9/10E all face some difficulty, due to construction beneath 9th Street.

Cost
The total present worth costs for Area 9/10 Leachate alternatives are as follows: SCL-9/10B ($2,440,000); SCL-9/10C ($3,208,000); SCL-9/10D ($3,523,000) and SCL-9/10E ($3,619,000).

AREA 11 SOIL

In addition to the No Action Alternative, Alternative SCS-11B will not be discussed within this section because it failed to meet either threshold criteria. The summary of the detailed analysis for Area 11 Soil is provided below for Alternative SCS-11C (Soil Vapor Extraction).

Overall Protection of Human Health and the Environment
Alternative SCS-11C is the only alternative that is protective of human health and the environment.

Compliance with ARARs
Alternative SCS-11C would comply with ARARS in a reasonable time frame.

Long-term Effectiveness and Permanence
Alternative SCS-11C is the most effective and permanent, although contaminants are treated in situ and therefore rely on operation and maintenance of a SVE system.

Reduction of Toxicity, Mobility, or Volume through Treatment
Alternative SCS-11C provides the greatest reduction in toxicity, mobility and volume of contaminants (approximately 85%) as opposed to all others.

Short-term Effectiveness
Alternative SCS-11C provides a medium level of short-term effectiveness. The SVE system will require a certain amount of time to achieve remediation goals. Short-term risks to on-site workers and the community are minimal, as soils would be treated in situ.

Implementability
Soil Vapor Extraction under SCS-11C is relatively easy to implement, however, space considerations exist.

Cost
The total present worth costs for Alternative SCS-11C is $3,185,500.

AREA 11 LEACHATE

The summary of the detailed analysis for Area 11 Leachate is provided below for Alternative SCL-11A (No Action)

Overall Protection of Human Health and the Environment
The No Action alternative is protective of human health and the environment.

Compliance with ARARs
Alternative SCL-11A complies with ARARs.

Long-term Effectiveness and Permanence
Alternative SCL-11A requires a degree of operation and maintenance as on-going groundwater sampling will be required. Alternative SCL-11A meets this criterion. Groundwater contamination will continue to degrade naturally.

Reduction of Toxicity, Mobility, or Volume through Treatment
Alternative SCL-11A will reduce toxicity, mobility and volume of contaminants through natural degradation.

Short-term Effectiveness
Alternative SCL-11A is effective in the short term. Low-level exposure to subsurface contamination may occur during installation of monitoring wells and sampling events.

Implementation
Alternative SCL-11A is straightforward to implement.

Cost
The total present worth costs for Alternative SCL-11A is $297,000.

PRINCIPAL THREAT WASTES

The National Contingency Plan (NCP) establishes an expectation that U.S. EPA will use treatment to address principal threats posed by a site wherever practicable (NCP, 40 CFR §300.430(a)(1)(iii)(A)). The term "principal threat" refers to source materials that are considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur (U.S. EPA, Guide 6-40). Remedial investigations conducted at the site have identified principal threat wastes at all four source areas (Area 4, Area 7, Area 9/10 and Area 11). Residual NAPL was positively identified at Areas 4, 7 and 11 (CDM, 2000 RI). At Area 9/10, groundwater concentrations were identified that were indicative of a significant source of groundwater contamination and NAPL presence (CDM, 2000 RI 3-77). The following text summarizes information identifying the principal threats at each Source Area.

AREA 4

Soil boring SB4-202 taken in the northern part of Swebco's parking lot tested positive for the presence of a LNAPL directly above and within the top portion of the saturated zone (CDM, 2000 RI 3-14). Laboratory analysis of soil within boring SB4-202 contained 510 ppm of 1,1,1-TCA (CDM, 2000 RI 3-14). LNAPL was found present at the source from 27 to 35 feet bgs but was not found in deeper portions of SB4-202 (CDM, 2000 RI 3-14). The extent of NAPL contamination was not identified. The estimated volume of contaminated soil at Area 4 is 155,400 cubic feet (CDM Operable Unit Three FS Appendix C).

AREA 7

Subsurface sampling results obtained at Area 7 suggest the presence of NAPL in two hot spots located in the northern and southern portions of the area. In the southern hot spot, PCE concentrations of 260 ppm in soil sample SB7-8D suggest the presence of a NAPL (CDM, 1995 RI 4-48). Concentrations of VOCs such as xylene, naphthalene and 2-methyl naphthalene were also identified within soil boring SB7-8 at concentrations high enough to exist as NAPL (CDM, 1995 RI 4-48). Additionally, the SB7-8D soil-boring log indicates an elevated headspace and a strong solvent odor for sample SB7-8D (CDM, 1995 RI Appendix A). Specific tests designed to positively identify NAPL were not performed on soils in the southern hot spot.

AREA 9/10

The concentration of 12 ppm of 1,1,1-TCA in MW201 indicates that NAPL is likely present in Area 9/10, based on the aqueous solubility limit of 1,1,1-TCA. The concentration of 1,1,1-TCA in MW201 represents 0.8 to 4 percent of its aqueous solubility limit. Dye testing did not reveal the presence of NAPL in the more shallow portions of the unconsolidated aquifer. However, DNAPL would not be expected to be present in the more shallow portions of the aquifer, because no confining units are present in the top 100 feet of the aquifer (CDM, 2000 RI 3-77).

Further research has revealed that numerous releases of petroleum based fuels (JP4, mineral spirits and fuel oil) and chlorinated solvents have occurred from underground storage tanks (USTs) in Area 9/10. Reports submitted to the Illinois EPA reveal that LNAPL in relation to the above- mentioned releases exists or has existed floating on the water table. In addition, PCE, TCE and metals are present in soil at concentrations that would be considered a threat to contaminate groundwater above the Class I Groundwater Standards.

AREA 11

Subsurface sampling results obtained at Area 11 suggest the presence of NAPL in two hot spots located in the western and central portions of the area. NAPL was detected in the western zone during field screening of SB11-203 soil samples from 39 to 43 feet bgs. A combination of black staining of soils and Sudan IV dye testing confirmed the presence of NAPL in samples taken from 39 to 43 feet bgs. Similar conditions were identified in SB11-202 from 39 to 45 feet bgs (CDM, 2000 RI 3-45, 51).

Soil samples taken in the central zone of contamination, SB11-4G (total VOCs 307 ppm) and SB11-8G (total VOCs 42 ppm) indicate the possibility for NAPL (CDM, 1995 RI 4-70, Table 4-4). However, no staining is noted in the soil boring logs and the Sudan IV dye test was not performed during the Operable Unit 2 investigation. The extent of NAPL contamination was not identified. The total estimated volume of soil at Area 11 is approximately 237,084 cubic feet (CDM, 2000 FS Appendix E).

SELECTED REMEDY

This section describes the rationale and the preferred alternatives for each source area and provides Illinois EPA's reasoning behind its selection. Alternatives can change or be modified if new information is made available to Illinois EPA through further investigation or research. An appropriate range of alternatives was developed, based upon the initial screening of technologies, the potential for contaminants to impact the environment and specific criteria for the source areas.

SOIL SOURCE CONTROL

The U.S. EPA has developed presumptive remedy directives with the objectives of streamlining site investigations and facilitating the selection of remedial actions. The directive on presumptive remedies for soils contaminated by VOCs is appropriate for addressing the types of contaminants found in the source areas at the Southeast Rockford site. Presumptive remedies that were considered and would be implemented for this site include soil vapor extraction and thermal desorption. Ex situ bioremediation was also considered for Area 7 as an alternative to thermal desorption of excavated material. For this source area, ex situ bioremediation would require a longer timeframe than soil vapor extraction to achieve ARARs. However, ex situ bioremediation would be more advantageous than ex situ soil vapor extraction, since bioremediation would not require treatment of contaminants in the vapor stream

LEACHATE SOURCE CONTROL

To assemble alternatives, general response actions were combined to form complete remedial responses for the media of concern in each source area. A detailed remedial approach considered the specific extent, depth and mobility of contaminants, as well as site-specific area constraints and hydrogeology for the individual source areas. Leachate source control would address residual contamination not addressed by soil remediation alternatives (other than No Action).

Leachate source control includes contaminated leachate in the shallow water-bearing zone. Leachate is assumed to be contamination that originated from the soil source areas and has migrated to the unconsolidated aquifer within the designated source areas. Contaminated source leachate is defined in the FFS and hereafter as shallow groundwater located inside each source area. Groundwater located outside the potential GMZ of the source areas was evaluated as part of management of migration of site-wide groundwater, and is not addressed as part of the FFS.

Leachate source control alternatives were formulated to address the remediation for each source area. Leachate source control alternatives were developed for Source Areas 4, 7 and 9/10, as noted in the fate and transport analysis (Final RI, SCOU 7/25/2000). Source Area 11 does not require leachate source control, based on modeling results that indicate ARARs are attained at the GMZ boundary.

GROUNDWATER MANAGEMENT ZONES (GMZ)

Fact Sheets and the proposed plan presented by the Illinois EPA proposed the use of Groundwater Management Zones pursuant to 35 Ill. Adm. Code 620.250 for each source area. As defined by Illinois EPA regulations, "a GMZ may be established as a three dimensional region containing groundwater being managed to mitigate impairment caused by the release of contaminants from a site". Groundwater Management Zones are used and established for sites undergoing corrective action that is approved by the Illinois EPA. The Focused Feasibility Study prepared for the Illinois EPA by Camp Dresser & McKee dated September 5, 2000 Volume I, Section 3-1, figures 3-1 through 3-4, presents boundaries of the proposed GMZ for each source area. For source areas 4, 7, and 11, the GMZ boundary was set to areas surrounding contaminated soil. In addition, the GMZ boundaries were set where it was possible for the proposed remedial action to achieve ARARs. The GMZ boundary for Source Area 9/10 was established knowing that site characterization of soil contamination was incomplete. Therefore, the GMZ boundary would encompass an area in which the Illinois EPA believes soil contamination is present, including United Technologies Corporation/Hamilton Sundstrand (UTC/HS) Corporation Plant No. 1, former Mid States Industrial and Rockford Products east of Ninth Street.

Volume 1, Section 7.1 of the Focused Feasibility Study, dated September 5, 2000 states, "Groundwater that lies beyond the GMZ of each source is considered part of the site-wide groundwater." During the time needed for remediation of the source areas, groundwater that exceeds the Class I Groundwater Quality Standards will exist below the entire area. As part of the GMZ, its boundaries will act as points of compliance set forth as part of the GMZ. It is the intention of the Illinois EPA that Class I Groundwater Quality Standards be met as part of the remediation goals. However, since it is possible that Class I Groundwater Quality Standards can not be achieved in the time frame established for remediation of the source areas, it may become necessary for the temporary establishment of alternative groundwater standards, pursuant to 35 Ill. Adm. Code Part, 620. This may occur for source areas where contaminated groundwater is flowing from an up-gradient position onto a source area. Therefore, compliance with GMZ requirements can be accomplished by the establishment of background conditions from groundwater located up gradient of the source area that it is migrating below the source area in question. Background concentrations in groundwater shall be established for the Southeast Rockford Groundwater Contamination Site pursuant to 35 Ill. Adm. Code 724, Subpart F and only for those groundwaters found to be significantly over Class I Groundwater Standards.

It is the intention of the proposed remedies in this ROD to meet the desired goals of Class I Groundwater Standards for the source areas, as well as the entire Southeast Rockford Area. However, due to continuing migration of contaminated groundwater below the entire site, exceedences of the Class I Groundwater quality may occur beyond GMZ boundaries until such time that the proposed remedies are fully operational and functional. Part of the proposed remedy is natural attenuation of already-contaminated groundwater beyond the source areas, however, to achieve this, adjustments shall be made for compliance with Groundwater Quality Standards, in accordance with 35 Ill. Adm. Code Part 620. The Illinois EPA acknowledges that the groundwater will not meet Class I Groundwater Standards until enough natural degradation of contamination occurs. Natural attenuation is a major part of the remedy proposed for the overall remediation of the entire site. Groundwater monitoring would be carried out during the entire remediation process to assess the effectiveness of the remedies proposed in the ROD. Pursuant to 35 Ill. Adm. Code 620.250(c), "The Agency shall review the on-going adequacy of controls and continued management at the site if concentrations of chemical constituents, as specified in Section 620.250(a)(4)(B), remain in groundwater at the site following completion of such action. The review must take place no less than every five years." This part of Illinois regulations is concurrent with the policies of the CERCLA and the NCP that will allow the Illinois EPA the opportunity to adjust remediation activities to meet the desired remediation goals.

AREA 4

Alternatives SCS-4D (Excavation and On-site Low Temperature Thermal Desorption) and SCL-4B (Hydraulic Containment) are the preferred alternatives for Area 4. The combination of these alternatives achieves substantial risk reduction by removing the source materials that constitute principal threats, as well as removing contaminated soil and groundwater surrounding the source materials. The excavation of contamination and thermal treatment, coupled with leachate containment reduces risks more quickly and cost effectively than the other alternatives.

Under these alternatives, approximately 2,800 cubic yards of contaminated soils would be excavated and VOCs would be removed through on-site thermal treatment via a LTTD unit. Excavated soils would be conveyed to the primary treatment unit, where the contaminants are thermally desorbed from the soil. It would take approximately one month (estimated) to thermally process the soil. Due to the levels of VOCs expected during excavation, the cost to install a temporary enclosure over the excavation (for emissions control) has been included. Contaminated vapors would be collected from the temporary enclosure and directed to the afterburner used in conjunction with the LTTD unit. Vapors produced within the thermal desorption unit would thus be destroyed in the afterburner. The treated soil would then be conveyed to a process unit that cools and re-hydrates the soil. Treated soil would be stockpiled, and following testing to ensure that remediation goals have been achieved, would be placed back into the excavation.

Well points would be installed to lower the water table and thus expose the residual NAPL. Water collected during this dewatering process would be contained on site in two 21,000-gallon carbon steel tanks and transported to an appropriate disposal facility (at a frequency to be determined during the design phase).

Following the completion of the soils excavation and thermal treatment, the leachate containment and treatment system would be installed. Leachate would be contained and extracted at a rate of approximately 20 gpm through a series of six leachate extraction wells, submersible pumps, piping and controls. An air-stripping unit would then treat the extracted leachate. The treated effluent would be discharged on site to a storm water ditch. Effluent would be monitored periodically for VOCs to confirm that the leachate is treated to acceptable levels. Vapors stripped from the leachate in the air-stripping unit would be directed to an on-site GAC unit. It is expected that under these alternatives, Area 4 would meet RAOs in less than 15 years.

Institutional controls would be placed on groundwater usage within the GMZ, monitoring wells would be installed and a groundwater- and leachate-monitoring program would be implemented. The total present worth cost of these alternatives is $3,238,000.

PNAs were identified as COCs in soils at Area 4. PNAs are not directly addressed by SCS-4D, although some remediation may occur incidentally (LTTD is not 100% effective on PNAs). Additional data will be obtained during remedial design to determine if PNAs are truly COCs due to industrial activities at Area 4, or simply contamination from other activities (i.e. naturally occurring sources or non-industrial human activities). If the PNA evaluation conducted during remedial design identifies the need for additional remediation, the remedy would be appropriately altered. Depending on the significance of the change in the remedy, the Agencies may be required to hold additional public meetings and allow public comment on the new remedy.

Proposed alternatives for Area 4 will meet all RAOs for Area 4. Table 10 describes each RAO and how the alternatives would meet them.

Excavation of soils and NAPL followed by LTTD would remove and treat the principal threat wastes from Source Area 4. Based on information currently available, 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 Illinois EPA expects the Preferred Alternative for Area 4 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 waiver); (3) be cost effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable and (5) satisfy the preference for treatment as a principal element, or explain why the preference for treatment will not be met.

Table 10. Area 4 Remedial Action Objectives

Remedial Action Objective -- *Prevent the public from contact with soil containing contamination in excess of state or federal standards or that poses a threat to human health.*

How Alternative will meet RAO -- Soils containing contamination in excess of state or federal standards or that poses a threat to human health will be excavated and treated by LTTD.

Remedial Action Objective -- *Prevent the public from inhalation of airborne contaminants in excess of state or federal standards or that pose a threat to human health.*

How Alternative will meet RAO -- Soils containing contamination in excess of state or federal standards or that poses a threat to human health will be excavated and treated by LTTD.

Remedial Action Objective -- ***Prevent the migration of contamination from the source area that would result in degradation of site-wide groundwater or surface water to levels in excess of state or federal standards or that pose a threat to human health or the environment.***

How Alternative will meet RAO -- The removal of free product NAPL, as well as those soils containing contamination in concentrations contributing to groundwater contamination in excess of ARARs will be excavated and treated. Following the LTTD, the leachate containment system will extract remaining leachate contamination until ARARs are met at the GMZ boundary.

AREA 7

Alternatives SCS-7E (Soil Vapor Extraction and Air Sparging) and SCL-7B (Multi-phase Extraction with Leachate Containment and Treatment) are the preferred alternatives for Area 7. These alternatives are recommended because they would achieve substantial risk reduction in consideration of cost. Alternatives SCS-7E and SCL-7B reduce risks substantially by treating the source materials constituting principal threats at the site.

Under these alternatives, the in situ technologies soil vapor extraction, air sparging, and multi-phase extraction would work in concert to treat contaminants in unsaturated and saturated soil and leachate in Source Area 7. The SVE system would extract vapors from suspected hot spots through sixteen vacuum extraction wells. Wells would be constructed to a depth of up to 25 feet and screened in the vadose zone, where they will extract volatile contaminants from the unsaturated zone, as well as some leachate contaminants that are able to volatilize from the surface of the water table. The estimated flow rate for the SVE system is 1200 scfm.

An air sparging system would be constructed to volatilize VOCs from saturated soils and leachate through the injection of air. VOCs would be collected through the SVE system from contaminated soil. A total of 53 air-sparging wells would be constructed to a depth of 50 feet bgs. CDM has assumed a radius of influence of 25 feet for the air sparging wells. Two air compressors would be used to inject air to the subsurface, each at a rate of 400 scfm, for a total of 800 scfm.

A MPE system would focus on the hot spot areas where either highly contaminated soils or NAPL exists. The MPE system would extract a combination of the following phases: NAPLs; groundwater (leachate); and soil vapor. Ten MPE wells would be installed into the hot spots to a depth of approximately 25 feet.

Lastly, a leachate containment system consisting of eight leachate extraction wells, a central pump station, an air-stripping unit, piping and controls would be installed. A containment system would focus on contaminated leachate along the down-gradient side of the GMZ. Leachate would be collected in the extraction wells and pumped to the air-stripping unit at a rate of 10 gpm.

The SVE, MPE and leachate containment systems would pipe contaminants to a central treatment building in the form of vapors, NAPL and leachate. Vapors would be sent directly to a catalytic oxidation system for treatment. Leachate and NAPL would be separated from each other through an oil/water separator. NAPL that is collected will be sent off site for treatment and leachate will be directed to an on-site air stripper. Vapors from the air stripper containing VOCs stripped from the leachate would be directed to the catalytic oxidation system for treatment. Treated water collected in the central treatment unit would be discharged on site to the unnamed creek located approximately 450 feet north of the hot spots.

Recovered NAPLs, groundwater and soil vapor would be piped underground to a central vacuum pump/vapor treatment system enclosure. The enclosure would also include an air/water separation system, with the separated water pumped to the leachate containment system air stripper. This alternative should comply with RAOs after approximately 15 to 25 years.

Institutional controls would be placed on groundwater usage within the GMZ, monitoring wells would be installed and a groundwater and leachate-monitoring program would be implemented. Estimated total present worth cost for these alternatives is $8,261,000.

Because the Illinois EPA was unable to quantitatively evaluate human health risks to residents who were exposed to creek surface water and sediments in Area 7, additional data from the creek will be obtained during the design phase (likely during 2002). Following data collection, risks to human health will be quantitatively evaluated. However, activities of the current owner have resulted in modification of the flow of the creek. This activity may hinder or potentially eliminate the ability of the Illinois EPA to collect additional samples necessary to perform a complete risk assessment.

Similarly, additional data will be collected from the creek during the design phase of the project to complete the ecological risk assessment. If the additional human health or ecological risk evaluations conducted during design identify the need for remediation in addition to that outlined within this ROD, the remedy will be appropriately altered. Depending on the significance of the change in remedy, the Agencies may be required to hold additional public meetings and allow public comment on the new remedy. The proposed alternatives for Area 7 would meet all RAOs for Area 7. The following table describes each RAO and how the alternatives would meet them.

