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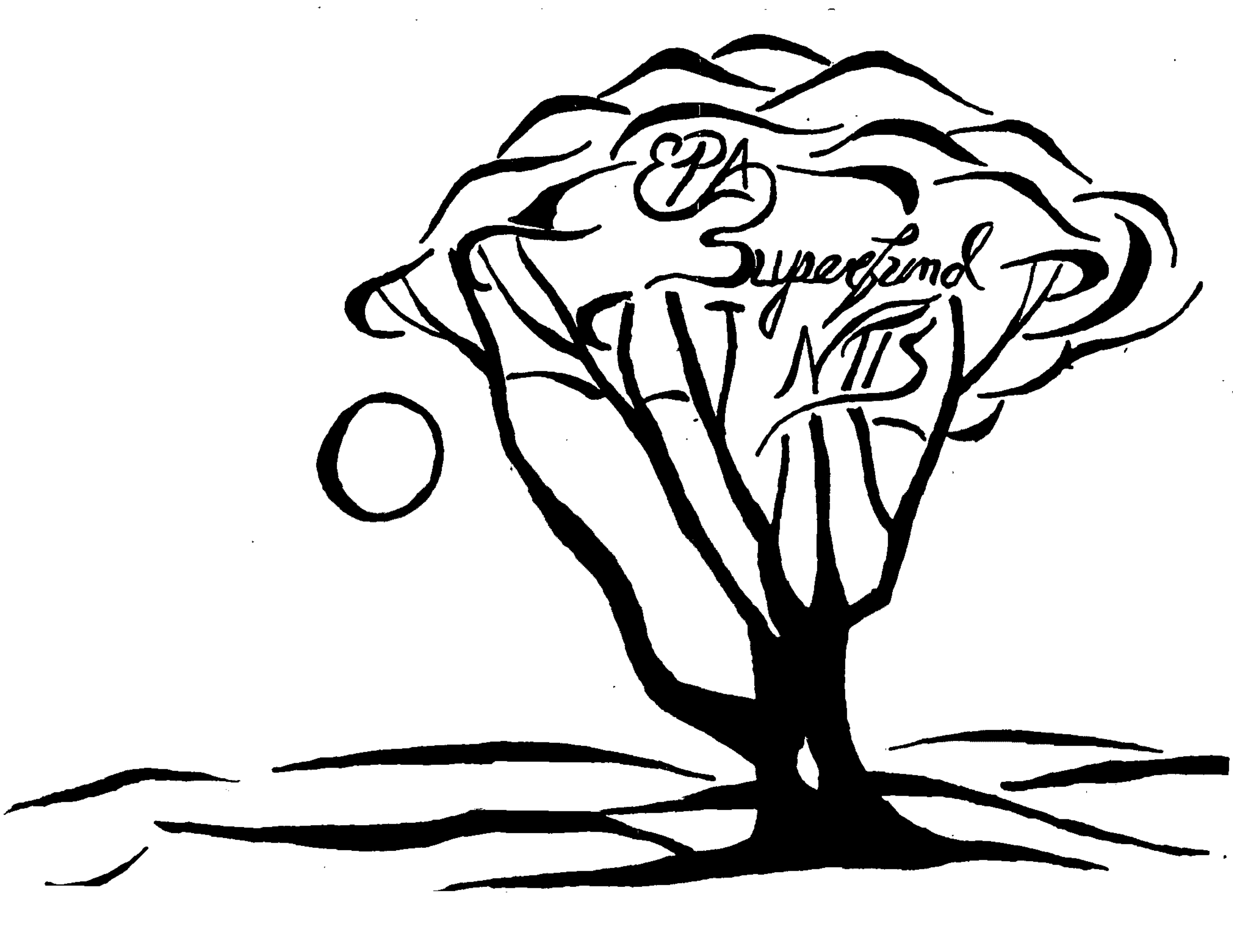
EPA Superfund
Record of Decision:

Caldwell Lace Leather Site, Auburn, KY



CALDWELL LACE LEATHER SUPERFUND SITE

RECORD OF DECISION

JUNE 30, 1994

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV

DRAFT RECORD OF DECISION
CALDWELL LACE LEATHER SITE

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DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Caldwell Lace Leather
State Highway 1039/Cemetery Road
Auburn, Kentucky 42206

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Caldwell Lace Leather Site, located in Auburn, Kentucky. The remedial action was selected in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document is based on the information contained in the Caldwell Lace Leather Administrative Record.

The Commonwealth of Kentucky Department of Environmental Protection does not concur with the selected remedy.

DESCRIPTION OF THE REMEDY

Based on the results of the Remedial Investigation, and the potential current and future risks estimated in the Baseline Risk Assessment, no action is necessary at this Site to ensure protection of human health and the environment. This remedy is the final action for the Site.

The Caldwell Lace Leather Site is approximately 56 acres in size. From 1972 until 1985, the Site received sludge and solid wastes generated by the Caldwell Lace Leather tannery facility located in Auburn, Kentucky. The Site is divided into two areas, one a landfill and the other a landfarm. Tanning-sludges and cowhide scraps were landfilled in unlined trenches or lagoons. The landfill area was closed in 1985 and covered with several feet of soil and vegetation. Tanning sludges were disked into the soil between 1982 and 1985 in the landfarm area and was never officially closed. The landfarm is currently being used as a pasture for grazing livestock.

Although EPA recommends that no Superfund action be taken, EPA does recommend that the Commonwealth of Kentucky or the current landfill owner continue groundwater/spring monitoring; and future land use restrictions be placed on the landfill property as well as maintenance of the landfill cover to prevent land use activities that would expose subsurface waste.

DECLARATION STATEMENT

Based on the results of the Remedial Investigation, and the potential current and future risks estimated in the Baseline Risk Assessment, no action is necessary at this Site to ensure protection of human health and the environment. Because this remedy will not result in hazardous substances remaining on-Site above health-based levels, the five-year review requirement will not apply to this action. EPA has determined that its response at this Site is complete. Therefore, the Site now qualifies for inclusion on the Construction Completion List.

June 30, 1994
Date

Patrick M Tobin for
John H. Hankinson, Jr.
Regional Administrator

DECISION SUMMARY

1.0 BACKGROUND

1.1 INTRODUCTION

In June 1988 the Caldwell Lace Leather (CLL) Site was proposed for inclusion on the National Priorities List (NPL). The United States Environmental Protection Agency (EPA) entered into negotiations with the Potential Responsible Parties (PRPs) in September 1988 to conduct the Remedial Investigation/Feasibility Study (RI/FS). The PRPs declined to conduct the RI/FS in October 1989. EPA began the RI/FS in March 1990 (A) to determine fully the nature and extent of any threat to the public health or welfare or the environment caused by the release or threatened release of hazardous substances, pollutants, or contaminants at or from the Site; and (B) to evaluate alternatives for the appropriate extent of any remedial action to prevent or mitigate the migration or the release or threatened release of hazardous substances, pollutants, or contaminants at and from the Site.

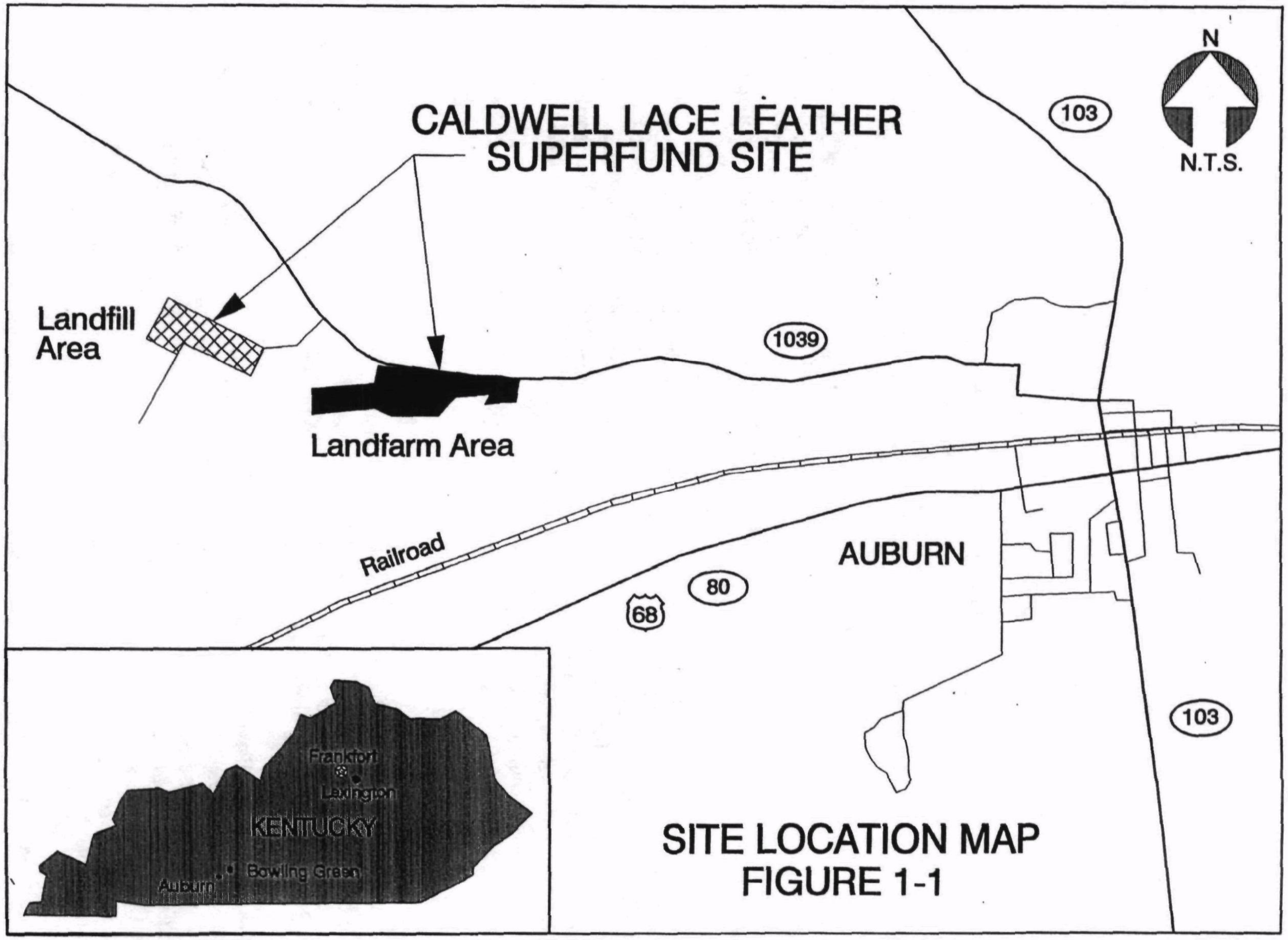
The RI Report for the CLL Site was conducted to meet the first objective above. The investigation was conducted in accordance with Section 104 and other provisions of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. Section 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act (SARA) (P.L. 99-499) and the National Contingency Plan (NCP), Part 300, Subpart E. The FS was not conducted. EPA determined, based on RI results, that because the CLL Site does not pose an unacceptable risk to human health and the environment an FS was not necessary. The Commonwealth of Kentucky assisted EPA in the review of reports and site evaluations.

1.2 SITE DESCRIPTION

The CLL Site is located along State Highway 1039 (Cemetery Road), approximately 2.5 miles northwest of the City of Auburn, Kentucky (Figure 1-1). CLL consists of two separate tracts, Tract 1 ("landfill") and Tract 2 ("landfarm"). Tract 1 consists of approximately 15.6 acres and Tract 2 consists of approximately 41.2 acres.

Tract 1 was used for disposing of tanning wastes in unlined trenches and lagoons. The trenches and lagoons were filled and covered with several feet of clay and soil. Tract 1 was vegetated with a mixture of grasses and legumes. The ground surface is somewhat undulated due to settling of the waste in the former trenches and lagoons. No buildings or structures exist on the property. An access road from Cemetery Road traverses the property from the unlocked gate to the southwest corner. The road is used by a local landowner to access his property located south of Tract 1. Tract 1 is surrounded primarily by cropland and pasture.

Tract 2 received tannery sludges that were disked into the soil. Tract 2 is located adjacent and


CALDWELL LACE LEATHER
SUPERFUND SITE
Landfill
Area
Landfarm Area
103
1039
Railroad
AUBURN
80
68
103
N
N.T.S.
Frankfort
Lexington
KENTUCKY
Auburn
Bowling Green
SITE LOCATION MAP
FIGURE 1-1

to the east of Tract 1. Tract 2 was sold to a farmer who now uses the land as a pasture for his cattle. The eastern portion of the property has a barn and a partially built house with an access road that leads to the buildings. The owner has recently placed two mobile homes on the property for his tenants. A water tank and an access road are on the western portion of the landfarm. The landfarm is bounded on the north by Highway 1039 (Cemetery Road) and several residences. Surrounding property is primarily woodlands.

1.3 DEMOGRAPHY AND LAND USE

The property is in a rural area a few miles northwest of Auburn, Kentucky. The Site is bounded on the north by Cemetery Road and in the other directions by pasture, cropland and woodland. Areas north of the road are principally woodland and farmland. The nearest residence is on the landfarm area of the Site. Other nearby residences are along the north side of Cemetery Road. Much of the site is now cropland and pasture. Cropland and pasture, and mixed forest are the predominant forms of land use within a two-mile radius of the Site.

The town of Auburn, population approximately 1,500, is the closest population center and has the nearest school. Auburn obtains its water supply from the Auburn Spring, which is located on the south edge of town. At one time all residents in the Site vicinity obtained their potable water supply from private wells, but many now obtain it from the East Logan Utility District, which purchases water from Russellville. A majority of people living along Cemetery Road that have been hooked up to the public water supply, continue to use well water for their livestock and pets.

1.4 GEOLOGIC/HYDROGEOLOGIC SETTING

Nearly all ground water at the Site is present at relatively shallow depths. The Site lies along the crest of an east-west trending ridge that is about 170 feet in elevation above the surrounding valley floors. In the vicinity of the Site, the bedrock is overlain by soils and residuum that is generally thin but variable in thickness. Soil depths range from 0 to 43 feet. The soils and residuum, where present, are underlain by limestones, shales and sandstone of the Mississippian age including, in descending order, (1) the Big Clifty Sandstone member of the Golconda Formation, (2) the Girkin Formation and (3) the Ste. Genevieve Limestone.

Most of the Site is underlain by as much as 70 feet of the Big Clifty Sandstone, which is the caprock for many of the ridges throughout the vicinity. The Big Clifty Sandstone is gray to light brown, fine-grained, cross bedded and locally shaley.

The Girkin Formation underlies the Big Clifty Sandstone and outcrops at the surface at the eastern and western ends of the Site. The Girkin Formation underlies the highly developed karst terrain lowlands that surround the Site. This Formation is approximately 170 feet thick and is comprised mostly of limestone that is medium-light gray to pale-yellow gray, aphanitic to coarsely detrital, and oolitic. Discontinuous shale and sandstone units up to five feet in thickness are present about 45 feet above the base of the Girkin Formation.

The Ste. Genevieve Limestone underlies the Girkin Formation. This limestone is light gray to light brown in color, fine to coarsely detrital, and oolitic. The Ste. Genevieve Limestone is approximately 200 feet thick in the vicinity of the Site and is the basal limestone in the area. The nearest outcrops of the Ste. Genevieve Limestone to the Site are at Mud Spring, about four miles southwest of the Site, and in the vicinity of the town of Auburn, located about two miles southeast of the Site. Auburn Spring, used by the city of Auburn for municipal water supply, is located near the outcrop of the Ste. Genevieve Limestone.

Ground-water hydrology in the vicinity of the Site is governed by the mature karst development of the Girkin Formation. Locally, the Big Clifty Sandstone is only present in the immediate vicinity of the Site and is not hydrologically significant with respect to the movement and occurrence of local ground waters. The Big Clifty member provides only temporary storage of infiltrated rain water that is relatively rapidly transmitted either to the underlying Girkin Formation or to surface discharge points in the form of small seeps and springs. Underlying the Girkin at considerable depth in the vicinity of the Site, the Ste. Genevieve Limestone is unlikely to be significantly affected by potential contamination from the Site. While the Girkin Formation undoubtedly transmits some recharge to the underlying Ste. Genevieve Limestone, the bulk of ground water that reaches the Girkin Formation will be diverted to surface water discharge points (springs) through discrete subsurface channel flow characteristic of karst terrains.

The hydrologically significant aquifer underlying the Site is therefore the Girkin Formation. As mentioned above, the Girkin Formation underlies the mature karst terrain of the areas surrounding the Site. Mature karst terrains are characterized by the presence of sinkholes, springs, disappearing streams and "karst windows", which are topographic depressions caused by the subsidence of the land surface resulting in the exposure of an underground stream. Ground-water flow in karst terrains is in turn characterized by conduit flow in subsurface channels, such as cave streams and other enlarged solution channels in the limestone. In the mature karst terrains such as those surrounding the Site, these conduits concentrate waters that enter the subsurface at either discrete points, such as sinkholes and karst windows, or by infiltration through overlying residuum or sandstone, into dendritic subsurface drainage patterns reminiscent of surface drainage patterns (i.e., creeks, streams and rivers). These subsurface conduits generally emerge to surface water discharge points in the form of springs.

Conduit flow in carbonate bedrock such as the Girkin Formation occurs in solution-enlarged openings that range in size from less than one inch to cave-size, such as the cave-like opening that forms Mossy Spring, a large volume discharge spring located approximately 2 miles northeast of the Site. These conduits develop along horizontal and vertical open fractures an bedding planes within the formation, resulting in the dendritic or trellised drainage network described above. Conduit flow predominates in the area surrounding the Site, and the hydrologic significance of this mature karst development is the rapid introduction of excess rainfall into the aquifer system, and subsequent rapid movement of ground water through the aquifer system.

1.4.1 MOVEMENT OF WATER FLOW

The movement of ground water in the CLL Site vicinity is determined by the nature of the soil and rock matrix associated with the different lithologic strata underlying the Site. The types of ground-water movement range from laminar flow in the interstitial pore spaces of unconsolidated media (e.g., in the soils and residuum overlying the bedrock in portions of the Site) to turbulent flow in discrete conduits (e.g., flow in the solution-enlarged subsurface channels found in the Girkin Formation).

Ground-water will always flow in response to hydraulic gradients present in the aquifers in question. At the Caldwell Site, potentiometric equipotential lines radiate outward from the Site, which is located at a topographic as well as a local potentiometric "high point" or divide. James F. Quinlan, a professional geologist, in 1982 determined the potentiometric surface of the water table to be "...an elongate, sausage-shaped mound that is concave northward...." In addition to the determination of the potentiometric surface of the local water table, Quinlan conducted a series of dye traces. The dye trace studies conducted by Quinlan identified routes of dye movement to the southwest, towards the Mud River, from the old waste disposal areas. Other routes of flow were identified to the north, from the landspreading operations area, towards discharge points on the Gasper River, and flow routes to the west were inferred from the hydraulic gradient data.

Ralph Ewers, geologist/hydrogeologist, in 1983 conducted additional dye-trace studies at the Site. The results of this study were similar to those reported by Quinlan, and tend to confirm those observations.

The United States Geological Survey also conducted dye-trace studies in 1992 at the Site. The results of the USGS study tended to confirm those of Quinlan by identifying points of discharge to the southwest and north. In addition, the USGS study confirmed the flow connection from the Site to points of discharge to the west, into the Long South Fork/Wiggington Creek drainage basin. The USGS study also confirmed the absence of a hydraulic connection between the Site and the spring used by the City of Auburn for public water supply. For the purposes of further discussion, the various springs used as monitoring points by Quinlan, Ewers, and the USGS will be identified by the nomenclature used in the 1993 USGS report.

During the course of the three separate studies, dye was injected into eight different points of entry to the subsurface conduit flow system either on the Site or in the immediate vicinity. These eight injection points include swallets, sinkholes and other karst windows that are naturally occurring. Detectors were placed during the course of the three studies in wells, springs, and surface streams surrounding the Site.

The results of the dye trace studies have delineated the movement of ground water in the karst aquifer underlying the Site. Dye injected at most of the injection points was recovered at a series of connected recovery points southwest of the Site leading to eventual discharge into the Mud River surface water drainage. The dye recovery points along this pathway were springs numbers 2, 3, 6 and 8 (Green Boiling Spring, Duncan Tile Spring, Coy Wright Blue Hole Spring, and Mud River Spring, respectively). Mud River Spring (spring 8) is the final discharge point for this subsurface system, and is located approximately four miles southwest of the Site. Please refer to Figure 1-2, which has been reproduced from the USGS report, for identification of some of the dye-recovery points. Dye-recovery points not indicated on Figure 1-2 may be found in the RI Report. The dye-recovery points that are indicated on Figure 1-2 were used for the ground water/spring monitoring locations as discussed in Section 4.1.7.

