UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

RESPONSE TO COMMENTS

FOR THE

US ECOLOGY, INC. SITE

SHEFFIELD, ILLINOIS

OCTOBER 1990

US ECOLOGY, INC.
SHEFFIELD, ILLINOIS
(ILD 045 063 450)

INTRODUCTION

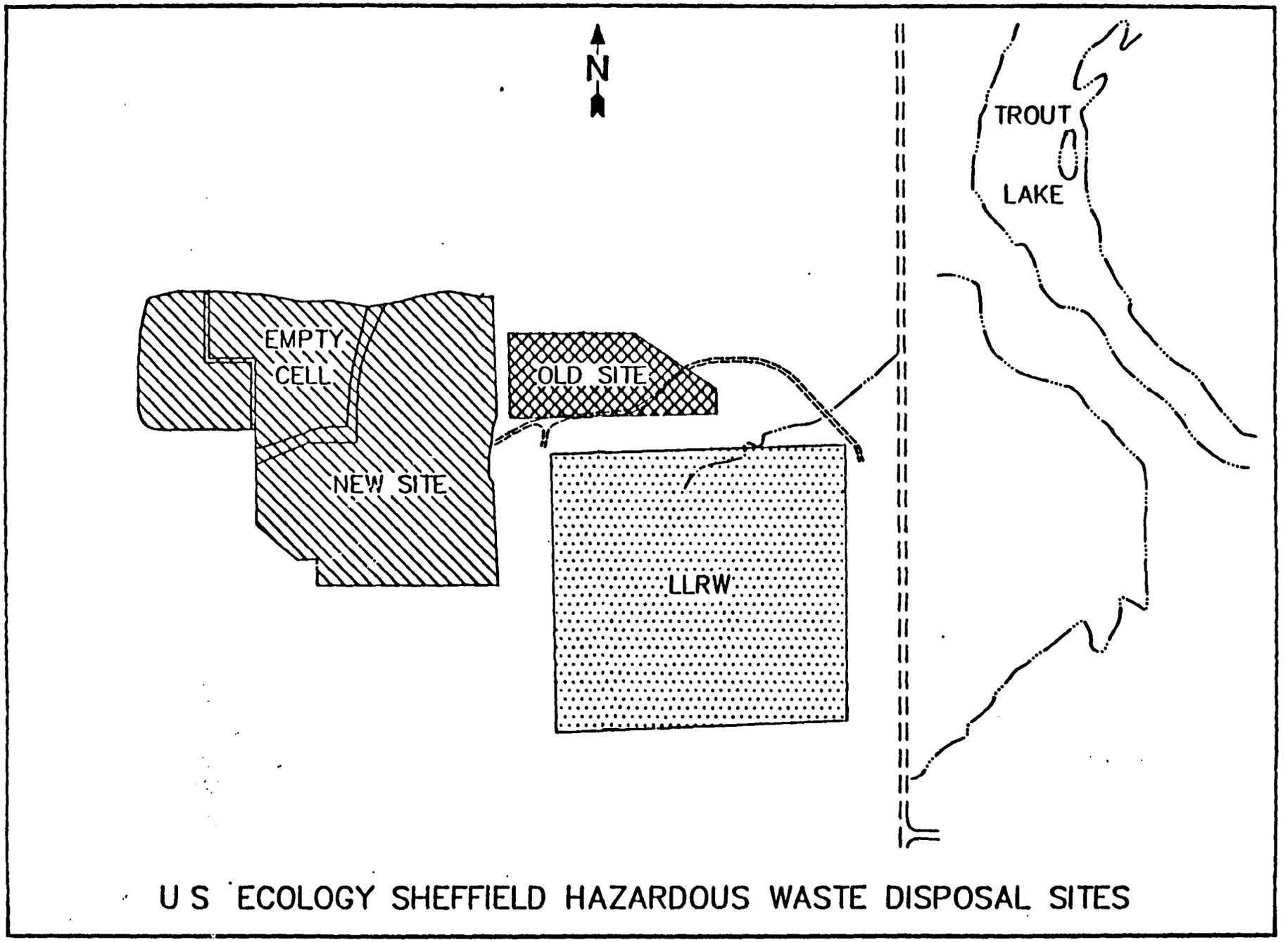
This response to comments (RTC) is being presented by the United States Environmental Protection Agency (U.S. EPA). The purpose of the RTC is to present concerns and issues raised during the public comment period and to provide responses. All of the significant comments received were carefully reviewed during the final selection of the remedy and have been responded to in this RTC. Some additional alternatives and suggested additions to components of the remedy were raised by commenters that were not considered during the Corrective Measure Study (CMS), previously referred to as the Feasibility Study (FS). All these comments have been considered, and the selected remedy is the proposed remedy with some modifications and clarification. To the extent possible, and where appropriate, additional details and requirements have been added to direct US Ecology, Inc. in the Corrective Measure Implementation (CMI) design phase, which will be initiated following the signing and release of this document.