Table 11. Area 7 Remedial Action Objectives

Remedial Action Objective -- *Prevent the public from contact with soil containing contamination in excess of state or federal standards or that poses a threat to human health.*

How Alternative will meet RAO -- Soil containing contamination in excess of state or federal standards or that poses a threat to human health will be treated by a combination of SVE and MPE. Increased airflow caused by SVE and MPE will remove contaminants from soils and promote biodegradation.

Remedial Action Objective -- *Prevent the public from inhalation of airborne contaminants in excess of state or federal standards or that pose a threat to human health.*

How Alternative will meet RAO -- Soil containing contamination in excess of state or federal standards or that poses a threat to human health will be treated by a combination of SVE and MPE. Increased airflow caused by SVE and MPE will remove contaminants from soils and promote biodegradation.

Remedial Action Objective -- *Prevent the migration of contamination from the source area that would result in degradation of site-wide groundwater or surface water to levels in excess of state or federal standards or that pose a threat to human health or the environment.*

How Alternative will meet RAO -- A combination of SVE, MPE, and air sparging will remove free product and the contamination from soils that contain concentrations contributing to site-wide groundwater contamination in excess of ARARs. Leachate and soil contaminants below the water table will be treated by a combination of air sparging, and leachate containment, which will be achieved by leachate collection via extraction wells. The leachate containment system will extract remaining leachate contamination until ARARs are met at the GMZ boundary.

Remedial Action Objective -- *Prevent the public from ingestion and direct contact with surface water containing contamination in excess of state or federal standards or that pose a threat to human health.*

How Alternative will meet RAO -- The removal of free product, contaminated soils, and contaminated groundwater will reduce the possibility that Area 7 groundwater contamination might impact the creek north of the park. Additional sampling will determine if levels within the creek pose a threat to human health.

Remedial Action Objective -- *Prevent the migration of contamination from Source Area 7 that would result in degradation of surface water and sediment in the unnamed creek to levels in excess of state or federal standards or that pose a threat to human health or the environment.*

How Alternative will meet RAO -- The removal of free product, contaminated soils, and contaminated groundwater will reduce the possibility that Area 7 groundwater contamination might impact the creek north of the park. Additional sampling will determine if levels within the creek pose a threat to the environment.

Remedial Action Objective -- *Prevent the migration of contamination from Source Area 7 that would result in the contamination of home-grown vegetables at concentrations which would pose a threat to human health.*

How Alternative will meet RAO -- The removal of free product, contaminated soils, and contaminated groundwater will reduce the possibility that Area 7 contamination might impact homegrown vegetables and fruits.

Extraction of NAPL and implementation of SVE in combination with air sparging would remove and treat the principal threat wastes from Source Area 7. Based on information currently available, the Illinois EPA believes the Preferred Alternative for Area 7 meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The Illinois 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 waiver); (3) be cost effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principal element, or explain why the preference for treatment will not be met.

AREA 9/10

Alternatives SCS-9/10C (Soil Vapor Extraction) and SCL-9/10E (Enhanced Air Sparging) are the preferred alternatives for Area 9/10**.** These alternatives are recommended, because following a more thorough investigation, they would provide substantial risk reduction by treating the source materials constituting principal threats at the site. The combination of SVE and enhanced air sparging would reduce risks in a reasonable amount of time, for a reasonable cost. Enhanced air sparging would take a slightly longer period of time to complete remediation objectives, as opposed to the reactive barrier wall. As part of the design phase in area 9/10, further investigation would be conducted to determine the most efficient means of implementing the remedies selected. To ensure efficiency in placement of the leachate remedy selection (SCL-9/10E) in effective source control, the leachate remedy would be made in conjunction with further investigation of Source Area 9/10. Upon the implementation of the Soil Vapor Extraction (SCS-9/10C and SCL-9/10E), should the results of the investigation indicate that additional corrective action is required, a contingent multi-phase pump and treat remedy (SCL-9/10B) or similarly designed system would be implemented to assist the selected remedy.

The SCL-9/10B was designed for Source Area 9/10 as a limited action response by itself, however, as a contingent remedy it's purpose would be to supplement the proposed leachate remedy (SCL-910E) enhanced air sparging. Implementation of the contingent pump and treat remedy (SCL-9/10B) could be made, pending the results of further characterization and effectiveness of the selective remedy. However, if further site characterization should discover that DNAPLs (free product), or higher (than previously expected) leachate concentrations exist below Source Area 9/10, the contingent remedy should be implemented as soon as possible. Designing a low volume vacuum extraction multi-phase system that would include a pump and treat system at 50 gallons per minute would allow the treatment of DNAPLs contained within the leachate. Should high enough concentrations of NAPL exist it may be necessary to collect the free product separately in a tank and dispose of it separately at a facility qualified and licensed for this type of work. The presence of DNAPLs would indicate that further contamination of the groundwater would occur, for a longer period of time, thus requiring the removal of that source to meet Class I Groundwater Standards. In addition, another trigger is if groundwater monitoring should reveal that concentrations of contaminants in groundwater are not decreasing after a period of time from operation of the soil remedy SVE. Design and construction of the contingent leachate remedy would be made on analysis of the results from additional characterization. Therefore, implementation of the contingent pump and treat remedy (SCL-9/10B) or a similarly designed system would be necessary based upon proposed further characterization and results of the proposed remedial actions (SCS-9/10C and SCL-9/10E) for source control to meet ARARs in the proposed time frame.

Under these alternatives, contaminated soils would be remediated in situ via an SVE system and leachate would be treated through the use of enhanced air sparging. At least four vacuum- extraction wells will be screened in the vadose zone, where they will remove volatile contaminants from the unsaturated zone, as well as some leachate contaminants that may diffuse from the surface of the water table. Vapors collected from the SVE unit will be treated using granular activated carbon. Following treatment, the vapors will be released to the atmosphere.

A thorough investigation could not be completed at Area 9/10, due to concern over underground utilities. Therefore, additional data will need to be collected in this area prior to constructing and designing the remedy. The vapor treatment scenario may have to be reevaluated, based on the results of additional data collection from Area 9/10 and the results of the SVE pilot program.

Originally, the leachate treatment remedy (SCL-9/10D) involved the construction of a Reactive Barrier Wall down gradient of the groundwater management zone (GMZ). Iron filings placed into a slurry react with contaminated groundwater passing through it, breaking down the VOCs into harmless compounds. However, research and additional information collected during the public comment period for the ROD has led the Illinois EPA to conclude that a different remedy should be used.

The information below led the Illinois EPA to first conduct additional investigations into the effectiveness of the proposed Reactive Barrier Wall. Information obtained from record searches indicated that numerous releases (mostly involving JP4 jet fuel) have occurred in Area 9/10. Research revealed that the iron filings of the barrier wall would not react with JP4 (and other petroleum based fuels), and would allow the JP4 to pass through the wall untreated. In addition, it is possible that the presence of JP4 may actually block the iron filings from reacting with chlorinated solvents (jet fuel could clog and foul the iron filings and thus inhibit the desired chemical reactions).

Further investigation supplied from sites in the Rockford area with similar natural groundwater chemistry indicated that groundwater passing through the barrier wall may very well result in the formation of a skin of calcium carbonate on the face of the reactive wall. This would result in a loss of permeability, leading to contaminated groundwater finding alternative paths through and around the system. Clogging and fouling up of barrier walls is now coming to be seen as a problem as use of barrier walls increases. The formation of mineral precipitates and/or biological fouling would likely result in a reduction of longevity and efficiency of the reactive barrier wall.

Research has shown that other potential contaminants (metals and other petroleum based fuels) exist in concentrations that present a concern to the Illinois EPA. The current design of the barrier wall will not accommodate these types of contaminants. Additional reactive gates would be required to remediate these newly identified contaminants.

Public comment and research conducted by the Illinois EPA led to the conclusion that substantial cost would be incurred to redesign the Reactive Barrier Wall system. A new barrier wall design would require additional reactive walls, gates and materials to remediate different forms of contamination. In addition, an increase in maintenance costs to both the reactive portions of the wall and to any surrounding structures would result.

A comment made to the Illinois EPA (by Rockford Products) during the public comment process stated that placement of reactive barrier wall on their property would constitute a taking of Rockford Products Property. This issue was investigated and brought to the attention of the Department of Legal Counsel of the Illinois EPA and representatives of the Illinois Attorney General's Office. They concluded that placing the Reactive Wall Barrier on Rockford Products Property might very well constitute a taking of Rockford Products property. A takings issue does not automatically preclude usage of a given alternative. However, it adds complicating factors for which access and/or appropriate compensation must be negotiated. The City of Rockford, in a comment to the Illinois EPA, expressed its concern about the utilities (infrastructure) that lie below Kishwaukee Avenue. This is a problem that would need to be addressed during the design phase; the real possibility of increased hydraulic pressure of groundwater may present a problem in dealing with the city utilities. Additional gates from a redesigned barrier wall would require a higher degree of rerouting of city utilities or design problems with the multiple gate system.

It is the decision of the Illinois EPA to select an alternative remedy for the treatment of leachate in Area 9/10 that meets the nine criteria specified by CERCLA. The Illinois EPA has selected alternative SCL-9/10E - Enhanced Air Sparging - as its preferred remedy. Enhanced Air Sparging would involve the placement of air injection wells down gradient and in the more highly- contaminated areas. Air would be injected into the contaminated groundwater, causing the contaminants to volatilize into air pockets in the soil above the water table. The air sparging would have to be operated in conjunction with the Soil Vapor Extraction System SCS-9/10C. Vapors would be collected underground prior to their treatment with activated carbon. Depending upon the further site characterization necessary in Area 9/10, it may be necessary to design a pump and treat system that will collect and remediate DNAPL or LNAPL in conjunction with one of the systems in the proposed plan.

SCL-9/10E: Install Injection Wells Along Boundary of the GMZ and Source Area /Install Air Sparging Unit/Inject Air/Restriction on Groundwater Usage

This alternative includes the installation of air injection wells along the southwestern border of the GMZ and an air-sparging unit. Additional injection wells would be installed into hot spots of contamination (that may include areas where contaminants exist in the form of NAPLs). Air injection into the wells would volatilize VOCs from the leachate that would then be extracted by vacuum extraction. Air sparging would be operated in conjunction with the SVE, with the vapors being passed through granulated organic carbon and then released into the atmosphere. Capital costs for this method are $2,697,000; annual operation and maintenance $65,000; total cost is $3,619,000.

The original selection of the Reactive Barrier Wall as the preferred remedy was based upon the information available at the time and was made to remediate the entire source area 9/10, not a particular facility. New information obtained by the Illinois EPA warrants the selection of a new remedy, as suggested above, or a possible combination of researched remedies. It is also possible that after further collection of information during the design phase, additions and modifications to the preferred remedy may be required.

Institutional controls would be placed on groundwater usage within the GMZ, monitoring wells would be installed and a groundwater and leachate-monitoring program would be implemented. The estimated present worth cost for these alternatives is $7,831,000.

PNAs were identified as COCs in soils at Area 9/10. PNAs are not addressed by SCS-9/10C. Additional data will be obtained during remedial design to determine if PNAs are truly COCs because of industrial activities at Area 9/10, or simply contamination from other activities (naturally occurring sources or non-industrial human activities).

If the evaluations conducted during design identify the need for remediation in addition to that outlined within this ROD, the remedy would be appropriately altered. Depending on the significance of the change in remedy, the agencies may be required to hold additional public meetings and allow public comment on the new remedy.

The proposed alternatives for Area 9/10 will meet all RAOs for Area 9/10. Table 12 describes each RAO and how the alternatives will meet them.

Table 12. Area 9/10 Remedial Action Objectives

Remedial Action Objective -- *Prevent the public from contact with soil containing contamination in excess of state or federal standards or that poses a threat to human health.*

How Alternative will meet RAO -- Soil containing contamination in excess of state or federal standards or that poses a threat to human health will be treated by SVE. Increased airflow caused by SVE will remove contaminants from soils and promote biodegradation.

Remedial Action Objective -- *Prevent the public from inhalation of airborne contaminants in excess of state or federal standards or that pose a threat to human health.*

How Alternative will meet RAO -- Soil containing contamination in excess of state or federal standards or that poses a threat to human health will be treated by SVE. Increased airflow caused by SVE will remove contaminants from soils and promote biodegradation.

Remedial Action Objective -- *Prevent the migration of contamination from the source area that would result in degradation of site-wide groundwater or surface water to levels*

in excess of state or federal standards or that pose a threat to human health or the environment.

How Alternative will meet RAO -- Soil Vapor Extraction will remove free product and the contamination from soils with concentrations contributing to site-wide groundwater contamination in excess of ARARs. Enhanced air sparging may be used to treat leachate to concentrations that meet ARARs at the GMZ boundary.

Following a more thorough investigation, the extraction of NAPL and implementation of SVE in combination with the enhanced air sparging would remove and treat the principal threat wastes from Source Area 9/10. Based on information currently available, the Illinois EPA 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 Illinois 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 waiver); (3) be cost effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principal element, or explain why the preference for treatment will not be met.

SCL-9/10B Contingent Remedy: Hydraulic Containment (leachate monitoring, containment/collection and treatment by air striping, off-site surface discharge, and groundwater use restrictions)

The system is designed as a leachate containment system that would consist of extraction wells and an air-stripping unit. Leachate extracted by pumps would be sent to an air-stripping unit at approximately 50 gallons per minute with the vapors treated with granular activated carbon and the treated vapor being released to the atmosphere. Exact placement of the extraction wells would be designed to treat higher concentrations of contaminated leachate or NAPL as determined from further characterization. In addition the pumping of leachate would also act as a hydraulic control and containment in areas of higher contamination. Treated water from the air-stripping unit would be discharged to off-site storm water ditch. Implementation of this system would be dependent upon the further characterization proposed in this ROD for Source Area 9/10. Design and construction may be tied directly into already proposed remedial design systems SCS-9/10C and SCL-9/10 E thus constructing a multi-phase design system

AREA 11

Alternative SCS-11C (Soil Vapor Extraction) and SCL-11A (No Action) are the preferred alternatives for Area 11. These alternatives are recommended because they would provide substantial risk reduction by treating the source materials constituting principal threats at the site. Alternative SCS-11C would reduce risks in the shortest amount of time for a reasonable cost.

Under these alternatives, contaminated soils would be remediated in situ via a vapor extraction system. Five vacuum extraction wells would be installed in locations of the hot spots in the area. Wells would be screened in the vadose zone, where they would remove volatile contaminants from the unsaturated zone, as well as some leachate contaminants that may diffuse from the surface of the water table. Due to the presence of NAPL, it has been assumed that the wells would be constructed of carbon steel, in case steam injection is required. Given the presence of residual NAPL, it is expected that significant quantities of contaminated vapors will be extracted. The vapors will be treated with a catalytic oxidation unit.

The No Action Alternative has been selected for leachate. Institutional controls would be placed on groundwater usage in the GMZ, approximately four additional monitoring wells would be installed and a groundwater- and leachate-monitoring program would be implemented.

If analysis indicates that contaminants are not degrading to levels near MCLs or risk based corrective action levels, air sparging will be considered in addition to SVE. Air sparging has the added benefit of enhancing biodegradation in both groundwater and vadose zone soils and will address the concerns and RAOs for Area 11. The approximate additional present worth costs for an air-sparging unit at area 11 would be $1,003,000. These costs are not included in the current cost estimate for the preferred Area 11 alternatives.

PNAs identified as COCs in soils at Area 11 are not addressed by SCS-11C. Additional data will be obtained during remedial design to determine if PNAs are truly COCs because of industrial activities at Area 11, or simply contamination from other activities (naturally occurring sources or non-industrial human activities). If the PNA evaluation conducted during design identifies the need for remediation in addition to that outlined within this ROD, the remedy would be appropriately altered. Depending on the significance of the change in remedy, the agencies may be required to hold additional public meetings and allow public comment on the new remedy.

The estimated total present worth cost for the Area 11 alternative is $3,482,500. The proposed alternative for Area 11 will meet all RAOs for Area 11. Table 13 describes the RAOs and how the Alternative will meet them.

Table 13. Area 11 Remedial Action Objectives

Remedial Action Objective -- *Prevent the public from contact with soil containing contamination in excess of state or federal standards or that poses a threat to human health.*

How Alternative will meet RAO -- Soil containing contamination in excess of state or federal standards or that poses a threat to human health will be treated by SVE. Increased airflow caused by SVE will remove contaminants from soils and promote biodegradation.

Remedial Action Objective -- *Prevent the public from inhalation of airborne contaminants in excess of state or federal standards or that pose a threat to human health.*

How Alternative will meet RAO -- Soil containing contamination in excess of state or federal standards or that poses a threat to human health will be treated by SVE. Increased airflow caused by SVE will remove contaminants from soils and promote biodegradation.

Remedial Action Objective -- ***Prevent the migration of contamination from the source area that would result in degradation of site-wide groundwater or surface water to levels in excess of state or federal standards or that pose a threat to human health or the environment.***

How Alternative will meet RAO -- SVE will remove free product and the contamination from soils with concentrations contributing to site-wide groundwater contamination in excess of ARARs. Computer modeling coupled with groundwater analysis will ensure that groundwater contamination will biodegrade at rates such that Area 11 leachate will not result in degradation of site-wide groundwater.

Soil Vapor Extraction would promote the continued natural attenuation of the principal threat wastes and treat the surrounding materials. Based on information currently available, 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 Illinois 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 waiver); (3) be cost effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment as a principal element, or explain why the preference for treatment will not be met.

COST ESTIMATE

Table 14

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT AREA 4
ALTERNATIVE SCS-4D REVISED 2: TOTAL DEMOLITION, EXCAVATION, AND ON-SITE THERMAL TREATMENT DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
General	
construction trailer (rental and delivery)	50'x12' construction trailer - $1.65/mi delivery fee (100mi) - rental allowance per 1996 Means
Mobilization	Heavy equipment and trailers, per vendor estimate
Demobilization	Allowance for trailer and equipment demobilization
decon trailer	Allowance based on CDM equipment rates
vehicle decon station	20'x20' gravel pad over 11 mil plastic with plywood and joist deck per 1996 Means
vehicle decon equipment	Steam cleaning and water tank per 1996 Means
health and safety equipment	Allowance based on CDM equipment rates
electrical power service supply	Based on expected electrical costs per month for this alternative
dust control	Water truck per 1996 Means
Demolition	
Total Demolition	Building Demolition, large urban projects, mixture of material types per Means 1999
Excavation and On-Site Thermal Treatment	
mobilization/demobilization	Transportation of the Indirect Heat and Volatilization unit (IHV), front loader, and the time involved for set-up for set up and tear down (vendor estimate)
pad for staging	Pad size approx. 200'x200' crushed stone or asphalt (vendor estimate)
temporary enclosure (rental - 88' wide by 200' long)	Sprung Instant Structure - vendor estimate; construct/install. costs include labor and heavy equip.
Excavation	Excavation cost (vendor estimate)
soil treatment	Vendor Estimate for Direct Fired Low Temperature Thermal Desorption (includes providing a loader and loader and operator to place contaminated soil into the cold feed bin and for restockpiling the clean processed reprocessed soil);
backfill and compaction	Backfill and compaction of clean soil from stockpiling (vendor estimate)
water supply	10 GPM is needed for operation of the thermal treatment system (4,800 gpd if run for 8hrs/day), based on costs based on construction site water average per 1996 Means - typical
sheet piling	Steel sheets, approx. 4' x 40' around perimeter of excavation; as per CDM experience
Excavation Dewatering (well point system)	
Completely furnish, install, operate, and remove system: well points spaced 20' O.C.	Based on vendor estimate - More Trench American (June 1998); System operation 24 hours/day, 7 days/week with diesel pumps.
Analytical	Based on CDM Experience
T&D cost (15 GPM produced)	Based on CDM Experience
rental of (2) 21,000 gallon tanks	Based on CDM Experience
Post Treatment Sampling	
Analytical for Volatile Organic Compounds (soils)	Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of 1 grid of 1 sample/250cy; 1 sampling grid per month (including QA/QC samples)
shipping and handling	Costs associated with transporting samples from site to laboratory twice per month

In general, a bulk density of 1.5 tons/yd^3 was assumed for soils material - this conversion was used for conversion of pricing given per ton, where volume of material is given in cubic yards.

