United States
Environmental Protection
Agency

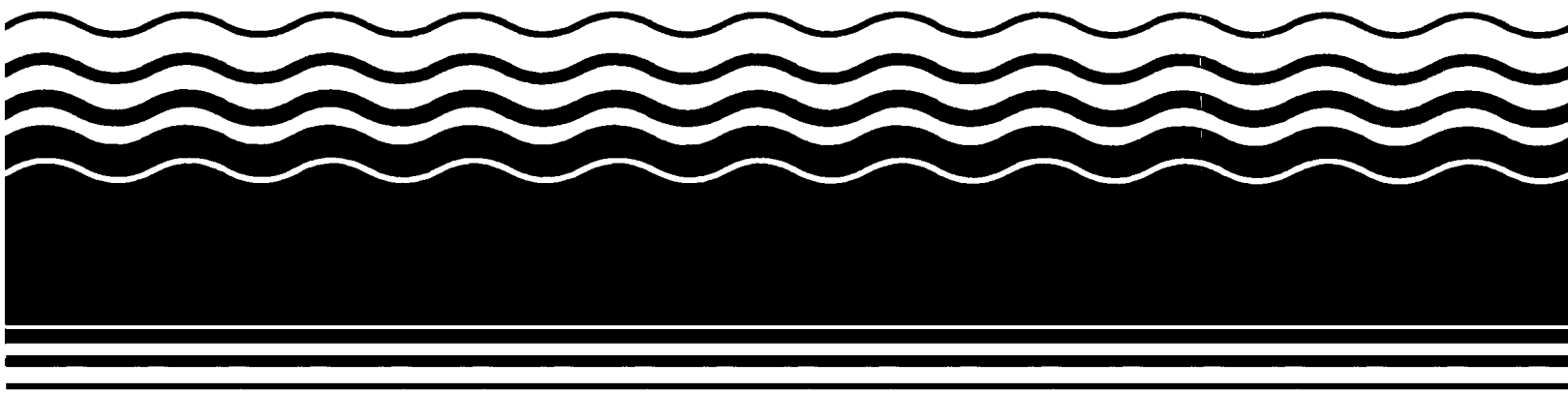
Office of
Emergency and
Remedial Response

EPA/ROD/R07-93/063
March 1993

EPA

Superfund Record of Decision:

Red Oak City Landfill, IA



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REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R07-93/063	2	3. Recipient's Accession No.

4. Title and Subtitle SUPERFUND RECORD OF DECISION Red Oak City Landfill, IA First Remedial Action - Final	5. Report Date 03/31/93
	6.
7. Author(s)	8. Performing Organization Rept. No.
9. Performing Organization Name and Address	10. Project Task/Work Unit No.
	11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460	13. Type of Report & Period Covered 800/800
	14.

15. Supplementary Notes

PB94-964303

16. Abstract (Limit: 200 words)

The 40-acre Red Oak City Landfill site is an inactive municipal landfill located in Red Oak, Montgomery County, Iowa. The site borders farmland to the north and south; Parkwest Road, woodlands, and a quarry pond to the west; and the Nishnabotna River to the east. Land use in the area is predominantly agricultural, with manufacturing facilities located within the City of Red Oak. The residents within the City of Red Oak and south/southwest of the site use the underlying Dakota Sandstone and alluvial deposits of the East Nishnabotna River to obtain their drinking water supply. From the late 1940s until the early 1960s, quarry and strip mining activities were conducted at the east edge of the site. In 1962, the City of Red Oak purchased the property and operated it as a municipal landfill until 1974. Types of waste disposed onsite included construction and demolition debris; tree prunings; municipal wastes; and various industrial chemical wastes, including toluene, PCE, mineral spirits, and laminated paper containing mercury chloride. Along with the general refuse, approximately 8,000 pounds of drummed filter cake containing lead was disposed of onsite. Environmental studies indicated that, as a result of past disposal practices, subsurface soil is contaminated sporadically with a variety of VOCs, including acetone,

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Red Oak City Landfill, IA
First Remedial Action - Final
Contaminated Media: soil, debris, surface water
Key Contaminants: VOCs (benzene, PCE, TCE, toluene, xylenes), other organics (PAHs), metals (arsenic, chromium, lead)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 18
	20. Security Class (This Page) None	22. Price

EPA/ROD/R07-93/063
Red Oak City Landfill, IA
First Remedial Action - Final

Abstract (Continued)

1-2 DCE, PCE, and toluene; and that the surficial soil contains primarily elevated levels of PAHs and heavy metals. During the RI, several "hotspots" also were identified in the landfill. This ROD addresses the first and final action for the contaminated onsite soil, and debris. The primary contaminants of concern affecting the soil, debris, and surface water are VOCs, including benzene, PCE, TCE, toluene, and xylenes; other organics, including PAHs; and metals, including arsenic, chromium, and lead.

The selected remedial action for this site includes constructing a sanitary landfill cap over the waste disposal area; contouring and revegetating the river bank slope; placing drainage swales along the perimeter of the landfill cap to direct surface water runoff; maintaining the cap; conducting long-term ground water monitoring; and implementing institutional controls, including deed and ground water use restrictions, and site access restrictions, such as fencing. The estimated present worth cost for this remedial action is $2,430,200, which includes an estimated O&M cost of $65,000 for years 0-5 and $45,000 for years 6-20.

PERFORMANCE STANDARDS OR GOALS:

Not applicable.

RECORD OF DECISION

RED OAK LANDFILL

RED OAK, IOWA

Prepared by:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VII
KANSAS CITY, KANSAS

MARCH 30, 1993

RECORD OF DECISION

DECLARATION

SITE NAME AND LOCATION

Red Oak Landfill
Red Oak, Iowa

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Red Oak Landfill Superfund site, in Red Oak, Montgomery County, Iowa, which was chosen in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the National Contingency Plan. This decision is based on the Administrative Record for this site.

The State of Iowa concurs with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedial action at the Red Oak City Landfill Superfund Site (herein referred to as "the Red Oak Landfill" or "the Site") addresses all identified remedial action objectives, and is to be implemented in a single operable unit. This action addresses the principal threat at the Site through containment of the waste materials. The containment system will limit the threat of direct contact with wastes, and minimize the potential for migration of contaminants to ground water and surface water.

The major components of the selected remedy include:

- Construction of a low permeability cover system over the waste disposal area in accordance with Iowa sanitary landfill closure requirements;

- Long-term ground water monitoring to evaluate and ensure the effectiveness of the remedial action;
- Installation of a fence surrounding the low permeability cover system to control access;
- Contouring and revegetation to stabilize the river bank slope; and
- Institutional controls, including deed restrictions to control future land use.
- Inspection and Maintenance of the fencing, stabilized slopes, and cover system to ensure long term effectiveness.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this Site.

Treatment of the principal threats of the Site was not found to be practicable, and the remedy does not employ treatment as a principal element. Treatment was determined to be impracticable primarily due to the size of the landfill, and the heterogeneity of the wastes. Due to the size of the Site, treatment would be cost-prohibitive for the entire volume of material that has been disposed of at the site. It was not judged to be practical to completely characterize surface and subsurface contaminant levels throughout the entire landfill, to locate discrete areas of waste to treat.

Because this remedy will result in hazardous substances remaining onsite above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

William W. Rice
Acting Regional Administrator
Region VII

3/31/93
Date

RECORD OF DECISION

RED OAK LANDFILL
RED OAK, IOWA

DECISION SUMMARY

Prepared by:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VII
KANSAS CITY, KANSAS

MARCH 31, 1993

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DECISION SUMMARY

Red Oak Landfill

1.0 INTRODUCTION

The **Record of Decision (ROD)** is the final document describing EPA's planned course of remedial action to clean up a Superfund site, proposed or listed on the National Priorities List (NPL). The Red Oak Landfill Superfund site consists of one operable unit. Its focus media is soils, with a groundwater monitoring component. This ROD for the Red Oak Landfill Site presents the final remedy for the landfill closure through capping.

The ROD consists of three major components: a **Declaration**, a **Decision Summary**, and a **Responsiveness Summary.**

The **Declaration** is the formal statement signed by the U.S. Environmental Protection Agency (EPA). The Declaration functions as an abstract for the key information contained in the ROD. The Declaration identifies the selected remedy and states the selection was made in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Contingency Plan (NCP).

This document, the **Decision Summary**, provides an overview of the site characteristics, the risks posed by site conditions, the remedial alternatives evaluated, and the analysis of those options. The Decision Summary identifies the selected remedy, provides the rationale for the remedy selection, and explains how the remedy fulfills statutory requirements.

The final component of the ROD, the **Responsiveness Summary**, provides information about community preferences regarding the remedial alternatives evaluated and general concerns about the Site, the Proposed Plan, Remedial Investigation/Feasibility Study (RI/FS) report and other information in the Administrative Record. The Responsiveness Summary also demonstrates how comments were considered as an integral part of the decision making process.

2.0 SITE NAME, LOCATION AND DESCRIPTION

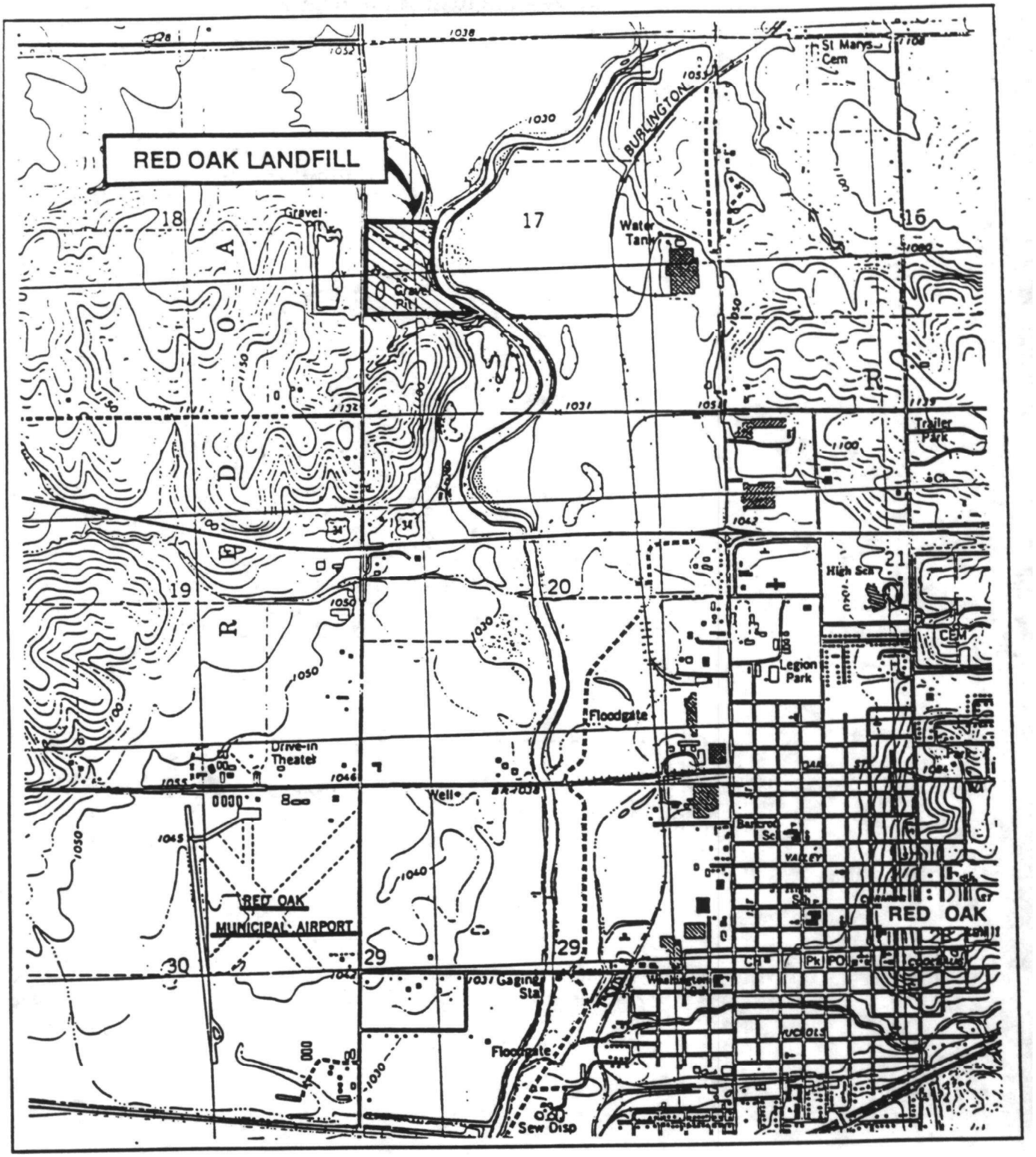
The Red Oak Landfill Site is located about 1½ miles to the northwest of the City of Red Oak in Montgomery County, Iowa. The Site occupies a parcel of land approximately 40 acres in size on the west bank of the East Nishnabotna River within Section 17, Township 72N, Range 38W. The Site is bounded by farmland to the north and south, Parkwest Road and a quarry pond to the west and the East Nishnabotna River to the east. See Figure 1 for a map of the general vicinity and Site location, and Figure 2 for a map showing the Site configuration.