The U.S. EPA, in its selection of the corrective measures to be implemented by US Ecology at its Sheffield, Illinois, landfills, has determined that the individual components of the remedy for source control and ground-water remediation will be both effective and protective. The selected remedy was chosen by U.S. EPA to promote remediation of contamination from both past and continuing releases of hazardous waste and/or hazardous constituents to ground water and to significantly reduce the likelihood of future releases from those areas addressed. However, the U.S. EPA wishes to make the following points very clear:

1. The Administrative Order By Consent, signed by U.S. EPA and US Ecology, remains in effect after remedy selection. Under Section VIII, titled Additional Work, U.S. EPA can require US Ecology to conduct additional remediation investigation (RI) work and/or feasibility studies (FS) if the Agency makes a determination that it is necessary.

2. Although U.S. EPA expects the number of future releases to be reduced once source control components are designed, approved, and implemented, it is clear that U.S. EPA retains statutory authority for corrective action, which can be used to address any newly-identified areas of releases (e.g., from different areas of the New Site (see Figure 1)).

3. If it is determined, following implementation of the selected corrective measures, that a specific component is not achieving the design specifications and, as such, will not be effective in source control or remediation of ground water, U.S. EPA will require US Ecology to redesign and reimplement the specific remedy component or implement another technology following further FS work.



U S ECOLOGY SHEFFIELD HAZARDOUS WASTE DISPOSAL SITES

Figure 1

US Ecology is obligated under Section X of the Consent Order, titled Corrective Action, to implement the corrective action selected by U.S. EPA. The corrective action will be completed in accordance with Attachment I to this document (i.e., Scope of Work for Corrective Measures Implementation at US Ecology, Inc., Sheffield, Illinois). The Consent Order (Section XVII.C) provides for financial assurance in the amount of $1,750,000.00 to guarantee performance of and payment for any corrective action selected by U.S. EPA.

SELECTED CORRECTIVE MEASURES

The selected corrective measures consists of two essential elements: (1) source control, and (2) ground-water remediation. These two elements are detailed below and depicted in Figure 2.

1. The selected corrective measures for source control consist of the following components, some of which are described in considerable detail in the draft FS report for source control (Alternative 1):

   a. Placing slurry walls around the Old Site trenches.

   b. Placing slurry walls at trench 18EWC and the G-120 area of the New Site.

   c. Capping of the Old Site with a RCRA-required cap.

   d. Implementation of modifications to the existing New Site clay cap, if required by the Illinois Environmental Protection Agency (IEPA) for closure purposes.

   e. Extension of RCRA-required caps over areas encircled by slurry walls tied into existing barrier walls at 18EWC and the G-120 area.

   f. Placement of recovery/extraction wells screened near bedrock in areas encircled by slurry walls (i.e., the Old Site trenches). The purpose of these wells is to lower the level of the ground water within the slurry walls to a level below that of the buried hazardous waste and a high percentage of the contaminated soils.

   g. Because of concerns expressed by commenters regarding the adequacy of the existing system of ground-water monitoring wells to detect releases, US Ecology will be required to reduce the spacing between existing wells by approximately one-half north of New Site trenches 4, 5, and 24; west of trenches 24, 23, and 22; south of trench 23; and east of trenches 14C, 15, 16B, and 18EWB.

   h. Installation of sumps and/or extraction wells inside the slurry-walled and capped areas at trench 18EWC and G-120.