Table 15

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT - AREA 4
ALTERNATIVE SCS-4D REVISED 1: PARTIAL DEMOLITION, EXCAVATION, AND ON-SITE THERMAL TREATMENT DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ Installation Costs	Annual O&M Costs	Start-up & Baseline Costs
General				**$51,785**	**$0**	**$0**	**0**
construction trailer (rental and delivery)	Mo	3	$275	$825			
Mobilization	1s	1	$10,000	$10,000			
Demobilization	1s	1	$10,000	$10,000			
decon trailer	Ea	1	$5,000	$5,000			
vehicle decon station	Ea	1	$10,000	$10,000			
vehicle decon equipment	Ea	1	$570	$570			
health and safety equipment	Mo	3	$4,500	$13,500			
electrical power service supply	Mo	3	$400	$1,200			
dust control	Mo	3	$230	$690			
Demolition				**$7,500**		**$0**	**$0**
Partial Demolition	Cf	30,000	$0.25	$7,500			
Excavation and On-Site Thermal Treatment				**$658,982**	**$60,000**	**$0**	**$0**
mobilization/demobilization	Ls	1	$23,500	$23,500			
pad for staging	Ls	1	$10,000	$10,000			
temporary enclosure (rental - 88' wide by 200' long)	Mo	3	$9,563	$28,689	$60,000		
Excavation	Ton	12,579	$5.00	$62,895			
soil treatment	Ton	4,080	$53.00	$216,240			
backfill and compaction	Ton	12,579	$2.00	$25,158			
water supply (10 GPM)	Mo	3	$1,500	$4,500			
sheet piling	Lf	360	$800	$288,000			
Excavation Dewatering (well point system)				**$281,580**	**$250,000**	**$0**	**$0**
Completely furnish, install, operate, and remove system: well points spaced 20' O.C.	Mo	1	$250,000		$250,000		
analytical	Batch	52	$1,000	$52,000			
T&D cost (15 GPM produced)	Gallon	1,132,900	$0.20	$226,580			
rental of (2) 21,000 gallon tanks	Mo	3	$1,000	$3,000			
Post Treatment Sampling				**$11,800**	**$0**	**$0**	**$0**
Analytical for Volatile Organic Compounds (soils)	Ea	58	$200	$11,600			
shipping and handling	Ea	4	$50	$200			

Table 16

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT
ROCKFORD, ILLINOIS
FEASIBILITY STUDY

SOURCE AREA 4
ALTERNATIVE SCS-4D REVISED 1: PARTIAL DEMOLITION, EXCAVATION, AND ON-SITE THERMAL TREATMENT

Item/Description		Total Cost
CAPITAL COSTS		
	General	$52,000
	Demolition/ Construction	$99,000
	Excavation / On-Site Thermal Treatment	$719,000
	Excavation Dewatering	$532,000
	Post Treatment Sampling	$12,000
	SUBTOTAL CONSTRUCTION COSTS (1)	**$1,414,000**
	Bid Contingency (15%)	$212,000
	Scope Contingency (15%)	$212,000
	Engineering and Design (15%)	$212,000
	Oversight/Health and Safety (5%)	$71,000
	TOTAL CAPITAL COSTS	**$2,121,000**
ANNUAL OPERATING AND MAINTENANCE COSTS		
	General Maintenance of Thermal Treatment System	$0
	TOTAL ANNUAL COSTS	**$0**
REPLACEMENT COSTS		
	TOTAL REPLACEMENT COSTS (2)	**$0**
PRESENT WORTH ANALYSIS		
	Total Capital Costs (from above) (3)	$2,121,000
	Present Worth Annual O&M Costs (4)	$0
	Present Worth Replacement Costs	$0
	TOTAL PRESENT WORTH	**$2,121,000**

(1) Capital costs for construction items do not include oversight fees, which are accounted for separately.
(2) Replacement costs include construction and oversight capital costs.
(3) Capital costs represent the present worth of the given alternative.
(4) Present worth of annual O&M costs is based on a 7% annual discount rate over a project life of 3 months.

Table 17

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT
FOCUSED FEASIBILITY STUDY
ROCKFORD, ILLINOIS
AREA 4 - LEACHATE

ALTERNATIVE SCL-4B: LIMITED ACTION / LEACHATE MONITORING / LEACHATE COLLECTION AND TREATMENT BY AIR STRIPPING UNIT / OFF-SITE SURFACE WATER DISCHARGE / GROUNDWATER USE RESTRICTIONS
COST SUMMARY

Item/Description	Total Cost
CAPITAL COSTS	
Groundwater Use Restrictions	$25,000
Leachate Containment System	$118,000
Leachate Monitoring Wells	$18,000
SUBTOTAL CONSTRUCTION COSTS (1)	**$161,000**
Bid Contingency (15%)	$24,000
Scope Contingency (20%)	$32,000
Engineering and Design (15%)	$24,000
Oversight/Health and Safety (5%)	$8,000
TOTAL CAPITAL COSTS	**$249,000**
ANNUAL OPERATING AND MAINTENANCE COSTS	
Leachate Containment System	$7,000
Granular Activated Carbon	$31,000
Leachate Containment System Sampling and Analysis (per event)	$4,000
Leachate Sampling and Analysis (per event)	$5,000
TOTAL ANNUAL COSTS	**$47,000**
REPLACEMENT COSTS (2)	
Leachate Containment System (every 15 years)	$78,000
Monitoring Well Replacement (every 15 years)	$29,000
TOTAL REPLACEMENT COSTS	**$107,000**
PRESENT WORTH ANALYSIS	
Total Capital Costs (from above) (3)	$249,000
Present Worth Annual O&M Costs (4)	$472,000
Leachate Containment System	
Quarterly Sampling – years 1 through 30	$200,000
Leachate Monitoring Wells	
Quarterly Sampling – years 1 and 2	$37,000
Semi-annual Sampling - years 3 through 30	$106,000
Present Worth Replacement Costs (5)	$53,000
TOTAL PRESENT WORTH	**$1,117,000**

(1) Capital costs for construction items do not include oversight fees.
(2) Replacement costs include construction *and* oversight capital costs.
(3) Capital costs represent the present worth of the given alternative.
30-year projection (Based on RCRA Closure Guidelines).
monitoring wells replacement and leachate collection system (including extraction wells, piping, pumps, and air stripping unit) every 15 years.

Table 18

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT, AREA 7 – ALTERNATIVE SCL-7E: SOIL VAPOR EXTRACTION (SVE)/AIR SPARGING (AS) ALONG GMZ BOUNDARY AND SOURCE AREA / MONITORING / GROUNDWATER USE RESTRICTIONS DETAILED COST ESTIMATE COMMENTS

COST COMPONENT	COMMENTS
Groundwater Use Restrictions	
legal fees	Cost based on CDM experience
General	
construction trailer (rental and delivery)	50'x12' construction trailer. $1.65/mi delivery fee (100mi), rental allowance per 1996 Means
Mobilization	Heavy equipment and trailers, per vendor estimate
Demobilization	Allowance for trailer and equipment demobilization
decon facilities	Based on level of personal and vehicle decontamination anticipated for this alternative
health and safety equipment	Allowance based on CDM equipment rates
electrical power service connection	Based on CDM experience
electrical power service supply	Based on expected electrical costs per month for this alternative
water supply	Based on expected use per month for this alternative (e.g., decon, personnel use)
Monitoring Wells	
Leachate monitoring well installation and materials	Cost based on CDM experience in monitoring well installation
Performance monitoring well installation and materials	Cost based on CDM experience in monitoring well installation
Leachate and Containment System Sampling and Analysis	
Labor	Based on 10 hour work day at average CDM labor rate of $60 for oversight personnel
Vehicle	Based on $300/week rental fee for a field vehicle
Equipment	Based on CDM equipment rental rates
Miscellaneous	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
leachate laboratory analysis	Based on average cost incurred for VOC analysis; One duplicate and one blank will be collected per 10 samples.
Vapor Recovery System (VRS)	
VRS well installation	Cost associated with installation of SVE wells. Based on CDM experience.
VRS main system	Vendor: includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator, condensate transfer pump, high condense. level alarm, vac. relief valve, vac. gauges, skid mounting, interconnecting piping and man. motor start switch
VRS control panels	Vendor estimate - NEEP (May 1998)
6" carbon steel pipe	Based on CDM experience
4" carbon steel pipe	Based on CDM experience
Excavation for piping placement (4 foot depth)	12" wide trench and backfill, 48" deep as per 2000 Means
electrical power requirements (10 HP)	Based on 3-phase power, working 24 hrs/day, $0.09/kW-hr
VRS treatment building	Basic prefabricated building on concrete pad. Based on CDM experience.
air/water separator tank	Based on CDM experience
air/water separator tank - condensate disposal	Based on CDM experience
catalytic oxidation	Based on CDM experience
Natural Gas	Based on CDM experience

Table 18 Continued

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT, AREA 7 – ALTERNATIVE SCL-7E: SOIL VAPOR EXTRACTION (SVE)/AIR SPARGING (AS) ALONG GMZ BOUNDARY AND SOURCE AREA / MONITORING / GROUNDWATER USE RESTRICTIONS DETAILED COST ESTIMATE COMMENTS

COST COMPONENT	COMMENTS
Air Sparging (AS)	
AS well installation	Cost associated with installation of AS wells. Based on CDM experience.
AS main system	Vendor: includes blower, exp motor, inline silencer, pressure relief valve, unitized base, pressure gauge and a manual motor starting switch.
AS control panels	Vendor estimate
6" carbon steel piping	Based on CDM experience
4" carbon steel piping	Based on CDM experience
excavation for piping placement	12" wide trench and backfill, 48" deep as per 2000 Means
condensate disposal	Based on CDM experience
electrical power requirements (25 HP)	Based on 3-phase power, working 24 hrs/day, $0.09/kW-hr
AS treatment building	Costs for AS treatment building included with corresponding VRS
air/water separator tank	Costs for air/water separator tank included with corresponding VRS
Catalytic oxidation treatment	Costs for catalytic oxidation treatment included with corresponding VRS

Table 19

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT, AREA 7 ALTERNATIVE SCL-7E: SOIL VAPOR EXTRACTION (SVE)/AIR SPARGING (AS) ALONG GMZ BOUNDARY AND SOURCE AREA / MONITORING / GROUNDWATER USE RESTRICTIONS DETAILED COST ESTIMATE COMMENTS

COST COMPONENT	COMMENTS
Groundwater Use Restrictions	
legal fees	Cost based on CDM experience
General	
construction trailer (rental and delivery)	50'x12' const. trailer, $1.65/mi delivery fee (100mi), rental allowance per 1996 Means
Mobilization	Heavy equipment and trailers, per vendor estimate
Demobilization	Allowance for trailer and equipment demobilization
decon facilities	Based on level of personal and vehicle decontamination anticipated for this alternative
health and safety equipment	Allowance based on CDM equipment rates
electrical power service connection	Based on CDM experience
electrical power service supply	Based on expected electrical costs per month for this alternative
water supply	Based on expected use per month for this alternative (e.g., decon, personnel use)
Monitoring Wells	
Leachate monitoring well install.& materials	Cost based on CDM experience in monitoring well installation
Performance monitoring well install. & matl.	Cost based on CDM experience in monitoring well installation
Leachate and Containment System Sampling and Analysis	
Labor	Based on 10 hour work day at average CDM labor rate of $60 for oversight personnel
Vehicle	Based on $300/week rental fee for a field vehicle
Equipment	Based on CDM equipment rental rates
Miscellaneous	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
leachate laboratory analysis	Based on average cost incurred for VOC analysis; One duplicate and one blank will be collected per 10 samples.
Vapor Recovery System (VRS)	
VRS well installation	Cost associated with installation of SVE wells. Based on CDM experience.
VRS main system	Vendor: includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator, condensate transfer pump, high condense. level alarm, vac. relief valve, vac. gauges, skid mounting, interconnecting piping and a manual motor start switch
VRS control panels	Vendor estimate - NEEP (May 1998)
6" carbon steel pipe	Based on CDM experience
4" carbon steel pipe	Based on CDM experience
Excavation-piping placement (4 foot depth)	12" wide trench and backfill, 48" deep as per 2000 Means
electrical power requirements (10 HP)	Based on 3-phase power, working 24 hrs/day, $0.09/kW-hr
VRS treatment building	Basic prefabricated building on concrete pad. Based on CDM experience.
air/water separator tank	Based on CDM experience
air/water separator tank condensate disposal	Based on CDM experience
catalytic oxidation	Based on CDM experience
Natural Gas	Based on CDM experience

Table 19 Continued

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT, AREA 7 ALTERNATIVE SCL-7E: SOIL VAPOR EXTRACTION (SVE)/AIR SPARGING (AS) ALONG GMZ BOUNDARY AND SOURCE AREA / MONITORING / GROUNDWATER USE RESTRICTIONS DETAILED COST ESTIMATE COMMENTS

COST COMPONENT	COMMENTS
Air Sparging (AS)	
AS well installation	Cost associated with installation of AS wells. Based on CDM experience.
AS main system	Vendor: includes blower, exp motor, inline silencer, pressure relief valve, unitized base, pressure gauge and a manual motor starting switch.
AS control panels	Vendor estimate
6" carbon steel piping	Based on CDM experience
4" carbon steel piping	Based on CDM experience
excavation for piping placement	12" wide trench and backfill, 48" deep as per 2000 Means
condensate disposal	Based on CDM experience
electrical power requirements (25 HP)	Based on 3-phase power, working 24 hrs/day, $0.09/kW-hr
AS treatment building	Costs for AS treatment building included with corresponding VRS
air/water separator tank	Costs for air/water separator tank included with corresponding VRS
catalytic oxidation treatment	Costs for catalytic oxidation treatment included with corresponding VRS

Table 20

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT –AREA 7 ALTERNATIVE SCL-7E SOIL VAPOR EXTRACTION (SVE) AIR SPARGING (AS) ALONG GMZ BOUNDARY AND SOURCE AREA/MONITORING/ GROUNDWATER USE RESTRICTIONS DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction / Installation Costs	Annual O&M Costs	Start-up & Baseline Costs
Groundwater Use Restrictions				**$25,000**	**$0**	**$0**	**$0**
egal fees	Is	1	$25,000	$25,000			
General				**$76,625**	**$40,000**	**$24,000**	**$50,000**
Const. (rental and delivery)	mo	3	$275	$825			
Mobilization	Is	1	$1000	$1,000			
Demobilization	1s	1	$1000	$1,000			
Decon facilities	e	1	$1000	$1,000			
health and safety equipment	M	3	$2000	$6,000		$24,000	
Electrical pwr service connection	Is	1	$5000	$5,000			
Electrical pwr service supply	M	3	$400	$1,200			
Water supply	M	3	$200	$600			
Pilot Scale Study	Is	1	$150,000	$60,000	$40,000		$50,000
Monitoring Wells				**$0**	**$120,000**	**$0**	**$0**
Monitoring well install. & materials	Well	5	$6000		$30,000		
Monitoring well install. & materials	well	15	$6000		$90,000		
Monitoring Well Sampling Analysis (per sampling event)				**$0**	**$0**	**$28,000**	**$0**
Labor	Hours	40	$60			$2,400	
Vehicle	Day	2	$60			$120	
Equipment	Is	1	$600			$600	
Miscellaneous	Is	1	$1000			$500	
Leachate laboratory analysis	Each	20	$230			$4,600	
Quarterly reports	Each	4	$5000			$20,000	
Vapor Recovery Systems (VRS)				**$671,000**	**$132,435**	**$112,700**	**$25,000**
VRS well installation	Each	16	$6000		$96,000		
VRS main system	Is	2	$50,000	$100,000	$20,000	$20,000	$25,000
VRS control panels	Is	2	$10,000	$20,000	$1,000	$4,000	
6” carbon steel piping	ft.	3000	$57	$171,000		$5,000	
4” carbon steel piping	ft	500	$32	$16,000		$3,200	
Excavation for piping placement	ft.	3500	$4.41		$15,435		
Electrical pwr reqmnts (10 HP)	yr.	1	$20,000			$20,000	
VRS treatment building (2 bldgs)	yr	800	$180	$144,000	Included		
Air/water separator tank	Is	2	$10,000	$20,000		$4,000	
Air/water separator tank cond.disp.-	Gal	260	$25			$6,500	
Catalytic Oxidation System	Is	1	$200,000	$200,000	Included	$40,000	
Natural Gas	Is	1	$10,000			$10,000	

Table 20 Continued

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT – AREA 7 ALTERNATIVE SCL-7E SOIL VAPOR EXTRACTION (SVE) AIR SPARGING (AS) ALONG GMZ BOUNDARY AND SOURCE AREA/MONITORING/ GROUNDWATER USE RESTRICTIONS DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction / Installation Costs	Annual O&M Costs	Start-up & Baseline Costs
Air Sparging (AS)				**$290,000**	**$378,935**	**$96,000**	**$25,000**
AS well installation	Each	57	$6,000		$342,000		
AS main system	Is	1	$100,000	$100,000	$20,000	$20,000	$25,000
As control panels	Is	1	$3,000	$3,000	$1,500	$600	
6" carbon steel piping	If	3000	$57	$171,000		$34,200	
4"carbon steel piping	If	500	$32	$16,000		$3,200	
Excavation for piping placement	If	3500	$4.41		$15,435		
Condensate disposal	Gal	520	$25			$13,000	
Electrical pwr. Reqmnts. (25 HP)	year	1	$25,000			$25,000	
AS treatment building							
Air/water separator							
Catalytic oxidation treatment							

Table 21

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT
ROCKFORD, ILLINOIS
FOCUSED FEASIBILITY STUDY
SOURCE AREA 7
ALTERNATIVE SCS-7E: SOIL VAPOR EXTRACTION (SVE)/AIR SPARGING (AS) ALONG SOURCE AREA / MONITORING / GROUNDWATER USE RESTRICTIONS
COST SUMMARY

	Item/Description	Total Cost
CAPITAL COSTS		
	Groundwater Use Restrictions	$25,000
	General	$167,000
	Leachate Monitoring Wells	$120,000
	VRS	$828,000
	Air Sparging	$694,000
	SUBTOTAL CONSTRUCTION COSTS (1)	**$1,834,000**
	Bid Contingency (15%)	$275,000
	Scope Contingency (20%)	$367,000
	Engineering and Design (15%)	$275,000
	Oversight/Health and Safety (5%)	$92,000
	TOTAL CAPITAL COSTS	**$2,843,000**
ANNUAL OPERATING AND MAINTENANCE COSTS		
	General	$24,000
	VRS Regular Maintenance/Electrical	$113,000
	Leachate Sampling and Analysis (per event)	$28,000
	Regular System Maintenance/Electrical	$96,000
	TOTAL ANNUAL COSTS	**$237,000**
REPLACEMENT COSTS		
	Leachate Monitoring Wells (every 15 years)	$29,000
	Equipment Replacement (e.g., motors, blowers) - every 15 years	$30,000
	TOTAL REPLACEMENT COSTS (2)	**$59,000**
PRESENT WORTH ANALYSIS		
	Total Capital Costs (from above) (3)	$2,843,000
	Present Worth Annual O&M Costs (4)	$1,636,000
	Leachate Sampling	
	Quarterly Sampling - years 1 and 2	$207,000
	Semi-annual Sampling - years 3 through 10	$295,000
	Present Worth Replacement Costs (5)	$0
	TOTAL PRESENT WORTH	**$4,981,000**

(1) Capital costs for construction items do not include oversight fees, which are accounted for separately.
(2) Replacement costs include construction and oversight capital costs.
(3) Capital costs represent the present worth of the given alternative.
(4) Present worth of annual O&M costs is based on a 7% discount rate over 10 years.
(5) Present worth of replacement costs is based on a 7% annual discount rate and no replacement of leachate monitoring wells and system equipment.