Land use in Montgomery County is predominantly agricultural, with manufacturing industry located primarily within the City of Red Oak. Land use in the vicinity of the Site is also predominantly agricultural. The Site is surrounded on the north, west and south by a low barbed wire fence and is not open to public use. The landfill surface is vegetated primarily with grasses and weeds; however, wooded areas are located along the riverbank, adjacent to Parkwest Road and along the southern boundary of the Site. The quarry pond west of the Site is privately owned and used for recreation, including fishing and swimming. The water supply well field for the City is located approximately 2 miles to the east/southeast of the Site, and several private water supply wells are located south/southwest of the Site.

3.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The property on which the Site is located was originally a limestone quarry. Quarrying activities were conducted from the late 1940's to the early 1960's. The limestone quarrying activities started at the east edge of the Site near the East Nishnabotna River and were undertaken in a strip mining fashion. Overburden was removed from a trench and set aside and the limestone was subsequently excavated. Following removal of the limestone, quarrying activities were moved and a second trench was opened. Overburden from this trench was then placed in the bottom of the initially excavated trench. This mining procedure was carried towards the west and ultimately halted at the west quarry pit (see water filled quarry pond, Figure 2) in the early 1960s. A limestone rim was left in place between the quarry pit and the west bank of the river to prevent flooding.

The City of Red Oak purchased the Site property in 1962, and operated it as a landfill until it closed in April 1974. Wastes disposed at the Site reportedly included construction and demolition debris, tree pruning waste, municipal refuse generated by residents and businesses, and industrial wastes from facilities in the Red Oak area.



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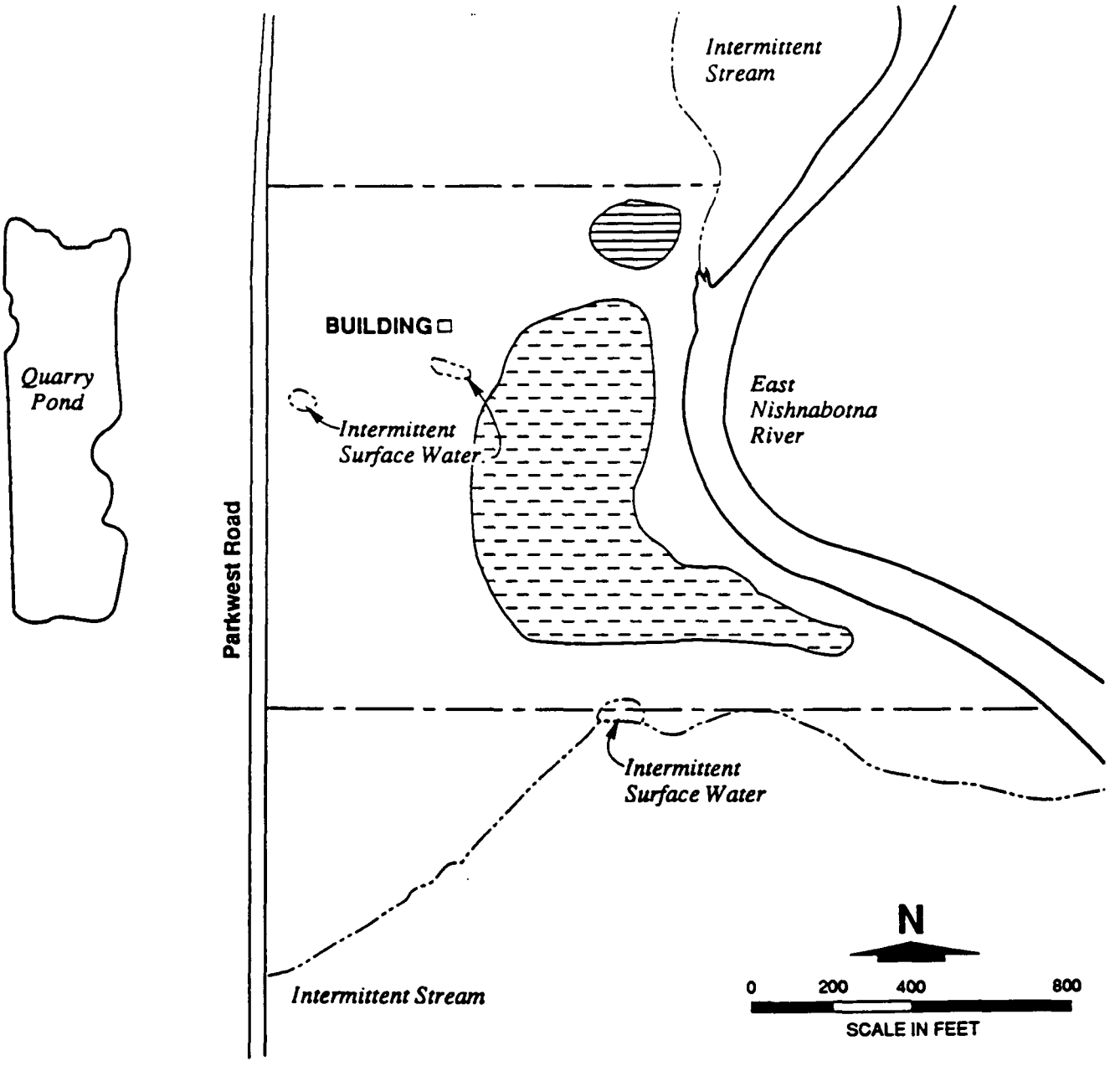
0 1000 2000 4000

SCALE IN FEET

FIGURE 1
SITE LOCATION

RED OAK LANDFILL
RED OAK, IOWA



APPARENT WASTE TYPE OBSERVED

TREE TRIMMINGS AND DEMOLITION DEBRIS

MUNICIPAL AND INDUSTRIAL WASTES

FIGURE 2
SITE CONFIGURATION MAP

RED OAK LANDFILL
RED OAK, IOWA

The industrial wastes disposed of at the Site reportedly included toluene, methyl isobutyl ketone, tetrachloroethylene, mineral spirits, diacetone alcohol, and laminated paper containing approximately 3 percent mercurous chloride by weight related to Union Carbide's production of dry cell batteries. Along with general refuse, Uniroyal disposed of approximately 8,000 pounds of drummed filter cake containing approximately 430 parts per million (ppm) lead.

The Site was initially identified as a result of EPA notification by the Union Carbide Corporation and Uniroyal, Incorporated. Site conditions have been investigated by EPA on several occasions since the initial identification of the site. Based on findings of the investigations, the Red Oak Landfill Site was included in Update Number 5 to the National Priorities List (NPL).

The EPA subsequently notified the potentially responsible parties (PRPs) of its intent to conduct a remedial investigation and feasibility study (RI/FS) under CERCLA and invited their participation in the process. In 1989, EPA and the PRPs entered into an Administrative Order on Consent for performance of the RI/FS, and Geraghty & Miller was enlisted to perform the work on behalf of the PRP group.

The RI field investigation was conducted in two phases. Phase I activities took place in December 1989 and in March through April of 1990. Phase II activities commenced in May 1991, with river bank stability investigation activities continuing through the Summer of 1992. The field investigation included sampling of surface and subsurface soils/wastes, surface water, ground water, and ground water seeps. Detailed discussion of the results of the field investigation is contained in the RI report. The FS report, which develops and evaluates remedial alternatives, was completed in July 1992.

4.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The RI/FS and the Proposed Plan for the Red Oak Landfill Site were released to the public in August 1992. These documents were made available to the public as part of the Administrative Record (AR) maintained by EPA's Region VII office, and the Red Oak Public Library, located at 2nd and Washington Street, Red Oak, Iowa. The remedial decision documented in this ROD is based on information contained in the Administrative Record. The notice of availability of these documents was published in the Red Oak Express, Red Oak, Iowa, a weekly news publication, and the Omaha World-Herald, Omaha, Nebraska, a daily newspaper commonly read in Red Oak, Iowa.

The public comment period was held from August 12, 1992 through September 11, 1992. In addition, a public meeting was held on August 20, 1992, at the Red Oak Fire Station. At this meeting, representatives from EPA, the Iowa Department of Natural Reources (IDNR), and the Iowa Department of Health (IDOH) presented information and answered questions about the Site and the remedial alternatives under consideration. Comments received during this period are addressed in the Responsiveness Summary, which is an attachment to this ROD. A written request for an extension of the comment period for the Red Oak Landfill Proposed Plan was requested by the City of Red Oak, and was received by EPA on September 1, 1992. An extension of thirty days was granted, bringing the public comment period to a close on October 11, 1992.

5.0 SCOPE AND ROLE OF THE REMEDIAL ACTION

Response actions at the Site are expected to be carried out in a single operable unit, and no additional decision documents are anticipated at present. The remedial action objectives for the Red Oak Landfill Site are as follows:

- Reduce or eliminate the threat of direct contact with, ingestion of, or inhalation of materials containing acetone, 1,2-dichloroethene, tetrachloroethene, toluene, and other contaminants contained in soils and wastes buried at the site;

- Reduce surface water infiltration through the buried waste materials in order to minimize the potential for leaching of contaminants from the waste materials to ground water and surface water;

- Control erosion of the river bank slope in order to minimize the potential for exposure of buried waste materials; and

- Address potential exposure to increased contaminant levels in the future due to erosion of existing surfacial materials.

The selected remedial action, documented in this ROD, must address all the remedial action objectives outlined above.