Dye injections were also recovered at springs 9 and 11 (Mossy Spring and Cemetery Road Spring, respectively) and at surface water monitoring point 10 located in Long South Fork Creek. Springs 9 and 11 discharge to Long South Fork Creek. These springs and the surface water monitoring point are located approximately 1.8 miles northwest of the Site. This indicates that the subsurface system of solution channels in the Girkin Formation draining towards Mud River Spring and towards Mossy Spring is interconnected.

Dye was also injected into a location, which does not lie on the Site itself, but which is located north of the former landspreading operation area. Runoff from the landspreading operation area could enter the karst aquifer at this point. Dye injected at this location was recovered at springs 12, 13, and 16 (Barnett Spring, Barnett Karst Window, and Crawford Spring, respectively). Spring 16 is the ultimate discharge point for this portion of the karst system, and is located approximately 2.2 miles north of the Site. This spring discharges into Gasper River. These results indicate that storm water runoff from the Site can enter the subsurface karst system and be transported in a northerly direction, eventually discharging to Gasper River.

The rate of ground-water flow in subsurface karst conduits of the type present at this Site is highly variable, dependent upon rainfall, antecedent moisture conditions, and time of concentration. Rates of flow will increase dramatically in response to rainfall events, slowly tapering off to base flow conditions thereafter. Subsurface flow hydrographs would look essentially the same as surface water stream hydrographs following rainfall events; i.e., a rapidly rising limb followed by a more gradual falling limb returning to base flow rates and volumes.

The USGS (1993) estimated flow rates from the Site to points of discharge at downgradient springs to range from three to five days, and in the case of spring number 8 (Mud Spring) as much as eight days. Eight days travel time to spring number 8 is approximately equal to an average flow rate of two feet per minute. Flow rates in open solution channels in mature karst

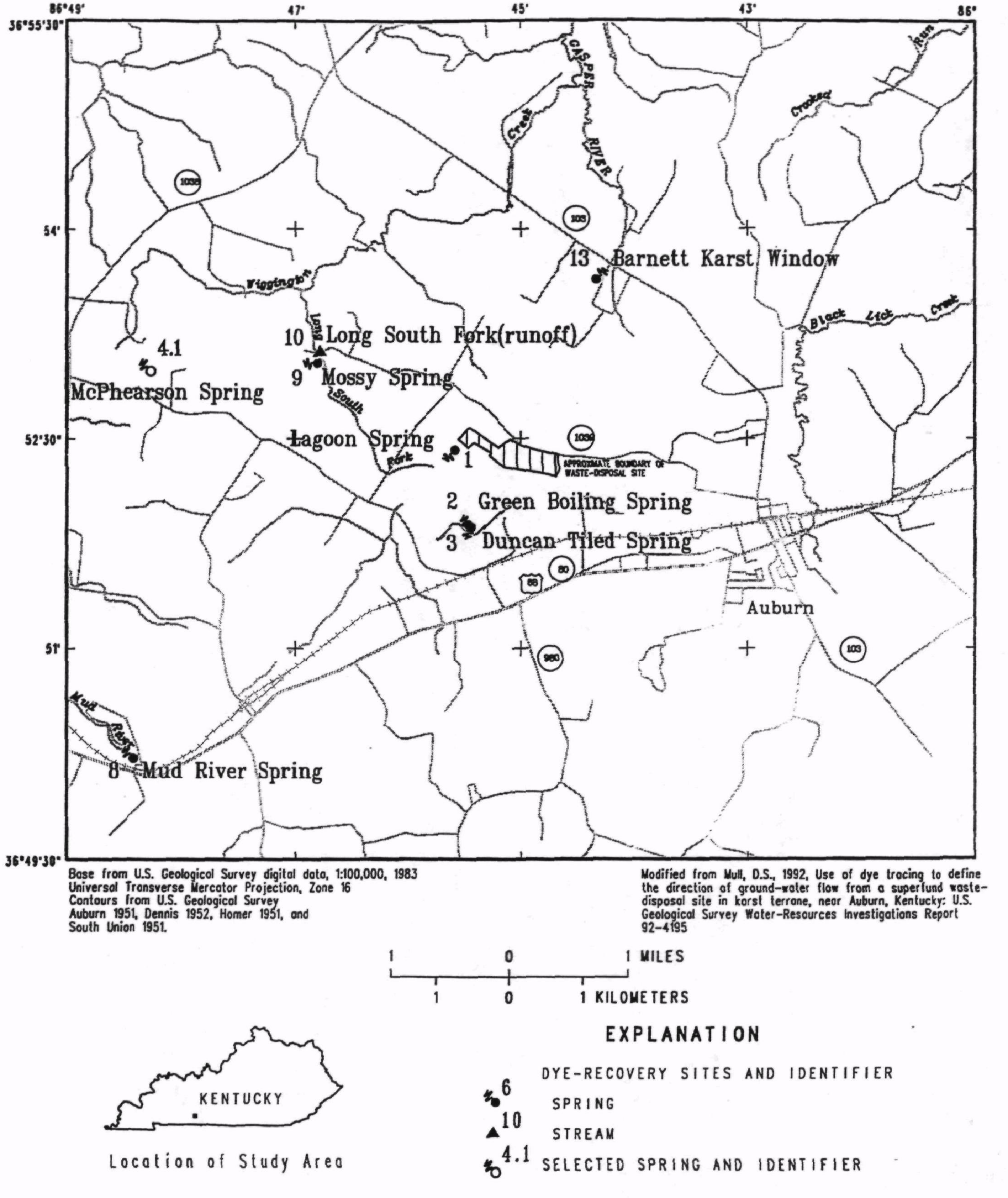


FIGURE 1-2 SELECTED MONITORING SITES

systems can be as high as 200 feet per minute under high flow conditions (e.g., in response to storm events).

1.4.2 GROUND-WATER RECHARGE/DISCHARGE

Ground-water recharge at the Site consists of infiltrated rainfall. Recharge occurs through the overlying soils and residuum, downward through fractures in the Big Clifty Sandstone, eventually reaching the open solution channels in the limestones of the Girkin Formation. Quantitative rates of recharge to the Girkin Formation (the primary aquifer of concern at the Site) have not been determined, but as in all karst terrains the rate of recharge will be relatively high, and the rapidity with which that recharge occurs will likewise be high. It is likely that as much as 25 inches per year of rainfall eventually serves as recharge to the Girkin Formation in the vicinity of the Site.

The primary points of discharge from the Girkin Formation were identified in the three dye trace studies discussed above. Discharge was identified into three separate drainage basins; to the southwest into the Mud River Basin, northwest into the Long South Fork Creek drainage basin, and north into the Gasper River drainage basin. Recharge from the Site, or runoff from the Site which is likely to enter nearby karst windows, will reach one or more of these discharge points.

2.0 SITE HISTORY AND ENFORCEMENT ACTIONS

The CLL Site is approximately 56 acres in size. From 1972 until 1985, the Site received sludge and solid wastes generated by the Caldwell Lace Leather tannery facility located in Auburn, Kentucky. Based on review of the collected records and interviews with knowledgeable government officials, the Caldwell Lace Leather Company, Inc. (Caldwell), of Auburn operated a tannery from the late 1800's until January 1985, when tanning ceased at the facility and only leather cutting operations were continued. There was no indication of what disposal locations were used for the tannery's waste streams prior to its use of the CLL Site in 1972. The Site and tannery were owned and operated by Caldwell until 1983, at which time they were purchased by a separate company named Lace Leather, Inc.

The tannery used a chrome-tanning process to tan cowhides which generated a wastewater sludge containing chromium. Laboratory analyses performed on samples of the wastewater sludge in 1971 by the Tanners' Council Research Laboratory revealed that the sludge contained between 2,580 and 3,940 milligrams per liter (mg/l) of trivalent chromium. The wastewater sludge, along with the tannery's other waste streams (cowhides, leather scraps, fleshings, cork, asbestos, cardboard and paper) were taken to a 15-acre area of the Site (hereinafter "Tract 1" or "landfill area") for disposal beginning in 1972. In general, the records revealed that Tract 1 contained at least 25 shallow trenches covering approximately 10 acres. The trenches were variously referred to as pits, lagoons, ponds, and basins in the Kentucky Department of Environmental Protection (KDEP) records. For clarification, they will be referred to as trenches. Most of the trenches were called drying trenches and were used to hold the liquid-based wastes until evaporation took place. The remaining trenches were used for the disposal of solid refuse, and according to KDEP inspectors, were not covered on any regular schedule.

During the years of Tract 1 operations, numerous inspection were conducted at the Site by KDEP. Problems regarding the uncovered scrap leather trench, overflowing sludge-drying trenches, and leachate running off of the Site property were constantly reported. Inspectors described the Site as covering 10 acres, with no buildings and many trenches containing different types of waste including hair, fat, dye, and rotten hides. Samples taken by the KDEP from the scrap leather trench were analyzed and shown to contain between 5.9 mg/l and 11.4 mg/l of total chromium. A sample taken by the KDEP from a run-off pool on neighboring property owned by Mr. and Mrs. Bobby Reeves was analyzed and contained 13.2 mg/l of total chromium. Inspectors reported that remedial measures would have to be taken by Caldwell immediately to stop contamination of ground water and surface water caused by run-off and leachate from the unlined trenches.

In 1981, an adjacent 41-acre area (hereinafter "Tract 2" or "landfarm area") was purchased with the intent of using the property for landspreading, also referred to as landfarming in KDEP records. A Site lay-out map is presented in Figure 1-2. In 1981, a sludge storage lagoon with 95,000 gallon capacity was constructed and was to be used when landspreading was impractical due to frozen ground or other unusual conditions. Although the lagoon was constructed on the Site, it is not clear whether the lagoon was constructed on Tract 1 or 2. In 1982, a construction permit was issued for a second 95,000-gallon sludge storage lagoon at the Site for use when landspreading was impossible due to freezing conditions. This lagoon was constructed along the eastern boundary of Tract 1.

On July 13, 1982, a conditional permit was issued to Caldwell for landfarming chromium and vegetable tanning sludge. This operation involved approximately 28.5 acres of Tract 2. On July 30, 1982, Caldwell was issued a Construction Permit for a third disposal area -- a residential landfill for disposal of solid waste (screenings, leather scraps, and gasket scraps) on approximately 5 acres adjoining the old landfilled area of Tract 1.

On October 12, 1982, Caldwell was notified by the KDEP that the company had violated numerous permit conditions at the Site. Some of the violations included: failure to submit a ground-water study report; failure to submit a separate $10,000 surety bond for the residential landfill; failure to maintain adequate landspreading records; failure to disk the sludge into the soil deeply enough; and gross deficiencies between the actual ongoing construction of the residential landfill and the construction permit. An Agreed Order was negotiated for several months, but never became final.

A KDEP site inspection of the landfarming area was conducted on December 15, 1982. Some corrections had been made, but problems still existed including continued use of inadequate equipment and lack of a field gridding system. In December 1982, Caldwell acquired two surety bonds covering the residential area and the landspreading area. The company submitted to KDEP a sludge application grid breakdown, which specified that 310,800 gallons per year of sludge would be spread over 29.6 acres of the Site. Conditional operating permits were issued for both the residential landfill (March 1983) and landfarming areas (February 1983).

On April 20, 1983, Caldwell (i.e., Caldwell Lace Leather Company, Inc.), changed its name to Lace Leather, Inc. Lace Leather, Inc., sold its original name and all its assets to Auburn Leather Co., Inc. On the same date, Auburn Lace Leather Co., Inc., incorporated by Mr. J. Richard Howlett and Mr. Harry Williamson, changed its name to Caldwell Lace Leather Co., Inc.

Additional transactions occurred regarding assets and liability -- thereby confusing the issue of the owner's true and correct name. Nonetheless, the title documents confirmed the sale of the Site and, by reference, the sale of the tannery to Caldwell Lace Leather Co., Inc. Therefore, based on this information the owner and operator of the Site and tannery after April 1983 was Caldwell Lace Leather Co., Inc. (Caldwell Lace Leather).

An inspection of the Site was conducted on March 18, 1983, by KDEP staff to investigate reports that Caldwell had drained waste trenches. The inspector reported that Caldwell had dug a ditch which allowed the contents of two of the trenches to discharge off the Site property. The volume of discharge was estimated to be between 2,900 and 9,000 gallons.

On April 15, 1983, Caldwell Lace Leather was notified that the KDEP had approved certain remedial actions. These included removal or covering of the remaining sludge in the two discharged trenches; removal or covering of fleshings in the open trenches; and landspreading of the fleshing liquid.

On April 29, 1983, Caldwell Lace Leather notified KDEP that the remaining sludge in the two discharged trenches was being covered with a mixture of sawdust and earth, and that the company had applied for a variation from the landspreading permit to allow for the spreading of liquids collected in the old fleshing trenches and subsequent covering and compaction of the trenches.

An inspection of the Site was made on April 30, 1983, following a complaint that fleshing trenches were overflowing and that the leachate was running across Mr. Bobby Reeves' property. The inspector reported that black material from the fleshing trenches was discharging across the property and into a sinkhole. It was estimated that 100 gallons per minute were discharging into the sinkhole. A similar inspection was made on May 15, 1983, following another complaint and the inspector again reported that the fleshing trenches were overflowing onto Mr. Reeves' property. The inspector noted that it was raining very hard on both occasions.

On October 1, 1984 an Agreed Order was entered into between Caldwell Leather Company and with the Commonwealth of Kentucky Natural Resources and Environmental Protection Cabinet (KNREPC). As statements of fact, the Order listed numerous violations which had occurred at the Site. It stated that the permit issued for the old disposal area in 1972 was revoked and superseded by conditions of the landfarming and residential landfill permits. The Caldwell Leather Company was ordered to maintain vegetation at the old disposal area in accordance with an approved closure plan which had been submitted by the company on September 2, 1983. The company was also directed to perform quarterly sampling and analysis of water in the diversion ditch below the old disposal area, to submit a complete leachate control system plan, to manage leachate from the inert waste section of the area and to pay a civil penalty of $3,000.

On February 22, 1985, KNREPC Division of Waste Management approved a closure plan for the old landfilled area on Tract 1. The closure plan stated that the area to be closed consisted of 5.5 acres and that solid waste had been disposed of there continuously from 1972 through the fall of 1982. The work was regulated by Solid Waste within the Division of Waste Management. Closure and post closure activities were to include application of lime and fertilizer, regrading and revegetation, and ground water/surface water monitoring. All phases of the closure plan were not completed until late 1989. The landfarm area was never closed.

On February 28, 1985, Caldwell Lace Leather was notified by KNREPC that a soil sample taken from the landfarming area in October had been analyzed and shown to contain high concentrations of total chromium (3,630 mg/l). The letter warned that such a high concentration level suggested that the potential for off-Site contamination as well as local plant toxicity was extreme. KNREPC requested that the company submit a testing plan including comprehensive soil testing, sampling analysis of collected rainwater, and a study of vegetation cover both on the landfarming area and on adjacent property to determine the effects of the toxicity.

In June 1985, Caldwell Lace Leather notified KNREPC that a leachate collection system had been installed and was operational at the Site. Details on this system were not presented in the KNREPC records. However, later inspection reports revealed that the collection system was not effective and that leachate from the leather scrap pit continued to present a problem at the Site.

An inspection of the Site conducted on March 21, 1985, revealed that the residential landfill had not been covered and was in poor condition. The inspector reported that there was still a problem with a discharge from the old leather scrap trench.

In November 1985, the tannery and the Site were purchased by North Park, Inc., a subsidiary of the Auburn Leather Co., Inc. Caldwell Lace Leather Co., Inc., has terminated the tanning operations earlier in 1985 and North Park, Inc., retained only the leather cutting operation which produced leather trimmings and scraps as its only waste stream.

In December 1985, the KNREPC completed a Preliminary Assessment and recommended a low priority for site inspection. Inspectors reported that the Site was unsuitable for the disposal of any hazardous waste due to the topography and hydrology of the area. In October 1986, a Hazard Ranking Score (HRS) package was prepared. The Site was proposed for inclusion on the National Priorities List (NPL) in 1988 and became final in August 1990.

3.0 COMMUNITY PARTICIPATION HIGHLIGHTS

Public participation requirements in CERCLA §§ 113(k)(2)(B)(i-v) and 117 were met in the remedy selection process. The Community Relations Plan (CRP) was finalized in June 1990 for the CLL Site. This document lists contacts and interested parties throughout the government and the local community. The Plan also establishes communication pathways to assure timely dissemination of pertinent information.

In June 1993, EPA issued a Fact Sheet Update describing the Superfund process and the RI summary. The Fact Sheet also provided the opportunity for the public to participate in the Superfund process and provided the opportunity for community groups to apply for Technical Assistance Grants (TAGS). The Fact Sheet was sent to the local community and local, State and Federal officials.

EPA established and maintained an information repository and Administrative Record at a convenient and accessible location in the Logan County Public Library and the EPA Region IV Records Center. The Administrative Record includes all information EPA used in developing the proposed final action. The RI/FS Reports and Proposed Plan for the CLL Site were released to the public on April 14, 1994. These two documents were made available to the public in both the Administrative Record and the information repository.

The notice of availability of these two documents was published in the Proposed Plan Fact Sheet and in the *Bowling Green Daily News*. A public comment period was held from April 15, 1994 to May 16, 1994. An extension to the public comment period was not requested. In addition, a public meeting was held on April 26, 1994 to present the findings of the RI and answer questions concerning the Site. Those in attendance included one interested citizen, representatives from Caldwell Lace Leather Company, the local press, and several local and State officials. A transcript of the public meeting is in the Responsiveness Summary, which is a part of this Record of Decision. No written comments were received during the public comment period.

This Record of Decision presents the selected remedial action for the CLL Site, chosen in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the National Contingency Plan.

4.0 SUMMARY OF SITE CHARACTERISTICS

4.1 NATURE AND EXTENT OF CONTAMINATION

The CLL Site is a disposal area in which chrome-bearing sludge was either landfilled or landfarmed between 1972 and 1985. A significant portion of the waste disposed of at the Site is chromium-bearing sludge landfilled in the northwest section of the property between 1972 and 1982; and landfarmed between 1983 and 1985. Also landfilled at the Site were fleshings, spoiled hides, screening, leather scraps and gasket scraps. The fleshings and screenings also contained chromium contamination.

The following is an estimate of the wastes disposed of at the landfill based upon operator records:

Landfill (based on 10 years of operation)

Chrome-bearing sludge:	15,000 - 42,350 tons
Fleshings:	1,040 - 1,610 tons
Screenings:	780 tons - 810 tons
Dry Waste (paper and cardboard):	162,500 tons

Landfarm (based on three years of operation)

Chrome-bearing sludge:	4,700 - 5,600 tons

EPA investigated the CLL Site because of the potential for ground-water contamination in the vicinity of the Site based upon the fact that chromium-bearing sludge was disposed of in unlined trenches and disked into the surficial soils. These disposal techniques, coupled with the karst topography of the region result were considered a potential threat to the local ground water.

The location and extent of wastes within the landfill and landfarm were defined during the RI by both intrusive and non-intrusive methods. Non-intrusive methods were accomplished by utilizing existing records and aerial photographic interpretation. An evaluation of the landfill aerial photographs indicated that the trenches were first excavated in 1972 and were constructed continuously until approximately 1982. All of the aerial photographs indicate that the trenching occurred within the boundaries of the landfill. Intrusive methods involved boring through waste and non-waste material and performing chemical analyses on samples collected from the borings. The intrusive methods also confirmed the location of trenches. Evaluation of the landfarm aerial photographs provided the landfarm boundaries and sampling and analyses confirmed those landfarm boundaries.

The following environmental media were sampled and analyzed as part of the RI:

- Surface soils
- Subsurface soils
- Surface water
- Springs/Ground water
- Sediments

4.1.1 LANDFARM SURFACE SOILS

Contaminants in the landfarm area were expected to be primarily in the first foot of soil. This assumption is based upon knowledge of the disposal method and random grab samples collected during the RI. Therefore, emphasis was placed on sampling surface soil, with subsurface soil studied to a lesser extent. The extent of contamination was determined based upon a statistical sampling approach utilizing a systematic grid sampling design. The area was divided into thirty grids (H-1 through H-30, Figure 4-1) each measuring 200 feet x 200 feet or approximately one acre. The surface of each full grid area was sampled by collecting a composite of up to nine aliquots each. Second samples were taken in select grids using an offset pattern to determine variability of concentrations within the grids.

The results, presented in Table 4-1, indicate that surface deposition of waste material on the landfarm resulted in no contaminant concentrations above preliminary remediation goals (600 mg/kg for chromium VI. The PRG development was based on the Review Draft Guidance for Part B of the Human Health Evaluation Manual (Development of Preliminary Remediation Goals). Results showed no organics or pesticides present above the minimum detectable limits.

4.1.2 LANDFARM SUBSURFACE SOILS

Subsurface soil samples from the landfarm area were collected from the centers of grids at a depth of three feet. Subsurface soil sample results from the landfarm are not significantly different than background sample results.