Table 22

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT AREA 7 LEACHATE ALTERNATIVE SCL-7B MULTI-PHASE EXTRACTION/ COLLECT LEACHATE AND TREAT BY AIR STRIPPING UNIT / DISCHARGE TO ON-SITE SURFACE WATER / GROUNDWATER USE RESTRICTIONS/MONITORING

DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
Groundwater Use Restrictions	
legal fees	Cost based on CDM experience
Leachate Containment System	
mobilization/demobilization for all	Cost based on CDM experience
treatment building	Based on 20 foot x 20 foot bldg. - cost based on Butler Building April 1998 estimate
electrical supply	Based on CDM experience
extraction well installation	4" diameter, stainless steel construction, 35 foot depth with 10 foot screen - cost based on CDM experience of average extraction well installation costs.
pump materials installation	1 pump per well (2 spare) @ 1.2 to 7 gpm flow with/control box each pump - costs based on April 1998 Grundfos cost estimate
2" dia. carbon steel pipe, from well to header	2" diameter carbon steel pipe, 10 foot linkages from each of the 9 wells to treatment unit (with 15% contingency) - cost based on CDM experience
4" dia. carbon steel header pipe to Central Pump Station	4" diameter carbon steel pipe, 10 foot linkages from header pipe to Central Pumping Station (with 15% contingency) - cost based on CDM experience
Central Pump Station	Includes controls - cost based on CDM experience
4" dia. carbon steel pipe from Central Pump Station to air stripper unit	4" diameter carbon steel pipe, 10 foot linkages from Central Pumping Station to treatment unit (with 15% contingency) - cost based on CDM experience
air stripping treatment unit and installation	Shallow Tray air stripper model 2631 with options - cost based on April 1998 North East Environmental Products, Inc. cost estimate
4" discharge pipe to creek	4" diameter carbon steel pipe, 10 foot linkages from treatment unit to Creek (with 15% contingency) - cost based on CDM experience
Leachate Monitoring Wells	
well installation and materials	Cost based on CDM experience in monitoring well installation
Leachate Treatment System Sampling and Analysis (per sampling event)	
Labor	Based on 10 hour work day at average CDM labor rate of $60 for oversight personnel
Vehicle	Based on $60/day rental fee for a field vehicle
Equipment	Based on CDM equipment rental rates
Miscellaneous	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
leachate treatment system laboratory analysis	s analysis; One duplicate and one blank will be collected per 10 samples.
Leachate Monitoring Well Sampling and Analysis (per sampling event)	
Labor	Based on 10 hour work day at average CDM labor rate of $60 for oversight personnel
Vehicle	Based on $60/day rental fee for a field vehicle
Equipment	Based on CDM equipment rental rates
Miscellaneous	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
leachate laboratory analysis	Based on average cost incurred for volatile organic compound analysis; One duplicate and one blank will be collected per 10 samples.

Table 22 Continued

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT AREA 7 LEACHATE ALTERNATIVE SCL-7B MULTI-PHASE EXTRACTION/ COLLECT LEACHATE AND TREAT BY AIR STRIPPING UNIT / DISCHARGE TO ON-SITE SURFACE WATER / GROUNDWATER USE RESTRICTIONS/MONITORING

DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
Multi-Phase Extraction in Source Areas	
Multi-Phase Wells (40 ft., 4 inch PVC with development	Based on CDM experience
MPE System including enclosure	Based on Carbon Air cost estimate
Piping (2 in. PVC @ 3 ft. bgs)	Based on CDM experience
Air Stripper System Expansion	Based on Carbon Air cost estimate
Pilot Study	Based on CDM experience
O&M Materials and Labor	Based on Carbon Air cost estimate
Electricity	Based on Carbon Air cost estimate
Expanded Air Stripper O & M	Based on Carbon Air cost estimate
Expanded Air Stripper / Catalytic Oxidation	Based on Carbon Air cost estimate
Natural Gas	
Multi-Phase Extraction Monitoring	
Multi-Phase Extraction Monitoring Wells	Based on CDM experience
Continuous Recorders Multi-Phase MWs	Based on CDM experience
Pressure Monitoring Points	Based on CDM experience
Geophysical Survey	
Mob/Demob	Based on Ground Truth Environmental cost estimate
Per Diem	Based on Ground Truth Environmental cost estimate
Gamma Ray Logs	Based on Ground Truth Environmental cost estimate
EM-39 Logs	Based on Ground Truth Environmental cost estimate
SIP and VIP off set Logging Stations	Based on Ground Truth Environmental cost estimate

Table 23

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT AREA 7 LEACHATE ALTERNATIVE SCL-7B MULTI-PHASE EXTRACTION/ COLLECT LEACHATE AND TREAT BY AIR STRIPPING UNIT/DISCHARGE TO ON-SITE SURFACE WATER / GROUNDWATER USE RESTRICTIONS/MONITORING DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ Installation Costs	Annual O&M Costs	Start-up & Baseline Costs
Groundwater Use Restrictions				**$25,000**	**$0**	**$0**	**$0**
legal fees	ls	1	$25,000	$25,000			
Leachate Containment System				**$268,100**	**$52,400**	**$17,500**	**$0**
mobilization/demobilization	ls	1	$5,000	$5,000			
treatment building	ls	1	$40,000	$40,000			
electrical supply	ls	1	$5,000	$5,000			
extraction well materials and installation	well	8	$5,800		$46,400		
pump materials and installation	pump	10	$2,000	$20,000	$1,000	$2,500	
2" dia. carbon steel carbon steel pipe from well to header pipe	feet	160	$25	$4,000			
4" dia. carbon steel header pipe to Central Pump Station	feet	2,000	$32	$64,000			
Central Pump Station	ls	1	$54,500	$54,500		$5,000	
4" dia. carbon steel pipe from Central Pump Station to air stripper unit	feet	300	$32	$9,600			
air stripping treatment unit and installation	unit	1	$50,000	$50,000	$5,000	$10,000	
4" carbon steel discharge pipe to creek	feet	500	$32	$16,000			
Leachate Monitoring Wells				**$0**	**$22,500**	**$0**	**$0**
well installation and materials	well	5	$4,500		$22,500		
Leachate Treatment System Sampling and Analysis (per sampling event)				**$0**	**$0**	**$3,760**	**$0**
labor	hours	10	$60			$600	
vehicle	day	1	$60			$60	
equipment	ls	1	$600			$600	
miscellaneous	ls	1	$1,000			$500	
leachate treatment system laboratory analysis	each	2	$1,000			$2,000	
Leachate Monitoring Well Sampling and Analysis (per sampling event) (1)				**$0**	**$0**	**$6,310**	**$0**
labor	hour	60	$60			$3,600	
vehicle	day	3	$60			$180	
equipment	ls	1	$600			$600	
miscellaneous	ls	1	$1,000			$500	
leachate laboratory analysis	each	11	$130			$1,430	

Table 23 Continued

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT AREA 7 LEACHATE ALTERNATIVE SCL-7B MULTI-PHASE EXTRACTION/ COLLECT LEACHATE AND TREAT BY AIR STRIPPING UNIT/DISCHARGE TO ON-SITE SURFACE WATER / GROUNDWATER USE RESTRICTIONS/MONITORING DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ Installation Costs	Annual O&M Costs	Start-up & Baseline Costs
Multi-Phase Extraction in Source Areas				**$425,000**	**$0**	**$92,500**	**$0**
Multi-Phase Wells (40 ft., 4 inch PVC with development	Each	10	$6,000	$60,000			
MPE System including enclosure	Ls	1	$200,000	$200,000			
Piping (2 in. PVC @ 3 ft. bgs)	Lf	2000	$20	$40,000			
Air Stripper System Expansion	Ls	1	$75,000	$75,000			
Pilot Study	Ls	1	$50,000	$50,000			
O&M Materials and Labor	Ls	1	$55,000			$55,000	
Electricity	Ls	1	$9,500			$9,500	
Expanded Air Stripper O & M	Ls	1	$7,000			$7,000	
Expanded Air Stripper / Catalytic Oxidation	Ls	1	$7,000			$7,000	
Natural Gas	Ls	1	$14,000			$14,000	
Multi-Phase Extraction Monitoring				**$43,500**	**$0**	**$0**	**$0**
Multi-Phase Extraction Monitoring Wells	Each	6	$4,500	$27,000			
Continuous Recorders for Multi-Phase MWs	Each	6	$2,000	$12,000			
Pressure Monitoring Points	Each	9	$500	$4,500			
Geophysical Survey				**$85,600**	**$0**	**$0**	**$0**
Mob/Demob	Ls	1	$2,000	$2,000			
Per Diem	Ls	1	$5,000	$5,000			
Gamma Ray Logs	Well	6	$175	$1,050			
EM-39 Logs	Well	6	$175	$1,050			
SIP and VIP off set Logging Stations	Station	612	$125	$76,500			

TOTAL OF ALL ITEMS LISTED BELOW PER ALTERNATIVE

(1) The monitoring schedule over 30 years was assumed as:
Years 1,2 = quarterly sampling: Years 3 through 30= semi-annual sampling (Based on RCRA Closure Guidelines)
These costs are incorporated in each alternative's cost summary under "Annual Operation and Maintenance."

Table 24

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT FOCUSED FEASIBILITY STUDY
AREA 7 LEACHATE ALTERNATIVE SCL-7B: MULTI-PHASE EXTRACTION/COLLECT LEACHATE AND TREAT BY AIR STRIPPING UNIT / DISCHARGE TO ON-SITE SURFACE WATER / GROUNDWATER USE RESTRICTIONS/MONITORING
COST SUMMARY

Item/Description	Total Cost
CAPITAL COSTS	
Groundwater Use Restrictions	$25,000
Leachate Containment System	$321,000
Leachate Monitoring Wells	$23,000
Multiphase Extraction in Source Areas	$425,000
Multiphase Extraction Monitoring	$44,000
Geophysical Survey	$86,000
SUBTOTAL CONSTRUCTION COSTS (1)	**$924,000**
Bid Contingency (15%)	$139,000
Scope Contingency (20%)	$185,000
Engineering and Design (15%)	$139,000
Oversight/Health and Safety (5%)	$46,000
TOTAL CAPITAL COSTS	**$1,433,000**
ANNUAL OPERATING AND MAINTENANCE COSTS	
Leachate Containment System	$18,000
Leachate Treatment System Sampling and Analysis (per sampling event)	$4,000
Leachate Sampling and Analysis (per sampling event)	$6,000
Multi-Phase Extraction in Source Areas	$93,000
TOTAL ANNUAL COSTS	**$121,000**
REPLACEMENT COSTS (2)	
Leachate Containment System (every 15 years)	$281,000
Monitoring Well Replacement (every 15 years)	$44,000
TOTAL REPLACEMENT COSTS	**$325,000**
PRESENT WORTH ANALYSIS	
Total Capital Costs (from above) (3)	$1,433,000
Present Worth Annual O&M Costs (4)	$467,000
Leachate Treatment System Sampling	
Quarterly Sampling - years 1 through 30	$200,000
Leachate Sampling	
Quarterly Sampling - years 1 and 2	$44,000
Semi-annual Sampling - years 3 through 30	$128,000
Present Worth Replacement Costs (5)	$150,000
TOTAL PRESENT WORTH	**$2,422,000**

(1) Capital costs for construction items do not include oversight fees.

(2) Replacement costs include construction *and* oversight capital costs.

(3) Capital costs represent the present worth of the given alternative.

(4) The "Present Worth Annual O&M Cost" line item includes all annual costs except for costs per sampling and analysis event. Costs incurred for sampling and analysis are broken down per sampling schedule as listed. Sampling and analysis costs are based on a 7% discount rate over a 30 year projection for the Multi-Phase Extraction System (Based on RCRA Closure Guidelines).

(5) Present worth of replacement costs is based on a 7% annual discount rate and replacement of monitoring wells and leachate containment system (including central pump station, extraction wells, piping, pumps, and air stripping unit) every 15 years (twice over 30-year projection)

Table 25

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT SOURCE AREA 11 LEACHATE
ALTERNATIVE SCL-11A: NO ACTION / LEACHATE MONITORING / NATURAL ATTENUATION / GROUNDWATER USE RESTRICTIONS
DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
legal fees	Cost based on CDM experience
Leachate Monitoring Wells	
well installation and materials	Cost based on CDM experience in monitoring well installation
Leachate Monitoring Well Sampling and Analysis (per sampling event)	
Labor	Based on 10 hour work day at the average CDM labor rate of $60 for over site personnel
vehicle	Based on $60/day rental fee for a field vehicle
equipment	Based on CDM equipment rental rates
miscellaneous	Incidental expenses (minor repairs, replacement of equipment, local purchases, etc)
leachate laboratory analysis	Based on average cost incurred for VOCs and bioparameters; One duplicate and one blank will be collected per 10 samples.
Air Sparging (AS)	
AS well installation	Cost associated with installation of AS wells. Based on CDM experience.
AS main system	Vendor: includes blower, exp motor, inline silencer, pressure relief valve, unitized base, pressure gauge and a manual motor starting switch.
AS control panels	Vendor estimate
6" carbon steel piping	Based on CDM experience
4" carbon steel piping	Based on CDM experience
excavation for piping placement	12" wide trench and backfill, 48" deep as per 2000 Means
condensate disposal	Based on CDM experience
electrical power requirements (25 HP)	Based on 3-phase power, working 24 hrs/day, $0.09/kW-hr
AS treatment building	Costs for AS treatment building included with corresponding VRS
air/water separator tank	Costs for air/water separator tank included with corresponding VRS
catalytic oxidation treatment	Costs for catalytic oxidation treatment included with corresponding VRS

Table 26

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT SOURCE AREA 11 - LEACHATE

ALTERNATIVE SCL-11A: NO ACTION /LEACHATE MONITORING /NATURAL ATTENUATION/GROUNDWATER USE RESTRICTIONS

DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction / Installation Costs	Annual O&M Costs	Start-up & Baseline Costs
Groundwater Use Restrictions				**$25,000**	**$0**		**$0**
legal fees	ls	1	$25,000	$25,000			
Leachate Monitoring Wells				**$0**	**$18,000**	**$0**	**$0**
Well installation and materials	well	4	$4,500		$18,000		
Sampling and Analysis (per sampling event)				**$0**	**$0**	**$7,920**	**$0**
Labor	hours	60	$60			$3600	
Vehicle	day	3	$60			$180	
Equipment	Is	1	$1,000			$600	
Miscellaneous	Is	1	$1,500			$500	
Leachate laboratory analysis	each	8	$380			$3040	
Air Sparging				**$134,000**	**$102,146**	**$54,440**	**$25,000**
AS well installation	each	13	$6,000		$78,000		
AS main system	ls	1	$100,000	$100,000	$20,000	$20,000	$25,000
AS control panels	ls	1	$3,000	$3,000	$1,500	$600	
6" carbon steel piping	lf	500	$57	$28,500		$5,700	
4" carbon steel piping	lf	100	$32	$3,200		$640	
Excavation for piping placement	lf	600	$4.41		$2,646		
Condensate disposal	gal	100	$25			$2,500	
Electrical power requirements	year	1	$25,000			$25,000	
AS treatment building	Costs for AS treatment building included with corresponding VRS						
air/water separator tank	Costs for air/water separator tank included with corresponding VRS						
catalytic oxidation treatment	Costs for catalytic oxidation treatment included with corresponding VRS						

Table 27

FOCUSED FEASIBILITY STUDY, SOURCE AREA 11 – LEACHATE
ALTERNATIVE SCL-11A: NO ACTION/LEACHATE MONITORING/NATURAL ATTENUATION/GROUNDWATER USE RESTRICTIONS
COST SUMMARY

Item/Description		Total Cost
CAPITAL COSTS		
Groundwater Use Restrictions		$25,000
Leachate Monitoring Wells		$18,000
Air Sparging		$262,000
	SUBTOTAL CONSTRUCTION COSTS	**$305,000**
Bid and Scope Contingency (20%)		$61,000
Oversight/Health and Safety (5%)		$15,000
	TOTAL CAPITAL COSTS	**$381,000**
ANNUAL OPERATING AND MAINTENANCE COSTS		
Leachate Sampling and Analysis (per event)		$8,000
Air Sparging		$54,000
	TOTAL ANNUAL COSTS[(1)]	**$62,000**
REPLACEMENT COSTS[(2)]		
Monitoring Well Replacement (every 15 years)		$29,000
	TOTAL REPLACEMENT COSTS	**$29,000**
PRESENT WORTH ANALYSIS		
Total Capital Costs (from above)[(3)]		$381,000
Present Worth Annual O&M Costs[(4)]		$379,000
Leachate Sampling		
Quarterly Sampling - years 1 and 2		$59,000
Semi-annual Sampling - years 3 through 30		$170,000
Present Worth Replacement Costs[(5)]		$14,000
	TOTAL PRESENT WORTH	**$1,003,000**

(1) Capital costs for construction items do not include oversight fees.
(2) Replacement costs include construction *and* oversight capital costs.
(3) Capital costs represent the present worth of the given alternative.
(4) The "Present Worth Annual O&M Cost" line item includes all annual costs except for costs per sampling and analysis event. Costs incurred for sampling and analysis are broken down per sampling schedule as listed. Sampling and analysis costs are based on a 7% discount rate over a 30-year projection (Based on RCRA Closure Guidelines).
(5) Present worth of replacement costs is based on a 7% annual discount rate and replacement of monitoring wells replacement every 15 years.

Table 28

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT
AREA 9/10 – SOIL
ALTERNATIVE SCS-9/10C: SOIL VAPOR EXTRACTION (SVE)
DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
General	
Construction Trailer(rental and delivery)	
Mobilization	Heavy equipment and trailers, per vendor estimate
demobilization	Allowances for trailer and equipment demobilization
Decon facilities	
Health and safety equipment	Allowances based on CDM equipment rates
Electrical power supply	Based upon expected electrical costs per month for this alternative
Water supply	Based upon expected use per month for this alternative
Soil Vapor Extraction (SVE)	
SVE well installation	Cost associated with installation of SVE wells. Based on CDM experience
SVE main system	Vendor: Includes blower, exp motor, inline air filter, silencers, dilution valve, moisture separator, condensate transfer pump, high condense, level alarm, vac. Relief valve, vac. gauges, skid mounting, interconnecting piping and a manual motor switch.
SVE control panels	Vendor estimate-NEEP (May 1998)
6" carbon steel piping	Based on CDM experience
4" carbon steel piping	Based on CDM experience
Excavation for piping placement	12" wide trench and backfill, 36" deep as per 1996 means
Electrical power requirements 25 HP	Based on 3-phase power, working 24 hrs/day, $0.09/kW-hr
SVE treatment building	Based on prefabricated building on concrete pad. Based on CDM experience
Air/water separator tank	Based on CDM experience
Activated carbon emissions treatment	Based on an estimate form Carbtrol (6/98)for a G-7Absorber carbon unit w/1600 lbs of vapor phase activated carbon designed for 2000 cfm flows
Activated carbon recharge (1600 lb unit)	Based on carbon use 3lb/day and 365 days/year, rate of 1.50/lb carbon recharge
Activated carbon disposal	Based on carbon used per 365/year, rate of $2.00 per lb of carbon
Sampling	Based on CDM experience
Post Treatment Sampling	
Test kits/Field Screening(per year)	Based on CDM experience and average test kit costs-25 samples per test kit, samples collected on a grid of 1 sample /250cy contamination. material ; 1sampling grid per 2weeks
Laboratory analysis (VOCs N,P) (per year)	Based on 1998 sample analysis costs from Midwest laboratories; samples collected on a grid of 1 sample /250cy contamination. material ; 1 sampling grid per 2weeks
Shipping and handling (per year)	Costs associated with transporting samples from site to laboratory twice per month

Table 29

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT
SOURCE AREA 9/10-
ALTERNATIVE SCS-9/10C: SOIL VAPOR EXTRACTION(SVE)
DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction / Installation Costs	Annual O&M Costs	Start-up & Baseline Costs
General				**$3,000**	**$0**	**$18,300**	**$0**
Construction trailer (rental and delivery)	Mo	1	$3,300			$3,300	
Mobilization	Is	1	$1,000	$1,000			
Demobilization	Is	1	$1,000	$1,000			
Decon facilities	Ea	1	$1,000	$1,000			
Health and safety equipment	Yr	1	$9,000			$9,000	
Electrical power	Yr	1	$3,600			$3,600	
Water supply	yr	1	$2,000			$2,400	
Soil Vapor Extraction				**$126,140**	**$32,016**	**$163,900**	**$0**
SVE well installation	ea	4	$6,000		$24,000		
SVE main system	unit	1	$18,000	$18,000	$6,000		
SVE control panels	unit	1	$3,000	$3,000	$1,500	$500	
6" carbon steel piping	Ft	720	$57	$41,040			
4"carbon steel piping	Ft.	50	$32	$1,600			
Excavation for piping treatment	Ft.	770	$0.67		$516		
Electrical power requirements (25 H.P.)	Is	1	$25,000			$25,000	
SVE treatment building	sf	500	$100	$50,000	included		
Air/water separator	Is	1	$5,000	$5,000		$500	
Activated carbon emissions treatment	Is	1	$7,500	7,500		$1,000	
Activated carbon recharge (1,600 lb recharge)	yr	30	$1,640			$49,200	
Activated carbon disposal	yr	30	$2,190			$65,700	
Sampling	ea	8	$1,500			$12,000	
Post Treatment Sampling				**$0**	**$0**	**$147,000**	**$0**
Test kits/Field Screening (per year)	samples	34	$3000			$10,200	
Laboratory Analysis(VOCs,N,P) (per year)	samples	672	$200			$134,400	
Shipping and handling (per year)	shipmt	24	$100			$2,400	