6.0 SUMMARY OF SITE CHARACTERISTICS

A summary description of the physical characteristics of the Site, the nature of the waste materials, and the nature and extent of contamination of ground water, surface water, and seeps is presented below. Sources of contamination and potential

routes of contaminant migration are also discussed. This summary is based on information contained in the remedial investigation report (Geraghty & Miller, March 1992).

6.1 Topography

The topography of the surrounding area is naturally hilly. Intermittent stream channels dissect the farmlands located north and south of the landfill. The topographic high of the Site is located in the southwest corner of the property. A ridge trending east-west is located in the southern part of the property; the elevation of the top of the ridge dips eastward toward the river. Slopes at the Site range from nearly flat terrain in the northern part of the property and along the ridge to slopes of approximately 10 percent. However, along the eastern edge of the Site, adjacent to the East Nishnabotna River, the slope is nearly vertical in places. Land surface elevations range from 1,107 ft above mean sea level (MSL) in the southwest corner of the site to 1,017 ft above MSL along the river.

6.2 Hydrology

The East Nishnabotna River flows southward along the eastern boundary of the Red Oak Landfill Site. The drainage basin of the river upstream of the City of Red Oak covers approximately 894 square miles (USGS, 1989). The average discharge of the river recorded for the water year of 1988 (from October 1987 to September 1988) at the USGS gaging station located under the Coolbaugh Street Bridge in Red Oak is 200 cubic feet per second (cfs). High and low flows measured at the USGS gaging station during the year of 1988 were 1000 cfs in February and 43 cfs in September. Other perennial surface water bodies located near the Site include the 4 acre quarry pond located due west of the Site.

6.3 Geology

In general, the Red Oak area is typically underlain by Pleistocene-aged deposits of loess and glacial till material (drift) underlain by discontinuous, Cretaceous-aged sandstone bedrock of the Dakota Group. The sandstone unconformably overlies Pennsylvanian-aged limestone and shale bedrock. Where Cretaceous-aged bedrock is absent, the glacial till is deposited directly upon Pennsylvanian-aged bedrock.

The geology underlying the Site was evaluated using soil boring logs, results of the geophysical survey, and available file information. Interpretation of these data identified several stratigraphic units underlying the Site, beginning with the shallowest unit, as follows: landfill materials; unconsolidated materials (likely a combination of loess, glacial till, and alluvial deposits) reworked during the quarry operation; undisturbed, unconsolidated materials (loess and

glacial till); undisturbed alluvial deposits; and, Pennsylvanian aged limestone and shale. Depth to bedrock through the unconsolidated materials ranged from approximately 40 to 90 ft.

6.4 Hydrogeology

Aquifers utilized in the Red Oak area include the Dakota Sandstone, the alluvial deposits of the East Nishnabotna River, and sand and gravel units within the glacial deposits. The water supply for the City of Red Oak is derived from five wells completed in the Dakota Sandstone. Residents living south/southwest of the Site rely upon shallow private wells which utilize the glacial and alluvial aquifers.

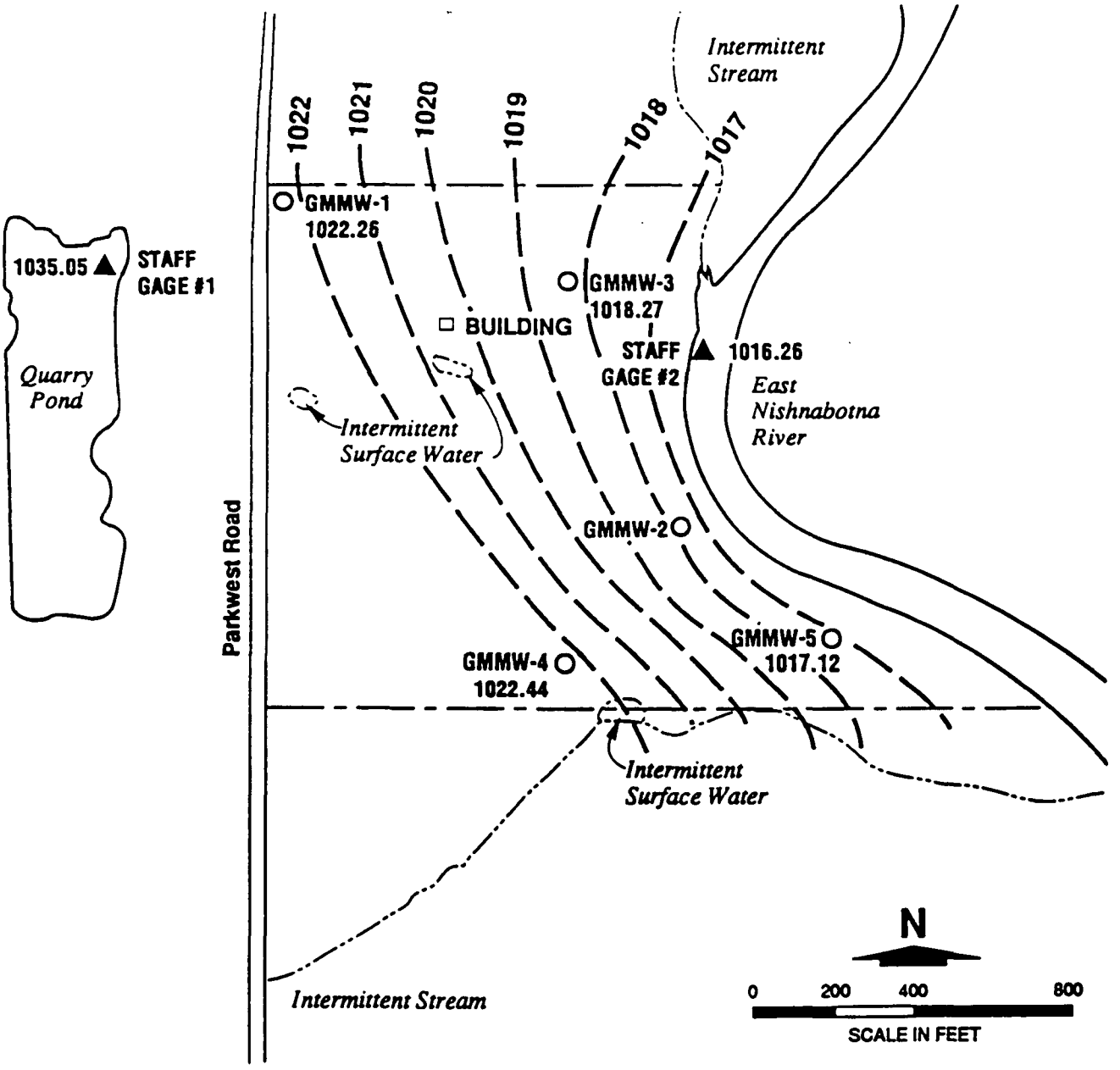
The East Nishnabotna River flows to the south and eventually discharges into the Missouri River, and regional shallow ground water flow is most likely southerly also. Local ground water flow in the vicinity of the landfill is predominantly eastward toward the river.

During monitoring well installation and soil boring activities, several perched water zones (lenses of water saturated materials contained within a matrix of unsaturated materials) were encountered within the fill material. The flow direction of perched water zones within the landfill are most likely controlled by topography. Ground water seeps observed on the face of the river embankment at the Site support this hypothesis.

The East Nishnabotna River likely functions as the local discharge boundary for shallow ground water. Consistent with this model, water levels in onsite monitoring wells indicate that shallow ground water, within the permanently saturated materials underlying the Site, flows east-northeast toward the river. A potentiometric surface map is shown in Figure 2.

6.5 Extent of Landfill Materials

The extent of the fill material disposed of at the Site was evaluated based on information obtained from records review, geophysical survey, and the soil boring program. The thickness of the fill material encountered in the soil borings ranged from 0 to 25 ft. The approximate areal extent of the fill materials is shown on Figure 3. In general, two main areas of fill were identified in the RI. The smaller area in the northeastern corner of the property is composed primarily of demolition debris, rubble, and partially burnt tree pruning waste. The larger fill area is located in the western and southern sections of the Site and appears to consist mainly of municipal and industrial refuse; however, some demolition debris was also observed.



LEGEND

O GMMW-1 MONITORING WELL LOCATION

▲ STAFF GAGE LOCATION

1018 EQUIPOTENTIAL CONTOUR

1022.26 WATER ELEVATION MAY 16, 1990

FIGURE 3

POTENTIOMETRIC SURFACE MAP
MAY 16, 1990

RED OAK LANDFILL
RED OAK, IOWA

6.6 River Bank Stability

Movement on the face of the slope along the southeastern edge of the Site, adjacent to the bank of the East Nishnabotna River, has been observed. Visual evidence of the active movement included soil tension cracks, soil failure scarps, displaced vegetation, and areas of no vegetation on the face of the slope. A monitoring system of 40 survey points was installed to quantitatively assess lateral and vertical ground surface movements over time.

The available evidence indicates that the erosion of the slope is due to surface water flows over the face of the slope and/or ground water seepage that discharges from the face of the slope. It appears, based on interpretation of historical aerial photographs, that river erosion at the toe of the river bank does not significantly contribute to slope instability; however, this has not yet been clearly demonstrated.

6.7 Chemical Characteristics of Environmental Media

Environmental samples from the landfill material and surrounding media were collected and analyzed to assess current conditions and potential environmental effects of the Site. The analytical results show that subsurface materials are sporadically contaminated with a variety of volatile organic chemicals (VOCs) including acetone, 1,2-dichloroethene, tetrachloroethene, and toluene. Toluene was the most frequently detected compound. Table 1 summarizes the concentration range of constituents detected in the subsurface materials. Polycyclic aromatic hydrocarbons (PAH) and elevated levels of some heavy metals were also found.

As would be expected, surficial soils were found to be relatively free of VOC contamination; however, PAHs and above-background levels of heavy metals were detected in the majority of surficial soil samples. Table 2 summarizes the concentration range of PAHs and heavy metals detected at the surface. Section 4.2 in the Remedial Investigation discusses the occurrence of "hot spots" identified in surface and subsurface soils at the site.

Analysis of ground water samples showed the presence of several VOCs in shallow and perched ground water at low concentrations. Above-background levels of some heavy metals were also detected. VOCs, semi-volatile compounds, and heavy metals were also detected in onsite ground water seeps.