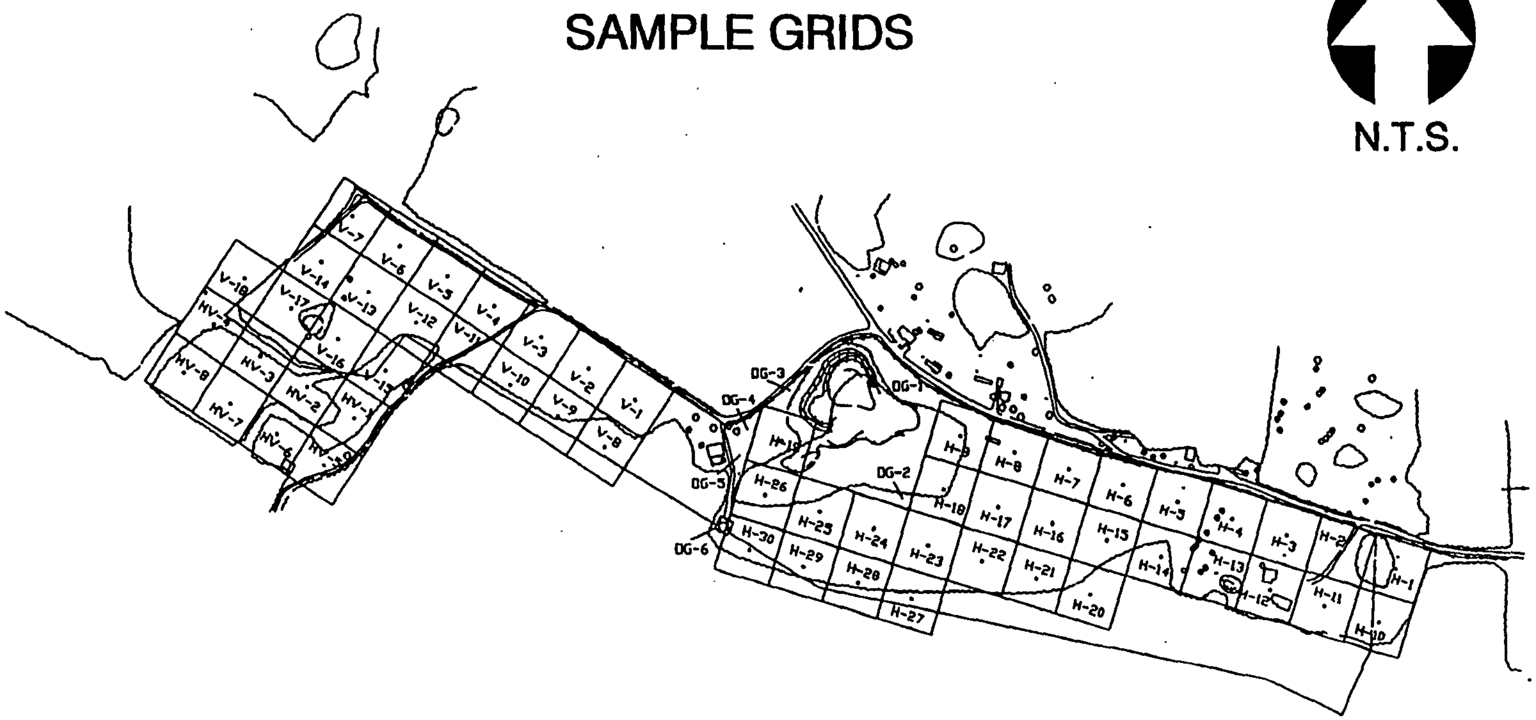
4.1.3 LANDFILL SURFACE SOILS

Surface soil samples were collected as random and systematic grab samples. Samples collected from the landfill area showed chromium concentrations ranging from 5 - 5,600 mg/kg. Lead concentrations ranged from 8.2 - 280 mg/kg. Mercury was found at concentrations from .07 - 0.46 mg/kg. Organic acids associated with tanning (i.e. pentadecanoic acid, hexadecanoic acid, etc.) were detected at most surface soil sample locations in the landfill at estimated concentrations ranging from 300 to 2,000 μg/kg. Some samples showed the presence of polynuclear aromatic hydrocarbon (PAH) compounds at low concentrations. Results are presented in Table 4-2.

SAMPLE GRIDS

N

N.T.S.



APPROXIMATE SCALE

548 0 274 548

(IN FEET)

1 inch =548 ft.

CALDWELL LACE LEATHER SITE

AUBURN, KENTUCKY

FIGURE 4-1

U.S. EPA, REGION IV

Table 4-1

**Caldwell Lace Leather Site
Contaminants Detected in Surface Soil
Landfarm Area**

Surface Soils Analyte	Site-Related Samples			Background* Sample (SLA-001) (mg/kg)
	Frequency of Detection	Range of Detected Concentrations (mg/kg)	Arithmetic Mean (mg/kg)	
INORGANICS				
Aluminum	34/34	5,400 - 20,000	10,547	13,000
Arsenic	30/34	1.6 - 18.0	4.6	
Barium	33/34	32 - 160	71.5	52
Beryllium	22/34	0.5 - 1.5	0.65	
Cadmium	1/34	0.6	NA	
Calcium	34/34	320 - 10,000	2,323	1,100
Chromium	33/34	7.4 - 1,100	107.7	
Cobalt	33/34	2.2 - 14	6.8	4.2
Copper	33/34	3.8 - 18	7.0	6.4
Iron	33/34	1,000 - 18,000	11,418	1,100
Lead	32/34	6.5 - 52.0	13.8	
Magnesium	34/34	420 - 11,000	1,500	14,000
Manganese	33/34	57.0 - 800	317	100
Mercury	15/34	0.07 - 0.11	0.081	
Nickel	34/34	3.5 - 25	7.5	8.5
Potassium	32/32	340 - 2,500	601	530

Table 4-1 (Continued)

Caldwell Lace Leather Site
Contaminants Detected in Surface Soil
Landfarm Area

Surface Soils Analyte	Site-Related Samples			Background* Sample (SLA-001) (mg/kg)
	Frequency of Detection	Range of Detected Concentrations (mg/kg)	Arithmetic Mean (mg/kg)	
INORGANICS (Continued)				
Sodium ·	3/34	110 - 120	113	
Strontium	32/32	4.9 - 32	11.2	
Tin	3/32	2.6 - 26.0	12.3	
Titanium	32/32	86.0 - 190	141.6	
Vanadium	34/34	11.0 - 33.0	20.7	22
Yttrium	32/32	2.2-27	6.2	
Zinc	32/34	15.0 - 270	31	

NA - Not applicable

* - Only the detected contaminants are reported. Blank spaces indicate result was below the detection limit.

Table 4-2

**Caldwell Lace Leather Site
Contaminants Detected in Surface Soil
Landfill Area**

Surface Soils Analyte	Site-Related Samples			Background* Sample (SLA-001) (mg/kg)
	Frequency of Detection	Range of Detected Concentrations (mg/kg)	Arithmetic Mean (mg/kg)	
INORGANICS				
Aluminum	46/46	3,900 - 25,000	11,767	13,000
Arsenic	35/44	1.8 - 8.4	4.8	
Barium	46/46	24.0 - 210	88	52
Beryllium	24/30	0.51 - 2.2	0.96	
Cadmium	1/14	1.7	NA	
Calcium	45/46	180 - 63,000	3,483	1,100
Chromium	38/46	5 - 5,600	167	
Cobalt	40/40	1.9 - 17	7.5	4.2
Copper	37/39	1.7 - 28	9.1	6.4
Iron	46/46	1,000 - 21,000	9,847	1,100
Lead	40/46	8.2 - 280	30.9	
Mercury	4/14	0.07 - 0.46	0.183	
Magnesium	46/46	300 - 24,000	4,224	14,000
Manganese	45/46	80 - 2,000	473	100
Nickel	36/38	2.5 - 22	9.6	8.5
Potassium	36/38	230 - 1,500	745	530
Strontium	28/28	2.2 - 210	14.3	
Titanium	28/28	81 - 210	160	
Vanadium	46/46	8.2 - 48	24	22

Table 4-2 (Continued)

**Caldwell Lace Leather Site
Contaminants Detected in Surface Soil
Landfill Area**

Surface Soils Analyte	Site-Related Samples			Background* Sample (SLA-001) (mg/kg)
	Frequency of Detection	Range of Detected Concentrations (mg/kg)	Arithmetic Mean (mg/kg)	
Yttrium	28/28	2.2 - 20	8.1	
Zinc	28/34	9.4 - 200	49	
SEMI-VOLATILE ORGANICS				
Benzo(a)anthracene	1/42	0.130	NA	
Benzo(b and/or k)fluoranthene	1/42	0.087	NA	
Benzo(a)pyrene	1/42	0.053	NA	
Chrysene	2/42	0.073 - 0.14	0.107	
Fluoranthene	2/42	0.076 - 0.23	0.153	
Phenanthrene	2/42	0.11 - 0.24	0.175	
Pyrene	2/42	0.08 - 0.15	0.115	

NA - Not applicable.

* - Only the detected contaminants are reported. Blank spaces indicate it was below the detection limit.

4.1.4 LANDFILL SUBSURFACE SOIL

A variety of organic acids and alcohols associated with tanning, were detected in all the former trenches sampled in the landfill area. Concentrated waste was encountered within three to four feet of the surface in most of the former trenches sampled. The sampling results (Table 4-3) indicated that wastes encountered in the areas of the former disposal trenches had significant levels of chromium, lead, and mercury. The concentrations of these inorganics generally increased with depth until such time as the soil boring penetrated the bottom soils of the trench, at which time the concentrations were dramatically reduced to levels approaching background. Background soils at the Site have characteristic concentrations of chromium (10-20 mg/kg), lead (9-12 mg/kg) and mercury (0.10-0.12 mg/kg). Similar ranges for other inorganic constituents such as aluminum, manganese, zinc, barium, iron, potassium, and magnesium can also be established; however, such constituents were not characteristic of wastes encountered.

Subsurface soil samples were collected at strategic locations to further evaluate the potential for downward migration of contaminants emanating from the trenches to determine the potential for adverse impact to groundwater. A review of this analytical data indicates that inorganic concentrations were more consistent with native soil levels than those observed for the various wastes encountered.

4.1.5 SOUTHWEST AREA SURFACE SOIL

The area to the southwest of the landfill (Grids HV-1 through HV-8, Figure 4-1) was included in this study due to the likelihood of contaminants deposited in the area by surface runoff from the landfill. The grids in this area were sampled by collecting a composite sample from each. The number of aliquots and the pattern of their collection was the same as that used for the landfarm area. An offset sample was collected from each grid in this area to measure variability of concentrations. The offset aliquot pattern used the same scheme as the landfarm.

Surface soil sample results from the landfarm are not significantly different than background soil samples.

4.1.6 SOUTHWEST AREA SUBSURFACE SOIL

Subsurface soil within this area was sampled by collecting a grab sample from a depth of three feet at the center of each grid in the same manner as the landfarm. Results of the analyses showed metals (including chromium) to be at levels consistent with background conditions of the area.

4.1.7 WATER QUALITY DATA

A unique aspect of ground-water characterization at sites where karst solution conduits dominate

Table 4-3

**Caldwell Lace Leather Site
Contaminants Detected in Subsurface Soils
Landfill Area**

Subsurface Soils Analyte (3-foot depth)	Site-Related Samples			Background* Sample (SLB-001) (mg/kg)
	Frequency of Detection	Range of Detected Concentrations (mg/kg)	Arithmetic Mean (mg/kg)	
INORGANICS				
Aluminum	18/18	2,300 - 21,000	14,433	18,000
Arsenic	16/18	1.2 - 18	5.3	
Barium	18/18	8.9 - 89	49.7	
Beryllium	5/18	0.54 - 0.63	0.57	
Calcium	18/18	200 - 43,000	3,223	
Chromium	18/18	4.9 - 5,000	312	
Cobalt	15/18	1.6 - 12	4.2	
Copper	18/18	1.5 - 16	7.5	
Iron	18/18	3,400 - 25,000	14,550	
Lead	18/18	2.4 - 45	12.5	
Magnesium	18/18	170 - 7,200	1,199	
Manganese	18/18	10 - 740	128	
Mercury	14/18	0.06 - 0.18	0.12	
Nickel	16/18	3.7 - 49	9.5	6.6
Potassium	16/18	270 - 1,200	689	330
Sodium	4/18	140 - 1,700	570	
Strontium	18/18	2.0 - 200	19.5	
Titanium	18/18	50 - 220	139	
Vanadium	18/18	7.2 - 47	28.8	18

Table 4-3 (Continued)

**Caldwell Lace Leather Site
Contaminants Detected in Subsurface Soils
Landfill Area**

Subsurface Soils Analyte (3-foot depth)	Site-Related Samples			Background* Sample (SLB-001) (mg/kg)
	Frequency of Detection	Range of Detected Concentrations (mg/kg)	Arithmetic Mean (mg/kg)	
Yttrium	16/18	1.8 - 10	4.1	
Zinc	18/18	2.9 - 91	24.6	
VOLATILE ORGANICS				
Acetone	1/18	1.7	NA	
o-Chlorotoluene	1/18	0.085	NA	
Ethylbenzene	1/18	0.11	NA	
Methyl Ethyl Ketone	1/18	0.44	NA	
Styrene	1/18	0.006	NA	
Toluene	1/18	0.043	NA	
(m- and/or p-)Xylene	1/18	0.58	NA	
o-Xylene	1/18	0.14	NA	
PESTICIDES/PCBs				
Alpha-Chlordane	1/18	0.13	NA	
Alpha-Chlordene	1/18	0.058	NA	0.027
Chlordene	1/18	0.062	NA	
Gamma-Chlordane	1/18	0.15	NA	
Trans-Nonachlor	1/18	0.054	NA	
SEMI-VOLATILE ORGANICS				
Bis(2-ethylhexyl)phthalate	1/18	42	NA	
1,2-Dichlorobenzene	1/18	3.9	NA	
1,3-Dichlorobenzene	1/18	0.042	NA	

Table 4-3 (Continued)

Caldwell Lace Leather Site
Contaminants Detected in Subsurface Soils
Landfill Area

Subsurface Soils Analyte (3-foot depth)	Site-Related Samples			Background* Sample (SLB-001) (mg/kg)
	Frequency of Detection	Range of Detected Concentrations (mg/kg)	Arithmetic Mean (mg/kg)	
1,4-Dichlorobenzene	1/18	0.62	NA	
N-Nitrosodiphenylamine/ Diphenylamine	1/18	1.2	NA	

* - Blank spaces indicate chemical was not detected above the detection limit.

NA - Not Applicable

subsurface hydrology is that ground-water quality is also considered to represent surface-water quality. Since the dye-trace studies showed that ground water from the Site discharges at several springs in the area, ground water was evaluated as potential surface water in the ecological risk assessment. Surface water evaluations included water from the springs and their tributaries. However, some of the surface water data collected does not represent ground-water quality because some of the data was collected from man-made ponds.

Twenty-four chemicals were detected during the RI sampling and analysis of ground water (Table 4-4); and twenty-six were detected in surface water (Table 4-5). Of these contaminants aluminum, bis(2-ethylhexyl)phthalate, chromium, iron, lead, manganese, silver and zinc were present in concentrations that were either above Maximum Contaminant Levels (MCLs) or Ambient Water Quality Criteria (AWQC) for protection of aquatic life. These contaminants are not present in concentrations that are significant from either an environmental or human health perspective.

Aluminum

Aluminum was detected in ground-water samples taken from the springs used as sampling points in concentrations ranging from 120 parts per billion (ppb) to 25 parts per million (ppm). The higher concentration exceeds both AWQC and the EPA secondary MCL. The AWQC for aluminum for protection of aquatic life from chronically toxic effects is 87 ppb, and the secondary MCL is 50 ppb. It should be noted, however, that the highest concentration was in a sample taken in association with a rainfall event, when the sediment load carried by turbulent flow in open solution channels is likely to have been very high. In karst flow conduits, sampling during response to rainfall events yields results analogous to sampling surface water streams in similar circumstances.

It should also be noted that samples taken from Duncan Tile Spring shown to be unaffected by the Site during the dye-trace studies yielded comparable results when analyzed for aluminum as those from the spring shown to contain the highest concentrations. Samples taken from McPherson Spring on the same date as that taken from Duncan Tile Spring which was shown to have 25 ppm of aluminum contained 5.5 ppm of aluminum. On another sampling date associated with rainfall events, Duncan Tile Spring samples contained 5.1 ppm and samples from McPherson Spring contained 6.6 ppm of aluminum.

Samples taken from Green Boiling Spring, which is located in very close proximity to Duncan Tile Spring and which was likewise shown to be in hydraulic connection to the Site, on the same date as the sample found to contain 25 ppm, contained only 0.73 ppm of aluminum. Finally, samples taken from Duncan Tile Spring in January 1993, which were not associated with a rainfall event were shown to contain only 0.51 ppm of aluminum.

Table 4-4

Caldwell Lace Leather Site
Contaminants Detected in Ground Water

Ground Water Analyte	Site-Related Samples			**Background* Sample (McPherson Spring) (μg/L)**
	Frequency of Detection	Range of Detected Concentrations (μg/L)	Arithmetic Mean (μg/L)	
INORGANICS				
Aluminum	38/43	56 - 25,000	3,575	3,430
Barium	40/43	5.3 - 960	80	84
Calcium	41/43	2,700 - 100,000	60,746	7,775
Chromium (Total)	6/43	6.1 - 22	15	
Chromium (VI)	8/38	1 - 10	5.9	
Cobalt	4/43	2.7 - 11	6.9	
Copper	9/43	3.8 - 92	34	
Iron	38/43	52 - 21,000	3,147	5,250
Lead	5/43	5.9 - 20	13.6	6.7
Magnesium	40/43	1,100 - 31,000	6,128	2,775
Manganese	32/43	7.5 - 4,200	265	1,085
Molybdenum	2/39	5.3 - 10	7.7	
Nickel	4/43	11 - 22	16.8	
Potassium	21/42	510 - 8,300	3,330	
Sodium	38/43	1,200 - 770,000	29,887	4,275
Strontium	39/39	62 - 3,700	360	48
Titanium	35/39	10 - 350	63	68
Vanadium	8/43	2.9 - 42	20	
Yttrium	3/39	12 - 21	15.6	

Table 4-4 (Continued)

Caldwell Lace Leather Site
Contaminants Detected in Ground Water

Ground Water Analyte	Site-Related Samples			**Background* Sample (McPherson Spring) (μg/L)**
	Frequency of Detection	Range of Detected Concentrations (μg/L)	Arithmetic Mean (μg/L)	
Zinc	24/43	5 - 710	59	14
VOLATILE ORGANICS				
Bromomethane	1/38	0.56	NA	0.55
Carbon Disulfide	2/38	1.3 - 1.7	1.5	
Toluene	1/38	1.0	NA	
SEMI-VOLATILE ORGANICS				
Bis(2-ethylhexyl)phthalate	4/37	14 - 59	38	

NA - Not Applicable

* - Background data was averaged from four sampling events at McPherson Spring. Only detected contaminants are reported. Blank spaces indicate result was below the detection limit.

Table 4-5

**Caldwell Lace Leather Site
Contaminants Detected in Surface Water**

Surface Water Analyte	Site-Related Samples			Background * Sample (McPherson Spring) (µg/L)
	Frequency of Detection	Range of Detected Concentrations (µg/L)	Arithmetic Mean (µg/L)	
INORGANICS				
Aluminum	36/38	84 - 25,000	2,618	3,430
Barium	36/38	28 - 380	57	84
Calcium	38/38	8,900 - 95,000	69,155	7,775
Chromium	5/38	6.1 - 710	154	
Cobalt	2/38	11 - 29	20	
Copper	1/38	14	NA	
Iron	36/38	91 - 21,000	2,294	5,250
Lead	3/38	5.9 - 20	12.6	6.7
Magnesium	37/38	1,800 - 52,000	5,908	2,775
Manganese	28/38	14 - 4,200	319	1,085
Nickel	3/38	8 - 58	29	
Potassium	20/38	700 - 8,300	3,143	
Sodium	35/38	1,300 - 770,000	27,202	4,275
Strontium	29/37	84 - 350	210	45
Titanium	26/37	10 - 350	60	68
Vanadium	6/38	2.9 - 66	25	
Yttrium	1/37	21	NA	
Zinc	18/38	5 - 61	22	14
VOLATILE ORGANICS				
Benzene	1/1	3.0		

Table 4-5 (Continued)

Caldwell Lace Leather Site
Contaminants Detected in Surface Water

Surface Water Analyte	Site-Related Samples			Background * Sample (McPherson Spring) (μg/L)
	Frequency of Detection	Range of Detected Concentrations (μg/L)	Arithmetic Mean (μg/L)	
Bromomethane	1/38	3.0	NA	0.55
Carbon Disulfide	1/38	1.7	NA	
Ethyl Benzene	1/1	2.0		
Toluene	1/38	1.0	NA	
Xylenes	1/1	7.0		
SEMI-VOLATILE ORGANICS				
Bis(2-ethylhexyl)phthalate	4/37	14 - 59	38	
Diethyl Phthalate	1/1	3.0	NA	

NA - Not Applicable
* Background data was averaged. Only detected contaminants are reported. Blank spaces indicate it was below the detection limit.