Table 30
SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT
SOURCE AREA 9/10
ALTERNATIVE SCS-9/10C SOILVAPOR EXTRACTION
COST SUMMARY

Item/Description	Total Cost
CAPITAL COSTS	
General	$3,000
Soil Vapor Extraction (w/emission controls)_	$158,000
SUBTOTAL CONSTRUCTION COSTS	**$161,000**
Bid Contingency (10%)	$16,000
Scope Contingency (10%)	$16,000
Engineering and Design (15%)	$24,000
Oversight/Health and Safety (5%)	$8,000
ANNUAL OPERATING AND MAINTENANCE COSTS	
General	$18,000
Regular System Maintenance /Electrical	$164,000
Post Treatment Sampling	$147,000
TOTAL ANNUAL COSTS	**$329,000**
REPLACEMENT COSTS	
TOTAL REPLACEMENT COSTS	**$0**
PRESENT WORTH ANALYSIS	
Total Capital Costs	$225,000
Present Worth Annual O&M Costs	$4,083,000
Present Worth Replacement Costs	$0
TOTAL PRESENT WORTH	**$4,308,000**

Table 31

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT AREA 9/10
ALTERNATIVE SCL-9/10E: AIR SPARGING(AS) ALONG GMZ BOUNDARY AND SOURCE AREA/MONITORING /GROUNDWATER USE RESTRICTIONS
DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	COMMENTS
Groundwater Use Restrictions	
Legal fees	Cost based on CDM experience
General	
Construction trailer (rental and delivery)	50 X 12 ft const. trailer –$1.65/mi delivery fee (100mi)-rental allowance per 1996 means
mobilization	Heavy equipment and trailers, per vendor estimate
demobilization	Allowance for trailer and equipment demobilization
Decon facilities	Based upon level of personal and vehicle decontamination anticipated for this alternative.
Health and safety equipment	Allowance based on CDM equipment rates.
Electrical power service supply	Based on expected electrical costs per month for this alternative
Water supply	Based on expected use per month for this alternative (e.g. decon, personnel Use)
Leachate Monitoring Wells	
Well installation and materials	Cost based upon CDM experience in monitoring well installation.
Leachate and Containment System Sampling and Analysis	
labor	Based on 10 hour work day at the average CDM labor rate of $60 for oversight personnel
vehicle	Based on $300/week rental fee for a field vehicle
Equipment	Based on CDM equipment rental rates
miscellaneous	Incidental expenses (minor repairs, replacement of equipment, local Purchases, etc.)
Leachate laboratory analysis	Based on an average cost incurred for VOC analysis; One duplicate and one blank will be collected per 10 samples.
Vapor Recovery System (VRS)	
VRS installation	Cost associated with installation of SVE wells. Based on CDM experience
VRS Main System	Vendor: includes blower, exp motor, inline filter, silencers dilution valve Moisture separator, condensate transfer pump, level alarm, Vacuum gauges, skid mounting, interconnecting piping and manual motor start switch.
VRS control panels	Vendor estimate- NEEP (May 1996)
6" carbon steel pipe	Based on CDM experience
4" carbon steel pipe	Based on CDM experience
Excavation for piping placement	12"wide trench and backfill, 36" deep as per 1996 means
Electrical power requirements 10 h.p	Based on 3-phase power working 24 hours/day, $0.09 kW-hr
VRS Treatment building	Basic prefabricated building on concrete pad. Based on CDM experience.
Air/water separator tank	Based on CDM experience
Activated carbon	Based on CDM experience

Table 31 Continued

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT AREA 9/10
ALTERNATIVE SCL-9/10E: AIR SPARGING(AS) ALONG GMZ BOUNDARY AND SOURCE AREA/MONITORING /GROUNDWATER USE RESTRICTIONS
DETAILED COST ESTIMATE - COMMENTS

COST COMPONENT	*COMMENTS*
Air Sparging (AS)	
AS well installation	Cost Associated with installation of AS wells. Based on CDM experience
AS min system	Vendor: includes blower, exp motor, inline silencer, pressure relief valve Unitized base, pressure gauge and a manual motor switch.
AS control panels	Vendor estimate
6" carbon steel piping	Based on CDM experience
4" carbon steel piping	Based on CDM experience
Excavation for piping placement	96 Means
Electrical power requirements (25 HP)	Based on 3 phase power, working 24 hours/day, 0.09kW-hr
AS treatment building	Costs for AS treatment building included with corresponding VRS
Air/water separator tank	Costs for air/water separator tank included with VRS
Activated carbon treatment	Costs for carbon air treatment included with corresponding VRS

Table 32

**SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT SOURCE AREA9/10
LEACHATE ALTERNATIVE SCL-9/10E, AIR SPARGING (AS) ALONG GMZ
BOUNDARY AND SOURCE AREA/ MONITORING/GROUNDWATER USE RESTRICTIONS
DETAILED COST ESTIMATE**

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ Installation Costs	Annual O&M Costs	Start-up & Baseline Costs
Groundwater Use Restrictions				**$25,000**			
Legal fees	Is	1	$25,000	$25,000			
General				**$1,038,000**	**$0**	**$0**	
trailer(rental and delivery)	mo	360	$275	$99,000			
mobilization	Is	1	$1,000	$1,000			
demobilization	Is	1	$1,000	$1,000			
Decon facilities	Ea	1	$1,000	$1,000			
Health and safety equipment							
Electrical power service	Mo	360	$2,000	$720,000			
supply	Mo	360	$400	$144,000			
Water supply	mo	360	$200	$72,000			
Leachate Monitoring Wells			**$0**	**$0**	**$22,500**	**$0**	**$0**
Well installation and materials	well	5	$4,5000	&0	$22,500		
Leachate Monitoring Well Sampling And Analysis (per event)				**$0**	**$0**	**$3,270**	**$0**
labor	hours	20	$60			$1,200	
vehicle	days	1	$60			$60	
equipment	Is	1	$600			$600	
miscellaneous	Is	1	$1,000			$500	
Leachate laboratory analysis	each.	7	$130			$910	
Vapor Recovery System				**$355,000**	**$67,059**	**$25,500**	**$0**
VRS well installation	ea	10	$6,000		$60,000		
VRS main system	Is	2	$14,000	$14,000	$5,000	$10,000	
VRS control panels	Is	2	$3,000	$3,000	$1,000	$500	
6” carbon steel piping	Ft	1530	$57	$87,210			
4” carbon steel piping	Ft	50	$32	$1600			
Excavation- piping placement	Ft	1580	$0.67		$1,059		
Elect. Pwr. requirements10 hp	yr	1	$20,000			$10,000	
VRS treatment building (2)	sf	800	$100	$80,000	included		
Air/water separator tank	Is	2	$5,000	$10,000		$1,000	
Carbon adsorption,emissions	Is	2	$80,000	$160,000	included	$4,000	

Table 32 Continued

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT SOURCE AREA9/10 LEACHATE ALTERNATIVE SCL-9/10E, AIR SPARGING (AS) ALONG GMZ BOUNDARY AND SOURCE AREA/ MONITORING/GROUNDWATER USE RESTRICTIONS DETAILED COST ESTIMATE

COST COMPONENT	Unit	No. Units	Unit Cost	Capital Cost	Construction/ Installation Costs	Annual O&M Costs	Start-up & Baseline Costs
Air Sparging (AS)				**$131,950**	**$98,907**	**$35,500**	**$0**
AS well installation	ea	15	$6,000		$90,000		
As main system	Is	1	$18,000	$18,000	$6,000	$10,000	
As control panels	Is	1	$3,000	$3,000	$1,500	$500	
6” carbon steel piping	If	1750	$57	$99,750			
4” carbon steel piping	If	350	$32	$11,200			
Excavation - piping placement	If	2100	$0.67		$1407		
Elect. Pwr. requirements25 hp	year	1	$25,000			$25,000	
AS treatment building	Included above						
Air/water separator tank	Included above						
Activated carbon treatment	Included above						

Table 33

SOUTHEAST ROCKFORD SOURCE CONTROL OPERABLE UNIT SOURCE AREA 9/10 LEACHATE ALTERNATIVE SCL-9/10E AIR SPARGING (AS) ALONG GMZ BOUNDARY AND SOURCE AREA/LEACHATE MONITORING/GROUNDWATER USE RESTRICTIONS COST SUMMARY

Item/Description	Total Cost
CAPITAL COSTS	
Groundwater Use Restrictions	$25,000
General	$1,038,000
Leachate Monitoring Wells	$23,000
VRS	$423,000
Air Sparging	$231,000
Subtotal Construction Costs	**$1,740,000**
Bid Contingency 15%	$261,000
Scope Contingency 20%	$348,000
Engineering and Design 15%	$261,000
Oversight/Health and Safety	$87,000
Total Capital Costs	**$2,697,000**
Annual Operating and Maintenance Costs	
VRS Regular Maintenance/Electrical	$26,000
Leachate Sampling and Analysis per event	$3,000
Regular System Maintenance/Electrical	$36,000
Total Annual Costs	**$65,000**
Replacement costs	
Leachate Monitoring Wells (every 15 years)	$29,000
Equipment (eg. Blowers motors) every 15 years	$30,000
Total Replacement Costs	**$59,000**
Present Worth Analysis	
Total Capital costs (from above)	$2,697,000
Present Worth Annual O&M Costs	$807,000
Quarterly Leachate Sampling-years 1&2	$22,000
Semi-annual Sampling –years 3 through 30	$64,000
Present Worth Replacement Costs	$29,000
Total Present Worth	**$3,619,000**

(1). Capital costs for construction items do not include oversight fees, which are accounted for separately.
(2). Replacement costs include construction and oversight capital costs
(3). Capital costs represent the present worth of the given alternative
(4). Present worth of annual O&M cost is based on a 7% discount rate over a life of 30 years.

(5). Present worth of replacement costs is based on a 7% annual discount rate and replacement of system equipment every 15 years (once over a 30 year projection)

STATUTORY DETERMINATIONS

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The risk posed by drinking contaminated groundwater and the risk posed by the contaminated soil in the four source areas were considered separately by the Illinois EPA and U.S. EPA for the Southeast Rockford Groundwater Contamination project. In October 1995, after carefully considering public comment, the Illinois EPA and U.S. EPA chose "Use Restrictions" as the remedy for the area groundwater that predictably would be impacted by contamination within the next 70 years. The remedy for the groundwater was implemented in 1998.

A human health risk assessment was conducted on the soil in each of the four source areas. The human health risk assessment followed a tiered approach, in conformance with Tiered Approach to Corrective Action Objectives (TACO). TACO is a program used by the Illinois EPA for developing remediation objectives for contaminated soil and groundwater. Development of these remediation objectives includes protecting human health and the environment and takes into account site conditions and land use. TACO must work within existing laws and regulations, therefore, the use of TACO for the development of remediation objectives for the Southeast Rockford Groundwater Contamination Site needed to meet guidelines in accordance with CERCLA, RAGS, RCRA, and 35 Ill. Adm. Code Part 620.

Three exposure pathways were considered in this assessment: (1) direct contact with soil (including ingestion and inhalation); (2) the soil component of the groundwater ingestion pathway; and (3) ingestion of vegetables. An evaluation was conducted for the direct contact with soil pathway and the soil component of the groundwater pathway. Chemical concentrations found at the site were compared to a combination of pre-established screening values, background concentrations and practical quantitation limits (PQLs). A PQL is the level at which a chemical can be reliably measured in the laboratory.

A risk assessment was also conducted for the soil component of the groundwater pathway (for chemicals which exceeded values established under Tier 1 assessment) and the ingestion of vegetables pathway for Area 7 only. Based on land use in this area, the close proximity of farmland, and the absence of institutional controls, it was determined that an agricultural scenario could not be ruled out.

Sampling data collected from the surface and subsurface soil of each of the four source areas were compared to the Tier 1 Exposure Route-Specific Values (ingestion and inhalation) for soil protective of residential areas and the Soil Component of the Groundwater Ingestion Exposure Route Values for Class I groundwater. The direct contact (ingestion and inhalation) values are protective of direct contact with soil, while the soil component of the groundwater protection values are protective of groundwater impacted by contaminants that could leach from soil.

As directed by Illinois EPA, it was assumed that all four-source areas were, or could become, residential areas. Currently, no land use restrictions are in place to prevent residential development or expansion. Therefore, it was necessary to employ soil remedial objectives that would be protective of residential land use. Because the exposure assumptions for the residential scenario are standardized, with few site-specific modifications, there was no advantage in developing Tier 3 values. Therefore, Tier 1 values were used.

Because several chemicals (that could impact groundwater) exceeded Tier 1 objectives for soil, Tier 3 soil remediation objectives (SROs) were developed. Tier 3 risk-based soil levels protective of groundwater are presented in Tables in this ROD for each Source Area. The SROs are back-calculated from the Groundwater Remediation Objective (GRO) presented for Class I Groundwater in Section 742, Appendix B: Table F of TACO. While most of the GROs are based on a hazard index of 1.0 or a cancer risk of one in one million, in some cases, the GRO is based on a higher cancer risk. Therefore, a mixture assessment was conducted according to the Illinois EPA mixture rule issued under Docket C of the Illinois Pollution Control Board (December 4, 1997) to determine what the risks would be if all of the SROs for the soil to groundwater pathway were achieved. This assessment demonstrated that, in accordance with TACO, total cancer risk associated with the SROs for the soil to groundwater pathway would not exceed an excess lifetime risk of one in ten thousand or a hazard index of 1.0 if all SROs were achieved.

RESULT OF THE DIRECT PATHWAY (TIER 1)

The results of the Tier 1 assessment of the direct contact pathway can be summarized as follows:

? Maximum concentrations of volatile organic compounds (VOCs) did not exceed their respective Tier 1 values in any of the focus areas.

? Maximum concentrations of semi-volatile organic compound (SVOCs) and inorganics exceeded their respective direct contact (ingestion and inhalation) Tier 1 values in all four areas.

? Maximum concentrations of inorganics and one SVOC in Area 7, (benzo (a) pyrene), were dropped from further evaluation, because detected concentrations were less than or consistent with background concentrations. Risk associated with these chemicals are below 1×10^{-6} (1E-06, one in one million) and/or a hazard index of 1.0.

? Selected samples in Areas 4 (SS4-201, SS4-203, SS4-203D) and 11 (SS11-206, SS11-207) were identified as "hot spots" that exceeded a Tier 1 value and the Practical Quantitation Limit (PQL).

? Three out of four samples in Area 9/10 (SS910-101, SS910-103, SS910-104) exceeded one or more Tier 1 values. These data are presented in Appendix B. The "hot spots" in Areas 4 and 11 and the samples exceeding a Tier 1 value in Area 9/10 will be addressed in the FFS. The FFS will evaluate whether or not additional SVOC data may be needed in the remedial design phase to better characterize risk and the extent of contamination. Based on the results of sampling, if necessary, remedial alternatives that address SVOCs would be developed and evaluated. The presence of these hot spots represents a potential exceedence of risk limits established by the U.S. EPA (a noncancer hazard index of 1.0 and cancer risks of between one in one million and one in one hundred thousand) and the Illinois EPA (a noncancer index of 1.0 and cancer risks of one in one million used to develop the Tier 1 values), depending on actual exposure.

RESULTS OF THE SOIL TO GROUNDWATER PATHWAY (TIER 1)

The results of the Tier 1 assessment of the soil to groundwater pathway can be summarized as follows:

? Several chemicals were dropped from further evaluation for the soil to groundwater pathway because they were not detected in groundwater (Dieldrin, carbazole and several SVOCs).

? VOCs in surface soil in Area 4 and VOCs in subsurface soil in all four areas exceeded Tier 1 soil component of the groundwater protection values. These VOCs were further evaluated in Tier 3. A Tier 3 assessment was conducted for those chemicals that exceeded a soil component of the groundwater protection value and were detected in groundwater during past sampling events at greater than 5 percent frequency of detection. The Tier 3 assessment consisted of calculating soil concentration protective of groundwater at a designated point of compliance.

RESULTS OF THE SOIL COMPONENT OF THE GROUNDWATER INGESTION PATHWAY (TIER 3)

The results of the Tier 3 assessment of the soil component of the groundwater ingestion pathway can be summarized as follows:

? Chemicals of concern in Areas 4, 7, and 11 exceed their respective SROs. Two additional chemicals of concern in Area 11 exceed their respective saturation concentrations, but not the calculated SRO. Risks associated with chemicals that exceed an SRO in Areas 4, 7 and 11 exceed Illinois EPA cancer risk limits of one in one million or a hazard index of 1.0.

? All areas where detected concentrations exceeded the lower of the SRO or saturation concentration were further evaluated in the FFS. Volumes estimates were developed for these areas for excavation or remediation purposes.

? Area 7 borders land currently used for agricultural purposes, and no current zoning restrictions prevent conversion of some of the undeveloped portions of Area 7 to agricultural use. For these reasons, a semi-quantitative evaluation was conducted to determine whether the use of Area 7 for growing vegetables or fruits would result in an unacceptable risk to human health. Based on this evaluation, it is concluded that ingestion of vegetables (or fruits which have a fresh weight consumption rate lower than vegetables, i.e., 88 mg/day) would not result in exceedence of either a hazard index of 1.0 or a cancer risk of 1E-06 (one in one million), which are the risk limits on which the Tier 1 values are based.

CONCLUSION

A combination of a Tier 1 and Tier 3 assessment was used to assess risks to human health. At Areas 4, 7, 9/10 and 11, Tier 1 was used to evaluate the direct contact pathway and the migration of soil to groundwater. Tier 3 was used to evaluate the migration of soil to groundwater pathway (for those chemicals that exceeded Tier 1 values) and the ingestion of vegetables pathway (for Area 7 only). The Tier 1 assessment resulted in the identification of SVOCs above Tier 1 values in Areas 4, 9/10 and 11. If these SVOCs were removed, all remaining concentrations of SVOCs would be less than the higher of the PQL or Tier 1 concentration. The Tier 3 Assessment resulted in remediation goals for VOCs in all four-source areas and was also used to develop a remediation plan.

SUMMARY OF ECOLOGICAL RISK ASSESSMENT OF SOIL IN AREA 7

Although the 1995 groundwater ROD concluded that the contaminated groundwater did not pose a long-term environmental (ecological) risk to the Rock River, Illinois EPA is required to consider the ecological risk of the contaminated soil in the source areas. However, TACO may not be used to establish ecological remediation goals. Therefore, an ecological assessment was conducted at Area 7 per U.S. EPA guidelines. Ecological assessments were not conducted at Areas 4, 9/10 and 11, because site characteristics (consisting mostly of pavement and buildings) are not highly suitable as habitat for significant populations of plants and animals. Also, some corrective action objectives cannot be used because, as they are currently designed, TACO values only consider human health risk and not environmental risk.

An Ecological Risk Assessment (ERA) was conducted at Area 7 to evaluate the likelihood that adverse ecological effects may occur (or are occurring) at the site as a result of exposure to single- or multiple-chemical stressors. Risks result because of contacts between ecological receptors and stressors that are sufficiently long in duration and of sufficient intensity to elicit adverse effects. The primary purpose of this screening-level ERA is to identify contaminants in surface water and sediment that can result in adverse effects to present or future ecological receptors.

This ERA is based primarily on a screening-level approach in which measured chemical concentrations in surface water and sediment are compared to relevant-effect concentrations. This ERA is intended to provide information that can help establish remedial priorities and serve as a scientific basis for regulatory and remedial actions for the site. The general approach used to conduct this ERA is based on site-specific information and on recent EPA guidance, primarily Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (EPA 1997a), supplemented by Guidance for Ecological Risk Assessment (EPA 1998).

Risks to ecological receptors are summarized below, within categories designated as low risk and risk. No sources of moderate or high risks are identified for this ERA. The differentiation of low and no risks is used to evaluate the relative risks associated with specific stressors compared to all other potential contributors to risks. These designations are based on both the quantitative risk estimates presented previously and best professional judgment.

LOW RISK

? Sensitive aquatic biota such as benthic invertebrates can be adversely affected by direct contact with surface water in the creek adjacent to Area 7. The only COPC of concern in water at this location is:

    1,1,1-trichloroethane

? Similar organisms may be additionally at risk from direct contact with creek sediments. Major sediment-associated COPCs at this location include:

    benzo(a)anthracene
    methoxychlor
    chrysene

NO RISK

? Aquatic and semi-aquatic organisms do not appear to be at significant risk from any other COPCs identified at this site.