TABLE 1
OCCURRENCE OF CONSTITUENTS IN SUBSURFACE SOIL SAMPLES, RED OAK LANDFILL, RED OAK, IOWA

Constituent	Range (mg/kg)
VOCs	
Acetone	0.004 - 38
Benzene	0.002 - 0.015
Chloroform	0.018
1,2-Dichlorothene	0.009 - 1.4
Ethylbenzene	0.35 - 2.6
Methylene chloride	1.1
4-Methyl-2-pentanone	2.9 - 260
1,1,2,2-Tetrachloroethane	1
Tetrachloroethene	0.003 - 120
Toluene	0.002 - 1,800
Trichloroethene	3.1
Styrene	0.75 - 1.5
Vinyl chloride	0.021 - 0.15
Xylene	0.65 - 2

TABLE 2
OCCURRENCE OF CONSTITUENTS IN SURFACE SOIL SAMPLES, RED OAK LANDFILL, RED OAK IOWA

CONSTITUENT	RANGE (mg/kg)
Inorganics	
Aluminum	4,400 - 11,000
Arsenic	4.1 - 9.3
Barium	120 - 380
Beryllium	0.6 - 1
Cadmium	4.3 - 18
Chromium	11 - 17
Cobalt	5.5 - 8.5
Copper	15 - 140
Iron	15,000 - 23,000
Lead	8.7 - 440
Manganese	400 - 15,000
Mercury	0.08 - 5.5
Nickel	16 - 25
Selenium	0.3
Silver	1.1 - 4.5
Thallium	0.6
Vanadium	25 - 31
Zinc	75 - 2,800
VOCs	
Tetrachloroethene	0.11
SEMI-VOCs	
Bis(2-ethylhexy)phthalate	0.098 - 240
Dibenzofuran	0.065
Di-n-butylphthalate	0.067 - 0.14
Di-n-octylphthalate	0.18
cPAH(f)	0.46 - 2.4
tPAH(g)	0.081 - 7.3
MISCELLANEOUS	
Cyanide	0.1 - 0.1

Concentration ranges of constitiuents detected in ground water and surface seeps are summarized in Tables 3 & 4.

Analysis of surface water and sediment from the East Nishnabotna River, both upstream and downstream of the Site, indicate that the river is not being measurably impacted by the Site. Given the concentrations of contaminants found in the shallow ground water and ground water seeps, and the discharge rates of ground water and seeps to the river, measurable impacts on the river would not be expected under current conditions.

7.0 SUMMARY OF SITE RISKS

A baseline risk assessment was conducted as required by CERCLA to evaluate the potential impacts to human health and the environment posed by Site contaminants absent any remedial action. The baseline risk assessment provides the basis for taking action and indicates the exposure pathways that need to be addressed by the remedial action. Both current and hypothetical land use scenarios were evaluated. This section summarizes the findings of the risk assessment, which is contained in the Administrative Record as part of the RI report. The risk assessment consists of an identification of contaminants of concern, an exposure assessment, a toxicity assessment, and a risk characterization.

7.1 Contaminants of Concern

Identification of the contaminants of concern was accomplished after considering the following factors: (1) comparison of mean detected concentrations to media-specific mean background concentrations, (2) comparison of average detected ground water and surface water concentrations to potentially applicable or relevant and appropriate standards or criteria, (3) frequency of detection of a given contaminant, and (4) toxicity of the contaminants.

7.2 Exposure Assessment

This assessment addressed the potential for exposure to the inorganics, VOCs, and semi-volatiles detected in the ground water, surface water, soils and sediments at the Red Oak Landfill. In order for risk to exist, the potential for a receptor to be exposed to contaminated environmental media must exist. Exposure can only occur if there is both a source of chemical release and a mechanism of transport to a receptor population.

The exposure assessment identified potential pathways and routes for contaminants of concern to reach the receptors and the estimated contaminant concentration at the points of exposure. Exposure pathways by which humans could be exposed to chemicals of concern were identified based on reasonable assumptions about current and future uses of the Site.

TABLE 3
OCCURRENCE OF CONSTITUENTS IN GROUND-WATER SAMPLES, RED OAK LANDFILL, RED OAK, IOWA

CONSTITUENT	RANGE (mg/kg)
Inorganics	
Arsenic	0.0011 - 0.0074
Barium	0.029 - 0.83
Beryllium	0.0001 - 0.0003
Cadmium	0.0011 - 0.0037
Chromium	0.026
Cobalt	0.0081 - 0.014
Copper	0.0062 - 0.018
Iron	0.049 - 22
Magnesium	18 - 64
Manganese	0.024 - 8.1
Nickel	0.0038 - 0.75
Selenium	0.0027 - 0.026
Silver	0.0059 - 0.0061
Vanadium	0.0041 - 0.015
Zinc	0.026 - 0.054
VOC	
Acetone	0.008 - 0.008
1,2-Dichloroethene	0.004
4-Methyl-2-pentanone	0.011 - 0.04
Toluene	0.025 - 0.065

TABLE 4
OCCURRENCE OF CONSTITUENTS IN SURFACE WATER SAMPLES FROM ON-SITE SEEPS, RED OAK LANDFILL, RED OAK, IOWA

CONSTITUENT	RANGE (mg/kg)
Inorganics	
Aluminum	0.17 - 260
Arsenic	0.0014 - 0.022
Barium	0.097 - 3.8
Beryllium	0.0003 - 0.017
Chromium	0.061 - 0.31
Cobalt	0.026 - 0.18
Copper	0.015 - 0.22
Iron	0.32 - 270
Lead	0.0014 - 0.12
Magnesium	5.6 - 160
Manganese	0.013 - 16
Nickel	0.0021 - 0.41
Vanadium	0.0095 - 0.58
Zinc	0.11 - 0.61
VOCs	
1,2 Dichloroethene	0.2
4-Methyl-2-pentanone	1.3 - 35
Trichloroethene	0.085
Toluene	3.9 - 6
Tetrachloroethene	0.96
Vinyl Chloride	0.22
SEMI-VOCs	
Benzyl alcohol	0.01
Isophorone	0.007 - 0.008
2-Methylphenol	0.2
4-Methylphenol	0.031
Naphthalene	0.004 - 0.02

For each potentially significant exposure pathway, exposure assumptions were made for reasonable maximum exposures. A reasonable maximum exposure (RME) represents a situation which is more conservative than an average case, but is not a worst case scenario. The RME scenario is developed to reflect the types and extent of exposures that could occur based on likely or potential uses of the Site.

The primary exposure pathways with significance for current conditions at the Red Oak Landfill Site include dermal contact, inhalation, and incidental ingestion of contaminated soils and fugitive dust. Due to hydrologic conditions at the site, i.e. shallow ground water gradient toward the river, ingestion or other exposures to contaminated ground water were determined not to represent a significant exposure pathway.

The potential current exposures were evaluated using a hunter/trespasser scenario. The risk assessment assumed that a hunter/trespasser weighing 70 kilograms walked across the site for 2 hours per day, 100 days per year, for 30 years. Hypothetical future exposures were evaluated for an excavation worker and residential scenarios. Exposure assumptions for the excavation worker included a 70 kilogram adult exposed 8 hours per day, 5 days per week, for 6 weeks. The residential exposure scenario assumed a combined 30 year exposure period as a child and as an adult.

7.3 Toxicity Assessment

Slope factors (SFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic contaminants. SFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the SF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Slope factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied. The uncertainty factors account for the use of animal data to predict effects on humans.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to contaminants 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, that are likely to be without an appreciable risk of adverse health effects. Estimated intakes of contaminants from environmental media (e.g., the amount of a contaminant ingested from drinking contaminated water) can be compared to the RfD to judge whether the contaminated media is likely to present a human

health concern. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied.

7.4 Risk Characterization

For carcinogens, risks are estimated as the incremental probability of an individual developing cancer over a life-time as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated in the following manner:

Risk = CDI x SF

where:

risk = a unitless probability of an individual developing cancer;

CDI = chronic daily intake averaged over 70 years or other period of exposure (mg/kg-day); and

SF = slope factor, expressed as $(mg/kg\text{-}day)^{-1}$

These risks are probabilities that are generally expressed in scientific notation (e.g., 1X10-6 or 1E-6). An excess lifetime cancer risk of 1X10-6 indicates that, as a reasonable maximum estimate, an individual has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure to a carcinogen under the specified exposure conditions. The lifetime cancer risks associated with exposure to the Red Oak Landfill Site are summarized in Tables 5. The hypothetical child resident scenario presents the highest risk at $2x10^{-4}$.

The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified period of time (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). The Hazard Index is generated by adding the HQs for all contaminants of concern that affect the same target organ within a given medium or across all media to which a given population may reasonably be exposed.

The HQ is calculated as follows:

HQ = CDI/RfD

Where:

CDI = Chronic Daily Intake

RfD = reference dose; and

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

In general, HIs greater than one are associated with potentially increased health risk. The baseline risk assessment indicated total HIs ranging from less than 1 to a maximum of 8

for hypothetical child resident. Hazard Indices calculated for the various exposure scenarios are summarized in Table 6.

TABLE 5
EXCESS LIFETIME CANCER RISK
RED OAK LANDFILL, RED OAK, IOWA

Scenario	RISK
Hunter/Resident	$4x10^{-5}$
Excavation Worker	$5x10^{-7}$
Future Adult Resident-Soil Exposure	$1x10^{-4}$
Future Child Resident-Soil Exposure	$2x10^{-4}$

TABLE 6
HAZARD INDICES FOR NON-CANCER EFFECTS

Scenario	Hazard Index
Hunter/Trespasser	0.2
Excavation Worker	1.0
Future Adult Resident-Soil Exposure	1.0
Future Child Resident-Soil Exposure	8.0

7.5 Uncertainties

The risk assessment process, in general, uses various assumptions regarding exposures and chemical toxicities to estimate risks. Inherent in this estimation of risk is considerable uncertainty.

Environmental sampling itself introduces uncertainty, largely because of the nonhomogeneous nature of most media. It is not known how well the chemical data collected during sampling efforts at the Red Oak Landfill reflect actual Site conditions. As with most dump sites, the uncertainty is especially large in the waste disposal due to the heterogeneity and inaccessibility of the wastes. As discussed in Section 4.2 of the Remedial Investigation, the contaminants present, as well as their concentrations, vary considerably with location and depth within the disposal area. The estimates of exposure point contaminant concentrations used in the risk assessment may not be representative of actual site conditions. The use of 95 percent upper confidence level or maximum detected level for exposure point concentration estimates reduces the likelihood that these levels were underestimated. However, potential exposure in the waste disposal area, especially for the hypothetical excavation worker scenario, may be higher than estimated in this assessment.

Also, the risk assessment process involves the usage of a subset of all Site contaminants (contaminants of concern) to estimate risks and does not account for the effects of all Site contaminants.

In addition to the limitations associated with a limited number of chemical data points, other assumptions and uncertainties that affect the accuracy of the risk assessment result from the extrapolation of potential adverse human effects from animal studies, the extrapolation of effects observed at high dose to low dose effects, the modeling of dose response effects, and route-to-route extrapolation. These extrapolations are generally carried out with the intent to err on the side of conservatism, but the limited number of possible data points and the heterogeneity of the materials at the site contribute to the need to be conservative in selecting a remedy.

The estimation of chemical intakes is dependant on the exposure scenarios used. The exposure assumptions therefore, introduce additional uncertainties. Also, it should be kept in mind that all plausible exposure scenarios have not been evaluated, and further, the scenarios that were evaluated assume that Site conditions remain stable over time. As such, these risk estimates should be viewed in consideration of the various assumptions and uncertainties upon which they are based.

7.6 Environmental Evaluation

The environmental risks posed by the Site are judged to be minimal under current conditions. The most likely impacts would be to the aquatic ecosystem; however, the levels of contaminants detected in ground water and ground water seeps indicate that the rate of off-Site migration of contaminants is too small to date to have measurable impacts on the East Nishnabotna River. Samples taken from the River support this conclusion, since constituents detected in the East Nishnabotna River were similar in both upstream and downstream segments. Constituents detected in sediments were similar to those found in samples taken from background locations. EPA believes, however, that further harm could result if the landfill materials were exposed as a result of erosion or other disturbance of the existing landfill surface or adjacent river bank.