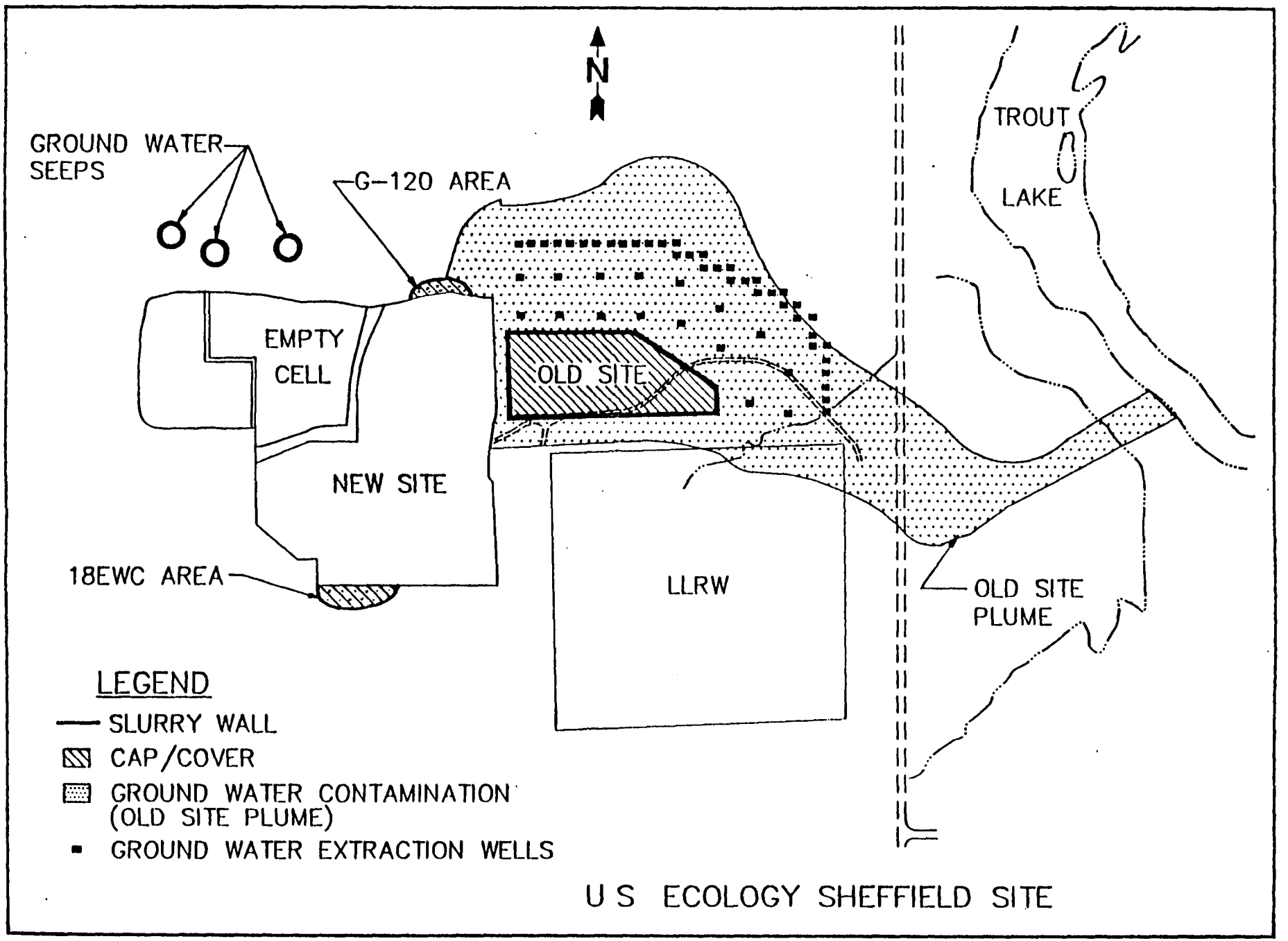

N
GROUND WATER SEEPS
G-120 AREA
TROUT
LAKE
EMPTY CELL
OLD SITE
NEW SITE
18EWC AREA
LLRW
OLD SITE PLUME
LEGEND
SLURRY WALL
CAP/COVER
GROUND WATER CONTAMINATION (OLD SITE PLUME)
GROUND WATER EXTRACTION WELLS
U S ECOLOGY SHEFFIELD SITE

Figure 2

i. Repair or modification of the existing trench barrier walls at 18EWC to ensure that they are effectively tied into a low-permeability stratum beneath the trench.

j. Installation of additional effective sumps into New Site trenches 1, 2, and 3, and 18EWC to control leachate generation and release from these trenches.