? Consumers of aquatic and semi-aquatic organisms (e.g., piscivorous birds, omnivorous upper trophic level predators), represented by belted kingfisher and red fox, respectively, do not appear to be at significant risk.

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

The remedies for the ROD are subject to federal Applicable or Relevant and Appropriate Requirements (ARARs) and any more stringent state regulations. The determination of ARARs has been made in accordance with Section 121(d)(2) of CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and the Small Business Liability Relief and Brownfields Revitalization Act of 2002. These ARARs are also consistent with the National Contingency Plan (NCP) 40 CFR Part 300; amended March 8, 1990. ARARs are federal, or more stringent state requirements, that the remedial alternative(s) must achieve, that are legally applicable to the substance or relevant and appropriate under the circumstances. Administrative requirements such as obtaining permits and agency approvals, record keeping, reporting and off-site activities such as waste disposal regulated by state or municipalities would also be considered applicable or relevant and appropriate regulations. It is important to note that, as identified at Section 121(e) of CERCLA, and in the NCP at 40 CFR 300.400(e), no federal, state, or local permits are required for any remedial actions conducted entirely on-site. However, all on-site emissions and/or discharges would need to attain a level of treatment and management meeting all substantive technical requirements that might otherwise be included in a permit. Any emissions or discharges that leave the site or any response actions that are conducted off-site are subject to all applicable permitting requirements.

The status of a requirement under Section 121(d) of CERCLA and other environmental laws, both federal and state, may be either applicable or relevant and appropriate to the remedial alternative, but not both. The NCP (40 CFR 300.5) defines these terms as follows:

APPLICABLE REQUIREMENTS

Those clean-up standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA 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 OR APPROPRIATE REQUIREMENTS

Those clean-up standards, standards of control and other substantive requirements, criteria or limitations described above, that, while not applicable, address problems or situations sufficiently similar to those encountered at a CERCLA site that their use is well-suited to the particular site.

In addition to ARARs, the U.S. EPA has identified federal and state non-promulgated criteria, advisories and guidance as requirements to be considered (TBC) as part of the FS analysis. TBCs are used on an as appropriate basis in developing clean-up standards. TBCs do not have the same status as ARARs and are not considered to be required clean-up standards because they are not promulgated regulations.

OTHER REQUIREMENTS TO BE CONSIDERED (TBCs)

Non-promulgated federal and state advisories or guidance documents do not have status as potential ARARs; however, these advisories or guidance documents may be considered in determining the necessary level of cleanup for the protection of health or the environment.
As specified in 40 CFR 300.430(f)(1)(ii)(C)(1) – (6), a remedial alternative that does not meet an ARAR under federal or state environmental laws can still be selected given any of the following six limited circumstances:

? The alternative is an interim measure and will become part of a total remedial action that will attain the applicable or relevant and appropriate federal or state requirement;

? Compliance with the requirement will result in greater risk to human health and the environment than other alternatives;

? Compliance with the requirement is technically impracticable from an engineering perspective (e.g., technical impracticability waiver for groundwater);

? The alternative will attain a standard or performance that is equivalent to that required under an otherwise applicable standard, requirement, or limitation through the use of another method or approach;

? With respect to a state requirement, the state has not consistently applied, or demonstrated the intention to consistently apply, the promulgated requirement in similar circumstances at other remedial actions within the state; and

? For Superfund-financed response actions only, an alternative that attains the ARAR will not provide a balance between the need for protection of human health and the environment with the availability of fund monies to respond to other sites that may present a threat to human health and the environment.

TYPE/STATUS OF ARARs

ARARs are divided into three types of requirements: chemical specific; location specific; and action specific. This distinction is based on the factors that trigger the requirement (e.g., emission of a chemical or particular action such as transportation of a chemical). These types of ARARs are defined as follows:

? Chemically Specific Requirements are set health or risk-based concentration limits or ranges in various environmental media for specific hazardous substances, pollutants or contaminants that is acceptable in the ambient environment. Examples of chemical specific ARARs are National Ambient Water Quality Standards.

? Location Specific Requirements are set restrictions on activities, depending on the characteristics of a site or its immediate receptors. A remedial alternative may be restricted or eliminated due to the location or characteristics of the site and the requirements that apply to it. Examples of location specific ARARs are regulations based on proximity to wetlands and flood plains.

? Action Specific Requirements are set controls or restrictions on particular kinds of activities related to the management of hazardous substances, pollutants or contaminants. These requirements are not triggered by specific chemicals at a site, but rather by the particular activities to be conducted during the implementation of the remedial alternative (technology or activity-based requirements). Examples of action specific ARARs are transportation and handling requirements.

Only chemical specific ARARs are candidates for site cleanup goals. Action specific and location-specific ARARs apply to the execution of the selected remedial alternative.

<u>Identification of Federal ARARs for the S.E. Rockford Site</u>
This section presents a summary of those federal regulations that may be found to be applicable or relevant and appropriate to the S.E. Rockford site, specifically:

? Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), including the Superfund Amendments and Reauthorization Act (SARA) of 1986, the Small Business Liability Relief and Brownfields Revitalization Act of 2002 and subsequent amendments;

? Resource Conservation and Recovery Act of 1996, as amended (RCRA);

? Hazardous and Solid Waste Act Amendments of 1984 (HSWA);

? The Clean Water Act (CWA) and Amendments;

? The Safe Drinking Water Act (SDWA);

? The Clean Air Act (CAA);

? The National Environmental Policy Act of 1969 (NEPA); and

? The Hazardous Materials Transportation Act.

<u>The Comprehensive Environmental Response, Compensation and Liability Act</u>
CERCLA, last amended in January 2002, provides the U.S. EPA Administrator the authority to respond to any past disposal of hazardous substances and any new uncontrolled releases of hazardous substances. Within CERCLA, a trust fund has been established for cleanup of abandoned past disposal sites and leaking underground storage facilities, as well as the authority to bring civil actions against

violators of this act. The National Contingency Plan (NCP), which guides removal and remedial actions at Superfund sites, was developed subject to this act.
The Superfund Amendments and Reauthorization Act (SARA) of 1986 extensively amended CERCLA. The major goals of SARA were to include more public participation, and to establish more consideration of State clean-up standards, with an emphasis on achieving remedies that permanently and significantly reduce the mobility, toxicity, or volume of wastes.

The Resource Conservation and Recovery Act
RCRA regulates the management and land disposal of hazardous waste and solid waste material and the recovery of materials and energy resources from the waste stream. RCRA regulates the generation, transportation, treatment, storage and disposal of hazardous wastes, as well as solid waste disposal facilities. RCRA applies to remedial actions that include disposal, treatment, storage or transportation of regulated wastes. Remedies that include on-site disposal of hazardous wastes will be required to meet RCRA design, monitoring, performance, e.g., air emission standards 35 Ill. Adm. Code 724, and closure standards. Off-site transportation of regulated wastes, whether as part of a remedial action or as generated during the investigation, will require use of the manifest system, a RCRA-licensed transporter and proof of acceptance at a licensed facility approved for the particular wastes.

The Hazardous and Solid Waste Act Amendments
The Hazardous and Solid Waste Act Amendments (HSWA) of 1984 impose new and more stringent requirements on hazardous waste generators, transporters, and owner/operators of treatment, storage, and disposal facilities. Land disposal restrictions, as described in 40 CFR 268, identify hazardous wastes that are restricted from land disposal and define those limited circumstances under which an otherwise prohibited waste may continue to be land disposed.

The Clean Water Act
The Federal Water Pollution Control Act, amended by the Clean Water Act of 1977, was last amended October 1992, and is commonly referred to as the Clean Water Act (CWA). Federal Ambient Water Quality Criteria documents have been published for 65 priority pollutants listed as toxic under the CWA. These criteria are guidelines that may be used by states to set surface water quality standards. Although these criteria were intended to represent a reasonable estimate of pollutant concentrations consistent with the maintenance of designated water uses, states may appropriately modify these values to reflect local conditions. Under SARA, however, remedial actions must attain a level or standard of control that will result in surface water conditions equivalent to these criteria, unless a waiver has been granted.

The water quality criteria are generally represented in categories that are aligned with different surface water-use designations. These criteria represent concentrations that, if not exceeded in surface water, should protect most aquatic life against acute or chronic toxicity. For many chemical compounds, specific criteria have not been established because of insufficient data. The criteria are used to calculate appropriate limitations for discharges to surface water. These limitations are incorporated in the National Pollutant Discharge Elimination System (NPDES) permits.

The provisions of the CWA are potentially applicable to uncontrolled landfill leachate and groundwater discharges to surface water bodies and to remedial actions that include a discharge of treated water to surface water.

Appendix A of 40 CFR Part 6 describes the requirements for flood plain/wetlands review of proposed U.S. EPA actions. These regulations are potentially applicable for work to be done in the creeks or other wetland areas, and for remedial activities within the flood plain, such as the unnamed creek in Area 7.

The Safe Drinking Water Act

The Safe Drinking Water Act of 1974 (SDWA) regulates the quality of water collected, distributed or sold for drinking purposes. Standards are set for MCLs permissible in water delivered to any user of public drinking water. The SDWA also has been broadened to protect groundwater and public drinking water supplies against contamination.

National primary drinking water standards established under the SDWA are promulgated as MCLs that represent the maximum allowable levels of specific contaminants in public water systems. MCLs are generally based on lifetime exposure to the contaminant for a 70 kg (154 pound) adult who consumes two liters (0.53 gallons) of water per day.

The SDWA provides for primary drinking water regulations to be established for maximum contaminant level goals (MCLGs), with MCLs as close to MCLGs as feasible. MCLGs are non-enforceable health goals at which no known or anticipated adverse effects on the health of persons would be expected to occur, thus allowing an adequate margin of safety. MCLGs only serve as goals for U.S. EPA in the course of setting MCLs and, therefore, are initial steps in the MCL rule-making process.

MCLs and MCLGs for contaminants of concern at the SCOU are established in the final Risk Assessment (CDM 1998).

The Clean Air Act

The Clean Air Act, as amended (CAA), was enacted to protect and enhance the quality of air resources to protect public health and welfare. The CAA is intended to initiate and accelerate national research and development programs to achieve the prevention and control of air pollution. Under the CAA, the Federal Agencies are to provide technical and financial assistance to state and local governments for the development and execution of their air pollution programs. The U.S. EPA is the administrator of the Act and is given the responsibility to meet the objectives of the Act. The Act establishes emission levels for certain hazardous air pollutants that result from treatment processes.

Requirements of the CAA are potentially applicable to remedial actions that result in air emissions, such as excavation and treatment activities.

The Hazardous Materials Transportation Act

The Hazardous Materials Transportation Act (HMTA) of 1981, as amended, was enacted to regulate the shipping, marking, labeling, and placing of hazardous materials that are transported on public roadways. Pursuant to the HMTA, the Department of Transportation (DOT) has promulgated regulations pertaining to transportation of hazardous materials. DOT also has jurisdiction over the packaging of hazardous materials prior to shipment.

Hazardous soils, residues, wastewaters, or wastes that are transported off-site from the SCOU site will be handled according to HMTA and DOT regulations.

Identification of State ARARs for the S.E. Rockford SCOU

The purpose of this section is to identify ARARs that exist based on Illinois state regulations that must be complied with when performing a remedial action. The agency charged with developing and enforcing environmental regulations for Illinois is the Illinois EPA, in conjunction with the Illinois Pollution Control Board. Specifically, these potential ARARs include:

? Illinois Groundwater Protection Act

? Illinois Solid Waste Management Rules; and

? Illinois Air Pollution Control Regulations

Illinois Groundwater Protection Act

The Illinois Groundwater Protection Act (IGPA) was enacted on November 7, 1991 (amended in 1994) by the Illinois General Assembly (IGA) as an outgrowth of long-standing concern by the IGA and the citizens of Illinois that the State's rich and valued groundwater resources be protected. The IGPA is a multi-faceted groundwater policy and program statement designed to provide such protection and to assure the continued viability of the State's groundwater resources. In order to restore, protect, enhance and manage the groundwater of Illinois, the IGPA proposes regulations that establish comprehensive water quality standards specifically for the protection of groundwater.

Groundwater impacted by activities at the SCOU will be compared to the Illinois groundwater quality standards to determine the need for corrective actions, if any. The IGPA is incorporated into the Illinois Administrative Code in Title 35, Subtitle F (Public Water Supplies), Part 620 Groundwater Quality; groundwater quality standards are given in Subtitle D of this Part 620.

Illinois Water Quality Standards (35 Ill. Adm. Code Subtitle C: Water Pollution and Subtitle F: Public Water Supplies)

These regulations pertain to all waters in the state and are intended to restore and maintain the chemical, physical and biological integrity of the waters of the state. The regulations include:

? Specific water quality standards and minimum treatment requirements that apply to all waters of the state (see Subtitle C: Part 302 water quality standards). These include minimum surface water quality standards, effluent standards and general use water quality standards.

? Regulations applying to industrial wastewater programs (National Pollutant Discharge Elimination System – NPDES);

? Water quality standards for water distributed through public water supply systems (Subtitle F, specifically). These include primary drinking water standards and groundwater monitoring requirements; and

? Groundwater quality standards for Class I-IV groundwater (defined in Subtitle F: Part 620) with potential for use in public water supply systems.

The procedures for developing water quality criteria based on toxicity are included in Ill. Adm. Code Subtitle C: Part 302, Subpart F, as are procedures for evaluating the characteristics of receiving waters. These procedures are used to determine discharge concentrations, which if not exceeded, will maintain the quality of the receiving waters. Note that Subpart F: Section 620.130 exempts groundwater from the General Use Standards or Public and Food Processing Standards of Subparts B and C of 35 Ill. Adm. Code 302. It is the purpose of all of the mentioned water quality regulations to meet the requirements of Section 402 of the Federal Clean Water Act (CWA).

Illinois Solid Waste Management Rules (35 Ill. Admin. Code Subtitle G: Waste Disposal)
These regulations specify requirements that apply to solid waste and hazardous waste facilities. These include solid waste management requirements, hazardous waste management permitting and related hazardous waste operations requirements. The solid waste regulations are given specifically under Subchapter I: Solid Waste and Special Waste Handling, Parts 807-880. These regulations include design and disposal regulations as well as monitoring requirements and standards for groundwater protection applicable to solid waste and special waste landfills. The hazardous waste regulations were developed pursuant to the requirements of RCRA and are given specifically in Parts 700-750 of Subtitle G. These hazardous waste regulations pertain to generators and transporters of hazardous waste and owners or operators of hazardous waste facilities. Regulations regarding Underground Injection Control (UIC) and the handling of Universal Wastes are also included in this section.

Illinois Air Pollution Control Regulations (35 Ill. Admin. Code Subtitle B: Air Pollution)
The Illinois air pollution control regulations were developed pursuant to the Federal Clean Air Act (CAA). The regulations contain specific emission levels and requirements for monitoring emissions. They contain regulations for specific types of operations (such as burning) and types of industry as well as permitting requirements. There are also specific emissions standards for hazardous air pollutants. Subchapter F, Part 232 provides information regarding toxic air contaminants and Subchapter L, Part 243 of these regulations give Air Quality Standards.

IDENTIFICATION OF ARARs

The regulatory groups previously described were considered during the ARAR identification process. This includes federal and state requirements (applicable or relevant and appropriate). Other information to be considered (TBCs) include federal and state criteria, advisories and guidance documents. The identification of ARARs presented in this section was based on current knowledge of the site, available analytical data and review of ARARs established for sites with similar contamination. The ARARs from other sites were derived by reviewing EPA RODs from sites both within and outside of Region V, based on selected remedial alternatives and final ARARs chosen for these sites.

Table 35 provides a summary of potential ARARs at the SCOU. Based on the anticipated remedial actions at the site, some of these potential ARARs may not apply and are marked in the last column of Table 35. The ARARs that will apply have a direct effect upon the remedial actions selected. The following paragraphs discuss some examples of this direct effect.

NPDES, Illinois Underground Injection Control (UIC) and Illinois Air Emission Source Construction permits can be obtained, but may take considerable lengths of time. The Illinois EPA Division of Air Pollution Control will require off-gas containment of any air stripper that exceeds a total volatile emission rate of 8 pounds per hour. Any groundwater that is remediated will require treatment to MCLs or IGWPA levels, whichever is more stringent; or to NPDES discharge levels, depending on the discharge option selected. MCLs and IGWPA Class I Groundwater Standards for all VOCs that exceed MCLs in groundwater are provided in tables in this ROD.

The IGWPA was set up in 1987 to respond to the need to manage groundwater quality by prevention-oriented processes. It establishes comprehensive water quality standards for groundwater, provides for the use of water well protection zones and allows for the establishment of groundwater management zones (GMZs) within any class of groundwater. A GMZ can be established where groundwater is being managed to mitigate against effects caused by the release of contaminants from a site. GMZ provisions recognize the practical limitations commonly associated with remediating groundwater contamination and links technological approaches and practices with standards regulation. The area of a GMZ can be established with reference to a given point of compliance and an appropriate period of time to achieve compliance. The groundwater within the study area is considered Class I groundwater, under the definitions provided by the Act.

Publicly Owned Treatment Works (POTWs) are designated to treat domestic wastewater or sewage. In general, POTWs are not designated to treat heavy metals, solvents, organics and other types of toxic pollutants. POTWs are certainly not for off-site treatment or disposal of contaminated groundwater. The treatment of toxic pollutants, if it occurs at all in a POTW treatment plant, is incidental to the design of most POTWs and involves, to a large extent, taking advantage of the treatment system's ability to dilute non-domestic or industrial discharges, as well as adsorption of toxic pollutants to particles that settle out into the sludge. Thus, a significant portion of the heavy metals and organic compounds that are introduced into the head-works of a POTW treatment plant end up in the POTWs sewage sludge. Therefore, this ROD has assumed that discharge to the POTW is not acceptable, unless appropriate pre-treatment steps were taken. It is noted that the local POTW has indicated that it would not accept any contaminated leachate collected from the SCOU.

Illinois EPA Bureau of Water regulations governing the construction and operation of treatment units are found at 35 Ill. Adm. Code Sections 302, 304, and 309. Section 302 contains water quality standards, Section 304 contains effluent limitations and Section 309 deals with permitting requirements.

The construction of a groundwater treatment system in most cases requires a permit from the Bureau of Water. A burden of proof is placed upon the permittee to justify that the proposed treatment system is capable of meeting either the surface water discharge standards or general pretreatment standards for discharge to a sanitary sewer. It is also required that the selected remedy is the correct technology and design specifications are correct for the contaminants of concern.

The National Pollutant Discharge Elimination System (NPDES) is utilized when a discharge is made to any surface water. The NPDES program provides for a non-degradation analysis of the receiving stream water quality analysis, and a review of the parameters of concern to determine the appropriate limits and monitoring requirements. Permit limits are derived from the more stringent applicable water quality standards, technology based effluent limits, and federal categorical limitations (not applicable in this case).

Air Strippers are part of the selected remedy for Source Areas 4 & 7 and have been determined by the Illinois EPA Bureau of Water to be an appropriate effective technology for the removal of VOCs. VOCs in both areas are the primary contaminants of concern, however, the effectiveness of the air-stripping system will be deferred until the design is completed and submitted.

A permeable reactive barrier wall was the proposed remedy for remediation of the leachate in Source Area 9/10. The Illinois EPA, however, modified the remedy used for leachate control in this area, based on additional data and analysis of the potential sources of contamination and public comment. The remedy will be designed to meet regulations of Public Water Supplies and 35 Ill. Adm. Code Part 620 Class I Groundwater Standards for potable water supplies.

Sampling requirements vary from site to site, however, a protocol that has worked well for remediation systems is to require more frequent initial monitoring. Once consistency is established, the frequency of sampling may be reduced. One method frequently used is to require weekly sampling during the first two months of operation, twice a month sampling during the next two months and finally monthly sampling thereafter. A shutdown of the system would require a return to weekly sampling for a period of time, before returning to the previous sampling frequency. Situations may call for a variance in the frequency of sampling, requiring more sampling following a period of shutdown. The additional sampling will allow for adjustments to be made in the establishment of system equilibrium.

Discharge Limits are based upon the most up-to-date information gathered for the parameters of concern. Table 34 includes both aquatic toxicity and human-health-based criteria. In most cases, the AATC (acute criteria) is used as the daily maximum quality-based limit. In some rare cases, a human-health-based limit may be used as the monthly average limit, depending on the potential for longer-term exposure. Discharge would be to a storm ditch, which would most likely be a zero low flow stream and therefore, water quality criteria would apply at the end of the pipe and would be the permit limits.