7.7 Conclusion

Based on the results of the risk assessment and the additional factors discussed here, the EPA has determined that actual and threatened releases of hazardous substances from this Site, if not remediated, may present an imminent or substantial endangerment to public health, welfare, or the environment.

8.0 DESCRIPTION OF THE REMEDIAL ALTERNATIVES

Information gathered during the Remedial Investigation was used to review possible remedial methods and to develop several remedial alternatives. A Feasibility Study was then conducted to evaluate the effectiveness of the alternatives in addressing the concerns related to the Red Oak Landfill Site.

In the Feasibility Study, EPA considered four remedial alternatives. The major components of each alternative are described below.

8.1 Remedial Alternative 1

- No Action

Under Remedial Alternative 1, the Site would remain in its current condition and no further action would be taken to prevent exposure to Site contaminants or reduce migration of contaminants. The NCP and the Superfund process require that the "No Action" alternative be evaluated. This alternative provides a baseline against which all other alternatives are compared.

This alternative is not protective of human health and the environment in the long-term due to potential for further degradation and potential exposures to on-site visitors and residents.

8.2 Remedial Alternative 2

- Access control
- Deed restrictions
- Ground water monitoring

Access restrictions would be provided by the installation of a fence around the perimeter of the Site. For purposes of the Feasibility Study, it was assumed that the fence would be a 6-foot high chain link fence with 3 strands of barbed wire along its top. However, a fence of other construction which serves to prevent access to the Site by unauthorized personnel would also be acceptable. A sufficient number of warning signs would be placed along the perimeter fence. A Site inspection and maintenance program would be instituted to maintain the condition of the fence as well as to monitor the condition of the landfill cover, bank stability, landfill seeps, etc.

Deed restrictions would be imposed through the local authorities and would be recorded in the appropriate registry of deeds. Deed restrictions would control any future land development of the Site. In addition, deed restrictions would prevent the future placement of ground-water supply wells within a prescribed zone on and adjacent to the Site.

A ground water monitoring program would be implemented to identify and quantify any waste constituent releases that may occur from the landfill waste materials. The program would generally follow the substantive provisions of the State of Iowa's sanitary landfill post-closure ground water monitoring requirements identified under 567 IAC 103. The exact scope of the long-term monitoring program, in terms of the number and location of monitoring points, the frequency of monitoring, and the parameters to be analyzed for, would be developed during the remedial design phase.

For purposes of the Feasibility Study, it was assumed that the five existing ground water monitoring wells would initially be sampled semi-annually, then annually during the course of a thirty year monitoring period. Samples would be analyzed for VOCs, selected metals and water quality indicators. Each round of ground water sampling data would be analyzed to determine whether a statistically significant change in values has occurred for any of the constituents of concern. In accordance with CERCLA Section 121(c), a formal review of the ground water quality data would be conducted by the EPA within five years of the implementation date.

Alternative 2 would take less than 6 months to construct. The capital costs associated with implementing Alternative 2 are estimated to be $162,800. The annual O&M costs are estimated to be $30,000 for the first 5 years, and 20,000 for the subsequent 25 years. By applying a 5% discount rate over a 30-year implementation period, the total present worth associated with Alternative 2 is estimated to be $513,600.

8.3 Remedial Alternative 3

- Access control
- Deed restrictions
- Ground water monitoring
- Sanitary landfill cap
- River bank stabilization
- Long term operation and maintenance of cap

Alternative 3 would consist of placing a sanitary landfill cap over the existing landfill surface. The access and institutional controls identified for Alternative 2 would also be provided under this alternative. In addition, the active river bank slope in the southeastern portions of the Site would be contoured and revegetated/reforested to manage surface water runoff and reduce soil erosion.

Subtitle D of the Resource Conservation and Recovery Act (RCRA) allows States to develop programs for the management of solid waste. In accordance with Subtitle D of RCRA, the State of Iowa has promulgated regulations for management of solid waste landfills. Some of these regulations are more stringent than the corresponding Federal regulations for management of solid waste appearing at 40 CFR Part 258. The State is authorized to administer the solid waste management program in Iowa. The State solid waste regulations are potential ARARs.

The Iowa solid waste management regulations are not applicable to the Red Oak Landfill site, since solid waste was not disposed of at the site subsequent to the effective date of December 3, 1986. However, the operation and characteristics of the Red Oak Landfill site are typical of sanitary landfills that received solid waste from a variety of sources. The Iowa regulations for management of solid waste under 567 IAC 103 and 567 IAC 110 are relevant and appropriate for the selection of remedy at the site because the site is sufficiently similar to sites at which Iowa solid waste regulations would apply.

The function of the engineered sanitary landfill cap under Alternative 3 would be to limit the amount of water infiltration that passes down through the landfill waste material, and to properly manage surface water runoff and direct surface water away from the slopes adjacent to the river. In addition, a key function of the cap is to provide a physical barrier to prevent exposure through direct contact with the waste material.

At a minimum, the engineered sanitary landfill cap would be designed and constructed to meet the substantive provisions of 567 IAC 103, which requires a two-foot minimum compacted soil cover and a two-foot minimum uncompacted soil cover to support vegetation. The State regulations require a minimum slope of 5 percent, not to exceed 25 percent, and installation of permanent survey markers. State regulations which are administrative in nature, including reporting requirements, are not included as components of Alternative 3.

Areas beyond the extent of buried waste may be graded, as needed, to manage and promote surface water runoff. To account for the additional surface drainage that would result from the reduced permeability of the landfill cover, drainage swales would be placed along the perimeter of the landfill cap, as necessary, to direct the surface runoff to existing intermittent stream channels located to the north and south of the landfill area. The surface drainage patterns would also be designed to direct surface runoff away from unstable river bank areas.

A long-term ground water monitoring program would be designed and implemented in a manner similar to that described under Alternative 2. New components of the ground water monitoring network would be designed and constructed in accordance with substantive requirements under 567 IAC 110. The exact scope of the long-term monitoring program, in terms of the number and location of monitoring points, the frequency of monitoring, and the parameters to be analyzed for, would be developed during the remedial design phase.

It is estimated that the sanitary landfill cap construction could be completed within a 6 to 12-month period. The capital costs associated with implementing Alternative 3 are estimated to be $1,695,100. The annual O&M costs are estimated to be $65,000 for the first 5 years, and $45,000 for the subsequent 25 years. By applying a 5% discount rate over a 30-year implementation period, the total present worth associated with Alternative 3 is estimated to be $2,430,200.

8.4 Remedial Alternative 4

- Access control
- Deed restrictions
- Ground water monitoring
- Hazardous waste landfill cap
- River bank stabilization
- Long term operation and maintenance of cap

Alternative 4 would be similar to Alternative 3, except that a RCRA Subtitle C cap would be used to cover the existing landfill surface rather than a sanitary landfill cap. Apart from some differences in the design of the cap, all aspects of Alternative 4 would be identical to those described for Alternative 3.

Regulations have been promulgated under RCRA Subtitle C for closure of hazardous waste landfills. The regulations allow for clean closure, where all contaminated materials are removed and managed as hazardous wastes, and landfill closure, which has certain minimum requirements for the design of the final cover system. These regulations under Subtitle C are not applicable to the remedy at the Red Oak site since no hazardous wastes were placed in the landfill subsequent to the effective date of the regulations, November 19, 1980, and the remedy does not constitute treatment, storage, or disposal of a hazardous waste.

To determine the relevance and appropriateness of the Subtitle C closure requirements, the characteristics of the waste and the site are considered. The site received some industrial wastes such as lead-contaminated filter cake, spent solvents, and paint wastes, but most of the materials disposed of at the site can be described as municipal solid wastes, tree pruning waste, and construction and demolition debris. Solid waste rather than hazardous waste regulations normally apply to the latter types of materials. Solid waste requirements are appropriate despite the presence of hazardous substances in the landfill, since solid waste landfills typically contain household hazardous wastes and hazardous wastes from certain classes of small quantity generators.

A RCRA Subtitle C type cap generally provides additional material layers to the sanitary landfill type cap further reducing the amount of infiltration that could pass through the cap. In accordance with 40 CFR 264.310 and EPA Technical Guidance (USEPA 1989b), the RCRA Subtitle C cap would typically include a two-component low permeability barrier consisting of a clay layer overlain by a flexible membrane liner.

A long-term ground water monitoring program would be designed and implemented in a manner similar to that described under Alternatives 2 and 3. New components of the ground water monitoring network would be designed and constructed in accordance with substantive requirements under 567 IAC 110. The exact scope of the long-term monitoring program, in terms of the number and location of monitoring points, the frequency of monitoring, and the parameters to be analyzed for, would be developed during the remedial design phase.

It is estimated that the hazardous waste landfill cap could be constructed within 18 to 24 months. The capital costs of implementing Alternative 4 are estimated to be $2,415,100. The annual O&M costs for this alternative are estimated to be $65,000 for the first 5 years, and $45,000 for the subsequent 25 years. By applying a 5% discount rate over a 30 year implementation period, the total present worth associated with Alternative 4 is estimated to be $3,150,200.

9.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

This Section summarizes the comparative analysis of alternatives presented in the Feasibility Study Report.

Nine evaluation criteria have been developed by EPA to address CERCLA statutory requirements and technical, cost, and institutional considerations which the Agency has determined appropriate. The evaluation criteria serve as the basis for comparing remedial alternatives. These criteria are defined below.

Threshold Criteria:

1) Overall protection of human health and the environment: Alternatives are assessed to determine whether they provide adequate protection of human health and the environment based on

how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

2) Compliance with applicable or relevant and appropriate requirements (ARARs): This criterion addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of Federal and State environmental statutes or provides a basis for invoking a waiver of these requirements.

Primary Balancing Criteria:

3) Long-term effectiveness and permanence: This criterion is a measure of the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. This criterion includes the consideration of residual risk and the adequacy and reliability of controls.

4) Reduction of toxicity, mobility, or volume through treatment: This refers to the anticipated performance or degree of effectiveness of the treatment technologies that a remedy employs.

5) Short-term effectiveness: This refers to the period of time needed to complete the remedy and is a measure of any adverse impacts on human health and the environment that may be posed during the construction and implementation of the remedy. The amount of time needed until protectiveness is achieved is also an assessment factor.

6) Implementability: This criterion requires an assessment of the technical and administrative feasibility of implementing a remedy, including the difficulties associated with construction and the availability of services and materials.

7) Cost: Under this criterion the benefits realized by implementing a remedy are weighed against the cost of the remedy. Generally, this criterion is only used to distinguish between alternatives that are equivalently protective.

Modifying Criteria:

8) State acceptance: Technical and administrative concerns the State may have with regard to an alternative are considered in the remedy selection process.

9) Community acceptance: Community issues or concerns with regard to the proposed cleanup plan and other remedial alternatives are considered in the remedy selection process.

9.1 Overall Protection of Human Health and the Environment

All of the alternatives, except the no action alternative, are protective of human health and the environment by controlling risk through containment of the wastes and/or usage of institutional controls. Since the no action alternative does not eliminate, reduce, or control any of the potential exposure

pathways, it is not considered protective of human health and the environment, and will not be considered further in the analysis of potential remedies for the Site.

The fence and institutional controls provided under Alternative 2 is considered protective because the potential for direct contact with the wastes would be limited and contaminants are not currently migrating offsite in large enough concentrations to impact human health and the environment. However, Alternative 2 relies on institutional rather than engineering controls and does not protect against the possibility of increased offsite migration of contaminants and increased exposure of waste materials due to further degradation of landfilled materials and/or uncontrolled river bank erosion.