A number of unaffected springs were sampled in February and May 1993. Aluminum was detected in these springs at concentrations ranging from 330 ppb to 4.6 ppm. While the concentrations are less than the maximum concentration observed in Duncan Tile Spring, they are similar in magnitude and in the fact that they exceed regulatory criteria. Therefore, even though the maximum aluminum concentration observed was in an affected spring, comparison of aluminum concentrations from that spring with those from a number, or set, of unaffected streams does not reveal a great discrepancy.

Bis(2-ethylhexyl)phthalate

Bis(2-ethylhexyl)phthalate was detected four times ((Mud River, Green Boiling, Lagoon, and Barnett-Karst springs). The contaminant concentrations ranged from 14 - 59 ppb. The primary MCL for bis(2-ethylhexyl)phthalate is 6 ppb. Now AWQC has been established for the contaminant. Due to the infrequency with which this contaminant was detected, the detections are more likely due to sampling or laboratory artifact than actual contaminant presence.

Chromium

Samples taken from the springs used as monitoring points for the RI were sampled for both trivalent and hexavalent chromium. Hexavalent chromium, the more toxic form, was detected in concentrations ranging from 1 ppb to 10 ppb. All reported concentrations were less than the AWQC for hexavalent chromium for protection of aquatic life from chronic toxicity, which is 11 ppb.

Trivalent chromium was detected in concentrations ranging from 17 ppb to 21 ppb. All reported concentrations were below the AWQC of 117 ppb for chronic toxicity resulting from exposure to trivalent chromium.

The primary MCL for chromium is based on total chromium, without regard to its valence state. The primary MCL for chromium is 100 ppb. All samples for either trivalent or hexavalent chromium were below the primary MCL, and even adding the highest trivalent result to the highest reported hexavalent result yields a combined concentration of only 31 ppb, also well below the primary chromium MCL.

Only one spring sampled for chromium by ESD contained 6.1 ppb of total chromium. Wells sampled showed total chromium at 20 and 22 ppb.

Iron

Iron was detected in almost all ground water and surface water samples. Concentrations ranged between 52 - 21,000 ppb. The AWQC is 1,000 ppb and the secondary MCL is 300 ppb. Two springs contributed to three of the highest concentrations observed, Duncan Tile Spring and Runoff Spring. Unaffected springs average concentration was 220 - 8,900 ppb. While the background concentrations are less than the maximum concentrations observed in these two springs, they are similar in magnitude and in the fact they exceed regulatory criteria.

Lead

Lead was detected five times in 43 ground water samples. Two of those five detections occurred in the potable wells which were not demonstrated to be connected to the Site. Positive results for lead were reported in three springs. Lead concentrations in ground water ranged from 5.9-20 ppb. One of the springs (Duncan Tile Spring) and one residential well exceeded the concentration established by CERCLA guidance for the protection of human health via drinking water consumption (15 ppb). There is no numerical MCL for lead. The chronic AWQC for lead as established by EPA is dependent upon the hardness of the water; at 100 ppm hardness, the chronic AWQC is 1.32 ppb. Lead detected in the three Site-related springs and in the background spring (McPherson Spring) did exceed the AWQC. The reported lead concentrations should be considered to be naturally occurring in the springs. The lead concentrations reported in potable wells is most likely due to household plumbing.

Manganese

Manganese was detected in spring samples in concentrations ranging from 18 ppb to 4,200 ppb. The highest concentration was found in a sample obtained from Lagoon Spring. The next two highest concentrations, 2,500 and 1,100 ppb were detected at McPherson Spring, which is assumed to be unaffected by contaminant transport from the Site. In fact, in three out of the five sampling events, the highest concentration of manganese was found in McPherson Spring. Lagoon Spring and Duncan Tile had the highest manganese concentrations in the other two sampling events.

No AWQC have been established for manganese for the protection of aquatic life. EPA has established a secondary MCL of 50 ppb, which was exceeded by a number of spring samples taken during the RI, including samples taken from Lagoon Spring, Mossy Spring, and Barnett Karst Window, as well as McPherson Spring and Duncan Tile Spring. Of more significance, however, is the fact that many of these samples also exceed EPA's health-based criterion for the protection of public health via consumption of drinking water, which is 180 ppb, based upon an EPA-approved reference dose.

The set of unaffected wells sampled contained manganese in concentrations ranging from nondetectable levels to 740 ppb.

Zinc

Zinc was detected in samples from potentially affected springs at concentrations ranging from 6 ppb to 61 ppb. The chronic AWQC for zinc is 59 ppb, and the secondary MCL is 5 ppm. The highest concentration observed, obtained from Duncan Tile Spring in association with a rainfall event, marginally exceeds the chronic AWQC for zinc.

The unaffected springs sampled by ESD contained zinc in concentrations ranging from 5 ppb to 12 ppb.

4.1.8 SEDIMENT

Site sediment concentrations were compared to US EPA Region IV Waste Division sediment screening values (January, 1992) which are based upon the National Oceanic and Atmospheric Administration effects range values for sediment contaminants. It should be noted these are just screening tools and not standards.

Three contaminants of concern were identified based upon an exceedance of EPA Region IV screening levels -- chromium, lead, and silver. Only sediment contaminants in Mossy Spring exceeded sediment screening values. Chromium, zinc, and manganese were found at levels more than twice levels found in the background spring. Although concentrations of some chemicals in sediment were elevated near springs, the concentrations farther downstream were generally at background levels and/or below screening levels. Results are presented in Table 4-6.

4.1.9 LEACHATE

A leachate sample was collected from an area adjacent to the leachate collection tank. The results indicate a wide variety of organic and inorganic contaminants. Chromium and lead were detected at estimated concentrations of 13 mg/l and .44 mg/l, respectively. Also present were mercury and cyanide at .002 mg/kg and .013 mg/kg, respectively. A number of organic acids, alcohols and amines were detected at concentrations ranging from .01 - 1 mg/l.

4.2 ECOLOGICAL STUDY

EPA conducted three ecological surveys. Two of the field efforts were focused in a very specific way on characterizing the biota of the Site and describing the communities which they occupy. One of the field efforts took place during the dormant season constituting only a partial accounting of species on Site. A subsequent survey was conducted to full assess the occurrence of receptor organisms as well as threatened and endangered species during early summer.

Table 4-6

**Caldwell Lace Leather Site
Contaminants Detected in Sediment**

Sediment Analyte	Site-Related Samples			Background Sample (SD-004) (McPherson Spring) (mg/kg)
	Frequency of Detection	Range of Detected Concentrations (mg/kg)	Arithmetic Mean (mg/kg)	
INORGANICS				
Aluminum	10/10	2,450 - 14,000	8,135	5,450
Arsenic	6/10	3.6 - 14	6.6	9.1
Beryllium	6/6	0.3 - 1.2	0.7	0.62
Calcium	8/10	1,400 - 6,200	3,456	610
Cobalt	10/10	5.4 - 33	10.3	11
Chromium	7/10	12 - 160	53.8	20
Copper	4/4	4.7 - 54	18.5	
Iron	9/10	4,900 - 41,000	15,811	16,000
Lead	7/10	7.5 - 39	17.1	11.9
Magnesium	7/10	240 - 2,000	714	440
Manganese	9/10	150 - 2,600	843	520
Nickel	10/10	5.4 - 13	8.6	4.2
Potassium	9/10	155 - 740	467	310
Silver	1/5	2.6	NA	
Sodium	6/10	15.5 - 43	25.8	28

Table 4-6 (Continued)

**Caldwell Lace Leather Site
Contaminants Detected in Sediment**

Sediment Analyte	Site-Related Samples			Background Sample (SD-004) (McPherson Spring) (mg/kg)
	Frequency of Detection	Range of Detected Concentrations (mg/kg)	Arithmetic Mean (mg/kg)	
Vanadium	10/10	8.6 - 59	25.8	25
Zinc	6/10	38 - 77	49.6	

NA = Not applicable. A mean cannot be derived from a single hit.

Tasks were formulated to identify general site and community boundaries and to determine whether or not the various habitats had the capacity for supporting receptor species.

Field methods used during floristic and faunistic investigations employed both systematic walk-through surveys and specialized habitat surveys. Quantitative information was also gathered in order to generated comprehensive species and species abundance checklists. Habitat surveys consisted of intensive visual screening of specialized habitats recognized as having the greatest potential for supporting threatened and endangered species. At the CLL Site, these included mesic limestone hillsides in boundary woodlands, small rock outcrops, sinkholes, moist depressions, and pond margins. Informational needs in this regard were augmented through literature reviews and contact with appropriate natural resource trustees.

The third field study focused on a habitat quality evaluation, ambient water quality measurements, biosurveys and sediment toxicity tests. The eight springs included seven springs shown by the dye-trace studies to be hydraulically connected to the Site (and thus potentially affected by Site contaminants), plus one background springs not hydraulically connected to the Site.

The following concluding statements summarize findings for ecological risk characterization:

- Many of the spring systems had only a limited aquatic habitat (e.g., intermittent stream, no defined channel).

- Sensitive benthic macroinvertebrate species were found in spring systems that having contaminated sediment (e.g., Mossy Spring).

- No toxicity was detected in any of the three sediment samples tested (i.e., Mossy Spring, Mud River, and Lagoon Spring Pond).

The field efforts and sensitive species study enabled EPA to determine whether the CLL Site had adversely impacted the environment. EPA determined that the species studied showed no noticeable impairments. No rare, threatened, or endangered species were encountered on the CLL Site or in conjunction with any outlying spring areas.

4.3 CONTAMINANT FATE AND TRANSPORT

The fate and transport of contaminants are related to the contaminants present, the soil type, hydrogeologic features, and other site characteristics. The following discussion describes the site-specific conditions that may affect contaminant transport.

The CLL Site was used for disposal of tanning wastes which were buried in the landfill area and tilled into soils in the landfarm. As a result, the surface and subsurface soils were impacted.

Also, due to the karst topography of the area, it is probable that releases of the wastes in soil have migrated to the ground water, surface water (springs) and sediments.

The Auburn, Kentucky area is typified by karst terrain involving underground streams, intermittent springs, and sinkholes. These sinkholes and subsurface features result from solution of channels which are formed by surface water percolating through the soil and eroding sandstone and limestone formations, eventually allowing the permeable soils above to subside. Most karst features are hydrogeologically significant because of their unique relation to the ground-water system. They collect and discharge water into, store and transmit, or discharge water from the ground-water system. Initially, flow diffuses through a large number of small fractures. With time, a network of conduits begins to develop that carries an increasing proportion of the flow. The development of sinkholes also contributes to the development of the conduit system because surface water will begin to flow directly into the conduits. In a mature karst system, runoff proceeds directly into tributary conduits and moves rapidly to the spring or springs at the downstream end of the basin.

Based on the physical and hydrogeological features present at the CLL Site, the potential exists for migration of some of the more mobile contaminants already detected in Site ground water and surface water. Due to the Site hydrogeology, chemicals entering the ground- water system may be flushed from the ground- water system and discharged off-Site. The depth of the ground-water table (30 to 40 ft.) in the area may help to slow the process of contaminant leaching, and the extensive system of sinkholes and fractures helps dilute and disperse any contaminant which does reach the ground-water medium. Important chemical factors in the water such as the pH, redox potential, ionic strength of the water, and the concentration of ionic complexes in the water all contribute to the fate of individual chemicals within the physical terrain.

The pH of the soil, adsorption rates, organic content in the soil, redox potentials, and the presence of sinkholes at the Site play significant roles in determining fate and transport. Adsorption renders some chemicals relatively immobile, making transport unlikely. However, the presence of sinkholes and/or fractures in the karst terrain may provide avenues for contaminant migration into the ground-water medium as runoff waters feed into them.

Based upon the survey of the physicochemical, geological, and hydrogeological features at the CLL Site, we would expect to find the majority of contamination to reside in the soil medium. Most of the organics detected in Site soil are relatively immobile and have not migrated to ground water or surface water. In addition, modeling indicated that chromium will not significantly leach from Site soil, a conclusion supported by the fact that groundwater chromium concentrators are well below MCLs. However, the potential does exist for some contaminants to migrate into ground water through sinkholes, runoff and leaching.

5.0 SUMMARY OF SITE RISKS

5.1 HUMAN HEALTH RISKS

A baseline risk assessment (BRA) has been conducted for the CLL Site and the results are presented Volume 2 of the RI. The BRA was based on contaminated environmental Site media as identified in the RI. It was conducted in order to provide an assessment of the resulting impact to human health and environment if contaminated soils and ground water at the Site were not remediated.

Based on the current and possible future land uses, four exposure scenarios were proposed: current landfill trespasser, current landfarm resident, future landfill resident and future landfill farm worker. These scenarios represent the individuals with maximum potential exposure to Site-related chemicals of potential concern. The four scenarios and their respective potential exposure pathways are listed in Table 5-1.

The CLL BRA concluded that the primary health risk posed by the Site is through ingestion and inhalation of groundwater. Carcinogenic risks did not exceed 1E-4 and are therefore not discussed in this ROD. The groundwater pathway posed a noncarcinogenic risk greater than or equal to 1.0 for the current or future residential scenario.

5.1.1 CONTAMINANTS OF CONCERN

The selected contaminants of concern for ground water are shown include barium, chromium, manganese, molybdenum, and vanadium. Of these, manganese was generally the most frequently detected and found at the highest concentrations. Please refer to Table 5-2.

5.1.2 EXPOSURE ASSESSMENT

The objectives of the exposure assessment are to identify actual or potential exposure pathways; characterize the potentially exposed populations; and to determine the extent of the exposure. The results of the exposure assessment are combined with the chemical-specific toxicity information to characterize the potential risks.

Ground-Water Use

The CLL Site is located in a rural part of Kentucky. The City of Auburn has not completely developed the city water distribution in the Site area. Therefore, some individual residences must have potable wells to draw ground water for their household needs. Under the document entitled Guidelines for Ground-Water Classification Under the EPA Ground-Water Protection Strategy (EPA, Final Draft December, 1986), the ground waters underlying the CLL Site are classified as Class IIA, i.e., a current source of drinking water supply.

Table 5-1

Exposure Scenarios and Potential Exposure Routes

Current

Landfarm Adult and Child Resident

- Incidental ingestion of surface water
- Dermal contact with surface water
- Incidental ingestion of sediment
- Dermal contact with sediment
- Incidental ingestion of surface soil (landfarm)
- Dermal contact with surface soil (landfarm)
- Ingestion of groundwater
- Inhalation of groundwater volatiles while showering
- Ingestion of home grown produce*

On-Site Trespasser (Hunter)

- Incidental ingestion of surface soil (landfill)
- Dermal contact with surface soil (landfill)
- Incidental ingestion of surface water
- Dermal contact with surface water
- Incidental ingestion of sediment
- Dermal contact with sediment

Future

Landfill Adult and Children Resident

- Ingestion of groundwater
- Inhalation of groundwater volatiles while showering
- Incidental ingestion of surface soil (landfill)
- Dermal contact with surface soil (landfill)
- Incidental ingestion of surface water
- Dermal contact with surface water
- Incidental ingestion of sediment
- Dermal contact with sediment
- Ingestion of home grown produce*

On-Site Landfill Worker

- Incidental ingestion of surface soil (landfill)
- Dermal contact with surface soil (landfill)
- Incidental ingestion of subsurface soil (landfill)
- Dermal contact with subsurface soil (landfill)

* Potential pathway, but is recommended by EPA Region IV not to be quantitatively evaluated. See Section 3.2.2.

Table 5-2

**Caldwell Lace Leather Site
Exposure Point Concentrations of Contaminants
Detected in Groundwater**

Groundwater Analyte	Site-Related Samples		
	95% UCL of Mean Concentration (μg/L)	Maximum Concentration (μg/L)	Exposure Point Concentration (μg/L)
INORGANICS			
Barium	84.6	960	84.6
Chromium	6.7	22	6.7
Manganese	400	4,200	400
Molybdenum	5.2	10	5.2
Vanadium	8.7	42	8.7

Land Use

The Site is located in a rural part of Kentucky. Land is used predominantly for livestock grazing and farmland. Currently, a trailer home is located in the landfarm area. Also, the potential exists for future use of the landfill area for cattle grazing or residential development. Based on these current and possible future land uses, two exposure scenarios represent the individuals with potential noncarcinogenic risk greater than 1.0. The two scenarios and their respective potential pathways are listed below:

Current

Landfarm Adult and Child Resident

- Ingestion of ground water
- Inhalation of ground water volatiles while showering

Future

Landfill Adult and Children Resident

- Ingestion of ground water
- Inhalation of ground-water volatiles while showering

5.1.3 EXPOSURE DOSE ASSUMPTIONS

Doses, expressed as chronic daily intakes in milligrams of contaminant per kilogram of body weight on a daily basis (mg/kg-day), are calculated for each exposure route applicable to the current residents and trespassers and the future residents and workers. For all the scenarios, doses are averaged over the number of days of exposure (70 years of exposure x 365 days/year) to evaluate chronic noncarcinogenic health effects.

The future resident scenario assumes that the Caldwell landfill area is converted to residential use and that individual lives on the Site for 30 years. It is assumed that residents take two vacations per year and therefore spend 350 days per year at home.

Three age groups are evaluated for the residential scenario: a child age 1-6, a child age 7-16, and an adult. A body weight of 15 kg was used for the child age 1-6. A body weight of 45 kg was used for the child age 7-16 and was calculated from the mean (50th percentile) body weight of male and female children reported for this age group. A body weight of 70 kg was used for the adult future worker, adult trespasser and the adult current and future residents. The exposure durations used in calculating ingestion of groundwater for the child age 1-6 was 6 years; the child age 7-16 was 10 years; and the adult was 14 years.

<u>Drinking Water Ingestion</u>

Drinking water ingestion is considered to be a potential exposure route for the current and future adult and children residents. The drinking water ingestion rates used for children and adult residents assume that all of his/her daily water intake occurs at home. The drinking water ingestion rate for the child and adult resident is 2 L/day.

<u>Inhalation While Showering</u>

Volatile organic compounds (VOCs) may be released to indoor air through a variety of home activities, including showering, cooking, dish washing, and laundering. Some researchers believe that inhalation doses of VOCs through typical home water uses may be as great or greater than doses from the ingestion of water. Based on experimental results for the transfer of trichloroethene from water to air in the shower stall, McKone and Knezovich (1991) report that inhalation exposures in showers could be equivalent to an ingestion exposure of 1 to 2 liters.

Inhalation while showering is evaluated to account for that dose of VOCs received from non-ingestion uses of water for the future adult and children residents. The dose from inhalation of VOCs while showering is based on the maximum ingestion equivalent (2 liters) described by McKone and Knezovich (1991). The ground-water ingestion model assumptions were multiplied by the VOC concentrations in ground water to derive the VOC exposure rate.

For the purpose of evaluating inhalation exposures, a VOC is defined as any organic compound with a Henry's Law constant of 1E-05 atm-m^3/mole or greater and with a molecular weight of less than 200 g/mole.

5.1.4 TOXICITY ASSESSMENT

The purpose of the toxicity assessment is to assign toxicity values (criteria) to each chemical evaluated in the risk assessment. The toxicity values are used in combination with the estimated doses to which a human could be exposed to evaluate the potential human health risks associated with each chemical. Human health criteria (cancer slope factors and reference doses) developed by the EPA were obtained preferentially from the Integrated Risk Information System (EPA, 1993b) or the 1992 Health Effects Assessment Summary Tables (EPA, 1992c). In some cases, the Environmental Criteria Assessment Office (ECAO, 1992) was contacted to obtain criteria for chemicals which were not listed in IRIS or HEAST.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to contaminants of concern exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of contaminants of concern from environmental media (e.g., the amount of contaminants of concern ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans).

Table 5-3

Chronic Reference Doses (RfD)
(mg/kg-day)

Chemical	Oral RfD	Reference	Inhalation RfD	Reference	ARAR (mg/L)
Barium	7E-2	IRIS, 1993	NC	—	2.0
Chromium (VI)	5E-3	IRIS, 1993	NC	—	0.1
Manganese	5.0E-3 (Water)	IRIS, 1993	NC	—	0.05 (SMCL)
Molybdenum	5E-3	IRIS, 1993	NC	—	NA
Vanadium	7E-3	HEAST, 1993	NC	—	NA

NC = Not of concern through this route of exposure.

5.1.5 TOXICITY SUMMARY ON THE CONTAMINANTS OF CONCERN

Barium - Very little is known about the human health effects of barium. The limited human and animal data suggest that the cardiovascular system may be one of the primary targets of barium toxicity. Cardiovascular effects include increased blood pressure, changes in heart rhythm, and heart muscle damage. Evidence from case reports suggests that barium also may cause some neurological effects.