2. U.S. EPA's selected corrective measures for ground-water remediation will require US Ecology to:

a. Employ ground-water pumping to:

(i) Limit expansion of the existing contaminated ground water by hydraulic controls; and

(ii) Remove the contaminated ground water from each location of contamination until ground-water quality at the completion of the remediation meets the following ground-water protection standards:

Arsenic:	10.0 µg/L
Benzene:	5.0 µg/L
Chloroform:	5.0 µg/L
1,1-Dichloroethane:	5.0 µg/L
1,2-Dichloroethane:	5.0 µg/L
1,1-Dichloroethylene:	5.0 µg/L
1,2-Dichloropropane:	5.0 µg/L
Methylene Chloride:	5.0 µg/L
Tetrachloroethylene:	5.0 µg/L
Trichloroethylene:	5.0 µg/L
Vinyl Chloride:	2.0 µg/L

b. Treat the removed ground water as necessary to comply with applicable State regulatory programs for discharge to air, surface water, and ground water (e.g., reinjection).

c. Provide a ground-water monitoring program to verify progress toward achieving U.S. EPA's ground-water protection standards.

d. Screen ground-water extraction wells in both the glacial aquifer and bedrock aquifer (including the G-120 area), as necessary, to achieve the ground-water protection standards specified herein in both the saturated zones.

e. Perform additional ground-water modeling to predict, to the extent possible, the effects of implementing the selected corrective measures particularly in regard to the low level radioactive waste (LLRW) site.

f. Provide for the placement of piezometers, and the institution of regular recordkeeping of water-level measurements in them, to

allow detection, assessment, and to assist in management of any potentially adverse effects on the ground-water gradients associated with the adjacent LLRW site.

g. Develop and submit contingency plans to raise or lower the ground-water levels associated with the LLRW site in the event that the implemented corrective measures (source control and/or ground-water remediation activities) are determined to be producing adverse effects on the LLRW site ground-water flow direction, ground-water elevations, etc.

h. Develop a treatment system(s) capable of handling extracted ground water removed from the chemical plume, including those areas where the radiochemical plume is mixed with the chemical plume. This requirement will include regular sampling of extracted ground water for those radionuclide parameters in Table 5-7 of the Final Remedial Investigation (RI) report plus I-129 and appropriate handling, treatment, storage, or disposal of the water and sludge.

The detailed designs for implementing these corrective measures will be developed in accordance with the Scope of Work for CMI attached to this document. In addition to these requirements, the following activities will be initiated/continued and considered.

1. Site access restrictions (including Trout Lake);

2. Collection of water discharging from the New Site north slope seeps and its treatment and discharge; and

3. Installation of additional monitoring wells in the Herrin Coal, upon approval of the plan by U.S. EPA.

The selected corrective measures provide the best balance among the alternatives with respect to the evaluation criteria, including:

- Long-term reliability and effectiveness;
- Reduction of toxicity, mobility, or volume of waste;
- Short-term effectiveness;
- Implementability; and
- Cost.

The selected corrective measures provide overall protection of human health and the environment as follows:

1. Source Control

The selected corrective measures for source control are expected to provide an appropriate degree of overall protection of human health and the environment by containing (with slurry walls) all Old Site hazardous wastes and most contaminated soil at the Old Site and the 18EWC and G-120 areas. The slurry walls will be designed to be compatible with the chemicals in the buried wastes and will be constructed to isolate the

wastes and contaminated soils and reduce further contaminant migration to ground water. RCRA-required caps, designed to achieve the maximum effective lifetime with the lowest maintenance, over the Old and New Sites and cap extensions over the G-120 and 18EWC plume areas will reduce the chance of exposure to contaminated soil and significantly reduce surface water infiltration, leachate generation and mobility, and help control future releases of contamination. Extraction wells placed inside the encircling slurry walls of the Old Site will be designed to create a reduced hydraulic head inside the walls that will reduce the probability of contaminated water exiting outward through the walls; to draw the ground-water surface level down inside the slurry walls to below the buried waste elevation; and to transmit extracted ground water to the proposed treatment system. By engineering the effective long-term isolation and containment of the relatively small volume of the Old Site waste and by reducing the volume of ground water in contact with the buried waste and contaminated soil through implementation of the selected source control, it is felt that short-term protection is greater and that long-term goals for protection of human health and the environment will be achieved as well.

Slurry wall technology is commonly used. However, its use requires care in design and implementation to achieve the desired goals of containment and isolation of the hazardous wastes. Installation of landfill capping and its maintenance is straightforward. The estimated costs of implementing the slurry wall and Old Site cap are $1,153,500 and $928,000, respectively, over thirty (30) years. The slurry walls could be designed and installed in two (2) years.