Alternatives 3 and 4 provide a level of protection superior to that of Alternative 2. The cap would act as a physical barrier to direct contact with the waste materials. Also, the cap would reduce infiltration through the waste materials, leading to reduced offsite migration of contaminants and minimizing the potential for increased offsite migration of contaminants in the future. Cap design goals under Alternative 4 would require lesser permeability than that required under Alternative 3, and therefore, Alternative 4 is considered to rank slightly higher in overall protectiveness than Alternative 3.

9.2 Compliance with Applicable or Relevant and Appropriate Requirements

Alternative 2 does not comply with State of Iowa landfill closure regulations. Therefore, alternative 2 does not comply with ARARs.

The primary potential ARARs for Alternatives 3 and 4 include the hazardous and solid waste landfill closure requirements. The State of Iowa has promulgated regulations which provide for management of solid wastes in accordance with RCRA Subtitle D. The State regulations constitute potential ARARs for the Red Oak Landfill remedy selection.

State regulations for the closure of solid waste landfills under 567 IAC 103 and 567 IAC 110 are relevant and appropriate to the Red Oak Landfill remedy selection. Alternative 3 can be designed in compliance with the substantive provisions of these regulations. The landfill cover included as a component of alternative 4 exceeds the cap design requirements under the State solid waste regulations. Therefore, Alternatives 3 and 4 would both be in compliance with the State of Iowa solid waste landfill closure regulations. Hazardous waste landfill closure requirements under Subtitle C of RCRA do not constitute ARARs for the selected remedy at the Red Oak Landfill Site because the wastes were deposited before the enactment of RCRA (not applicable) and are generally not "sufficiently similar" to RCRA wastes that the regulations be adhered to as a matter of policy (not relevant and appropriate).

The state regulation concerning cleanup actions which is set forth in 567 IAC 133, which is applicable here, requires that

certain action be taken when the action levels specified in 567 IAC 133.2 are exceeded in groundwater. This could require that the lifetime health advisory level (HAL) or the negligible risk level (NRL) be met by requiring a groundwater cleanup. However, the regulation provides that where, as here, site conditions and available technology are such that attainment of these goals would be impractical, an alternative cleanup level or levels may be established, including such other conditions as will adequately protect the public health, safety, environment and quality of life. As part of this remedy, institutional controls will be established to control usage of groundwater contaminated at levels in excess of action levels prescribed in 567 IAC 133.

Although they do not constitute ARARs, Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act will be considered in the selection of remedy at the Red Oak Landfill site. MCLs are directly applicable at the tap only when the water is provided to 25 or more people or 15 or more service connections. The MCLs are not considered relevant and appropriate since the shallow groundwater at the site does not represent a potential drinking water source. The site is located directly adjacent to the western bank of the East Nishnabotna River. The shallow ground water beneath the site flows east to northeast, discharging directly into the River.

Three rounds of shallow ground water samples were collected from the five on-site monitoring wells during the RI. Additionally, shallow ground water samples were collected from two nearby residential wells.

Five volatile organic compounds (VOCs) were detected in samples collected from the onsite wells. None of the detected VOC's exceeded corresponding MCLs. No semi-volatile compounds were detected.

Significant inorganic compounds detected in samples collected from the on-site wells (at greater than twice the background concentration) include arsenic, barium, cadmium, cobalt, copper, manganese, and nickel. All inorganic concentrations detected were below the corresponding MCLs, with the exception of nickel in one sample. Nickel exceeded the MCL only once during three sampling events for all of the five monitoring wells. No lead, mercury or cyanide were detected in any of the samples.

Analyses of the private well samples detected no organic or inorganic constituents exceeding the corresponding MCLs.

With the exception of a single exceedence for nickel, all organic and inorganic contaminant levels were below the corresponding MCLs. In addition, it does not appear that the site contaminants are adversely impacting water quality in any drinking water wells. Comparison of the current data to the MCLs further supports the risk assessment, which indicates that ground water remediation is not a necessary component of the selected remedy.

9.3 Long-Term Effectiveness and Permanence

Alternative 2 is not considered reliable in the long-term due to the inability to assure the continued effectiveness of institutional controls, and the difficulty for EPA to enforce institutional controls directly. Alternative 2 also lacks engineering controls designed to assure that the site remains stable over time, and that exposure to surface or subsurface contaminants does not increase due to erosion or other disturbance of surface materials. Moreover, the National Contingency Plan states that "the use of institutional controls shall not substitute for active response measures" such as containment of source material in cases where such active response measures are practical (40 CFR 300.430(a)(1)(iii)(D)).

Alternatives 3 and 4 would provide much greater long-term effectiveness than Alternative 2. Installation of a cap would minimize the potential for direct contact with the waste materials, and greatly reduce the potential for contaminant migration throughout the life of the cap, which is largely dependant on how well and for how long the cap is maintained. It is difficult to predict any differences between the two capping alternatives with regard to durability over the long-term.

9.4 Reduction of Toxicity, Mobility or Volume through Treatment

The application of treatment technologies was not found to be practical for this Site, and therefore none of the alternatives involve treatment.

9.5 Short-Term Effectiveness

Of the available alternatives, Alternative 2 ranks the highest in short-term effectiveness because it can be implemented quickly and easily with no impacts to worker health and safety from potential exposure to waste materials.

Construction of either of the capping alternatives would require scarification and regrading of the existing landfill cover leading to the potential for exposure to waste materials and contaminant release during the implementation period. Therefore, Alternatives 3 and 4 could lead to potential short-term impacts on human health and the environment which would not be a concern for Alternative 2. Alternative 4 is slightly less effective in the short-term than Alternative 3, since it would likely require a slightly longer construction period.

9.6 Implementability

Alternative 2 may be readily implemented. The capping alternatives require a much more involved design and construction effort, and would be somewhat more difficult to implement than Alternative 2. Factors influencing the implementability of the capping alternatives include the local availability of materials, and the potential for encountering cap construction difficulties along the river bank. It is anticipated that both Alternatives 3 and 4 could be implemented without excessive difficulties; however, Alternative 4 is considered slightly more difficult to

implement than Alternative 3 due to the additional material requirements and the added complexity of installation.

9.7 Cost

Table 7 presents a summary of the capital costs, present net worth operation and maintenance (O & M) costs, and the total net present-worth costs estimated for each of the alternatives. There are no costs associated with implementation of the no-action alternative.

9.8 State Acceptance

The Iowa Department of Natural Resources (IDNR), acting on behalf of the State of Iowa, has indicated a preference for Alternative 3, but finds Alternatives 2 and 4 to be marginally acceptable.

TABLE 7
COST SUMMARY

	Capital Cost	O&M Cost (Present Net Worth)	Total Present Net Worth
Alternative 2 Access Restrictions	$162,800	$350,800	$513,600
Alternative 3 Sanitary Landfill Cap	$1,695,100	$735,100	$2,430,200
Alternative 4 RCRA Cap	$2,415,100	$735,100	$3,150,200

9.9 Community Acceptance

Community acceptance of the available remedial alternatives was evaluated following the public meeting held on August 20, 1992, and the conclusion of the public comment period on October 11, 1992. The results of this evaluation are presented in the attached Responsiveness Summary.

10.0 THE SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the detailed analysis of alternatives using the nine criteria, and public comments, the EPA and the IDNR have determined that Alternative 3 is the most appropriate remedy for the Red Oak Landfill Site. Alternative 3 provides the best balance of trade-offs among the alternatives with respect to the evaluation criteria.

The primary component of the remedy will be placement of an engineered low-permeability cap over the surface of the landfill. The function of the cap will be to limit the amount of water infiltration that passes through the landfill waste material, to provide a physical barrier limiting the potential for direct contact with the waste materials, and to properly manage surface water runoff to prevent ponding, infiltration, and erosion.

To manage surface drainage resulting from the reduced permeability of the landfill cover, diversion and drainage structures will be placed along the perimeter of the landfill cap, as necessary, to direct surface runoff to existing intermittent stream channels located to the north and south of the landfill area. The surface drainage patterns will also be designed to direct surface runoff away from unstable river bank areas.

Contouring and revegetation/reforestation techniques will be employed to stabilize the river bank slope in the areas currently exhibiting active soil movement due to precipitation runoff and ground water seepage from the face of the slope. These actions should reduce or eliminate seepage from the face of the slope and allow direction of surface water runoff away from the slope. The effectiveness and success of the landfill capping and contouring/revegetation technologies in stabilizing the river bank will be monitored through regular inspection. If inspections indicate that soil movements on the face of the slope have not been adequately stabilized, or if erosion continues to be a problem, additional response actions will be taken.

It is unclear whether river erosion at the toe of the river bank contributes to the instability of the slope. The results of slope stability monitoring and study of river channel migration over time currently appear to indicate that significant toe erosion has not occurred. After controlling precipitation runoff and ground water seepage in the manner described above, the influence of toe erosion on the stability of the river bank will be further evaluated over time. Operation and maintenance plans

will address monitoring and evaluating the effects of river erosion on bank stability in conjunction with a contingency plan for actions to prevent river erosion and stabilize the toe of the slope.

A long-term ground water monitoring program will be designed and implemented using existing and/or new monitoring wells for purposes of detecting and characterizing potential ground water contamination and evaluating the effectiveness of the remedy. Monitoring plans will contain a strategy for establishing and monitoring contaminants of concern, maximum permissible contaminant levels, and points of compliance. The selected remedy will also include a field study conducted during the design phase to determine the necessity for a landfill gas ventilation or collection system.

A perimeter fence will be constructed to control access to the landfill area. Institutional controls, including deed and access restrictions, will be used to control future land use at the Site. Institutional restrictions will also be established to control usage of ground water contaminated at levels in excess of action levels prescribed in 567 IAC 133.

11.0 STATUTORY DETERMINATIONS

Consistent with the statutory requirements of Section 121 of CERCLA, as amended, remedial actions should be selected that:

- Are protective of human health and the environment.
- Comply with ARARs.
- Are cost effective.
- Utilize permanent solutions and alternative treatment technologies to the maximum extent practicable.
- Satisfy the preference for treatment which, as a principal element, reduces toxicity, mobility, or volume.

The manner in which the selected remedy satisfies these five requirements is discussed in the following subsections.

11.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy is protective of human health and the environment in that it minimizes all potential risks posed by the Red Oak Landfill. The landfill cover system, in conjunction with fencing and land use restrictions, will limit the potential for exposure to waste materials through direct contact, which is the primary health risk identified at the Site.

The landfill cover system will also minimize the amount of infiltration passing through waste materials, thus, reducing the potential for leaching of waste constituents which could

discharge as seeps or enter the underlying ground water. Controlling ground water usage will further reduce the potential for exposure to contaminated ground water.

The contouring and drainage systems in conjunction with river bank stabilization will limit erosion of the river bank and cover soils, minimizing the potential for losing containment of the waste materials.

11.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The selected remedy will comply with all applicable or relevant and appropriate requirements (ARARs). The ARARs, presented below, are categorized as location-specific, action-specific, or contaminant-specific. All actions associated with the selected remedy are considered onsite actions and, therefore, need only comply with the substantive requirements of Federal and State environmental laws that are determined to constitute ARARs.