Table 34. Discharge Limits

Parameter	Acute Criteria	Chronic Criteria	Human Health
1,1 dichloroethylene	3000 ug/l	240 ug/l	0.95 ug/l
1,2-dichloroethylene	14 mg/l	1.1 mg/	-
ethyl benzene	210 ug/l	17 ug/l	9.3 mg/l
tetrachloroethylene	1.2 mg/l	0.15 mg/l	2.8 ug/l
toluene	2000 ug/l	230 ug/l	62 mg/l

1,1,1-trichloroethane	4900 ug/l	390 ug/l	-
1,1,2-trichloroethane	19 mg/l	4.4 mg/l	12 ug/l
trichloroethylene	12 mg/l	0.94 mg/l	25 ug/l
xylenes	0.92 mg/l	0.073 mg/l	62 mg/l

Note: Technology based (BAT) limits are normally used for Benzene (0.05 mg/l) and Total BTEX (benzene, ethylbenzene, toluene, and xylenes) (0.75 mg/l).

Table 35
Summary of ARARS
Southeast Rockford SCOU Focused Feasibility Study

Act/Regulation	Federal or State	Type of ARAR	Parameter/ Program	Description	Probably Will Not Apply
Action Specific					
Air Pollution Emission Control Regs. (63)	S	Action	Air emission	Permit required for all emissions. Requires control of off-gas if emission > 8 lbs/hr	
Air - Pollution Control Board (64)	S	Action	Air emission	No person shall cause or threaten or allow the discharge or emission of any contaminant	
Air - Pollution Control Board (65)	S	Action	Air emission	Regulates particulate matter emissions	
CWA(50)	F/S	Action	NPDES	Discharge permit required (to Rock River)	
CWA/RCRA (49-51)	F/S	Action	POTW	Regulates discharge to POTW	X
CWA(49)	F	Action	NPDES	POTW pre-treatment standards relating to Superfund site leachate	
CWA(56)	F	Action	NPDES	Establishes Water Quality Based Effluent Limitations	
CWA(50)	F	Action	National pre-treatment standards	Discharge to POTW restrictions	
CWA(51)	F/S	Action	National pre-treatment standards	National pre-treatment program requirements for POTWs	
CAA(34)	F	Action	Air quality	Sets max. primary and secondary 24-hour particulate concentrations	

CWA(52)	F/S	Action	NPDES	Permit must include proposed action and list all other permits	
CWA(53)	F/S	Action	NPDES	Establish standards, limitations and other conditions	

Table 35 Continued
Summary of ARARS
Southeast Rockford SCOU Focused Feasibility Study

CWA(54)	F	Action	NPDES	BAT for toxic and non-conventional wastewater or BCT for conventional	
CWA(61)	F	Action	Env. sampling	Requires adherence to sample preservation, container type, and holding times	
CWA(56)	F/S	Action	NPDES	Effluent limitations and standards; permit requirements for discharge to storm sewer	
CWA(57)	F/S	Action	NPDES	Establish discharge limits for toxins exceeding BAT/BCT standards	
CWA(60)	F/S	Action	Surface water	States granted enforcement jurisdiction over discharges to surface waters	
CWA(58)	F/S	Action	NPDES	Requires monitoring to ensure compliance	
DOT(36)	F	Action	Haz. mat. transportation	Procedures for packaging, labeling and transportation of hazardous materials	
Fish and Wildlife Coordination Act(62)	F	Action	Surface Water	Any fed. agency must consult U.S. Fish and Wildlife if a surface water body is modified	
Noise Control Act(37)	F	Action	Construction noise emission standards	Sets standards for construction noise emissions	
Protection of	F	Action	Archeological	Procedures for	X

Table 35 Continued
Summary of ARARS
Southeast Rockford SCOU Focused Feasibility Study

Archeological Resources(38)			resource protection	archeological resource protection	
RCRA	F/S	Action	UIC	Regulates injection of groundwater	X
RCRA(48)	F/S	Action	T & D standards	Interim storage or treatment of haz. waste in containment buildings	
RCRA(47)	F/S	Action	T & D standards - haz waste storage	Standards for haz. waste storage in containers, surface impoundments and landfills	
RCRA(46)	F/S	Action	T & D standards	Requirements for closure and post-closure of haz. waste facilities	
RCRA(45)	F/S	Action	T & D standards - groundwater	Requirements for groundwater monitoring program	
RCRA(44)	F/S	Action	T & D standards	Sets standards for T & D facility storage and treatment, design, emergency and preparedness plans	
RCRA(43)	F/S	Action	UST regs.	Sets requirements for UST closure	
RCRA(42)	F/S	Action	RCRA land disposal restriction	Defines haz. waste debris and applies to wastes disposed off-site	
RCRA(41)	F/S	Action	T & D standards	Sets requirements for haz. waste man. unit closure	
RCRA(40)	F/S	Action	Haz. waste transport and disposal (T & D)	Sets standards for haz. waste generators and transporters	
RCRA(39)	F/S	Action	Land disposal of solid waste	Solid, nonhaz. remediation derived waste disposal procedures	
UIC Regulations (72-	S	Action	UIC	Permit and controls	

Table 35 Continued
Summary of ARARS
Southeast Rockford SCOU Focused Feasibility Study

74)				required	
Illinois Groundwater Protection Act (79)	S	Action/ Chemical	Groundwater	Establishes groundwater management zones	
RCRA (69)	F/S	Action/ Chemical	Spent Carbon	Manifest/Transport/ Regenerate Spent Carbon	
Chemical Specific					
CAA(1)	F	Chemical	Air emission	Sets regs. On national primary and secondary air quality standards	

Table 35 Continued
Summary of ARARS
Southeast Rockford SCOU Focused Feasibility Study

CWA(2)	F/S	Chemical	Water quality	Establishes water quality standards	
Air - Pollution Control Board(8)	S	Chemical	Air permits and provisions	Lists provisions for new sources requiring permits	
Air - Pollution Control Board(9)	S	Chemical	Air permits and provisions	Defines emission sources and sets limitations	
Air - Pollution Control Board(10)	S	Chemical	Air permits and provisions	Sets air quality standards and measurement methods for lead, CO, nitrogen and sulfur oxides	
Air - Pollution Control Board(11)	S	Chemical	Air permits and general provisions	Sets provisions and procedures for id. and evaluating toxic air contaminants	
Air - Pollution Control Board (12)	S	Chemical	Air emissions	VOM emissions limited to <20 ppm	
Air - Pollution Control Board (13)	S	Chemical	Air emissions	CO emissions from incinerators limited to <500 ppm	
CAA (1)	F	Chemical	VC	VC emissions limited to <10 ppm	
Public Water Supplies Poll. Control Board(20)	S	Chemical	Primary Drinking Water Standards	MCLs, primary drinking water standards, analytical requirements	
Public Water Supplies Poll. Control Board(19)	S	Chemical	Illinois Groundwater Quality	Illinois groundwater quality standards, class designations	
SDWA (3)	F	Chemical	MCLs	Sets MCLs for public drinking water	
RCRA(5)	F/S	Chemical	Solid Waste	Sets criteria for identifying haz. waste	
RCRA(4)	F/S	Chemical	Solid waste	Sets treatment standards for waste extract incl. hazardous waste	
RCRA(6)	F/S	Chemical	Solid Waste	Identifies charac. of haz. waste	

Table 35 Continued
Summary of ARARS
Southeast Rockford SCOU Focused Feasibility Study

RCRA(7)	F/S	Chemical	Solid Waste	List of haz. waste from sources	

Table 35 Continued
Summary of ARARS
Southeast Rockford SCOU Focused Feasibility Study

Waste Disposal - Pollution Control Board(76)	S	Chemical	Solid waste and special waste hauling	Solid waste permitting, san. landfill closure and post-closure, and waste classification	
Waste Disposal - Pollution Control Board(16)	S	Chemical	Hazardous waste landfill disposal	Describes haz. waste restrictions on halogenated solvents and liquid wastes	
Waste Disposal - Pollution Control Board(17)	S	Chemical	Hazardous waste lists and criteria	Solid waste permitting, sanitary landfills, closure & post closure care, and special waste classifications	
Waste Disposal - Pollution Control Board(14)	S	Chemical	Hazardous waste lists and criteria	Identifying and listing hazardous waste (includes PCB wastes under TSCA)	
Waste Disposal - Pollution Control Board(15)	S	Chemical	Hazardous waste landfill disposal	Defines landfill waste disposal restrictions, treatment standards and prohibitions	
Water - Pollution Control Board(19)	S	Chemical	Effluent Standards	General and temp. effluent standards incl. NPDES	
Water - Pollution Control Board(18)	S	Chemical	Water Quality Standards	Water quality criteria, public and food processing water supply	X
Location Specific					
CWA(22)	F	Location/Action	Wetland dredge and fill permits	Requires no wetland alteration if practical alternative available	X
Air - Pollution Control Board(30)	S	Location	Air emissions standards	Distinguishes air emission standards for Chicago and Metro East Area	
Air - Pollution Control Board(29)	S	Location	Construction permitting	Application for construction and operating permits including review	X

Table 35 Continued
Summary of ARARS
Southeast Rockford SCOU Focused Feasibility Study

Fish and Wildlife Coordination Act(23)	F	Location	Water body modification	Any federal agency must consult U.S. Fish and Wildlife prior to water body modification	

Table 35 Continued
Summary of ARARS
Southeast Rockford SCOU Focused Feasibility Study

Flood Control Act(27)	F	Location	Flood plain construction	Req. approval for any construction in floodway outside Superfund boundary	
NEPA(25)	F	Location	Floodplain Management	Req. fed. agencies to mitigate flooding and preserve flood plains	
NEPA(24)	F	Location	Protection of Wetlands	Requires federal agencies to minimize degradation and preserve wetlands	
RCRA(27)	F/S	Location	100 year floodplain	Controls type of construction in 100 year floodplain	X
Waste Disposal - Pollution Control Board(31)	S	Location	RCRA permit	RCRA permit application rules, applicability and information	
Water - Pollution Control Board(33)	S	Location	NPDES and water related permitting	Includes NPDES permit provisions and other water related permitting	
Water - Pollution Control Board(32)	S	Location	Water use and site specific standards	Establishes site specific water quality standards in Illinois	

COST EFFECTIVENESS

The types of costs that will be assessed include the following:

? Capital costs, including both direct and indirect costs;

? Annual operation and maintenance costs (O&M);

? Cost of periodic replacement of system components; and

? Net present value of capital and O&M costs based on a 30-year period.

Capital costs consist of direct (construction) and indirect (non-construction and overhead) costs. Direct costs include expenditures for the equipment, labor, and materials necessary to install remedial actions. Indirect costs include expenditures for engineering, financial and other services that are not part of actual installation activities, but are required to complete the installation of remedial alternatives. A bid contingency of 10 to 15 percent, a scope contingency based on the level of difficulty to implement the alternative and costs for engineering design and implementation of the alternative were included as indirect costs.

Annual operation and maintenance costs are post-construction costs necessary to ensure the continued effectiveness of a remedial action. Periodic replacement costs are necessary when the anticipated duration of the remediation exceeds the design life of the system component.

A present worth analysis is used to evaluate expenditures that occur over different time periods, by discounting all future costs to a common base year, usually the current year. A discount rate of seven percent was used for the present worth analysis. This allows the cost of remedial action alternatives to be compared on the basis of a single figure representing the amount of money that, if invested in the base year and disbursed as needed, would be sufficient to cover all costs associated with the remedial action over its planned life. The total present worth costs presented in this section were estimated as accurately as possible, but were prepared for comparative purposes only. The actual costs for each alternative may change upon detailed design and implementation, but the overall cost difference of one alternative relative to another should not vary significantly.

CHEMICAL SPECIFIC REQUIREMENTS

Federal

(1) Clean Air Act (42 U.S.C. §§ 7401 et seq.), National Primary and Secondary Ambient Air Quality Standards (40 CFR 50), U.S. EPA regulations on National Primary and Secondary Ambient Air Quality Standards.

(2) Clean Water Act (33 U.S.C. §§ 1251 et seq.), Water Quality Standards (40 CFR 131), U.S. EPA regulations on establishing water quality standards.

(3) Safe Drinking Water Act (42 U.S.C. §§ 300f et seq.), Maximum Contaminant Levels (40 CFR 141.11 - 141.16), sets standards for contaminants in public drinking water supplies.

(4) Solid Waste Disposal Act, as amended (42 U.S.C. §§ 6901 et seq.), Land Disposal Restrictions (40 CFR 268) Subpart D, Treatment Standards, sets the treatment standards for waste extract, specified technology and hazardous waste debris.

(5) Solid Waste Disposal Act, (42 U.S.C. §§ 6901 et seq.), Identification and Listing of Hazardous Waste (40 CFR 261) Subpart B, Criteria for Identifying the Characteristics of Hazardous Waste and for Listing Hazardous Waste, sets criteria for identifying a hazardous waste.

(6) Solid Waste Disposal Act, (42 U.S.C. §§ 6901 et seq.), Identification and Listing of Hazardous Waste (40 CFR 261) Subpart C, Characteristics of Hazardous Waste, identifies the characteristics of a hazardous waste.

(7) Solid Waste Disposal Act, (42 U.S.C. §§ 6901 et seq.), Identification and Listing of Hazardous Waste (40 CFR 261) Subpart D, List of Hazardous Waste, list of hazardous waste from sources.

State

(8) Air – Illinois Environmental Protection Act, Section 9 (415 ILCS 5/9), Pollution Control Board (Title 35), Subtitle B - Subchapter A, Part 201: Permits and General Provisions, lists general provisions for new sources requiring permitting. Exemptions from permit requirement are also given.

(9) Air - Illinois Environmental Protection Act, Section 9 (415 ILCS 5/9), Pollution Control Board (Title 35), Subtitle B - Subchapter C Emission Standards and Limitations for Stationary Sources, Part 211: Definitions and General Provisions, defines emission sources and related items; Part 212 Visible and Particulate Matter Emissions sets emission limitations for particulate matter for a variety of operations, i.e., incinerators or waste storage piles. Also see Parts 214-219, which gives information regarding specific types of emissions per operation e.g., sulfur, organic material, carbon monoxide and nitrogen oxide emissions.

(10) Air - Illinois Environmental Protection Act, Section 9 (415 ILCS 5/9), Pollution Control Board (Title 35), Subtitle B - Subchapter L, Part 243: Air Quality Standards, sets air quality standards and measurement methods for PM-10, particulates, sulfur oxides, carbon monoxide, nitrogen oxides, ozone and lead.

(11) Air - Illinois Environmental Protection Act, Section 9 (415 ILCS 5/9), Pollution Control Board (Title 35), Subtitle B - Subchapter F, Part 232: Toxic Air Contaminants, sets provisions and procedures for identifying and evaluating toxic air contaminants; exceptions are also given here.

(12) Air - Illinois Environmental Protection Act, Section 9 (415 ILCS 5/9), Pollution Control Board (Title 35), Subtitle B – Air Pollution, Part 215: Organic Material Emissions Standards and Limitations, sets emission standards for volatile organic material for a variety of operations.

(13) Air - Illinois Environmental Protection Act, Section 9 (415 ILCS 5/9), Pollution Control Board (Title 35), Subtitle B – Air Pollution, Part 216: Carbon Monoxide Emissions, sets emission standards for carbon monoxide for a variety of operations.

(14) Waste Disposal - Illinois Environmental Protection Act, Section 21 (415 ILCS 5/21), Pollution Control Board (Title 35), Subtitle G - Subchapter C: Hazardous Waste Operating Requirements, Part 721: Identification of Listing of Hazardous Waste, includes PCB wastes regulated under TSCA, universal wastes, criteria for identifying and listing hazardous waste, and lists of hazardous waste.

(15) Waste Disposal - Illinois Environmental Protection Act, Section 21 (415 ILCS 5/21), Pollution Control Board (Title 35), Subtitle G - Subchapter C: Hazardous Waste Operating

Requirements, Part 728: Land Disposal Restrictions, defines land disposal restrictions for wastes, waste specific prohibitions, treatment standards, and prohibitions on storage.

(16) Waste Disposal - Illinois Environmental Protection Act, Section 21 (415 ILCS 5/21), Pollution Control Board (Title 35), Subtitle G - Subchapter C: Hazardous Waste Operating Requirements, Part 729: Prohibited Hazardous Wastes in Land Disposal Units, describes general hazardous waste restrictions and restrictions on halogenated solvents and liquid hazardous wastes in landfills.

(17) Waste Disposal - Illinois Environmental Protection Act, Section 21 (415 ILCS 5/21), Pollution Control Board (Title 35), Subtitle G - Subchapter I: Solid Waste and Special Waste Hauling, Part 807 includes information on solid waste permitting, sanitary landfills and closure and post-closure care; Part 808 includes information on special waste classifications.

(18) Water - Illinois Environmental Protection Act, Section 12 (415 ILCS 5/12), Pollution Control Board (Title 35), Subtitle C - Part 302: Water Quality Standards, provisions and water quality standards for general use, public and food processing water supply, secondary contact and indigenous aquatic life and Lake Michigan. Procedures for determining Water Quality Criteria are also in this Part.

(19) Water - Illinois Environmental Protection Act, Section 12 (415 ILCS 5/12), Pollution Control Board (Title 35), Subtitle C - Part 304: Effluent Standards, general and temporary effluent standards including NPDES effluent standards.

(20) Public Water Supplies - Illinois Environmental Protection Act, Section 14 (415 ILCS 5/14), Pollution Control Board (Title 35), Subtitle F - Part 611: Primary Drinking Water Standards, includes provisions of the primary drinking water standards as well as maximum contaminant levels (MCLs)/goals, and analytical requirements.

(21) Public Water Supplies - Illinois Environmental Protection Act, Section 14 (415 ILCS 5/14), Pollution Control Board (Title 35), Subtitle F - Part 620: Groundwater Quality, includes Illinois groundwater quality standards as well as definition of groundwater class designations.

Location-Specific Requirements

Federal

(22) Clean Water Act, (33 U.S.C. §§ 1251 et seq.), Permits for Dredge or Fill Material (Section 404), requires that no activity that adversely affects a wetlands shall be permitted if a practicable alternative that has less effect is available.

(23) Fish and Wildlife Coordination Act (16 U.S.C. §§ 661 et seq.), requires that any federal agency that proposes to modify a body of water must consult U.S. Fish and Wildlife Services.

(24) National Environmental Policy Act (42 U.S.C. § 4321) Executive Order 11990, Protection of Wetlands, requires federal agencies to minimize the destruction, loss, or degradation of Wetlands and preserve.

(25) National Environmental Policy Act (42 U.S.C. § 4321) Executive Order 11988, Floodplain Management, requires federal agencies to reduce the risk of flood loss, to minimize impact of floods, and to restore and preserve the natural and beneficial value of flood plains.

(26) National Environmental Policy Act (42 U.S.C. § 4321) Statement of Procedures on Floodplain Management and Wetland Protection (40 CFR 6) Appendix A to Part 6, promulgates Executive Orders 11988 and 11990 regarding wetlands and flood plains.

State

(27) Flood Control Act (ILCS 14-28-1), requires formal approval for any construction, excavation or filling in the floodway outside of the Superfund boundary.

(28) Water Resources Management Act (ILCS-14-25-7), requires registration of any significant water withdrawal facility with the Department of Natural Resources. A significant water withdrawal facility is defined as any water withdrawal facility that, in the aggregate from all sources and by all methods, has the capacity to withdraw more than 100,000 gallons of groundwater or surface water or a combination of the two in one day. This would also include any potable pumps employed by the facility.

(29) Air - Illinois Environmental Protection Act, Section 9 (415 ILCS 5/9), Pollution Control Board (Title 35), Subtitle B - Subchapter A, Part 201, Subpart D: Permit Application and Review Process, describes contents of the application for construction and operating permits and the review process.

(30) Air - Illinois Environmental Protection Act, Section 9 (415 ILCS 5/9), Pollution Control Board (Title 35), Subtitle B - Subchapter C Emission Standards and Limitations for Stationary Sources, Part 218: Organic Material Emission Standards and Limitations for the Chicago Area; Part 219: Organic Material Emission Standards for the Metro East Area, distinguishes emission standards for the Chicago Area and the Metro East Area - see detailed regulation for applicability to the S.E. Rockford site.

(31) Waste Disposal - Illinois Environmental Protection Act, Section 21 (415 ILCS 5/21), Pollution Control Board (Title 35), Subtitle G - Subchapter B: Permits, Part 703: RCRA Permit Program, rules on application for and issuance of RCRA permits; applicability and information requirements.