2. Ground Water

The selected corrective measures for ground-water remediation will provide adequate protection of human health and the environment since they provide for halting plume expansion and initiating remediation of the plumes of contamination by extraction and treatment of ground water (i.e., from the Old Site, trench 18EWC, the G-120 area, and the north slope seeps). Following ground-water remediation by using reliable metals precipitation, air stripping, and carbon adsorption technologies to achieve the concentrations proposed by U.S. EPA, the residual health risks from ingestion of ground water will be reduced to acceptable levels. The draft FS report estimates there will be a 98 percent reduction of the total mass of organic constituents in the ground water within thirty (30) years. Extraction and ground-water treatment will continue indefinitely toward achieving U.S. EPA's ground-water protection standards. A National Pollutant Discharge Elimination System (NPDES) permit will restrict the effluent discharge levels of the various parameters of concern. Monitoring wells will be sampled regularly to test for the effectiveness of the extraction and treatment systems by monitoring for changes in plume size and contaminant concentration levels. Because US Ecology owns all of the land surface under which hazardous constituent plumes are currently delineated, no third party has a well water supply screened in a plume. Containment of the plume and extraction and treatment of the ground water will reduce

or eliminate potential risks from ingestion of contaminated ground water downgradient of the landfill at any off-site location.

It is estimated that it will take eighteen (18) months to design and install the ground-water treatment system. All components are readily available technologies that have been extensively used at other sites and do not restrict future expansion or modification of the selected ground-water corrective measures. The estimated cost over thirty (30) years for the ground-water remediation is projected to be about $10 million.

The total cost of the selected corrective measures is estimated to be about $12 million over thirty (30) years.

COMMUNITY RELATIONS ACTIVITIES

U.S. EPA released the Proposed Plan for the US Ecology, Sheffield, Illinois, facility in May 1990. At citizens' requests, a 2-week informational period was scheduled by U.S. EPA from May 14 to May 28, 1990. This period permitted the public to become familiar with the Proposed Plan prior to the start of a 45-day comment period. The comment period began on May 28 and terminated on July 26, 1990, fifteen (15) days after the original closure date. The extension to the comment period was granted at the request of Attorney General Neil Hartigan and Congressman Lane Evans.

On June 14, 1990, U.S. EPA conducted an informational meeting at the Buda-Sheffield Western School in Buda, Illinois. The purpose of the meeting was to present and explain the Proposed Plan and to answer the community's questions on a more informal basis. Over seventy-five (75) people attended the slide presentation and question and answer period that followed. A court reporter recorded the meeting and a transcript was made and is available at the Information Repository at the public library in Sheffield, Illinois.

U.S. EPA held a public hearing on June 28, 1990, to take and record formal comments on the Proposed Plan. Transcripts from the court reporter have been made available. Approximately 150 people attended the hearing and fifteen (15) people gave oral testimony. The meeting was attended by representatives from the Illinois Environmental Protection Agency (IEPA), the Illinois Department of Nuclear Safety (IDNS), the Attorney General's office, Senator Simon's office, Representative Mautino's office, and the press.

U.S. EPA regularly updates the community through letters to citizens, media relations, and conversations with citizens.

CONCERNS RAISED DURING THE COMMENT PERIOD

During the public comment period, U.S. EPA received written comments on the proposed plan from several sources including government officials and agencies, citizen groups and their representatives, private citizens, and US Ecology. Additional comments are included within the transcripts of the June

14 public informational meeting and June 28 public hearing. Table 1 lists all written comments received by the Agency. A complete copy of all written comments is available for review at the U.S. EPA, Region 5, library (located on the 16th Floor, 230 South Dearborn Street, Chicago, Illinois), and at the Information Repository in the public library in Sheffield, Illinois.

All comments presented in this section are referenced according to source document numbers presented in Table 1. For example, comments from William C. Child of the Illinois Environmental Protection Agency (IEPA) are referenced as A2, while comments from Eloise Baker, a private citizen, are referenced as C7. Citations are also provided for the location of the comments [page (p), paragraph (¶), and section (§)] within a source document, as appropriate. For example, a specific comment that appeared on page 3, Section 6 of William C. Child's (IEPA) written comments would be referenced as [A2,p.3,§6]; a specific comment from the first paragraph on page 2 of Eloise Baker's written comments would be referenced as [C7,p.2,¶1]. In cases where U.S. EPA received the same comment from several sources, all sources are referenced. For example, a comment that was made by both William C. Child of IEPA and Eloise Baker might be referenced as [A2,p.2,§2; C7,p.1,¶3].