11.2.1 Location-Specific ARARs

Location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they are in a specific location. Analysis for these requirements included a review of the Archeological and Historic Preservation Act, the Archeological Resources Protection Act, the Endangered Species Act, the Fish and Wildlife Coordination Act, the Clean Water Act, the Resource Conservation and Recovery Act, and Iowa waste management laws.

Location standards for disposal facilities are specified under RCRA 40 CFR 264.18(b), and 40 CFR 258, Subpart B. These standards apply to the siting of new facilities and therefore will not be applicable to the Red Oak Landfill; however, the restriction on facilities located in a 100-year floodplain is considered relevant and appropriate. Both municipal waste landfills and hazardous waste management facilities located within a 100-year floodplain should be constructed, operated, and maintained to prevent washout of any waste by a 100-year flood.

The selected remedy will not impact historic, archeological, or cultural resources, sensitive ecosystems or any threatened or endangered species. No other location-specific requirements were determined to be either applicable or relevant and appropriate.

11.2.2 Action-Specific ARARs

Action-specific ARARs are technology- or activity-based requirements or limitations on actions taken as part of the remedy. Analysis for these requirements involved a review of the environmental laws and regulations that pertain to closure of a land disposal facility including the Solid Waste Disposal Act, the Resource Conservation and Recovery Act, and the Iowa waste management laws.

The wastes at the Red Oak Landfill were disposed of prior to the effective date of landfill closure requirements under RCRA Subtitles C and D and the Iowa Solid Waste Disposal Act, as amended. In addition, the selected remedial action does not constitute treatment, storage or disposal of solid or hazardous waste; therefore, landfill closure requirements under RCRA or the Iowa Solid Waste Disposal Act are not applicable to this action.

The National Contingency Plan provides that the nature of the wastes, and the type and size of the facility should be considered in judging the relevance and appropriateness of a given requirement. The Red Oak Landfill operated as a large municipal landfill. The site did receive some industrial wastes, such as lead filter cake, spent solvents and paint wastes. However a large majority of the materials disposed of at the site included municipal refuse, tree pruning waste, and construction and demolition debris. This is supported by subsurface sampling conducted during the remedial investigation that confirmed the sporadic presence of hazardous substances, generally at low concentrations. The presence of low levels of hazardous substances is not atypical of Subtitle D facilities which receive household hazardous wastes and other hazardous wastes from certain classes of small quantity generators. The overall composition of the materials disposed of at the Red Oak Landfill therefore more closely resembles solid waste regulated by Subtitle D of RCRA than hazardous waste regulated by Subtitle C of RCRA.

Other factors are also considered in the determination of relevance and appropriateness, such as the type and size of the facility. The Red Oak Landfill is approximately 40 acres in size, and was operated primarily as a municipal waste landfill. These are typical characteristics of a Subtitle D facility. In addition, materials disposed of at the Red Oak Landfill are not currently adversely impacting surface or ground water quality. For these reasons, Subtitle C regulations for landfill closure are not considered relevant and appropriate to the Red Oak Landfill remedy selection.

The State of Iowa is authorized to administer the solid waste management program in Iowa. The State solid waste regulations replace the corresponding Federal regulations under Subtitle D of RCRA as potential ARARs. The operation and characteristics of the Red Oak Landfill site are typical of sanitary landfills that received solid waste from a variety of sources. Because the Iowa solid waste regulations would otherwise be applicable to the site if disposal had occurred subsequent to the effective date of the Iowa regulations, the Iowa regulations for management of solid waste under 567 IAC 103 and 567 IAC 110 are relevant and appropriate for the selection of remedy at the site.

The specific regulations constituting ARARs contained in 567 IAC 103 and 110 include sanitary landfill post-closure monitoring requirements at 567 IAC 103.2(10), closure requirements at 567 IAC 103.2(13), and the postclosure requirements for 30 years following closure of the site at 103.2(14). In addition, ARARs impacting the design of the ground water monitoring system

include requirements for hydrologic monitoring systems at 567 IAC 103.2(3) and 567 IAC 103.2(4), and monitoring well siting requirements at 567 IAC 110, and monitoring well design requirements at 567 IAC 110.11. The selected remedy will comply with the substantive provisions of the above mentioned requirements which have been determined to constitute ARARs.

11.2.3 Contaminant-Specific ARARs

Contaminant-specific ARARs are health- or risk-based numerical values that establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment.

The EPA has proposed, but not promulgated, New Source Performance Standards (NSPSs) under the Clean Air Act (CAA) for air pollutant emissions from new municipal solid waste landfills. An environmental requirement can only constitute an ARAR if promulgated. Given the similarity of the Red Oak landfill to the municipal solid waste landfills to be regulated by this new rule, these requirements are to be considered (TBCs) for the selected action.

Iowa's ambient air quality standards (567 IAC 28), derived from the National Primary and Secondary Ambient Quality Standards (NAAQS) provided in 40 CFR Part 50, are considered relevant and appropriate to the evaluation of air quality at the Site both during and after implementation of the remedy. The restrictions at 567 IAC 23 will be applicable to fugitive dust emissions generated during the construction phase.

Federal Water Quality Criteria (WQCs) and Iowa Surface Water Quality Criteria are considered relevant and appropriate for evaluating water quality in the East Nishnabotna River. Although analysis of river water samples taken during the remedial investigation have not shown measurable impacts on river water quality, monitoring plans will include river sampling and analysis to verify that these criteria are not exceeded during and after implementation of the selected remedy.

11.3 Cost-Effectiveness

The selected remedy is considered cost effective in that it affords overall effectiveness proportional to its costs. The selected remedy is the least costly of the two alternatives that are deemed to provide adequate protection of human health and the environment.

11.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The EPA has determined that the selected remedy utilizes permanent solutions and treatment technologies to the maximum extent practicable for this Site. The fact that the selected remedy does not employ treatment, reflects the finding that no remedies involving treatment are practicable for this Site.

As with the majority of landfills and large dumpsites, cost-effective remedial actions with potential application for the Red Oak Landfill Site must involve containment technology as a primary component. Treatment of the principal threats of the Site was not found to be practicable, and the remedy does not employ treatment as a principal element. Treatment was determined to be impracticable primarily due to the size of the landfill, and the heterogeneity of the wastes. Due to the size of the Site, treatment would be cost-prohibitive for the entire volume of material that has been disposed of at the site. It is not was not judged to be practical to completely characterize surface and subsurface contaminant levels throughout the entire landfill, to locate discrete areas of waste to treat.

The selected remedy provides the best balance among the alternatives with respect to the evaluation criteria identified in Section 9 of this ROD. Since Alternative 2, which employs institutional controls and access restrictions only, is not considered to provide reliable long-term protection, capping is considered the only alternative that is both adequately protective and cost-effective. Alternative 3 is preferred over Alternative 4 because it is equally effective in preventing direct contact with the waste materials, which has been identified as the primary threat posed by the Site, but costs less to implement. Also, analysis of relevant landfill closure requirements indicates that sanitary landfill requirements are appropriate for the Site.

11.5 Preference for Treatment as a Principal Element

Treatment of the principal threats of the Site was not found to be practicable; therefore, the selected remedy does not satisfy the statutory preference for remedial actions which employ treatment as a principal element. The large size of the landfill, the large volumes of wastes, the dispersion of the contamination, and the heterogeneity of the wastes, are all factors precluding a remedy in which contaminants could be excavated and treated effectively.

12.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the Red Oak Landfill Site was released for public comment in August 1992. The Proposed Plan identified Alternative 3, sanitary landfill closure, as the preferred remedial action. The EPA has reviewed all written and verbal comments submitted during the comment period, and has determined that no significant changes to the remedy, as originally identified in the Proposed plan, are necessary.

RECORD OF DECISION

RESPONSIVENESS SUMMARY

RED OAK LANDFILL SITE

RED OAK, IOWA

Prepared by:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII

KANSAS CITY, KANSAS

MARCH 31, 1993

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1.0 INTRODUCTION

This Responsiveness Summary is the third and final component of the Record of Decision (ROD) for the Red Oak Landfill Site. The Responsiveness Summary provides information about community preferences regarding the remedial alternatives evaluated and general concerns about the site. The Responsiveness Summary also demonstrates how comments were considered as an integral part of the decision-making process. Section 2.0 describes the community participation activities that were conducted as part of the remedy selection process. Section 3.0 includes a summary of comments received from the community during the public comment period, including those received from any potentially responsible parties (PRPs). EPA's response to each comment is provided.

2.0 COMMUNITY INVOLVEMENT

The RI/FS and the Proposed Plan for the Red Oak Landfill site were released to the public in August 1992. These documents were made available to the public as part of the Administrative Record maintained by EPA's Region VII office. An additional copy of the Red Oak Landfill Site Administrative Record has been made available locally at the Red Oak Public Library, located at 2nd and Washington Street, Red Oak, Iowa. The remedy selection documented in this ROD is based on information contained in the Administrative Record. The notice of availability of these documents was published in the Red Oak Express, Red Oak, Iowa, a weekly news publication, and the Omaha World-Herald, Omaha, Nebraska, which is a daily news publication with circulation available to Red Oak residents.

The public comment period was originally announced from August 12, 1992 through September 11, 1992. In addition, a public meeting was held on August 20, 1992, at the Red Oak Fire Station. At this meeting, representatives from EPA, and the Iowa Department of Health (IDOH) presented information and answered questions about the Site and the remedial alternatives under consideration. Comments received during this period are addressed in the Responsiveness Summary, which is an attachment to this ROD.

An extension of the comment period for the Red Oak Landfill Proposed Plan was requested by the City of Red Oak, and was received by EPA on September 1, 1992. An extension of thirty days was granted, bringing the public comment period to closure on October 11, 1992.

3.0 RESPONSE TO COMMENTS

3.1 RESPONSE TO COMMENTS RECEIVED AT THE PUBLIC MEETING

Comment: One commentor questioned whether the proposed fence would surround the entire property, or only the contaminated area. The commentor questioned how the fence would be constructed and maintained, and whether noxious weeds would be allowed to revegetate the site.

Response: There is no need to surround the entire property. In order to achieve cost-effectiveness, the fence will surround only areas covered by the sanitary landfill cap, providing for some buffer area to be determined in the remedial design phase.

The exact design of the fence will be determined following selection of remedy, during the detailed design phase. As discussed above, the interests of the community will be considered by EPA in the final design. The selected remedy includes maintenance of the fence to maintain its effectiveness.

The selection of indigenous vegetation will be determined during the design phase following remedy selection and will consider the need to control noxious weed growth.

Comment: One commentor asked what evidence EPA had regarding pollutant migration, what the current cost estimate for the proposed remedy is, to whom the costs will be charged, who will be responsible for operation and maintenance, and if consideration has been given to relocation of the entire landfill.

Response: There is evidence of contaminant migration because of the low levels of contaminants detected in the ground water, and because of the presence of surface seeps originating from buried materials. These data have been presented in the Remedial Investigation which is included in the site Administrative Record.

The current estimated cost of the selected remedy is $2.43 million. The EPA would look toward those deemed to be potentially responsible parties to actually implement the cleanup. Operation and maintenance may be provided through an agreement reached with the potential responsible parties as a component of the selected remedy; otherwise, the EPA would look to the State of Iowa to provide long-term operation and

maintenance if the Superfund pays for the cleanup.