Chromium - Adverse human health effects have been associated primarily with occupational exposure to chromium (VI) salts from chromium plating manufacturing. These effects are manifested by nasal irritation, pulmonary effects, contact sensitization, and kidney effects. Evidence of contact sensitization reactions have been seen in both the inhalation and dermal routes of exposure.

Manganese - The amount of manganese in a normal diet is about 2.5 to 5.0 mg/day. No cases of illness from eating too little manganese have been reported in humans; however, in animals it can interfere with normal growth, bone formation, and reproduction. Occupational exposure to high levels of manganese results in mental disturbances, muscle pain, weakness, and lack of coordination.

Molybdenum - Pastures containing 20 to 100 ppm molybdenum may produce a disease referred to as teart in cattle and sheep. It is characterized by anemia, poor growth rate, and diarrhea. Prolonged exposure has led to deformities of the joints. Hexavalent molybdenum compounds were found to be more toxic. Gavage studies in rats showed fatty degeneration of the liver and kidney. Another side effect of molybdenum exposure in toxic amounts is anemia due to inducing copper deficiency. Molybdenum has also been shown to be a metal effecting the male and female reproductive capacities by effecting spermatogenesis and embryogenesis, respectively.

Vanadium - The inhalation of vanadium leads to vanadium pneumonitis and mild respiratory distress including coughing, wheezing, chest pain, runny nose, and a sore throat. Renal and gastrointestinal effects are common after ingestion of vanadium compounds.

5.1.6 RISK CHARACTERIZATION

The risk characterization is an evaluation of the nature and degree of potential carcinogenic and noncarcinogenic health risks posed to hypothetical current and future residential receptors at the CLL Site. EPA generally does not recommend remedial action when the cumulative site risks at a site are less than 1E-4 and the noncarcinogenic hazard index is less than 1.0. The carcinogenic risks are not provided in this discussion because they did not exceed 1E-4. Both carcinogenic and noncarcinogenic chemicals are evaluated for potential noncarcinogenic effects.

The potential for noncarcinogenic effects is evaluated by comparing exposure level over a specified period (e.g., life-time) with a reference dose derived for a similar exposure period. The ratio of exposure to toxicity is called a hazard quotient (HQ). By adding the HQs for all contaminants of concern that effects the same target organ (e.g., liver) within a medium or across all media to which a given population may be reasonably be exposed, the Hazard Index (HI) can be generated.

The HQ is calculated as follows:

Non-cancer HQ = CDI/RfD

Where:

HQ = Hazard quotient
CDI = Chronic daily intake (averaged over the exposure period) (mg/kg-day)
RfD = Reference dose (mg/kg-day)

Hypothetical noncarcinogenic risks that exceeded an HI of 1.0 were:

- Current landfarm residents
- Future landfill residents

<u>Potential Risks Associated with Current Resident</u>

The total hazard index for the current residents age 1 to 6 years old, age 7 to 16 years old, and the adult were 12, 4, and 2, respectively (Tables 5-4). The majority of the risk by chemical was due to manganese through ground-water ingestion. For 1 to 6 year-olds, manganese contributed 10 of the HI of 12. For the youth (7-16 years old) the hazard index for manganese was 3 out the HI of 4. The adult hazard index for manganese was 2 of the 2 total. Only the ingestion of ground-water pathway exceeded the HI of 1.0; all other pathways did not exceed the unity value.

<u>Potential Risks Associated with Hypothetical Future Resident</u>

The total hazard index for the future scenario 1-6 year-old child was 12 (Table 5-4) through the ground-water ingestion pathway. Ingestion of ground water contributed 11 to the total (assuming that the child consumes 2 L/day of ground water). Of the total hazard index, manganese contributed nearly all of the risk in the ground-water pathway.

The total hazard index for the 7-16 year old is 4 (Table 5-4). The ground-water use pathway contributed nearly all of the total noncancer risk for this age group, with manganese contributing nearly all of the risk.

Table 5-4

Total Hazard Index
Using Reasonable Maximum Exposure Concentrations

Exposure Medium	Current			Future		
	Resident			Resident		
	1-6 yr. old	7-16 yr. old	Adult	1-6 yr. old	7-16 yr. old	Adult
Groundwater	Manganese - 10 Barium - 0.2 Chromium - 0.2 Molybdenum - 0.1 Vanadium - 0.2	Manganese - 3	Manganese -2	Manganese - 10 Barium - 0.2 Chromium - 0.2 Molybdenum - 0.1 Vanadium - 0.2	Manganese - 3	Manganese - 2
Surface Water	NE	None	None	NE	None	None
Sediment	NE	None	None	NE	None	None
Landfarm Surface Soil	Arsenic -0.2 Chromium - 0.5	None	None	NE	NE	NE
Landfill Surface Soil	NE	NE	NE	None	None	None
Subsurface Soil	NE	NE	NE	NE	NE	NE
Total HI	12	4	2	12	4	2

NE - Not Evaluated

The total hazard index for the future adult resident was 2 (Table 5-4). The ground-water pathway contributed a hazard index of 2 due to manganese.

5.1.7 UNCERTAINTIES IN RISK CHARACTERIZATION

The principal goals of the uncertainty analysis are to provide to the appropriate decision makers a discussion of the key assumptions made in the risk assessment that significantly influence the risk results and to assess the contribution of these factors to the under- or overestimation of risk. The uncertainty analysis should show that the calculated risks are relative in nature and do not represent an absolute quantification.

In recent months, the EPA has placed even more emphasis on the uncertainty analysis. In a 26 February 1992 memorandum from the Deputy Administrator to all assistant and regional administrators, EPA provides additional guidance on explaining risks and all their underlying data so that the strengths and weaknesses of the assessment become clear.

In the absence of empirical or site specific data, assumptions are developed based on best estimates of data quality, exposure parameters, and dose-response relationships. To assist in the development of these estimates, the EPA recommends the use of guidelines and standard factors in risk assessments conducted under CERCLA. The use of these standard factors is intended to promote consistency among risk assessments where assumptions must be made. Although the use of standard factors no doubt promotes comparability, their usefulness in accurately predicting risk is directly proportional to their applicability to the site-specific conditions.

The carcinogenic and noncarcinogenic risk estimates for the CLL Site were based on a number of assumptions that incorporated varying degrees of uncertainty resulting from several sources, including:

- Data evaluation.
- Selection of exposure pathways, input parameters, algorithms, and scenarios.
- Confidence in toxicological data used to estimate cancer potency factors and reference doses.

5.1.8 RISK ASSESSMENT CONCLUSIONS

The ingestion of ground-water pathway for current and hypothetical future residents exceeded the HI of 1.0; all other pathways did not exceed the unity value. For the following reasons, EPA has determined that the CLL Site does not pose unacceptable risk to human health.

Manganese is primarily responsible for the elevated ground-water hazard indices in the risk characterization. Consistent with EPA guidance, manganese is not eliminated from the chemical of concern list because its maximum detection (4,200 μg/L) exceeded two times background

(1,085 μg/L, Table 4-4). However, the exposure point concentration (Table 5-2) for manganese in ground water is 400 μg/L which is less than background. Even though the hazard index calculated with the exposure point concentration is above unity, it is also indicative of the hazard indices that could be generated with the background concentration for manganese. Manganese concentrations observed during the RI are likely to be naturally occurring. Manganese is often enriched in carbonate sediments. The enrichment of manganese in limestones, sandstones, shales and clays is most likely accounted for by manganese substituting for similar ions, like calcium.

Chromium is another metal contributing to the elevated ground-water hazard indices in the risk characterization. There are many uncertainties associated with toxicity values, especially those that are derived from studies in laboratory animals. The form in which a metal occurs can greatly influence it toxicity potential (e.g., hexavalent chromium is more toxic than trivalent chromium). Data collected during the RI did not show detections of chromium VI in any samples except for one ground water sample (10 ug/l). Also, chromium VI is not typically associated with tanneries and their waste streams, but in the CLL Risk Assessment EPA Region IV conservatively assumed that all chromium is in the hexavalent form.

For a risk to exist, both significant exposure to the pollutants of concern and toxicity at these predicted exposure levels must exist. The toxicological uncertainties primarily relate to the methodology by which carcinogenic and noncarcinogenic criteria (i.e., cancer slope factors and reference doses are developed. In general, the methodology currently used to develop cancer slope factors and reference doses is very conservative, and likely results in overestimation of human toxicity (e.g., reference doses are estimates with an uncertainty spanning perhaps an order of magnitude or greater).

5.2 ECOLOGICAL RISKS

5.2.1 HABITAT AND BIOTA SURVEYS

Biologists conducted field investigations (walk-through surveys) of the CLL Site consisting of qualitative inventories of occurrences and extent of major community types, presence of surface water and associated drainage patterns, potential wetlands, and signs of gross surface contamination. The field investigations included the CLL Site and eight off-Site springs which dye traces indicated might be impacted by the CLL Site.

From the ecological perspective, the CLL Site is typical of most culturally impacted areas within the Western Escarpment Physiographic Province. Land use practices have resulted in a wide range of disturbance regimes that span all stages of successional development. Community associations therefore contain elements characteristic of each of these successional types. The purposeful and accidental introduction of exotic plant species has also had a profound influence on regional floristic diversity.

The varied plant life observed at the Site offers the indigenous fauna many habitat opportunities and a bountiful food supply. The numerous mast, browse, seed, and forage species signals a potentially complex pollutant pathway.

No rare, threatened, or endangered species were encountered on the CLL Site or in conjunction with any of the Springs.

5.2.2 SURFACE WATER

The most likely pathway for contaminants to migrate is via natural springs and the karst geology in the vicinity. To qualitatively determine whether surface water contaminants might pose a risk to aquatic life, site concentrations were compared to the Ambient Water Quality Criteria (AWQC) and the Kentucky surface water standards. After comparing surface water concentrations to Region IV chronic screening values, several contaminants exceeded the values suggesting a potential adverse effect on aquatic biota.

Five chemicals of concern for surface water exceeded the surface water quality values: aluminum, chromium, iron, lead, and bis(2-ethylhexyl) phthalate. Aluminum exceeded acute standards by two-fold in all eight springs. Chromium exceeded screening values only if chromium VI is considered, and then only slightly in three springs. Iron exceeded chronic screening values in six springs and acute screening values in Mossy Spring and Lagoon Spring. Lead exceeded chronic screening criteria in three springs. Lead exceeded chronic screening criteria in Duncan Tile, Mossy Spring, and the Runoff Spring. However, Duncan Tile Spring has a poor stream structure and the Runoff Spring is an intermittent spring, thus indicating that chronic effects related to lead in surface water would be limited. Bis(2-ethylhexyl) phthalate was detected in four springs and in all instances exceeded the chronic screening value indicating a low to moderate risk to aquatic life. Most of the surface water samples which exceeded AWQC or state surface water standards were either within two times the concentration found in the background spring (i.e., McPherson Spring) or were found in springs having a poor physical aquatic habitat (e.g., poor stream structure of Duncan Tile Spring; intermittent nature of Runoff Spring).

5.2.3 SEDIMENT

Site sediment concentrations were compared to US EPA Region IV Waste Division sediment screening values (January, 1992) which are based upon the NOAA effects range values for sediment contaminants. It should be noted these are just screening tools and not standards.

Only sediment contaminants in Mossy Spring exceeded sediment screening values. Lead exceeded the NOAA (Effects Range-Low) ER-L while chromium and silver exceeded both the ER-L and the (Effects Range-Median) ER-M screening values.

5.2.4 ECOLOGICAL RISK CHARACTERIZATION

The following concluding statements summarize findings for ecological risk characterization:

- No threatened or endangered species were observed at the site or in the spring systems.
- Many of the spring systems had only a limited aquatic habitat (e.g., intermittent stream, no defined channel).
- Although concentrations of some chemicals in sediment were elevated near springs, the concentrations farther downstream were generally at background levels and/or below screening levels.
- Sensitive benthic macroinvertebrate species were found in spring systems that having contaminated sediment (e.g., Mossy Spring).
- No toxicity was detected in any of the three sediment samples tested (i.e., Mossy Spring, Mud River, and Lagoon Spring Pond).
- Most of the surface water samples which exceeded AWQC or state surface water standards were either within two times the concentration found in the background spring (i.e., McPherson Spring) or were found in springs having a poor physical aquatic habitat (e.g., poor stream structure of Duncan Tile Spring; intermittent nature of Runoff Spring).

5.2.5 ECOLOGICAL UNCERTAINTY ANALYSIS

Ecological risk assessments, like human health risk assessments, are subject to a wide variety of uncertainties. Virtually every step in the risk analysis process involves numerous assumptions and unknowns which contribute to the total uncertainty in the final evaluation of potential risk. In general, the main sources of uncertainty can be attributed to the following areas:

- Environmental chemistry and sampling analysis
- Environmental parameters (i.e., pH, TOC, flow rates, etc.)
- Exposure assumptions
- Interpretation and application of toxicological data

Two major sources of uncertainty in an ecology risk assessment are the interpretation and application of toxicological data in the toxicity assessment. Frequently, data from literature sources are inadequate and regulatory criteria for many chemicals are unavailable. In addition, regulatory criteria are based on the general protection of animal and plant life, and can not be considered as distinct levels of toxicity for aquatic life in all situations. Variations in species sensitivity may differ due to some of the following factors: dose-response behavior (toxicity), tolerance thresholds, symptomatic behavior, delayed response behavior, and metabolic differences.

6.0 SCOPE AND ROLE OF RESPONSE ACTION

EPA has determined that no action is necessary to provide protection for human health or the environment. The results of the RI, including the Risk Assessment, indicate that there are not current or future risks from exposure to soils, sediments, or surface water. However, there is currently no feasible way to determine whether future ground-water risks would be a significant threat to human health or the environment because of the unpredictability of karst topography. Consequently, EPA is recommending that the Commonwealth of Kentucky or the current landfill owner continue spring monitoring because this is the primary pathway by which the landfill portion of the Site could potentially impact human health or the environment in the future. The current landfill owner has expressed his intentions to improve the landfill area for wildlife. Several management practices can be incorporated into ongoing land management activities that would enhance the property for a wildlife habitat. Regardless of the proposed wildlife habitat, EPA recommends that future land use restrictions be placed on the landfill property, as well maintenance of the landfill cover, to prevent land use activities that would expose the subsurface waste to human contact or the environment. Since EPA is not proposing to take a cleanup action, these land use restrictions would be voluntarily implemented by the landowner, or put in place by the Commonwealth of Kentucky or local government. The land-use restrictions would further reduce any potential future risk connected with the CLL Site.

EPA will continue to review information from the Commonwealth of Kentucky or any other entity to ensure acceptable health or environmental standards are maintained. In the event any monitoring indicates levels that pose unacceptable risk to human health or the environment, the Site shall be restored to the NPL without application of the HRS (40 CFR §300.425(e)(3)). EPA could initiate cleanup actions in the future pursuant to CERCLA and in accordance with the NCP.

The Record of Decision is the only Record of Decision contemplated for the CLL Site. EPA has determined that its response at this Site is complete and therefore recommends the Site for inclusion on the Construction Completion List.

APPENDIX A

RESPONSIVENESS SUMMARY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

PUBLIC INFORMATION MEETING

FOR THE

CALDWELL LACE LEATHER

SUPERFUND SITE

APRIL 26, 1994

7:00 p.m. C.D.T.

FIRE HALL, AUBURN, KENTUCKY

REPORTER: SANDRA SMITH SHERRELL
513 East 10th Street, Suite A1C
Bowling Green, KY 42101
(502)-782-1096

The following is the PUBLIC INFORMATION MEETING FOR THE CALDWELL LACE LEATHER SUPERFUND SITE held on April 26, 1994 at 7:00 p.m. Central Daylight Time at the Fire Hall in Auburn, Kentucky pursuant to Public Notice in the local newspapers.

* * * *

APPEARANCES

MS. SUZANNE DURHAM:	Community Relations Coordinator for the Caldwell Lace and Leather Site in Auburn, Kentucky with the U. S. Environmental Protection Agency, Region IV, Atlanta, Georgia.
MS. BETH BROWN:	Remedial Project Manager for the Caldwell Lace and Leather Site in Auburn, Kentucky with the U. S. Environmental Protection Agency, Region IV, Atlanta, Georgia.
MR. HAROLD W. TAYLOR, JR:	Chief of the Kentucky/Tennessee Section of the North Superfund Remedial Branch with the U. S. Environmental Protection Agency, Region IV, Atlanta, Georgia.
MR. RICK HOGAN:	Commonwealth of Kentucky Superfund Program. Natural Resources and Environmental Protection Cabinet Frankfort, Kentucky
MR. WILLIAM M. HILL:	Commonwealth of Kentucky Superfund Program. Natural Resources and Environmental Protection Cabinet Frankfort, Kentucky

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INTRODUCTION AND WELCOME

MS. SUZANNE DURHAM: Good evening. My name is Suzanne Durham. And, I'm the Community Relations Coordinator for the Caldwell Lace and Leather Site, here in Auburn, Kentucky. I am with the U. S. Environmental Protection Agency out of Atlanta, Georgia.

The purpose of tonight's meeting is to tell you about EPA's long term investigation which we've conducted here over the past couple of years, to tell you exactly what we have found, and then what we're proposing to do at the site.

But, most importantly, we are here to hear from the community and those who are most effected by the site.

Before I go any further, I'd like to introduce the EPA and Commonwealth of Kentucky staff who are here with us.

On the front row here is Beth Brown. She's the Remedial Project Manager who handles the day to day technical activities at the site. And, you've, probably, seen her in your community for the last couple of years.

To her right is

Harold Taylor. He's Beth's supervisor as well as mine. He's the Chief of the Kentucky/Tennessee section of the North Superfund Remedial Branch, also, in Atlanta, Georgia.

To my right, I have Rick Hogan and Billy Hill, who are both with the Commonwealth of Kentucky Superfund Program.

And, with us tonight, we have the local Magistrate and someone from the Solid Waste Program here in Logan County.

We thank all of you for coming.

Again, we're going to keep the presentation short so that you all can get right on into your questions and answers.

I had a seventeen (17) minute video to show the Superfund Program from site discovery through the decision making process, but, I think, we're just going to cut that out and let Beth go right on into her investigation, what she found, and what we're proposing to do.

*　　*　　*　　*

PRESENTATION

BETH BROWN: Okay. I'm Beth Brown, and I'll be presenting what EPA has done the past few years at the Caldwell Lace Leather Superfund Site.

If you have any questions during my presentation, I'll try and answer them if they are a brief answer. Otherwise, I may wait until the end to try and address your questions.

Okay. The site's located about two point five (2.5) miles northwest of the city of Auburn.

The reason why EPA became involved at the site was we had concerns about the nature of the waste that was disposed at the site, the volume of the waste that was disposed at the site, and the potential for the waste to migrate to ground water or surface water and effecting those who might drink from groundwater or surface water.

All the information that I'm going to be presenting this evening can be found in the Administrative Record that's located either in Russellville, or you can contact EPA Region IV in Atlanta.

I've, also, brought

some material if you're interested after the meeting, the maps of dye traces that we've done, a summary of the investigation that we've done, and some aerial photos.

Okay. The reason why the site is here in Auburn is because the tannery that's located in downtown Auburn. The tannery was in operation from the late 1800's until, approximately 1985, when they changed their tannery operation and are no longer producing or tanning. They're actually just doing leather cutting.

We don't know where the disposal locations are prior to 1972 for the waste that was generated from the facility.

But, we're concerned with the Caldwell Lace Leather Site that's north of town.

The waste stream consisted of cowhide scraps, fleshings, and the sludge. And, it was disposed of in two (2) methods. It was either landfilled or it was landfarmed. And, I'll discuss that in more detail later on.

The site was placed on EPA's National Priorities List in 1990, which made it eligible for EPA to expend Superfund money.

Again, the reason why we were concerned about investigating the site was the potential for the waste to migrate to groundwater or surface water.

And, also, there is someone that lives on a portion of the site that we were concerned about, him living there, what would happen. He, also, grazes cattle, what would happen to the cattle or if he sold the cattle for subsequent cow's milk.

So, those were the questions we wanted to answer, so we performed a Remedial Investigation which consisted of defining the nature of the waste and the extent of the waste.

REPORTER'S NOTE: (During the presentation Ms. Brown indicated on and referred to visual aids continuously.)

Okay. If you remember I referred to the landfill. It was -- actually, had several different time frames that the landfill operated in. But, it's primarily this portion of the site.

Okay. And, the other method of disposal was landfarming where basically they took the waste water sludge and disked it into the soil with a tractor and a plow. And, so this is this portion of the site.

Okay. And, lastly, we were concerned about the landfill and potential migration of waste on the surface onto this portion of the site, and we refer to that as the southwest area.

Now, what these symbols mean is, this is, basically, a sink hole. These are trees. Here's another sink hole. And, here's another sink hole on the southwest quadrant of the site.