The comments listed below are separated into seven categories. The categories are titled:

I. Source Control Corrective Measures
II. Ground-Water Corrective Measures
III. Site Geology and Hydrogeology
IV. Remedial Investigation and Feasibility Study
V. Interactions Between Chemical and Radioactive Waste
VI. Health Effects and Cleanup Goals
VII. Miscellaneous Comments

I. SOURCE CONTROL CORRECTIVE MEASURES

1. Concern:

IEPA and others questioned the technical feasibility of slurry wall installation and is concerned that installing the slurry wall through permeable, saturated and unconsolidated sediments will cause the sediments to collapse into the trench. [A2,p.1,§1a; B6,p.II-1,§2; E2,p.55,¶2]

Response:

Experienced engineers and contractors are available for hire by US Ecology who can overcome, by increased engineering, the potential limitations raised by IEPA regarding slurry wall installation. Regarding the issue of depth, walls up to eighty (80) feet can be installed with modified backhoes; deeper walls would most likely utilize a hydraulic clam shell. The potential for collapse of unconsolidated sediments into the trench during excavation will be eliminated by introduction of slurry just after the trench is

TABLE 1

LIST OF PUBLIC COMMENTS ON U.S. EPA'S PROPOSED PLAN FOR US ECOLOGY'S SHEFFIELD HAZARDOUS WASTE SITES

A. Government Agencies and Public Officials

1. Lane Evans, Congressman, "Remarks of Congressman Lane Evans, US Ecology Chemical Waste Disposal Facility, Hearing on the Corrective Action Plan," written statement read at June 28, 1990, Public Hearing by Jerry Lack (received June 28, 1990)

2. William C. Child, Manager, Division of Land Pollution Control, Illinois Environmental Protection Agency, letter to David A. Ullrich, U.S. Environmental Protection Agency, undated (received June 28, 1990)

3. Dave Ed, Senior Scientist, Illinois Department of Nuclear Safety, "Statement by the Illinois Department of Nuclear Safety at the U.S. Environmental Protection Agency's Public Hearing on the Proposed Plan for Corrective Action at the US Ecology Inc. Hazardous Waste Facility Near Sheffield, Illinois," written statement read at June 28, 1990, Public Hearing (received June 28, 1990)

4. Thomas W. Ortciger, Director, State of Illinois Department of Nuclear Safety, letter to Jonathan Cooper, U.S. Environmental Protection Agency, July 10, 1990 (received July 11, 1990)

5. Neil F. Hartigan, Attorney General, State of Illinois, letter (with attached "Comments of the People of the State of Illinois and the County of Bureau Concerning the United States Environmental Protection Agency's Proposed Plan for the US Ecology, Site, Sheffield, Bureau County, Illinois") to Valdas V. Adamkas, Regional Administrator, U.S. Environmental Protection Agency (dated and received July 26, 1990)

B. Citizens' Groups

1. Rodger Bruyn, Manager, Bureau County Farm Bureau, memo (with attached report "A Review of the Final Remedial Investigation Report for the Sheffield Hazardous Waste Disposal Sites" prepared by K.W. Brown & Associates, Inc., College Station, Texas, July 1989) to Thomas J. Kenney, U.S. Environmental Protection Agency, August 15, 1989

TABLE 1 (Continued)

**LIST OF PUBLIC COMMENTS
ON U.S. EPA'S PROPOSED PLAN
FOR US ECOLOGY'S SHEFFIELD
HAZARDOUS WASTE SITES**

2. Dr. R.S. Nelson, Environmental Exploration Associates, Inc. (representing Associated Citizens for Protection of the Environment), "Summary -- Evaluation of Geology and the Hazardous Waste Sites, Sheffield, Ill.," written comments submitted at June 28, 1990, Public Hearing (received June 28, 1990)

3. Stan Gingrich, President, Associated Citizens for Protection of the Environment, written statement read at June 28, 1990, Public Hearing (received June 28, 1990)

4. Alan T. Dale, President, Bureau County Farm Bureau, "Public Hearing -- U.S. EPA Remediation Proposal," written statement read at June 28, 1990, Public Hearing (received July 12, 1990)

5. Rodger Bruyn, Manager, Bureau County Farm Bureau, "Farm Bureau's Position," written statement read at June 28, 1990, Public Hearing (received June 28, 1990)

6. Jeanine L. Morse, Hydrogeologic Consultant for Bureau County Farm Bureau, "Comments on the Final Remedial Investigation, Draft Feasibility Study Reports and the Proposed Plan for Corrective Action for the US Ecology, Inc. Landfill Near Sheffield, Bureau County, Illinois," written comments submitted at June 28, 1990, Public Hearing (received June 28, 1990)

7. Dr. R.S. Nelson, Environmental Exploration Associates, Inc. (On Behalf of Associated Citizens for Protection of the Environment), "Geologic and Hydrologic Interpretation & Comments on Proposed Corrective Action, US Ecology Hazardous Waste Sites, Sheffield, Illinois," dated July 11, 1990 (received July 26, 1990)