Excavation and off-site management of the landfilled materials has been judged to not be economically feasible due to the tremendous volume of material that would require management and the associated costs.

Comment: One commentor asked if the remedy would prevent contamination of the Red Oak, Iowa municipal water supply.

Response: On the basis of existing data, the municipal water supply does not appear threatened. The selected remedy will further reduce the potential for contamination of ground water in the area.

Comment: One commentor asked the number of sites appearing on the EPA's National Priorities List, where else the proposed remedy had been implemented, whether testing had been performed on an active well immediately northwest of the site, if testing had detected contaminants from the site in any private wells or the nearby quarry pond, and when the remedy would be implemented.

Response: The number of sites appearing on EPA's National Priorities List exceeds 1200. The selected remedy at the Red Oak Landfill site is a common remedy selection for former municipal landfills that received hazardous substances nation-wide. Remedy selection is, however, conducted on a site-by-site basis.

All analytical results generated during the Remedial Investigation are included in the Administrative Record. The analysis of samples collected from the quarry pond detected the presence of five metals. The quarry pond does not appear to be threatened by contaminants at the site.

Two private wells were sampled during the investigation. Without more specific information it is not possible to state if the specific well mentioned had been sampled. If private wells are identified during the remedial design phase that appear to be threatened by contaminants at the site, they will be included in the ground water monitoring program.

The schedule for implementation of the remedy is dependent upon negotiations with potentially responsible parties following remedy selection, but could be completed in as short a time frame as one and one-half to two years.

Comment: One commentor raised concerns regarding the impediment the fence would cause with wildlife traffic patterns, and the

direction that surface water runoff would be diverted from the site. The commentor asked if consideration has been give to some type of system to collect and contain the seeps before they enter the river.

Response: Protection of wildlife will be considered during the design of the fence. The surface drainage direction will be determined during the remedial design phase. The selected remedy will control infiltration of precipitation through the surface, and is expected to help to reduce or eliminate the presence of the seeps. This in conjunction with river bank stabilization measures should help to control the seepage problem. If the remedy is fully effective, collection and containment of these seeps will not be necessary.

Comment: One commentor asked if the ground water would be threatened if the seeps were dried up.

Response: The threat to the river and any threat to ground water would both be controlled by limiting infiltration of precipitation into the landfill. With less water entering the landfill, there will be less leachate likely to be generated.

Comment: One commentor asked what assurance existed that the remedy would be effective, and who was involved in the remedy selection process.

Response: These types of remedies have been successfully and effectively implemented by not only EPA, but states, municipalities, and private entities at numerous sites of a similar nature nationally. Although there can never be absolute certainty that any remedy will be effective, in EPA's judgement this is effective, and should provide long-term protection of human health and the environment. EPA makes the actual remedy selection, with input from the State and public. The State of Iowa concurs with EPA's selected remedy.

Comment: One commentor asked why access and institutional controls and ground water monitoring (alternative 2) alone would not be preferred over the selected remedy, and why the selected alternative is preferred over alternative 4, placement of a RCRA cap.

Response: The selected remedy provides the best balance across the nine criteria EPA uses for decision-making, as specified in Federal regulations. Long-term protectiveness can not be assured with alternative 2 due to long-term uncertainty in the effectiveness and implementability of institutional controls; the risk of erosion or other disturbance of existing surficial

materials resulting in further exposure to hazardous substances; and the continued potential for direct contact with surface soils. The selected remedy also controls infiltration into the landfill which addresses the threat to surface and ground water posed by the continued migration of contaminants.

The selected remedy also better satisfied the nine remedy selection criteria than alternative 4. In particular, the selected remedy was determined to be more cost-effective than alternative 4. Although both the selected remedy and alternative 4 were determined to be protective, the selected remedy afforded similar protection at a lower cost.

Comment: One commentor asked for a breakdown of estimated costs for the selected remedy. The commentor believed that some of the costs may have been over-estimated. The commentor asked if there was anything that would cause EPA, on the basis of existing information, to broaden the preferred alternative. The commentor asked about the health hazard posed by this site, and the threat to wildlife posed by the site. The commentor again reiterated concern that the fence should be designed to provide access to wildlife. The commentor asked how the cost of the remedy would be apportioned.

Response: This information was provided for the audience at the public meeting, and is included in Table 14 in the Remedial Investigation which appears in the site Administrative Record. The costs represent order-of-magnitude cost estimates, which are considered to be accurate to within -30% to +50% The estimated costs will be refined during the design phase.

The remedy selected for the Red Oak Landfill Site is the same alternative presented the Proposed Plan as EPA's preferred alternative. The preferred alternative will be implemented as presented. The remedy can not be significantly altered or expanded in scope without a supplemental remedy selection process, possibly requiring issuance of a revised proposed plan, as well as an additional public comment period and another opportunity for a public meeting. The EPA does not intend to revise the selected remedy at this time.

A risk assessment was performed to estimate current and future potential health risks at the site. The risk assessment concluded that there was an unacceptable level of risk under certain future use scenarios. However, additional risks may exist due to the presence of undetected contaminants at the surface of the landfill, and increased future risk would result if surficial materials are eroded or disturbed and additional contaminants at higher concentrations are exposed. The EPA has concluded that the selected remedy is appropriate and necessary for the protection of public health and the environment.

The EPA will first attempt to arrange for an agreement to implement the selected remedy with the parties deemed potentially responsible for the contamination according to the Superfund law (Comprehensive Environmental Response, Compensation, and Liability Act, as amended). The details of the apportionment of costs would likely be determined through negotiations among the potentially responsible parties following remedy selection. If an agreement for the implementation of the remedy can not be concluded with potentially responsible parties, then under the law, Superfund trust fund money could be used to fund up to half of the remedy, since the site is municipally owned, and the remaining half would need to be funded by the City or the State. If Superfund monies are used to fund a portion of the remedy, it would be EPA's intention to pursue cost-recovery through litigation with any non-settling potentially responsible parties later on.

Protection of wildlife will be considered during the design of the fence, as stated above.

Comment: One commentor believed that a six-foot chain link fence would be excessive for some deer to jump over, and could result in bodily harm to some animals.

Response: This will be considered in the design of the fence.

Comment: One Commentor expressed the City's concern for minimizing the cost of the remedy, and asked for assurance that the City would not be required to pay for half of the remedy.

Response: The EPA is sensitive to the City's concern for the cost of the remedy. According to the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, remedies selected by EPA at Superfund sites must be cost-effective. Cost is one of the criteria that EPA considers in conjunction with performance to determine the cost-effectiveness of each of the remedies. The EPA has selected a cost-effective remedy for the Red Oak Landfill Site. The apportionment of costs among the parties may be reached through negotiations as part of a settlement between EPA and the potentially responsible parties, or would need to be shared by EPA and other levels of government as discussed above.

3.2 RESPONSE TO WRITTEN COMMENTS

Comment: The commentor requested a 30-90 day extension of the public comment period in order to provide adequate time to

prepare his replacement in the position of City Attorney prior to his departure.

Response: A 30 day extension was granted and the comment period was extended to October 11, 1992. A written response was sent to the requestor.

Comment: The commentor concurred that a sanitary landfill cap is necessary to limit potential migration. The commentor requested that no more extensive fencing be installed than what is currently in place. This would benefit wildlife, and be less costly to maintain and would not be an eyesore.

Response: Fencing is normally an integral component of the selected remedy to control future access to the site and to protect the landfill cover. During the design of the remedy, including the required fencing, consideration will be given to both aesthetics and protection of wildlife.

Comment: The commentor provided comments on behalf of the City of Red Oak, Iowa. The City believes that the cost of Alternative 3 should in no event exceed the $2.43 million estimate, and that many of the costs for components of alternative 3 were over-estimated. The City urges EPA not to broaden the scope of the proposed plan, and that local contractors be used to the greatest extent possible. The City is not so much concerned about the site's hazards to wildlife, as the disruption of wildlife traffic patterns caused by a unnecessarily high or dense fence. Standard farm fence would be sufficient. Regrading and revegetation should be accomplished to possibly provide a wildlife habitat or future recreational use.

Response: The estimated costs outlined in the Feasibility Study, Table #14, are considered order-of-magnitude cost estimates, that will be refined during the design phase of the project. The order-of-magnitude cost estimate is intended to be accurate within +30% - 50%.

The remedy selected for the Red Oak Landfill Site is the same alternative presented the Proposed Plan as EPA's preferred alternative. The preferred alternative will be implemented as presented. The remedy will not be significantly altered or expanded in scope without a supplemental remedy selection process, including issuance of a revised proposed plan, an additional public comment period and an opportunity for a public meeting. The EPA does not intend to revise the selected remedy at this time.

Fencing and wildlife protection will be considered as discussed above. Revegetation of the site is an integral

component of the selected remedy. The future use of the site must remain protective of human health and the environment. Any potential future use of the site must not threaten the continued effectiveness of the cover system installed as a component of this remedy.

If implementation of the remedy is funded through use of the Federal Superfund trust fund, procurement of contractor services must be conducted in accordance with federal acquisition regulations. Although preference can not legally be given to a group of potential bidders on the basis of their proximity to the site, local contractors are expected to be given the opportunity to submit proposals for the work to be performed, and compete for the contracts to implement the selected remedy. If the remedy is implemented through some type of unilateral or consental enforcement activity, EPA may have limited control over contractor selection.

The EPA is sensitive to the City's concern for the cost of the remedy. According to the Comprehensive Environmental Response, Compensation, and Liability Act, as amended (CERCLA), remedies selected by EPA at Superfund sites must be cost-effective. Cost is one of the criteria that EPA considers in conjunction with performance to determine the cost-effectiveness of each of the remedies. The EPA has made the determination that the selected remedy for the Red Oak Landfill site is cost-effective.

COMMENT: Another commentor felt that a landfill cap and associated controls, as proposed, was the most effective and economical remedy for the site. The commentor also expressed interest in participation in the implementation of the remedy.

RESPONSE: Potential contracting opportunities for local firms are addressed above.

COMMENT: One commentor provided comments on behalf of the Red Oak Landfill Respondents. This commentor concurred with EPA's proposed remedy. The commentor believes that access control objectives can be accomplished with a 3 to 4 strand barbed-wire fence. The commentor believes that access restrictions alone are adequately protective in the northern portion of the site that received only tree pruning waste and other demolition debris. The commentor believes that the remedial design should consider identification of cost-effective borrow sources, including on-site materials, and should provide for minimal disruption to the community due to construction traffic. The commentor agrees that ground water monitoring and management of precipitation runoff at the site are important components of the remedy. The commentor recommends details for a ground water monitoring program.

RESPONSE: Design of the fence will be addressed following remedy selection in consideration of the comments received regarding aesthetics and wildlife. The EPA believes that the existing data are inadequate to conclude that hazardous substances exceeding health-based levels do not exist in the northern portion of the landfill. In fact, due to the areal expanse of the site, it is not practical to consider completely characterizing surface and subsurface concentrations across the entire site. The selected remedy includes a cover for the entire landfill area to provide a barrier and prevent infiltration to all potentially contaminated areas.

Cost-effectiveness and disruption to the community will be considered during the design of the remedy. Innovative approaches are sometimes identified by bidders and other interested parties during the design phase. The ground water monitoring program recommended by the commentor will be considered during the design phase of the project.