(32) Water - Illinois Environmental Protection Act, Section 12 (415 ILCS 5/12), Pollution Control Board (Title 35), Subtitle C - Part 303: Water Use Designations and Site Specific Water Quality Standards, provisions and site specific water quality standards for water bodies throughout Illinois.

(33) Water - Illinois Environmental Protection Act, Section 12 (415 ILCS 5/12), Pollution Control Board (Title 35), Subtitle C - Part 309: Permits, Subpart A includes provisions for NPDES permits and Subpart B includes provisions for all other water related permitting.

ACTION-SPECIFIC REQUIREMENTS

Federal

(34) Clean Air Act, (42 U.S.C. §§ 7401 et seq.), National Primary and Secondary Ambient Air Quality Standards (40 CFR Part 50), specifies maximum primary and secondary 24-hour concentrations for particulate matter.

(35) Clean Water Act, (33 U.S.C. §§ 1251 et seq.), Permits for Dredge or Fill Material (Section 404), provides requirements for discharges of dredged or fill material. Under this requirement, no activity that affects a wetland shall be permitted if a practicable alternative that has less impact on the wetland is available. If there is no other practicable alternative impacts must be mitigated. A Section 401 water quality certification may be required from Illinois EPA if wetlands or other waters of the state are impacted.

(36) Department of Transportation Rules for Transportation of Hazardous Materials, (49 CFR Parts 107, 171.1 - 171.5), outlines procedures for the packaging, labeling, and transporting of hazardous materials.

(37) Noise Control Act, as amended (42 U.S.C. §§ 4901 et seq.); Noise Pollution and Abatement Act (40 U.S.C. §§ 7641 et seq.), Noise Emission Standards for Construction Equipment (40 CFR 204), the public must be protected from noise that jeopardizes health and welfare.

(38) Protection of Archeological Resources (32 CFR Part 229, 229.4; 43 CFR Parts 107, 171.1 - 171.5), develops procedures for the protection of archeological resources.

(39) Solid Waste Disposal Act, as amended (42 U.S.C. §§ 6901 et seq.), Guideline for the Land Disposal of Solid Wastes (40 CFR 241), Part B - Requirements and Recommended Procedures, solid, nonhazardous wastes generated as a result of remediation must be managed in accordance with federal and state regulations; this is applicable to waste generated by the remedial action.

(40) Solid Waste Disposal Act, as amended (42 U.S.C. §§ 6901 et seq.), Standards for Hazardous Waste Generators (40 CFR 262) and Standards for Hazardous Waste Transporters (40 CFR 263); general requirements for packaging, labeling, marking, and manifesting hazardous wastes for temporary storage and transportation offsite. Any residues determined to be RCRA hazardous waste destined for offsite disposal are subject to manifest requirements. Remedial actions involving offsite disposal of RCRA listed wastes will be subject to this requirement.

(41) Solid Waste Disposal Act, as amended (42 U.S.C. §§ 6901 et seq.), Interim Status Standards for Owners and Operators of Hazardous Waste Treatment Storage and Disposal Facilities (40 CFR 265), Storage, and Disposal General Facility Standards, Subpart G, Closure and Post-closure, sets general requirements for closure of interim status hazardous waste management units.

(42) Solid Waste Disposal Act, as amended (42 U.S.C. §§ 6901 et seq.), Land Disposal Restriction-RCRA (40 CFR 268), RCRA Land Disposal Restriction, defines hazardous waste debris. This requirement is applicable to those RCRA hazardous wastes that will be disposed offsite.

(43) Solid Waste Disposal Act, as amended (42 U.S.C. §§ 6901 et seq.), Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (40 CFR 280), Subpart G, Out-of-Service UST Systems and Closure, sets requirements for temporary and permanent UST closure, and assessing the site closure.

(44) Solid Waste Disposal Act, as amended (42 U.S.C. §§ 6901 et seq.), Standards for Owners and Operators of Hazardous Waste Treatment Storage, and Disposal Facilities (40 CFR 264), Subpart B, General Facility Standards; Subpart C, Preparedness and Prevention; Subpart D, Contingency Plan and Emergency Procedures; Subpart E, Manifest System, Record Keeping and Reporting, establishes general requirements for storage and treatment facility location, design and inspection, waste compatibility determination, emergency contingency plans, preparedness plans, and worker training.

(45) Solid Waste Disposal Act, as amended (42 U.S.C. §§ 6901 et seq.), Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (40 CFR 264) Subpart F, Releases from Solid Waste Management Units, details requirements for a groundwater monitoring program to be installed at the site.

(46) Solid Waste Disposal Act, as amended (42 U.S.C. §§ 6901 et seq.), Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (40 CFR 264)

Subpart G, Closure and Post-Closure, defines specific requirements for closure and post-closure of hazardous waste facilities.

(47) Solid Waste Disposal Act, as amended (42 U.S.C. §§ 6901 et seq.), Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (40 CFR 264), Subpart I, Use and Management of Containers; Subpart J, Tank Systems; Subpart K, Surface Impoundments; Subpart L, Waste Piles; and Subpart N, Landfills. Containers, surface impoundments, and landfills used to store hazardous waste must be closed and in good condition. Tank systems must be adequately designed and have sufficient structural strength and compatibility with the wastes to be stored or treated to ensure that it will not collapse, rupture, or fail, including secondary containment. Waste piles must be designed to prevent migration of wastes out of the pile into adjacent subsurface soil or groundwater or surface water at any time during its active life. Disposal of special wastes in landfills must be done in accordance with requirements.

(48) Solid Waste Disposal Act, as amended (42 U.S.C. §§ 6901 et seq.), Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (40 CFR 264), Subpart DD, Containment Building. Hazardous waste and debris may be placed in units known as containment buildings for the purpose of interim storage or treatment.

The following is a list of potential ARARs for Superfund sites that discharge treated groundwater to Publicly Owned Treatment Works (POTW):

(49) Clean Water Act, (33 U.S.C. §§ 1251 et seq.), National Pollutant Discharge Elimination System (NPDES) Permit Regulations [40 CFR 122.42(b)], requires notification of issuing authority of re-evaluation of POTW pretreatment standards. In the event that the POTW does not have a local limitation for a particular pollutant found in the leachate from a Superfund site, it must re-evaluate its local limitations, and develop a limitation if necessary to protect the POTW from interference, pass-through, or contamination of the sewage sludge.

(50) Clean Water Act, (33 U.S.C. §§ 1251 et seq.), National Pretreatment Standards (40 CFR 403.5), discharge to a POTW must not interfere, pass through untreated into the receiving waters, or contaminate sludge.

(51) Clean Water Act, (33 U.S.C. §§ 1251 et seq.), National Pretreatment Program Requirements for POTWs (40 CFR 403.8(f)).

The following is a list of potential ARARs for Superfund sites that discharge treated groundwater to surface water bodies:

(52) Clean Water Act, (33 U.S.C. §§ 1251 et seq.), NPDES Permit Regulations (40 CFR 122.21), permit application must include a detailed description of the proposed action including a listing of all required environmental permits.

(53) Clean Water Act, (33 U.S.C. §§ 1251 et seq.), NPDES Permit Regulations (40 CFR 122.44), establishes limitations, standards and other NPDES permit conditions, including federally approved State water quality standards.

(54) Clean Water Act, (33 U.S.C. §§ 1251 et seq.), NPDES Permit Regulations (40 CFR 122.44(a)), Best Available Technology (BAT) for toxic and non-conventional wastewater or Best Conventional Technology (BCT) for conventional pollutants.

(55) Clean Water Act, (33 U.S.C. §§ 1251 et seq.), NPDES Permit Regulations (40 CFR 122.44(b)), effluent limitations and standards requirements under Section 301, 302, 303, 307, 318 and 405 of the Clean Water Act (CWA).

(56) Clean Water Act, (33 U.S.C. §§ 1251 et seq.), NPDES Permit Regulations, Water Quality Standards and State Requirements (40 CFR 122.44(d)), Water Quality Based Effluent Limitations (WQBELs), any requirements in addition to or more stringent than promulgated effluent limitations and guidelines or standards under Section 301, 304, 306, 307, 318 and 405 of the CWA.

(57) Clean Water Act, (33 U.S.C. §§ 1251 et seq.), NPDES Permit Regulations, Technology Based Controls for Toxic Pollutants (40 CFR 122.44(e)), discharge limits established under paragraphs (a), (b), or (d) of 40 CFR 122.44 must be established for toxins to be discharged at concentrations exceeding levels achievable by the technology-based (BAT/BCT) standards.

(58) Clean Water Act, (33 U.S.C. §§ 1251 et seq.), NPDES Permit Regulations (40 CFR 122.44(i)), requires monitoring of discharges to ensure compliance.

(59) Clean Water Act, (33 U.S.C. §§ 1251 et seq.), NPDES Permit Regulations (40 CFR 125.100), the site operator must include a detailed description of the proposed action including a listing of all required environmental permits.

(60) Clean Water Act, (33 U.S.C. §§ 1251 et seq.), (40 CFR Part 131), states are granted enforcement jurisdiction over direct discharges and may adopt reasonable standards to protect or enhance the uses and qualities of state surface water bodies.

(61) Clean Water Act, (33 U.S.C. §§ 1251 et seq.), (40 CFR 136.1 - 136.4), requires adherence to sample preservation procedures including container materials and sample holding times.

(62) Fish and Wildlife Coordination Act, (16 U.S.C. §§ 661 et seq.), requires that any federal agency that proposes to modify a body of water must consult the U.S. Fish and Wildlife Services.

<u>State</u>

(63) Air - Illinois Environmental Protection Act, Section 9 (415 ILCS 5/9), Pollution Control Board (Title 35), Subtitle B - Subchapter C Emission Standards and Limitations for Stationary Sources, Part 211: Definitions and General Provisions (defines emission sources and related items); Part 112 Visible and Particulate Matter Emissions, sets emission limitations for particulate matter for a variety of operations, i.e., incinerators or waste storage piles. Also see Parts 214-219 that gives information regarding specific types of emissions per operation (e.g., sulfur, organic material, carbon monoxide and nitrogen oxide emissions). These regulations may apply to some of the presumptive remedies in which emissions will be a factor, e.g., incineration.

(64) Air - Illinois Environmental Protection Act, Section 9 (415 ILCS 5/9), Pollution Control Board (Title 55), Subtitle B – Permits of Air Pollution, Part 201: Prohibition of Air Pollution, no person shall cause or threaten or allow the discharge or emission of any contaminant into the environment.

(65) Air - Illinois Environmental Protection Act, Section 9 (415 ILCS 5/9), Pollution Control Board (Title 35), Subtitle B – Air Pollution, Part 212; Visual and Particulate Matter Emission, emission standards for incinerators.

(66) Waste Disposal - Illinois Environmental Protection Act, Section 21 (415 ILCS 5/21), Pollution Control Board (Title 35), Subtitle G - Subchapter B: Permits, Part 703: RCRA Permit

Program, rules on application for and issuance of RCRA permits; applicability and information requirements.

(67) Waste Disposal - Illinois Environmental Protection Act, Section 21 (415 ILCS 5/21), Pollution Control Board (Title 35), Subtitle G - Subchapter C: Hazardous Waste Operating Requirements, Parts 722 and 723, includes standards applicable to generators and transporters of hazardous waste, respectively.

(68) Waste Disposal - Illinois Environmental Protection Act, Section 21 (415 ILCS 5/21), Pollution Control Board (Title 35), Subtitle G - Subchapter C: Hazardous Waste Operating Requirements, Parts 724 and 725, includes standards applicable to owners and operators of hazardous waste treatment, storage and disposal facilities (Part 735 is for Interim Status) - corresponds to 40 CFR Parts 264 and 265.

(69) Waste Disposal - Illinois Environmental Protection Act, Section 21 (415 ILCS 5/21), Pollution Control Board (Title 35), Subtitle G - Subchapter C: Hazardous Waste Operating Requirements, Part 726, includes standards for the management of specific hazardous waste and specific types of hazardous waste management facilities; often applies to hazardous waste being used in such a way as to constitute disposal.

(70) Waste Disposal - Illinois Environmental Protection Act, Section 21 (415 ILCS 5/21), Pollution Control Board (Title 35), Subtitle G - Subchapter C: Hazardous Waste Operating Requirements, Part 728: Land Disposal Restrictions, defines land disposal restrictions for wastes, waste specific prohibitions, treatment standards, and prohibitions on storage.

(71) Waste Disposal - Illinois Environmental Protection Act, Section 21 (415 ILCS 5/21), Pollution Control Board (Title 35), Subtitle G - Subchapter C: Hazardous Waste Operating Requirements, Part 729: Prohibited Hazardous Wastes in Land Disposal Units, describes general hazardous waste restrictions and restrictions on halogenated solvents and liquid hazardous wastes in landfills.

(72) Waste Disposal - Illinois Environmental Protection Act, Section 21 (415 ILCS 5/21), Pollution Control Board (Title 35), Subtitle G - Subchapter D: Underground Injection Control and Underground Tank Storage Program, Part 731: Underground Storage Tanks, regulations regarding USTs.

(73) Waste Disposal - Illinois Environmental Protection Act, Section 21 (415 ILCS 5/21), Pollution Control Board (Title 35), Subtitle G - Subchapter D: Underground Injection Control and Underground Tank Storage Program, Part 740: Site Remediation Program, procedures established for investigation and remediation at sites where there is a release, or suspected release of hazardous substances, pesticides, or petroleum for review and approval of these activities.

(74) Waste Disposal - Illinois Environmental Protection Act, Section 21 (415 ILCS 5/21), Pollution Control Board (Title 35), Subtitle G - Subchapter D: Underground Injection Control and Underground Tank Storage Program, Part 742: Tiered Approach to Corrective Action Objectives, procedures for evaluating the risk to human health posed by environmental conditions and develop remediation objectives that achieve acceptable risk level. Also, to provide for adequate protection of human health and the environment based on risks to human health posed by environmental conditions while incorporating site related information.

(75) Waste Disposal - Illinois Environmental Protection Act, Section 21 (415 ILCS 5/21), Pollution Control Board (Title 35), Subtitle G - Subchapter H: Illinois "Superfund" Program, Part 750: Illinois Hazardous Substances Pollution Contingency Plan, regulation which is applicable

whenever there is a release or a threat of a release at a site; this part assigns responsibility, organization and guidelines for phased hazardous substance response including development of remedial alternatives and engineering methods for on-site actions and remedying releases.

(76) Waste Disposal - Illinois Environmental Protection Act, Section 21 (415 ILCS 5/21), Pollution Control Board (Title 35), Subtitle G - Subchapter I: Solid Waste and Special Waste Hauling, Part 807 includes information on solid waste permitting, sanitary landfills and closure and post-closure care; Part 808 includes information on special waste classifications.

(77) Water - Illinois Environmental Protection Act, Section 12 (415 ILCS 5/12), Pollution Control Board (Title 35), Subtitle C - Part 304: Effluent Standards, general and temporary effluent standards including NPDES effluent standards.

(78) Water - Illinois Environmental Protection Act, Section 12 (415 ILCS 5/12), Pollution Control Board (Title 35), Subtitle C - Part 309: Permits, Subpart A includes provisions for NPDES permits and Subpart B includes provisions for all other water related permitting.

(79) Public Water Supplies - Illinois Environmental Protection Act, Section 14 (415 ILCS 5/14), Pollution Control Board (Title 35), Subtitle F - Part 620: Groundwater Quality, prescribes various aspects of groundwater quality including methods of classification of groundwater, non-degradation provisions, standards for quality of groundwater and various procedures and protocols for the management and protection of groundwater.

Other Requirements to be Considered (TBCs)

Federal

(80) Geological Survey Professional Paper 579-0, Elemental Composition of Surficial Materials in the Conterminous United States, 1971. Schacklette, H.T., J.C. Hamilton, J.G. Boerrgen and J.M. Bowles, provides background levels of metal in soils for the United States.

(81) Occupational Safety and Health Administration Standards (29 CFR Part 1910; 1910.1000), Subpart Z, Toxic and Hazardous Substances, sets worker exposure limits to toxic and hazardous substances and prescribes the methods for determination of concentrations.

(82) Occupational Safety and Health Administration Standards (29 CFR Part 1910; 1910.95), Subpart G, Occupational Noise Exposure, sets limits of worker exposure to noise during the performance of their duties.

(83) Occupational Safety and Health Administration Standards (29 CFR Part 1910; 1910.120), Hazardous Waste Operations and Emergency Response, sets the standards for workers conducting hazardous waste operations and emergency response.

(84) Occupational Safety and Health Administration Standards (29 CFR Part 1926), specifies the type of safety equipment and procedures to be followed during site remediation.

(85) Occupational Safety and Health Administration Standards Record keeping, Reporting and Related Regulations (29 CFR Part 1904), establishes Record keeping and reporting requirements for an employer under OSHA.

(86) OSWER Directive 9355.0-48FS - Presumptive Remedies: Site Characterization and Technology Selection for CERCLA Sites with Volatile Organic Compounds in Soil, September 1993, addresses the vadose zone only.

(87) OSWER Directive 9355.3-01, October 1988 Interim Final - Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA Development and Screening of Remedial Alternatives, development of the FS Work Plan.

(88) OSWER Directive 9355.4-01-Guidance on Remedial Actions for Superfund Sites with PCB Contamination, sets soil PCB clean-up levels and management controls for PCB concentrations at Superfund sites.
(89) OSWER Directive 9355.4-12 - Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Sites and RCRA Corrective Action Facilities, sets soil lead clean-up levels for Superfund sites.
(90) Safe Drinking Water Act (42 U.S.C. §§ 300f et seq.), Subpart F, Maximum Containment Level Goals (40 CFR 141.50 - 141. 51), establishes enforceable clean-up goals for drinking water based on technology and health risk.
(91) Threshold Limit Values, consensus standards for controlling air quality in work place environments; used to assess site inhalation risks for soil removal operations.
(92) U.S. Environmental Protection Agency, RCRA Guidance Manual for Subpart G Closure and Post-Closure Standards and Subpart H Cost Estimating Requirements, January 1987. Provides guidance on closure and post-closure standards and cost estimating requirements for hazardous waste management units.
(93) U.S. Environmental Protection Agency, Disposal of Polychlorinated Biphenyls, Proposed Rule, December 6, 1994. Provides for disposal of non-liquid PCB remediation waste generated by clean-up process of their existing concentration; provides for a risk-based remediation option for PCB remediation waste.
(94) U.S. Environmental Protection Agency, Soil Screening Guidance, December 1994. Provides generic risk-based soil screening values for Superfund sites.
(95) U.S. Environmental Protection Agency Region III, Risk - Based Concentration Table, Smith R., 1995. Provides risk-based screening values for groundwater and soil concentrations.
(96) U.S. Environmental Protection Agency, Integrated Risk Information System (IRIS), 1995 - 1996. Provides reference doses and cancer potency slopes for calculating the hazard index or incremental cancer risk for specific site contaminants.
(97) U.S. Environmental Protection Agency, Interim Policy for Planning and Implementing CERCLA Off-Site Response Actions, November 5, 1995. Specifies appropriate method of off-site treatment on disposed of waste from a Superfund site.
(98) U.S. Environmental Protection Agency, Summary Quality Criteria for Water, Office of Science and Technology, 1992. Provides ambient water quality criteria.
(99) U.S. Environmental Protection Agency, Quality Criteria for Water, Office of Water Regulation and Standards, U.S. EPA 440/5-86-001, 1986. Provides ambient water quality criteria.
(100) U.S. Environmental Protection Agency, Ambient Water Quality Criteria for Polychlorinated Biphenyls, U.S. EPA 440/5-80-068, 1980. Provides ambient water quality criteria for PCBs.
(101) U.S. Environmental Protection Agency, Risk Assessment Guidance for Superfund: Environmental Evaluation Manual, Volume II, Final Report, EPA/540/1-89/002, 1989. Provides guidance for conducting ecological risk assessments.
(102) U.S. Environmental Protection Agency, Risk Assessment Guidance for Superfund. Volume I. Human Health Evaluation Manual Supplemental Guidance. Standard Default Exposure Factors, Interim Final, March, 1991. OSWER Directive #9285.6-03, 1991. Provides exposure factors for estimating hazard or risk in human health risk assessments.
(103) U.S. Environmental Protection Agency, Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A, December, 1989. U.S. EPA 540/1-89/002. Office of Emergency and Remedial Response. Provides guidance on preparing a baseline human health

risk assessment using the four steps, data evaluation, exposure assessment, toxicity assessment, risk characterization.