Okay. So, in summary, here are the areas that we are concerned about. The old landfill area that operated from '72 to '82, and then a portion of that landfill area they coined it or termed it a "Residential Landfill," and at that time, that was basically only receiving the cowhides and the scraps. It was not receiving the sludges.

But, the residential landfill is on the older part of the landfill. All that area is in this circled area.

With the landfill portion of the site, it actually was closed in 1985, and they put a surface soil, about two feet (2') surface soil, clay type of material, and they, also, vegetated that area.

We weren't real concerned about the surface soil because they used clean soil to put -- to place on top of the landfill.

We were, however, concerned about the subsurface contamination, and its potential to migrate down into the ground water and into the springs.

The landfarm area because of the method of disposal was basically disking, we were only concerned about, probably, the top foot (1') of soil. We didn't expect it to migrate or to have been disposed below a foot (1').

The southwest quadrant of the site, again, we were concerned with the surface soil because that was the area that surface water from the waste would leach onto that part of the property.

Okay. And, when I'm referring to surface soil, or I'm sorry, the ground, surface soil, we look at the top twelve to eighteen inches (12"-18"), approximately a foot (1').

And, subsurface samples were collected from about a foot (1') down to a depth of about sixty feet (60') in some locations.

Okay. For right now, I'm just going to discuss the landfarm and the southwest quadrant because those were similar because we were only really concerned about surface soil, although we did take some subsurface samples.

So, here's the land farm. Here's the southwest quadrant.

As you can see, we divided the site up into grids that basically were about one (1) acre in size. And, the landfarm, we basically took nine (9) samples out of each grid.

We, also, selected some of the grids that we suspected received some of the most contamination or, I'm sorry, most chemicals of concern due to their disking method. And, that was primarily in this area. So, in this area, we took subsurface samples down to a depth of about three feet (3').

The southwest quadrant, we took, again nine (9) samples, surface soil samples, in each grid.

And, we, also, took one (1) subsurface sample in the center of each grid.

Okay. Now, I'll talk about the landfill. The landfill, we took a lot of subsurface samples located in the trenches because we wanted to get an idea of the nature of the waste that was put in the trenches. So, those would be this actual -- the hatched areas actually represent the areas that were trenched.

And, these trenches were unlined so, they were, basically, the waste was, basically, a pit was dug and the waste was just placed in those trenches. So, again, here are some more trenches in the hatched area.

All these little hatched or circled areas represent a soil sampling location.

If you'll, also, notice, we did take samples that were not located in the trenches. We wanted to get an idea of whether or not waste from those trenches was migrating out of the trenches. So, that would be the purpose of locating those or locating those soil borings out of the trenched areas.

To give you an idea of what we found in the landfarm portion of the site, I'll just give you an idea of some of the chemicals that were detected, the frequency at which they were detected, and the range of the concentrations.

The parts per million expresses a very low concentration of that chemical. For instance, one point six (1.6) part per million of Arsenic. Well, a part per million can be represented as like one (1) ounce of say Arsenic in one million (1,000,000) ounces of water.

To even give you a better idea, we're talking about one (1) drop of that chemical in a swimming pool, that would be one (1) part per billion (1,000,000,000) of that chemical.

So, there in your handout on the front table there are more tables of the contaminants that were detected. So, I'm just going to go ahead and skip through these, and if you have questions about what we detected, we can talk about those later during the question and answer period.

To understand whether or not we had groundwater contamination we had to have an understanding of the geology and the hydrogeology.

Most of you are pretty familiar with the area and, probably, can tell me more about it than I can tell you.

It's what we call a karst geology regime, which is basically characterized by sinkholes, springs, streams. And, the basic geology are sandstones and limestones.

The site actually is on an east/west trending sandstone, that forms a groundwater divide. And, let me go ahead. What we did was to characterize groundwater flow was we conducted a dye trace.

And, I think, most of you are, probably, familiar with the dye trace because you've probably seen the fluorescent dyes they use to determine which way the groundwater flows.

And, basically, they -- the United States Geological Survey performed the dye trace for us. They placed bugs or detectors that had charcoal filters in them all over the site area. They then on several locations on the site, which I'll show you in just a minute, injected dye.

So, wherever that dye flowed from the site they detected it in the springs.

So, to give you an idea, we had several injection points on the site and just off-site.

And, what we found was the groundwater flowed to the northwest and to the southwest eventually discharging into Mud River.

To the northwest, it eventually, the groundwater, eventually discharges into Wiggington Creek, to the Gasper River.

So, what we wanted to do was monitor those locations that we knew were in the direct flow path from the site should anything migrate out of those trenches.

So, those locations are indicated here. There were eight (8) locations that we monitored.

We did not find that the Auburn Spring was connected to our site in any way. It's actually in a totally different hydrogeologic regime.

We monitored those eight (8) springs for about one (1) year, consisted of five (5) sampling events, two (2) of which were related to rainfall.

If we had a significant rainfall event, we wanted to find out when the rain hit the waste whether or not you would have any significant flushing of chemicals into the groundwater. So, we did that twice.

And, we, also, did three (3) other events over that year.

Chemicals that we detected consisted of Chromium, Manganese, Barium, Vanadium, and Beryllium.

To give you an idea of the concentrations that we detected, again, I've prepared a table of the chemicals that we detected, frequency with which we detected them, and then I compared them to drinking water standards. There are Federal standards that EPA sets.

As you'll see, we have an exceedance. Twenty (20) is above the drinking water regulation of fifteen (15). And, we, also, have an exceedance of this Phthalate.

Now, let me explain the lead. We sampled several residential wells, and two (2) of those, we were concerned that they had elevated levels. So, immediately we went back and resampled those wells and did not find lead contamination.

In older homes because they use soldering you can often find lead because of the plumbing. You can find lead in the tap water.

We notified those residents that there was a potential problem. However, we do not feel that they are site-related.

As far as the Phthalate concerns, often in the laboratory analysis, chemicals can be introduced into the samples, and because we only detected it four (4) times we didn't feel like the Phthalate was related to the site.

Because these

springs can, also, be accessed by wildlife, we compared it to Federal standards but take into consideration those wildlife and what would happen to their systems if they would ingest these concentrations.

We found we wanted to look more closely at the Aluminum, the Chromium, the Lead, Manganese, and the Phthalate.

Because there were eight (8) springs, only three (3) of these had exceedances. So, our ecologists or our biologists went to those three (3) springs, the Mossy Spring, the Lagoon Spring, and the Mud River Spring, and studied those springs to see whether or not the levels of concentrations we were seeing were effecting those bugs and critters. We determined that there was no affect.

We had very sensitive species living in those springs. It's kind of the canary in the coal mine. These species would, if they exist in those springs, would mean that there wasn't any effect or any impairment to those, to the wildlife.

Also, as part of our ecological study, we did surveys and actually walked the site and spent several days in the spring and, also, in the winter to get an idea of what kind of wildlife and what kind of plants were in the area.

We didn't find any endangered species in the area.

And, again, we detected sensitive species in that spring, in those springs.

And, we did not detect any toxicity.

After we collect all that data we want to find out whether or not anybody exposed to those concentrations would suffer any adverse affects.

So, we looked at someone living on the site, both the landfarm, and the landfill, if it was a child, if it were an adult.

We, also, looked at someone that is actually working on the land.

And, what we found was because Manganese was detected at elevated concentrations in some of those springs, someone drinking from them might suffer adverse affects.

So, what we did was we, also, looked at what we call the background spring, a spring that wasn't related to the site.

And, what we found was, the Manganese was just as high in that background spring as it was in the site-related spring.

Well, what we know is because of the limestone, which is in this area, Manganese is in limestone. So, we do not feel that the elevated concentrations are necessarily related to the site or pose any adverse affect.

So, to summarize, we took samples in privates wells; we performed ecological studies; we took soil samples both surface and subsurface; we sampled the springs both water and the sediment in those springs, and then we performed our Risk Assessment.

And, our conclusion is that the Caldwell Lace Leather Site does not pose an unacceptable risk.

Because you have waste left in place, EPA is recommending to the State or to the current landfill owner that they continue to monitor the springs, that they place future land-use restrictions on the landfill so that the waste won't be disturbed and no one will be exposed to it, and lastly, EPA will review any of this information that the State collects or any other individual and we'll review it and, if necessary, we'll visit the site again.

* * * *

SUZANNE DURHAM: Lastly, I want to tell you all that the public has thirty (30) days to come in over to comment on EPA's Administrative Record which is here in the Logan County Public Library and to comment on our proposed plan of action.

If you need additional time, we can grant an additional thirty (30) day extension.

We will keep you informed through fact sheets and notices in your local paper. After the final decision is made I will publish a notice here in the local papers for you.

And, now, I think we're ready to move right on into the question and answer period. I will ask that you stand, state your name, spell it if it's an unusual spelling.

I will, also, ask that each person only ask two (2) questions each or two (2) comments, and then we'll move onto someone else and then come back. I promise we'll answer each and every question before the night is over.

First question? Surely someone has a question or a comment.

QUESTIONS AND ANSWER SESSION

ROBYN MINOR
DAILY NEWS:

My question is about health risk assessment. Was there any kind of survey done to any people living near the area as far as any, you know, asking them if they've had any particular health problems or anything like that?

BETH BROWN:

No, ma'am. And, the reason for that is because we didn't find any chemicals at concentration that caused us concern that would lead us to do those kind of studies.

ROBYN MINOR:

What about the chromium levels? You didn't say too much about that, but they seemed quite a bit higher than background levels on both the soil and the water?

BETH BROWN:

Okay. We did find Chromium at elevated concentrations in the subsurface waste which is to be expected in the landfill.

In the surface soil, however, we did not detect the Chromium at concentrations that caused us concern.

ROBYN MINOR: How much money has the Federal Government spent on this site investigation so far?

BETH BROWN: To the best of my knowledge, I don't have a number for you. But, I feel comfortable in saying we have not spent five hundred thousand ($500,000.00).

If you're interested in a more accurate number, I can get back to you on that.

MS. DURHAM: Are there other questions?

TODD BRATCHER
LOGAN COUNTY HEALTH DEPARTMENT

In regards to the recommendation on future land use restrictions for the landfill property, what did you specifically have in mind?

BETH BROWN: Well, we prefer not to see any building of houses or any weight bearing structures because the nature of the waste is not solid so that you could have some subsidence. And, we don't want any pressure being put on that, the waste, because it could be exposed to the surface then.

TODD BRATCHER: Who is the current owner of the property?

BETH BROWN: Mr. Joe Howlett, I believe, is the current --

TODD BRATCHER: A single owner?

BETH BROWN: It may be through a

corporation.

TODD BRATCHER: Well, do they -- are they aware of this recommendation?

BETH BROWN: Yes, sir, they are. And, they have expressed their willingness to continue monitoring and to emplace some kind of future land use restrictions.

TODD BRATCHER: Okay. So, the current owner or corporation has, at least, accepted to continue to monitor?

BETH BROWN: Yes, sir. And, they will pursue that or actually the State of Kentucky, we believe, is going to pursue that through some kind of order.

TODD BRATCHER: Are you aware of that?

RICK HOGAN: Yes. That's correct.

TODD BRATCHER: Okay. And, what would that be, or do you know what type of order you'll be delegating to who?

RICK HOGAN: We would hope to accomplish an Agreed Order which would be a written agreement between the responsible party and the State of Kentucky which would commit them to, among other things, continue to monitor the site and to place some sort of deed restriction on the property which would prevent any intrusive activity.

TODD BRATCHER: Thank you.

* * * *

BETH BROWN: Anybody else have any questions? If not, we'll stay afterwards, too, if you want to come up and talk to us.

SUZANNE DURHAM: Anybody else? Well, if not, we thank you all for coming tonight.

We want to officially thank the City for the use of the Fire Hall and the local school for the use of their audio/visual equipment.

Thank you all, and good night.

*   *   *   *   *   *

STATE OF KENTUCKY)
)
COUNTY OF WARREN)

I, Sandra Smith Sherrell, a Notary Public in and for the State of Kentucky at Large, do hereby certify that the forgoing Public Information Meeting was taken by me at the time, place, and for the purposes mentioned in the caption; that said Public Information Meeting was taken by me in shorthand notes and by tape recording and thereafter reduced to a typewritten transcript under my direction; that no request was made by any party that the transcript of said Public Information Meeting be submitted to anyone for reading and signature; that said transcript is a true and accurate Record of said taking to the best of my ability.

Given under my hand on this May 4, 1994.

SANDRA SMITH SHERRELL, NOTARY PUBLIC
State of Kentucky at Large.

My Commission expires: 10/14/97.

APPENDIX B

STATE CORRESPONDENCE

PHILLIP J. SHEPHERD
SECRETARY

BRERETON C. JONES
GOVERNOR

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
FRANKFORT OFFICE PARK
14 REILLY ROAD
FRANKFORT, KENTUCKY 40601

June 24,1994

Ms. Beth Brown, RPM
North Superfund Remedial Branch
Waste Management Division
United States Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Re: Caldwell Lace Leather Superfund Site
Draft Record of Decision

Dear Ms. Brown,

The Commonwealth of Kentucky, Division of Waste Management, has reviewed the Draft Record of Decision for the Caldwell Lace Leather Site and finds it to be a complete and accurate representation of the investigative activities which have occurred there. However, we believe the data generated by that investigation do not support EPA's determination that no remedial action is necessary. To the contrary, the Remedial Investigation Report concludes that the additional cancer risk to future residents is 3 in 100,000, which is significantly in excess of Kentucky's de minimus risk level of 1 in 1,000,000 and which should trigger remedial action and/or risk management.

Kentucky, therefore, does not concur with the "selected remedy." We hope that you reconsider this decision and will be glad to meet at your convenience to discuss alternative solutions.

Sincerely,

Caroline P. Haight, Director
Division of Waste Management

Caldwell Lace Leather Superfund Site
EPA Response to KYDEP Comments on the
Baseline Risk Assessment

GENERAL COMMENTS

KYDEP COMMENT #1: ***Too little investigation has occurred in each media of this property and in areas off-site (USEPA, 1989, December).***

Response: The EPA Office of Health Assessment (OHA) and Waste Management Division (WMD) considered the sampling performed as the basis for this baseline risk assessment to be adequate. Comments received from KYDEP Division of Waste Management apparently do not agree with the KYDEP Risk Assessment Section, because no mention was made of too little investigation. Also, it is important to note, that during the three and one-half years that the RI was conducted, KYDEP never made this comment. KYDEP's Risk Assessment Section representatives were asked to attend Site visits, agreed to attend the Site visits and then would not attend.

What would KYDEP consider an adequate investigation in each media? Where would KYDEP suggest samples be taken, what kind of samples should be taken and how often? Please provide clarification so that EPA may respond.

KYDEP COMMENT #2: ***Potentially completed pathways appear to have been excluded for the soil exposures based on too few sampling points.***

Response: It is not clear to which "potentially completed pathways" the KYDEP is referring. How does KYDEP define too few sampling points? Please provide clarification so EPA may respond.

KYDEP COMMENT #3: ***Risk for certain receptors would likely result from a combination of exposures from both the landfill and landfarm, yet exposures have been considered to come from one or the other.***

Response: It was assumed the two land areas were of sufficient size to support two separate residential populations and there would not be a need to combine exposures. Also, because KYDEP had approved landfill closure, which consisted of placing "clean soil" over the landfill, the landfill surface soil was not considered to be a problem. However, the landfarm was considered to potentially have contaminated surface soil.

KYDEP COMMENT #4: ***Groundwater investigation included little data from on-site and the off-site data was generally treated as if it were all equally representative of the Caldwell site. Most of the wells and all springs sampled were located off-site, yet results from all of them appear to have been grouped together to obtain a site mean.***

Response: The exposure point concentrations for ground water were developed following Region IV guidance. The lessor of the 95% upper confidence limit (UCL) of all Site-related samples and the maximum detected concentration was used. Data from springs hydraulically connected to the Site and those possibly Site-related were grouped together to develop the exposure point concentration. The springs, although off-Site, are representative of groundwater quality from the CLL Site. Please refer to the RI Section 5.0 and Appendices A and C which explain the groundwater investigation. Appendix D of this document provides groundwater ingestion risks based on individual springs.

KYDEP COMMENT #5: ***Chemical background values where generated from a single off-site source atypical of sources sampled elsewhere. The McPherson Spring appeared to reflect conditions characteristic of a stagnant pool or small wetland.***

Response: Although McPherson had lower pH and conductivity values, the flow was not atypical of other springs observed in the Site vicinity. Chemical concentrations from McPherson were not statistically different for most of the chemicals of concern. McPherson is a spring that does not always have flow, which is not uncharacteristic of karst topography. U.S.G.S made the recommendation that this spring be considered as background because it is not Site-related. A number of private drinking water wells and springs, not established as being hydraulically connected to the Site, do provide control data for comparison with Site-related springs.

KYDEP COMMENT #6: ***Numerous chemical of concern (COC's) were eliminated from consideration based on unacceptable methods (e.g., iron because it is an essential element; manganese because its concentration is less than two times the background; and lead via the "Lead Model #5".***

Response: All methods of selection of chemicals of potential concern listed are acceptable based on Risk Assessment Guidance for Superfund (RAGS) and Region IV Guidance (Appendix A). Manganese has been added to the COC list.

Please see response to General Comment #s 10 and 16 for discussion of the two-times rule and Lead Model.

KYDEP COMMENT #7: ***Means calculated for use in determination of intakes and risk values were not clearly defined and almost certainly represent an underestimation of chemical concentrations likely to exist in specific exposure pathways. Because of the minimal sampling that was performed, the maximum concentrations probably should have been used.***

Response: Reasonable maximum exposure (RME) point concentrations were used as described in Section 3.4 of the Risk Assessment to quantify risk. The lessor of the 95% UCL or the maximum detected concentration was used as the exposure point concentration input in the RME calculation. Arithmetic means were provided for data summary purposed.

KYDEP COMMENT #8: ***Data from groundwater and surface water samples were inappropriately combined to obtain site-wide means. From the tables of data, it is unclear exactly what samples went into calculation of the averages.***

Response: The ground water/surface water data are taken from the documents listed in Section 1.3 of the Risk Assessment and presented in their entirety in the CLL RI. Please refer to Appendix B of this document.

KYDEP COMMENT #9: ***Tables frequently provide "ranges" of data, but the individual components of those ranges and/or means were generally omitted from the risk assessment. The data from which the ranges are extracted should at least be referenced (e.g., Volume II, Page 14).***

Response: Complete data tables are included in the RI report (Volume I). Please refer to Appendix B of this document for list analytical data used in calculating the means.

KYDEP COMMENT #10: ***Several assumptions (i.e., default values) and methods for treating data were used that are not acceptable by the KYDEP (e.g., Two times the background rule; elimination based on nutritional criteria; grouping of dissimilar samples).***

Response: All assumptions, default values, and method for treating data are in accordance with Region IV and/or EPA risk assessment guidance. The purpose of the two-times background rule is to provide a conservative estimation of whether a chemical is significantly different than background. EPA recognizes KYDEP's concerns and would prefer a statistical comparison, like a T-test, but have found that statistical comparisons often eliminate more chemicals of concern. The two-times rule is a more conservative method. EPA Region IV is currently developing conservative guidance to deal with this issue.

KYDEP COMMENT #11: ***The ecological investigation reflected an apparent neglect of aquatic organisms such as fishes in the waters capable of supporting them and of other species that would likely exist below the surface in burrows or caves. Subsurface exposures could be significant within and below the landfill and other potential hot spots.***

Response: The primary goal of the supplemental field effort at and in the vicinity of the CLL Site was to identify general site and habitat boundaries and determine whether or not the various habitats have the capacity for supporting both receptor and indicator species. As such, aquatic sampling was outside the scope of the investigation. However, ecologists did confirm the presence of fish at two of the off-Site locations (8C Runoff and Mud River Spring) and identified those species that were observed.

The studies performed included chemical analyses, toxicity testing, and benthomacroinvertebrate community studies. Had any of these studies indicated problems, the next step would have been a more detailed ecological investigation. See also response to Specific Comment #46.

KYDEP COMMENT #12: ***Efforts to obtain relevant information on threatened and endangered species of the area appeared to be virtually non-existent. Apparently, since no site-specific study had been conducted previously, local regional studies were not considered important to the site's characterization.***

Response: EPA believed the best and most productive way to gather site-specific information would be the on-Site surveys conducted by WESTON ecologists familiar with flora and fauna of Kentucky's Highland Rim and Shawnee Hills Sections. EPA did contact Mr. Al Westerman, Risk Assessment Section of the KYDEP to attend on-Site surveys. The U.S. Department of Interior (DOI), Fish and Wildlife Service office in Cookeville, Tennessee was also contacted and invited to attend the on-Site surveys. Both parties agreed to attend the surveys, but neither party attended. Throughout the RI, and especially during the determination of what type of ecological studies should be performed, KYDEP and DOI participated in the development of those Site studies.

EPA did review the Environmental Assessment of the Headwaters of the Mud and Gasper Rivers in the Vicinity of Auburn, Logan County, Kentucky prepared by KYDEP Division of Water, 1987.