C. Private Citizens

1. Chester M. Grafft, Princeton, Illinois, written comments submitted at June 28, 1990, Public Hearing (received June 28, 1990)

2. Steve Barlow, Princeton, Illinois, written statement read at June 28, 1990, Public Hearing (received June 28, 1990)

3. Roy L. Mahnesmith and Edward F. Glubczynski, memo to Jonathan Cooper, U.S. Environmental Protection Agency, July 6, 1990 (received July 10, 1990)

TABLE 1 (Continued)

LIST OF PUBLIC COMMENTS
ON U.S. EPA'S PROPOSED PLAN
FOR US ECOLOGY'S SHEFFIELD
HAZARDOUS WASTE SITES

4. Laverne Weidler, Kewanee, Illinois, letter to Jonathan Cooper, U.S. Environmental Protection Agency, undated (received July 12, 1990)

5. Timothy D. Wilson, Sheffield, Illinois, written comments (postmarked July 10, 1990)

6. Mr. and Mrs. Ronald Wilson, Sheffield, Illinois, written comments (postmarked July 10, 1990)

7. Eloise P. Baker, Neponset, Illinois, written comments (postmarked July 18, 1990)

8. Eloise P. Baker, Neponset, Illinois, written comments (postmarked July 24, 1990)

9. I. Jay and Louise J. Langford, Sheffield, Illinois, written comments dated July 19, 1990 (received July 25, 1990)

10. Ted Strouse, Buda Illinois, written comments dated July 18, 1990 (received July 20, 1990)

11. Rev. Frank Rottier, Sheffield, Illinois, written comments dated July 16, 1990 (received July 26, 1990)

D. US Ecology

1. Laurence Levine, US Ecology, Inc., written comments (received June 28, 1990).

2. Bradley E. Dillon, General Counsel, US Ecology, Inc., "US Ecology, Inc.'s Comments on U.S. EPA's Proposed Plan (with Attachments 1 through 13)," dated July 26, 1990 (received July 27, 1990)

E. Transcripts from Public Meeting and Public Hearing

1. Transcript of "The Informational Meeting on U.S. EPA's Proposed Plan for Corrective Measures for the US Ecology, Inc. Site, Sheffield, Illinois," held at Buda-Sheffield Western School, Buda, Illinois, June 14, 1990 (prepared by Kathy L. Johnson Professional Reporting Services)

TABLE 1 (Continued)

**LIST OF PUBLIC COMMENTS
ON U.S. EPA'S PROPOSED PLAN
FOR US ECOLOGY'S SHEFFIELD
HAZARDOUS WASTE SITES**

2. Transcript of "The Public Meeting on U.S. EPA's Proposed Plan for Corrective Measures for the US Ecology, Inc. Site, Sheffield, Illinois," held at Bureau County Courthouse, Princeton, Illinois, June 28, 1990 (prepared by Kathy L. Johnson Professional Reporting Services)

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opened and before the water table is reached. The viscosity/density of the slurry is maintained at a level that is appropriate for hydraulically shoring up and stabilizing the trench walls. Also, during trench excavation, a thin filter cake forms on the trench walls minimizing slurry loss into the surrounding geologic materials, stabilizing the soil in contact with the slurry, and providing a plane on each trench wall against which the hydraulic pressure of the slurry can act to stabilize the excavation (EPA/540-2-84-001; Feb. 1984). Test borings will be done along the proposed wall locations during the design phases of Corrective Measure Implementation (CMI) and the presence of the various sediment types will be considered in fine tuning the engineering design.

2. Concern:

Compatibility tests of the waste with bentonite slurry walls were not performed. Bentonite is sensitive to chemical attack and alteration and published information (EPA/530-SW-86-007; March 1986) does not recommend soil/bentonite mixtures for use where hazardous waste or leachates occur. [A2,p.1,§1b; A5,p.2,¶2]

Response:

The potential for adverse effects on slurry wall materials from chemicals exists and will be addressed. Compatibility tests will be performed during the CMI design phase. A work plan will be required which will describe procedures to collect representative leachate (ground water) samples from the site. These will be used in specified laboratory tests to determine the effects of the leachate on various proposed backfill mixtures which incorporate site soils and other soils with different types of bentonites.