KYDEP COMMENT #13: ***Seemingly, very little information generated from previous investigations was considered in the assessment. What efforts were made to research state or federal agency records or to communicate with others regarding flora and fauna in the area?***

Response: See response to General Comment #12.

KYDEP COMMENT #14: *Hexavalent chromium is likely to present significant risk via groundwater ingestion, due in part to the presence of manganese oxide.*

Response: The hexavalent chromium data were suspect so risk associated with its presence was not quantified. However, as a conservative method, the total chromium data are quantified using CrVI toxicity values. (Section 4.3.4.1). This procedure should have well estimated any risk as the mean concentration for total chromium is greater than the CrVI data.

KYDEP COMMENT #15: ***Azo dyes, many of which are carcinogenic and were used during the era of this tannery operation, (Brown, 1993), have apparently not been considered in this assessment. They may not be present at the Site, but should be addressed.***

Response: EPA suggests that if KYDEP is concerned about the presence of azo dyes, then any sampling KYDEP conducts in the future, should include nitrates and nitrites. However, nitrate in the drainage basins may be high because of fertilizer and cattle present in the basin.

SPECIFIC COMMENTS

KYDEP COMMENT #1

Section 1.2, pp. 1-8: *Lead and chromium were detected in two drinking water wells during February of 1991, but subsequent testing in May of 1991 did not detect either chemical.*

Different concentrations of these contaminants could result as water levels and weather conditions change. Several samples taken over a long period should be analyzed.

Response: These wells were not demonstrated to be Site-related, but EPA did provided all private well owners of the sampling results. EPA suggests that if KYDEP has concerns about these wells, that KYDEP continue to sample them.

KYDEP COMMENT #2:

Section 1.2, pp. 1-12: *Figure 1-7 shows grids of the site with dimensions of 200 feet by 200 feet.*

Grids of such large size would unlikely be sufficient for surface or subsurface soil sampling in areas containing narrow trenches and other potential spots of high contamination. They should be further subdivided into smaller sections and each of the smaller sections sampled. Several options for selection of sampling points are provided in EPA document (USEPA, 1985).

Response: Apparently, there appears to be some confusion regarding the use of grids. EPA did not just use grids, but also collected biased samples from areas of known trenches and "hot spots". Please refer to RI, Section 3.6 which explains in detail the rationale for the size grids. Section 4.1.3.2 provides the results with an explanation of the statistical confidence that was achieved for this sampling pattern. These explanations should clarify your concerns with regard to subdividing into smaller sections. The selection of sampling points were selected based on statistically developed performance constraints utilizing various representative sampling method guidance documents more appropriate for this Site than the PCB spill cleanup guidance document to which KYDEP refers.

KYDEP COMMENT #3:

Section 2.1, p. 2-1: *Chemicals of Concern listed in summary tables include only those positively identified in at least one sample from a given medium.*

This procedure assumes that all detection limits are low enough to assure detection of chemicals at levels sufficient to create excessive risk. The type and level of each detection limit used should be clearly provided with results of analyses.

Response: The detection limit is included in the RI Appendices.

KYDEP COMMENT #4:

Arithmetic means were used.

It is unclear if arithmetic or geometric means have been used throughout the assessment. From data provided, it seems likely that a normal distribution does not exist, therefore, a log normal would be used to calculate the upper Confidence Limits of means. However, it appears that too few samples of any given medium or location have been analyzed, (i.e., a minimum of 16 representative data points are required).

Response: Please refer to Section 3.4 of the Risk Assessment which describes and provides the calculation used to determine the reasonable maximum exposure (RME); the arithmetic mean is not the RME. (It should be noted that at least 16 data points were used in determining the arithmetic means).

KYDEP COMMENT 5:

Means were calculated using the detected concentrations only.

> ***This may be acceptable provided the non-detects are also excluded from the number of samples composing the denominator of the fraction: total contamination over number of samples. However, elimination of non-detects when determining the background concentrations is not acceptable, as it would likely result in a high background level to which contaminants elsewhere are compared.***

Response: This is a true statement and non-detects were also excluded from the denominator. In the calculation of the 95% UCL, one-half the detection limit was included in the calculation for all non-detects.

KYDEP COMMENT #6:

> *Screening of chemicals was achieved by comparing the detected concentrations to two times the background.*
>
> ***What is the technical basis for the two-times background exclusion? The two-times background procedure is not accepted by KYDEP. Often, background concentrations themselves are high enough to present significant risks. Such a procedure might be considered when determining the extent of remediation required, but not for calculating the baseline risk.***

Response: The comparison of site samples to two-times average background is consistent with Region IV guidance. Please see response to General Comment #10. It should be noted that the objective of Superfund remediation is not to reduce risk below background levels, therefore risks from background concentrations of chemicals are not included in the CERCLA process.

KYDEP COMMENT #7:

> *Tables 2-1 through 2-6 reflect calculations of means from ranges of detected concentrations involving up to three orders of magnitude difference.*
>
> ***If non-detects were included, the order of magnitude would increase to five for some chemicals. This would likely reflect very large variances of data, perhaps even larger than the man. A large variance is an indicator of the need for additional sampling, particularly in the vicinity of hot spots. Tables need to include the exact values used in calculation of the means, including the***

individual sample concentrations, variances and standard deviations. It is likely that additional characterization is needed to find hot spots and their boundaries.

Response: The individual data points for the calculation of the means is included the RI Report. When the variance of a sample set is high, the 95% UCL will typically exceed the maximum detected concentration and therefore, result in the use of the maximum detect concentration as the exposure point concentration.

KYDEP COMMENT #8:

Tables indicate that backgrounds are based on one surface soil sample from the landfarm, one surface soil and one subsurface soil sample from the landfill, five surface water samples (one sample per each of five different events) from the McPherson Springs, and an unspecified number of groundwater samples from four McPherson Wells.

Background sampling should be done off-site at least in an area of minimal contamination and in sufficient amounts to produce statistically sound results. Too few samples have been collected from each medium to allow its characterization. Only the water samples are from off-site, and it is not certain if these sources are impacted by the Caldwell site contamination. As mentioned previously, non-detect values should be included in calculations for the background means.

Response: Soil samples were collected in areas suspected of minimal contamination and in sufficient amouts to produce statistically sound results. Please refer to Section 3 and 4 of the RI. For clarification, there are no McPherson wells, only one spring. Only those springs hydraulically connected to CLL were used in developing the RME. The McPherson Springs was used as a background to Site-related springs. For comparison purposes, other wells and springs may be used as control samples. Please refer to 5.5.3.1 of the RI. Non-detect values (one-half the detection limit) were included in calculating the background means.

KYDEP COMMENT #9:

The "Frequency of Detection" column of the tables provides the number of samples in which contaminants were detected and also the total number that were used to calculate site means.

It appears from locations and/or events have been combined when they should be considered individually or in small groups segregated from the site as a whole. Grouping of non-representative data lessens the likelihood for hot spot detection.

Response: Please see response to General Comment #3 and Specific Comment #s 2 and 36. Also, It should also be noted that the landfarm area design was based on the smallest area within which exposure could be limited under the most conservative, reasonable, future use scenario (residential development).

KYDEP COMMENT #10:

Section 2.1, pp. 2-15: *Surface soil samples were collected 0" - 18" and subsoil samples at 3'.*

KYDEP generally considers surficial soils where mixing has occurred as those within the top 12" of the surface. Subsoil samples should be taken at various depths below the surficial soils. Since "clean" soil was placed over contaminants to a depth of 3 or 4' in certain trenches and lagoons during past remedial efforts, subsoil sampling should include soil below that depth. In most locations, sampling should continue to bedrock, to the groundwater table, or to a depth below that expected to provide exposure to receptors through contact with the soil or through leaching of contaminants into surface or groundwater.

Response: EPA also considers surface soils as those within the top 12" of the surface. EPA collected 90 surface soil samples, nine of which were the top 18" and 81 were the top 12". Fifty-nine biased samples were collected from the landfill including samples from trenches and lagoon. When possible, two-man power augers (Little Beaver® variety) were advance through the waste down to native soils. An all-terrain mobile drill rig was later used at the landfill to drill nine boreholes to down to depths determined by auger refusal or 60 feet. The purpose of these 17 samples was to gain a better understanding of possible migration of contamination from the trenches in the vadose zone and if possible the saturated zone.

KYDEP COMMENT #11:

Section 2.2.1.2, pp. 2-16: *A detection frequency of less than 5% was used in conjunction with other considerations to eliminate chemicals of concern.*

Due to minimal sampling, this procedure is not acceptable. A

single detection could represent a significant hot spot that would contribute excessive risks. It is unclear what specific chemicals were eliminate based on this method.

Response: Please refer to Section 2.2.1.2 in the BRA. No chemicals were eliminated by this method.

KYDEP COMMENT #12:

The "two-times rule" was applied to all inorganic chemicals for which there was data. The maximum on-site concentration had to be at least two-times greater than the average detected value of the respective background samples (non-detects within background analyses were dropped).

As mentioned previously, this procedure is not accepted by KYDEP. The application of the two-times rule is especially flawed when used with background values that are too high due to incorrect treatment of data, as is likely the case in this assessment.

Response: The comparison of site samples to two-times average background is consistent with Region IV guidance. Non-detects are included in the calculation of average background values.

KYDEP COMMENT #13:

Section 2.2.1.3, pp. 2-21: *Any non-carcinogenic potential chemical of concern that contributed less than 1% of the total risk was deleted.*

This approach seems reasonable for this site, since chromium and manganese were not eliminated via this method. However, the actual calculation of total risk values for all potential chemicals of concern was not provided. Therefore, it is difficult to confirm the accuracy of results leading to elimination of other chemicals. Obviously, the individual risk and total risk should be pathway specific for each medium and receptor. Calculations supporting this approach should be provided as part of the baseline risk assessment.

Response: The toxicity-concentration screen was performed consistent with RAGS guidance

(Chapter 5.9.5). Also, please refer to Section 2.2.1.3 of the Risk Assessment which explains the exact procedure used in deleting chemicals from the potential chemicals of potential concern. With this information, it is possible to duplicate the calculations supporting this approach. Supporting calculations can be provided if needed.

KYDEP COMMENT #14:

Section 2.2.1.4, pp. 2-24: *Essential nutrients were dropped from the list of chemicals of concern if less than two times the background.*

Even essential nutrients may present risk. Elimination on the basis of the two-times rule is not acceptable, particularly in light of how the background data was treated.

Response: The elimination of essential nutrients is consistent with Region IV guidance.

KYDEP COMMENT #15:

Section 2.2.2.1, pp. 2-24: *McPherson wells were used to determine background for the groundwater.*

Analyses of water from these wells alone are unlikely to provide a representative value for groundwater in the area of Logan County and the Caldwell Lace Leather site. Additional groundwater samples in the area beyond potential impact by the Caldwell Lace Leather contamination should be used to expand the confidence of the background mean. Since determination of background concentrations is important when selecting remediation methods to be used at a Superfund site, it seems strange that so little effort was applied to determining the background concentration of contaminants.

Response: Please see response to General Comment #5. Also, it is important to note that before determining possible remediation methods, potential risk should be determined. If risk above 1E-4 is determined, a remedial action may be warranted. At this point, the clean-up number will be established, and in groundwater it is usually the MCL, unless the background exceeds the MCL.

KYDEP COMMENT #16:

Since toxicity information for lead is not available, lead concentrations were investigated via the Lead Model.

The Lead Model is not acceptable as a method for evaluating risk to receptors in a baseline risk assessment. Some toxicity information for lead is available through various sources. EPA's IRIS, in 1986 listed an oral cancer slope factor of 1.4E-03 $(mg/kg/day)^{-1}$ and an inhalation cancer slope factor of 4.3E-04 $(mg/kg/day)^{-1}$. IRIS, 1989, listed an oral cancer slope factor of 1.0E-03 $(mg/kg/day)^{-1}$. Though EPA has since pulled the listings from IRIS for further review, they have recently printed an oral cancer slope factor of 7.7E-03 $(mg/kg/day)^{-1}$ for use when calculating carcinogenicity of compiles mixtures (Office of Pollution Prevention and Toxics). KYDEP currently uses the latter for calculation of risk due to lead ingestion. KYDEP generally requires that soil contaminated with lead be cleaned to a level of about 20 mg/kg. Groundwater has an action level of 15 ug/L. Tetraethyl lead, if present, may present significant systemic risks at very low concentrations. The oral RfD is 1.0E-07 mg/kg/day (IRIS, 1994). Obviously, lead in any form may be of concern. It is likely that lead contributes significant risks both on and off the Caldwell Lace Leather site and cannot be eliminated from quantitative consideration in this assessment.

Response: The purpose of the using the EPA's biokinetic model for lead exposure is because it better estimates potential adverse effects, than the outdated slope factors. EPA believes that the available studies to not provide sufficient quantitative information. Although lead is currently classified as a B2 carcinogen, EPA considers the noncarcinogenic neurotoxic effect in children to be the critical toxic effect in terms of health-based environmental cleanup. In absence of lead health criteria, the Lead Uptake/Biokinetic Model (Version 0.5) is the best approach to predict mean lead blood levels in children. Region IV recommends the use of the Lead Model.

KYDEP COMMENT #17:

Section 2.3, pp. 2-29: *Chemicals that were quantitatively assessed are listed in Table 2-7. Those chemicals without health criteria were assessed qualitatively.*

The list of Chemicals of Concern is deficient due to the improper elimination of chemicals via the two-times background rule, essential element consideration, etc. Furthermore, several of the chemicals assessed qualitatively do have sufficient information in literature and other sources to enable quantitative assessment.

Response: The elimination of chemicals of concern were based on EPA Region IV protocols. If there are sources for toxicological values we have overlooked, please provide them for possible inclusion.

KYDEP COMMENT #18:

Section 3.1.1 — *The Caldwell Lace Leather site has both a topographic and groundwater divide. Two distinct groundwater basins discharge to two rivers (Mud River at 4 miles SW and the Gasper River at 2.4 miles NE).*

Despite having this knowledge, groundwater sample results of both basins were combined when calculating means. Minimally, data from well and/or sprigs of each basin should be considered independent of each other. It is likely that sample locations should be further segregated to include only those wells and/or springs that hydrologically connected to a specific part of the Caldwell Lace Leather site (i.e., specific source of specific contaminants).

Response: Why should they be considered separately, would the receptor know the difference between one basin or the other? For your information, we calculated the risks from individual springs. The results indicate one spring (Lagoon) had an increased hazard index and all the others were decreased. Please see Appendix D of this document for individual spring ingestion risks.

KYDEP COMMENT #19:

Section 3.2, p. 3-3: — *The landfill was capped with two feet of clean soil.*

Information on when this took place, evidence that the soil was clean, and the actual area covered has not been provided. Also, the "clean" soil could actually have become contaminated since it's placement on the site. Sampling of these soils should be completed as part of the investigation.

Response: EPA suggests that KYDEP review their own records because KYDEP approved Caldwell's closure plan for the disposal area in February 1985. The landfill surface soil was sampled as part of the RI. Please refer to RI Sections 3 and 4.

KYDEP COMMENT #20:

Section 3.2, p. 3-4: *Current and future land uses proposed in the risk assessment were:*

Landfill	*Current Trespasser*
	Future Resident
	Future Farm Worker
Landfarm	*Current Resident*

Additional land use scenarios should include:

Landfill	***Current Farm Worker***
	Future Resident
Landfarm	***Current Trespasser***
	Current Farm Worker
	Future Trespasser
	Future Resident
	Future Farm Worker

Response: The future scenarios do not assume attenuation of contaminants. Therefore, the requested "current farm worker" would be identical to the future farm worker in the landfill. For the landfarm, a current resident was evaluated because a family currently resides there. More over, any risk to any other populations would be less than the risk of the resident since its assumptions are more conservative.

KYDEP COMMENT #21:

Section 3.2.1, pp. 3-5: *Inhalation of volatiles has been considered only in groundwater used for showering.*

Several volatiles and semi-volatiles (e.g., acetone, bromomethane, carbon disulfide, o-chlordane, 1,2-Dichlorobenzene, ethylbenzene, toluene, styrene, xylene, etc.) have been detected in either the groundwater and subsurface soil. Granted, most concentrations detected thus far are relatively low, but hot spots are possible. Through tillage of the soil and accumulation of volatiles in dwellings, receptors may be at risk from vapors. Additional on-site soil, water and air sampling and monitoring should be conducted, particularly in the vicinity of the landfill.

Response: The levels of volatiles detected in soils was not sufficient to warrant development scenarios associated with volatiles in outdoor air.

KYDEP COMMENT #22:

Section 3.2.2, pp. 3-8: *The age range defaults used for exposure durations of residents are: Child resident of 1-6 years of age and child resident of 7-16 years of age.*

Appropriate residential defaults should be:

Child	***<7 years of age***	=	***6 years***
Child	***7-18 years of age***	=	***12 years***
Adult (Rural)	***19-40 years of age***	=	***22 years***
Adult (Total)		=	***40 years***

Adults living in a rural area tend to stay in one location longer than those in urban settings. The total adult exposure is the sum of exposures encountered as a child, adolescent, and adult.

Response: The default values used exposure durations consistent with EPA guidance.

KYDEP COMMENT #23:

Section 3.4, pp. 3-12: *Exposure point concentrations for use in calculating intakes were derived using the 95% Upper Confidence Limit (UCL) of the arithmetic mean. However, if the 95% UCL was greater than the maximum concentration detected, the maximum concentration detected was used.*

This is the proper procedure, however, since the derived means are suspect, little confidence can be placed in the calculated 95% UCL. Even the maximum concentration detected to date may not be the true maximum, since too few samples have been collected and analyzed.

Response: The procedure for development of exposure point concentrations is consistent with EPA guidance.

KYDEP COMMENT #24:

Section 3.4
pp. 3-17,18,19 *Tables 3-5 through 3-7 contain exposure point concentrations detected.*

These tables, just as others mentioned previously, exclude certain chemicals that have been inappropriately eliminated as chemicals of

concern via two-times background rule, etc.

Response: The selection of chemicals of potential concern is consistent with EPA guidance.

<u>KYDEP COMMENT #25:</u>

Section 3.5
pp. 3-20 through 35

Narrative and tables provide models and assumptions (defaults) used for determining exposure.

Several assumptions are not consistent with those used by the KYDEP:

Table 3-8 Incidental Ingestion of Soil

Used in the Risk Assessment	*KYDEP*
IR=50 mg/day for Future Worker	*480*
EF=45 days/yr for Trespasser	*140*
ED=10 yrs for Current Child	*12*
=14 yrs for Adult	*22*

The future worker is likely to be a farmer who tills the soil, therefore, his ingestion of soil would be similar to construction workers.

Table 3-9 Dermal Contact with Soil

Used in the Risk Assessment	*KYDEP*
SA = 2125 cm^3 Chile 1-6 yrs	*3730*
(50% of events)	*(100%)*
4397 cm^2 Child 7-16 yrs	*7400*
4145 cm^2 Adult Resident	*3500*
(50% of events)	*(100%)*
1980 cm^2 Future Worker	*4700*
AF = 1mg/cm^2	*2.7*
ABS = 0.01 Organic Compounds	*1*
0.001 Inorganic Compounds	*1*
EF = 45 days/yr for Trespasser	*140*
ED = 10 yrs for Current Child	*12*
14 yrs for Adult	*22*

Dermal contact with soil by a resident would be expected to involve

100% of the events, however, a case could be made to use 50% of events for trespassers. The ABS should be chemical specific and appropriate values related to the chemical of concern may be used.

Table 3-10 Ingestion of Groundwater

Used in the Risk Assessment	*KYDEP*
ED = 10 yrs Child	*12*
14 yrs Adult	*22*

Table 3-11 Incidental Water Ingestion (Water)

Used in the Risk Assessment	*KYDEP*
EF = 45 days/yr for Child (7-16)	*140*
45 days/yr for Adult	*52*
ED = Omission of Child <7 yrs	*6*
10 yrs for Child (7-16)	*10*
14 yrs for Adult	*22*

Table 3-12 Dermal Absorption (Wader)

Used in the Risk Assessment	*KYDEP*
SA = Omission of Child <7 yrs	*3730*
4397 cm^2/day Child (7-16)	*7400*
4145 cm^2/day for Adult	*9300*
EF = Omission of Child <7 yrs	*140*
45 days/yr for Child (7-16)	*140*
45 days/yr for Adult	*52*
ED = Omission of Child <7 yrs	*6*
10 yrs Child (7-16)	*12*
14 yrs for Adult	*22*

Table 3-13 Incidental Ingestion of Sediment

(The EF and ED should be the same as the corrected values in Table 3-8, including child <7 years and adult resident, trespasser and worker).

Table 3-14 Dermal Contact with Sediment

(The SA,AF, ABS, EF and ED should be the same as corrected

values in Table 3-9).

Response: The assumptions used in the risk assessment are consistent with EPA default values. It is a agreed that a more representative soil value for a farmer would be 480 mg/day for the percentage of time spent tilling soils. However, if 480 mg/day were used for the entire exposure period the risk levels would still remain in the acceptable range. Please see Appendix C of this document for landfill surface and subsurface soil ingestion and dermal contact risks based on an IR of 480 mg/day for a farmer.

<u>KYDEP COMMENT #26:</u>

Section 4.0 *pp. 4-1 thru 23*	*Narrative and Table 4-3 provide toxicity information on potential chemicals of concern.* ***Again, certain chemicals have been omitted due to inappropriate screening techniques.***

Response: The selection of chemicals of potential concern is consistent with EPA guidance.

<u>KYDEP COMMENT #27:</u>

Section 4.3.2.1 *p. 4-23*	*Lead is considered to be a potential carcinogen through the oral route, but EPA does not have a Cancer Slope Factor available.* ***EPA did list a CSF of 1.0$(mg/kg/day)^{-1}$ in 1989, but have since removed it for further review. KYDEP has calculated a similar value and therefore continues to use it in assessment of risk from lead intakes.***

Response: EPA no longer considers the CSF for lead to be valid.

<u>KYDEP COMMENTS #28:</u>

Section 4.3.2.2, 4-23	*There are no volatiles chemicals of potential concern in groundwater.* ***Some VOCs have been detected in soil on-site. Groundwater on-site has not been sufficiently characterized to permit this conclusion.***

Response: The selection of chemicals of potential concern is consistent with EPA guidance.

KYDEP COMMENT #29:

Section 4.3.2.3, 4-24 *Dermal slope factors were derived by dividing the oral slope factor of volatile organics by 0.8, semi-volatile organics by 0.5, and inorganics by 0.2.*

Though this procedure has apparently been recommended by Region 4, EPA, and may be reasonable, the KYDEP has not received supporting information from EPA. We have seen it used elsewhere and would like to see the science behind it use. KYDEP continues to use the oral slope factor as the dermal slope factor except when chemical specific information is available.

Response: These default values are used when sufficient data is unavailable for development of chemical specific values. It should be noted that use of the oral slope factor as the dermal slope factor is less conservative than use of the default oral absorption factors.

KYDEP COMMENT #30:

Section 4.3.4, 4-28,29 *Table 4-4 list 1,3 dichlorobenzene, aluminum, and tin as not having the toxicity data available.*

Oral RfD's for the above chemicals, in order as listed, are 0.089, 2.90, and 0.600 mg/kg/day (U.S.EPA, 1994a). Obviously, these chemicals should be included in the quantitative risk assessment.

Response: The RfD for tin is included in HEAST and should have been included in the document. However, the RfDs for 1,3-dichlorobenzene and aluminum are from sources other than IRIS or HEAST.

KYDEP COMMENT #31:

Section 5.3, pp. 5-6,7 *Table 5-1 and 5-2 indicate that Current Landfarm Trespasser, Future Landfarm Resident, and Future Landfarm Worker scenarios were not evaluated for surficial soil ingestion.*

Each of the above scenarios appear to present risk via potentially completed pathways, therefore, each should be included in the assessment.

Response: Please refer to Comment #20 response.

<u>*KYDEP COMMENT #32:*</u>

Sediments were eliminated from evaluation because no carcinogens were detected.

Sampling of sediments has not been sufficient to eliminate them as contributors of risk. In fact, lead was detected in the sediments and that in itself is reason enough to perform the risk calculations.

Response: Please refer to the RI Sections 3.8, 4.2.2.1, and 7.3 which supports the selection of the sediment sampling locations. Habitat quality evaluations, ambient water quality measurements, biosurveys, and toxicity tests were performed at those springs which had sediment screening value exceedances (RI Section 7.3).

<u>*KYDEP COMMENT #33:*</u>

Section 5.3, pp. 5-8: *Table 5-3 and 5-4 present the Hazard Quotient and Hard Index for current and future residents of different age groups, current trespassers and future workers.*

The actual calculations have not been provided. It is unclear if child intakes and risks have been added into the adult scenario for residents. Also, future trespassers and current workers should be included in the tables.

Response: Section 5.2 provides the equation which incorporates the exposure dose intakes combined with the toxicity data to generate the HQ and HI. The values are provided in the Risk Assessment Appendix A and B. Child and Adult risks were not summed.

<u>*KYDEP COMMENT #34:*</u>

Section 5.3.2.1 pp. 5-13 *The cancer risk for future residents is 3E-05. Since no pathway exhibits risk greater than 1E-04, there are not specific chemicals of concern as carcinogens.*

The risk value after making corrections and adjustments (i.e., expanding the list of chemicals of concern, revising calculations of exposure and intake, and inclusion of risk from carcinogens previously omitted) will almost certainly reflect a greater total risk

level for various pathways. Furthermore, a risk of 1E-04 is not the point of departure. All risk specific to an exposure pathway greater than 1E-06 should be addressed via remediation and/or management.

Response: The risk assessment follows EPA Region IV protocols. Therefore, the total risk for the future resident is as stated.

KYDEP COMMENT #35:

Section 5.3.2.2: pp. 5-14 — *The potential non-carcinogenic risk for a child resident 1-6 years of age via groundwater ingestion is a Hazard Index of 11. Through surface soil ingestion it is a Hazard Index of 0.8. The Hazard Index for a future worker is 0.09.*

The adult risk must include the total of that accrued over the period of being a child as well as the portion attributed to the years of exposure as an adult. It is unclear if the adult risk has been calculated correctly. Reported risk levels likely are an underestimate of reasonable maximum exposure risks due to exclusion of certain chemicals of concern and perhaps to improper calculations.

Response: The noncarcinogenic risk for a child and adult are not summed.

KYDEP COMMENT #36:

Section 5.4.2, pp. 5-16: Groundwater lead levels averaged 13.6 ug/l at the Caldwell site.

It is unclear what specific samples were included in calculations of this mean. Were the samples from wells and/or springs? Were they from on-site and/or off-site. EPA has established an action level for lead at 15 ppb. With a mean of 13.6 ppb, it is likely specific sample locations exceeded the action level. It is also probable that the individual locations of sample should be considered separately rather that grouped together.

Response: Please refer to Appendix B of this document for specific samples included in calculations of the mean. The complete data package is in the RI for KYDEP to evaluate whether exceedances of 15 ppb occurred. EPA already identified in the RI the two exceedances that occurred.

KYDEP COMMENT #37:

Section 5.5.2, pp. 5-20: Use of the 95% UCL may have resulted in conservative estimates of the dose values.

Possible, but on the other hand, if the intakes are based on UCL's derived from improperly derived means, as appears to be the case with this assessment, the doses (i.e., intakes) may actually be underestimated.

Response: The risk assessment was completed according to EPA Region IV protocols and the arithmetic means were based on the data presented in the RI.

KYDEP COMMENT #38:

Section 5.5.2, pp. 5-22: Manganese was eliminated as a chemical of concern because it's exposure point concentration was calculated to be 400 ug/l which was less than the background.

The maximum manganese concentration detected was 4200 ug/l. Even at 400 ug/l, it presents risk greater than a de minimis level if ingested in drinking water. Again, the grouping of groundwater sample from such diverse sources as represented by this mean is not appropriate. Certainly, exclusion of manganese on the basis of the two-times background rule in this case borders on the ridiculous. The MCL for drinking water is 50 ppb.

Response: Manganese is now included in the Risk Assessment. Currently, there is now federal MCL for manganese, but EPA recognizes the Kentucky MCL for manganese.

KYDEP COMMENT #39:

Section 6.2.1, p. 6-2: For assessment of ecological risk, aluminum, magnesium and vanadium were eliminated as chemicals of concern via the two-times background rule. Also, calcium, iron, potassium and sodium were eliminated due to low toxicity.

As with the assessment of risk to Human Health, the two-times background rule is not acceptable. As for elimination of chemicals due to toxicity, justification via peer reviewed literature or other

studies should be provided. While it is likely that calcium, potassium and sodium concentrations are acceptable, iron at concentrations detected exceed the Kentucky Chronic Water Quality Aquatic Health Criteria of 1 mg/l.

Response: Please see response to General Comment #10.

KYDEP COMMENT #40:

Section 6.2.2, p.6-2 *Eight springs were determined to be hydrologically connected to the Caldwell Lace Leather site.*

It is not clear which of the springs are actually connected to the same source of contaminants at the site. It is unlikely that they all are being impacted by the same contaminated sources, therefore, only those springs known to be part of the same underground conduit and draining from the same area of contamination should be grouped together for averaging data. It is likely that each spring provides for averaging data. It is likely that each spring provides for separate exposures to different receptors (e.g., aquatic organisms in one spring are not likely to be exposed to chemicals in another spring). The risk from chemicals of concern at each spring should probably be evaluated independent of others.

Response: The springs were evaluated separately for the ecological assessment.

KYDEP COMMENT #41:

Section 6.2.2, p. 6-7 *McPherson Spring was used as the (surface water) background. The essential elements calcium, iron, magnesium, potassium and sodium were eliminated because they are essential nutrients of low toxicity.*

The background for surface water should include data from several other locations around Logan County. Both iron and magnesium were detected at levels presenting significant risk to some organisms.

Response: Please see response to General Comment #5.

KYDEP COMMENT #42:

Section 6.2.3
pp. 6-8 thru 6-10

Tables 6-2 and 6-3 present surface water and sediment data.

For comparison purposes, units within a table should be consistent. Either ug/l or mg/l should be used throughout the table. Also, the range data does not provide the individual entries from which they were derived. The tables should be expanded to show all data used in obtaining the ranges.

Response: The Tables 6-2 and 6-3 have been revised to include ug/l units only.

KYDEP COMMENT #43:

Section 6.3.1.4, p. 6-20 Only three of eight springs and seeps investigated appeared to contain perennial waterflow levels sufficient to support fish. They were Mossy Spring, Mossy Spring Runoff, and Mud River. Despite intensive search from the bank, no fish were found.

It appears that either the waters are too toxic for fish to live or the investigation was not sufficient to detect aquatic fauna. Either way, it is obvious that more investigation of at least the three springs mentioned above is warranted.

Response: Ecologists did confirm the presence of fish at two of the off-Site locations (8C Runoff and Mud River Spring) and identified those species that were observed. The studies performed included chemical analyses, toxicity testing, and benthomacroinvertebrate community studies. Had any of these studies indicated problems, the next step would have been a more detailed ecological investigation. See also response to Specific Comment #46.

KYDEP COMMENT #44:

Section 6.3.2.2, p. 6-33 The Mud River Spring consists of two separate springs that converge approximately ten meters downstream.

It is unclear where samples were taken at this location. The point of convergence would be fine for surface water samples, but groundwater samples should be collected at the point of origin for the two separate springs. These two springs are likely to represent different underground conduits. Either of which could be hydrologically connected to the Caldwell Lace Leather site.

Response: During collection of samples from Mud River Spring, careful attention was paid to collecting samples from the Mud River Spring origin. A U.S.G.S. representative was onSite to assist in identifying the correct location for sampling Mud River Spring.

KYDEP COMMENT #45:

Section 6.3.2.3
pp. 6-34, 35

The summary states that no rare, threatened or endangered species were encountered on the Caldwell property or off-site at the spring locations.

This statement may represent the findings, but the investigation was obviously limited. It appears that the aquatic organisms have received minimal attention, particularly the fishes. Also, the subsoil has been virtually ignored in this assessment. Burrowing animals would potentially be exposed to high concentrations of some chemicals. Insects and other small organisms exposed to toxic chemicals in soil or water would likely be involved in the bioaccumulation of some chemicals at higher trophic levels.

Response: KYDEP's statement refers to endangered and threatened species, but the comment focuses on other topics. Therefore, it is uncertain what KYDEP's concern is. Here are possible responses to the points mentioned in the comment:

a) What do KYDEP consider to be aquatic organisms? Only those that live in the water column? Benthic macroinvertebrates were included in the biosurvey, and other biota such as fish were noted. Some of the spring-fed streams surveyed did not provide appropriate habitat for fish (e.g., low flow, intermittent flow). Also, little surface water and sediment contamination was found above background levels.

b) Although few possible burrowers were observed, some of the habitats found onSite might be appropriate for burrowing animals. Most exposure would probably be limited by fur, etc.) or possibly incidental ingestion if the animals eat underground. This exposure is expected to be limited. Also, the ranges of contaminant concentrations found in surface soil in the landfill and landfarm areas are similar to the ranges for subsurface soils, except for nickel.

c) Insects and small organisms might bioaccumulate some of the surface soil contaminants, but it is not expected that the contaminants would biomagnify along a food chain (e.g., no pesticides detected in surface soils, and mercury found at only low levels).

KYDEP COMMENT #46:

Section 6.3.3.3, p. 6-38 The Water Quality measurements are summarized in Table E-14.

The range of results for most parameters appear to justify the need for evaluating each exposure source independently:

Ph 5.5-7.4.
Temperature 13.5-26.4°C.
Oxygen 2.50-19.8 mg/l.
Conductivity 50-499 uohm.
Salinity 0.0-0.2.
Alkalinity 17-178 mg/l $CaCO_3$ (3 samples). Hardness 16-211 mg/l $CaCo_3$ (3 samples).

Response: The springs were evaluated separately for surface water and sediment chemical analyses, habitat quality, and biosurvey. Sediment toxicity tests were conducted for those springs having sediment contaminant levels above sediment screening numbers, to check for Site-specific toxicity.

KYDEP COMMENT #47:

Section 6.3.3.3, p. 6-39 Testing of three sediment samples detected no toxicity. Lab bench sheets are in Appendix B of this report. Poor performance of control animals and those from the Lagoon Spring Pond may be attributed to starvation.

Three sediment tests are too few for any conclusive statements about sediment contamination on or off-site. Where is Appendix B? What poor performance? This section needs much more development!

Response: a) Sediment toxicity tests were conducted on sediments showing the highest levels of Site-related contaminants (i.e., mainly those exceeding sediment screening levels). If no effects were noted at those levels, no effects would be expected for sediments containing lower levels of contaminants. b) Either the appendix letter missing or the appendix was not attached in the Risk Assessment. Appendix B (referenced in the Risk Assessment and RI) is the "Short-term Chronic Toxicity Test - Amphipod Survival Test." If the test is missing from the Risk Assessment, please refer to RI Section 7.0 tables.
c) "Poor performance" refers to mortality control and Lagoon Spring Pond test organisms. The comment might be answered once KYDEP sees the the appendix.

<u>*KYDEP COMMENT #48:*</u>

Section 6.3.3.4, p. 6-40 Impairment of spring fed aquatic systems of Mossy Spring and Mud River Spring do not appear to be from the Caldwell site-related chemicals.

What impairment does this comment relate to and what is the basis for the conclusion that the Caldwell site is not contributing to the problems?

Response: a) It would have been better for the text to state that the two spring-fed aquatic systems did not appear to be impaired in relation to chemical contaminants from the CLL Site. The low diversity found in these two aquatic systems is characteristic of a stenothermal environment. (Also, stream headwaters often have lower diversity as mentioned in the KYDEP Environmental Assessment Report, 1987.) b) Also, Mossy Spring samples contained contaminants at levels higher than those at Mud River Spring, yet the sediment toxicity tests showed the high survival rates for both locations, and sensitive species were found at both locations.

<u>*KYDEP COMMENT #49:*</u>

Section 6.3.4.1, p. 6-43: No site-specific information on threatened or endangered species was available from Kentucky or the U.S. Fish and Wildlife Service.

Threatened and endangered species in the area of Mammoth Cave (geographically similar and near the Caldwell site) have been investigated and are likely recorded with the U.S. Park Service and/or Western Kentucky University. Also, the Kentucky Nature Preserves Commission, the Kentucky Department of Fish and Wildlife Resources, and the Kentucky Department for Environmental Protection's Division of Water all investigate and monitor populations of various species within the state. Were these resources contacted? It appears that little effort has been made toward acquiring this information. Information on species of the general area should be used to guide the site-specific investigation.

Response: Ideally, endangered species information should have been obtained from the Commonwealth of Kentucky and from U.S. Fish and Wildlife Service. However, KYDEP and USFWS personnel have been kept informed throughout the investigation and were invited to visit the Site. During the RI, trained ecologists conducted detailed survey of the Site and spring areas in two different seasons, especially focusing on habitats where endangered and threatened species might be expected; no endangered or threatened species were found.

KYDEP COMMENT #50:

Section 6.3.4.1 pp. 6-45, 46 *Tables 6-4 and 6-5 provide exposure point concentrations of contaminants detected in surface soil at the landfarm and landfill.*

The separate entries from which the 95% UCL's have been derived should be provided. Also, the exposure point concentrations of the two parcels should be considered both separately and combined with the entire site for comparison purposes since some receptors would likely receive exposure in both locations.

Response: Please refer to response to General Comment #7. EPA suggests that KYDEP perform the comparison to determine the merit of this comment.

KYDEP COMMENT #51:

Section 6.3.4.1, p. 6-47 Table 6-6 provides State Water Quality values for Warm Water Aquatic Habitat Criteria based on hardness of 170 mg/L calculated from average surface water calcium and magnesium concentrations.

A hardness average derived from a single sample of locations would be of low confidence, especially when the springs are not even hydrologically connected and are located great distances apart. The hardness measured during various events over time at each location should be used for calculating a spring-specific mean that would then be compared to the water quality criteria.

Response: The hardness measurement was calculated using the average value for calcium and magnesium for Site-related samples. Did KYDEP determine that exceedances occurred using the suggested approach? If so, were the exceedances any different than exceedances already identified?

KYDEP COMMENT #52:

Section 6.4.1.1, p. 6-53 Some inorganic chemical concentrations were calculated using a hardness value of 50 mg/l.

It is unclear which chemical concentrations were calculated using

this or other hardness values. Use of spring-specific hardness data should be used to calculate potentially toxic concentrations in individual springs, especially when lower than the 50 mg/l (exceedances of Kentucky Water Quality Standards).

Response: This has been corrected so that all hardness-dependent chemicals were calculated using 170 mg/l.

KYDEP COMMENT #53:

Section 6.4.2.2, p. 6-59 Organic matter within water will eventually reduce Cr(VI) to Cr(III). Residence time of chromium in lake water is from 4.6 to 18 years.

The organic matter in most of the springs would be expected to be minimal, therefore, residence time would not likely be reduced significantly due to organic matter's reducing capability. Also, the influx of chromium from the Caldwell site is likely to continue well into the future (e.g., leachate). The presence of MnO_2 in natural waters will oxidize Cr(III) to Cr(VI) and the CR(VI) will remain relatively stable (Bodek, et. al., 1988).

Response: EPA will agree that various literature on oxidation and reduction of suggests chromium valence states may go either way. For this reason, EPA assumed toxicity values of Cr(VI) rather than total chromium.

KYDEP COMMENT #54:

Section 6.5, p. 6-64 U.S. EPA Region IV Waste Division freshwater surface water and sediment screening values were used to determine if chemicals presented risk in these media.

Use of these values may be acceptable, but KYDEP has not received this information from Region IV. Obviously, such values could not be less stringent than criteria required elsewhere (e.g., Ambient Water Quality or Kentucky Water Quality Criteria). Provide a copy of these values and a table showing site-specific comparisons.

Response: This is true statement. Please refer to Appendix E of this document for a copy of Region IV screening values.

KYDEP COMMENT #55:

Section 6.5.1, p. 6-65 *Five chemicals of concern exceeded surface water criteria in one or more location. They are aluminum, chromium, lead, manganese and bis(2-ethylhexyl)phthalate.*

The list of chemicals should be expanded to include chemicals that were inappropriately excluded (e.g., iron).

Response: The Risks Assessment follows EPA Region IV protocols.

KYDEP COMMENT #56:

Appendix D, D-1,2 *Remediation goals were developed for carcinogenic chemicals with risks ≥ 1E-06 where the pathway risks exceeds 1E-04.*

Goals for remediation and/or management should be developed for each chemical that is predicted to present systemic risk greater than a Hazard Quotient of 1 or carcinogenic risk to human health greater than 1E-06 through any pathway.

Response: Presentation of remediation goals is consistent with Region IV guidance. See also EPA OSWER DIRECTIVE 9355.0-30 which clearly points out that when cumulative carcinogenic risk is less than 1E-04, action is generally not warranted.

KYDEP COMMENT #57:

The pathway of drinking water from wells in the area reflects a Hazard Quotient ≥ 1 and a carcinogen risk of 1E-04 for the future scenario.

The same risk would appear to exist for current use of the groundwater. Also, the risk from drinking water from these wells is likely to be much greater since the risk values are based on a mean of results from all well samples combined. Each drinking water source should be considered independent of the other. It is unlikely that a resident would drink equal volumes of water from

each source! Media other than groundwater likely require some remediation or at least some management of risk.

Response: The hazard quotient for manganese exceeds one, however, the carcinogen risk listed in this comment is incorrect. Calculation of risks from individual wells or springs would result in only one spring (lagoon) with an increased hazard index and all others would be decreased. Please refer to Appendix D for calculation of risks from individual springs.