The specific draft document cited in this concern is titled: Design, construction, and evaluation of clay liners for waste management facilities. The vertical slurry walls:

a. Will not be in direct contact with hazardous waste as a landfill liner might be, but instead with contaminated ground water (i.e., less concentrated);

b. Will be used in conjunction with complementary technologies (i.e., an effective landfill cap and ground-water extraction wells inside the slurry-walled areas). The extraction wells in the Old Site constitute use of slurry walls with active (rather than passive) management. That is, the hydraulic gradient will be inward into the Old Site thereby controlling releases of leachate moving outward through the wall. It is expected then that any water which permeates the slurry wall around the Old Site, when the extraction

wells are operable, will be less contaminated and have less of a potential for an adverse impact on the slurry wall.

c. Will be in contact with more dilute organic solutions than those used in some laboratory studies showing marked permeability increases in clays. Tests conducted with less concentrated solutions of organics (i.e., at or near their solubility limits in aqueous solution) caused no appreciable increases in permeability (Evans, Fang, and Kugelman, 1985).

d. Will be engineered and designed to the fullest degree possible in relation to this important concern. Different types of bentonite and even other types of clay, less affected by chemical attack, can be used.

3. Concern:

Commenters are concerned that ground water will mound on the outside of the slurry wall and cause an increased gradient through the wall which may result in containment failure. [A2,p.2,§2a]

Response:

A potential does exist for mounding of ground water beneath the New Site immediately west of the proposed location of the west side of the Old Site slurry wall. Because of the increased potential for piping and hydrofracturing in a wall if the head differential across a slurry wall is high, U.S. EPA will require the design phase to ensure eventual: (1) implementation of a wall as homogeneous, both horizontally and vertically, as possible; (2) use of only specified backfill materials to yield the established design permeability; (3) requirement of monitoring of ground-water levels inside and outside of the wall to ensure that design head levels are not exceeded; and (4) ability to control the hydraulic gradient across the wall by appropriate use of extraction wells on both sides of the wall.

4. Concern:

US Ecology did not evaluate the cap on the New Site to determine if it meets the minimum technology requirements for landfill cover pursuant to 35 Illinois Administrative Code 724.410a. [A2,p.2,§5]

Response:

US Ecology has already responded to this comment by IEPA. Attachment 4 of their submittal evaluates the existing New Site cap and IEPA has a copy of this. US Ecology referred to landfill final cover design objectives as "10 CFR 264.310a". That should read 40 CFR 264.310a. The State analogs are 35 Ill. Adm. Code 724.410a. US Ecology will be required to implement a RCRA-approved cap.

5. Concern:

Commenters question the plan to 'key' the slurry wall three feet into the bedrock because the bedrock is comprised of various geologic units of differing permeability. US Ecology has not evaluated the effectiveness of keying a slurry wall into fractured bedrock. Therefore, the ability of the wall to cut-off the ground-water flow can not be judged. [A5,p.3,¶2; A2,p.1,§1c]

Response:

These comments raise potentially valid concerns, but increased engineering and design can surmount these problems if these conditions actually exist beneath the Old Site at the depth at which the slurry walls would be keyed into bedrock. The RI report examined the bedrock for the presence of fractures and jointing. These are stated in the RI report to be "sparse based on observations from core samples, caliper logs, and borehole televiewer logs" (pages 4-67, 4-69). During the actual design phase, an approved plan will require drilling boreholes on a specified spacing along the actual slurry wall location to further characterize the sediments through which the trenching and installation will occur. In addition, cores of bedrock will be taken to the design depths for examination.

U.S. EPA believes the following factors indicate that this comment is less of a concern than it initially might appear: (1) this further subsurface study will provide additional location-specific information during the design phase to ensure an adequate keying of the wall into bedrock; (2) the ground-water level within the slurry wall will be maintained at or near the surface of the bedrock as extraction wells remove ground water inside the slurry wall thus eliminating all or most of the vertical driving force; and (3) data from monitoring wells during the RI study have shown that the bedrock is relatively uncontaminated and that most of the organic contamination is migrating along the interface between the bedrock and glacial sediments (i.e., the tendency on site appears to be for lateral, not vertical, movement of ground water).

6. Concern:

Commenter states that a major flaw in the plan is that it does not address excavation of the Old Site as an alternative and suggests U.S. EPA reconsider alternatives such as solidification or incineration and aboveground storage. [A1,p.1,¶5; B2,p.2,¶4; B3,p.2,¶2; C2,p.2; C3,p.1,§6; C7,p.2,¶1; C9,p.1,¶1; C11,¶5; B1,App.A,p.1,¶2 and p.2,¶1; B1,App.A,p.3,¶1; B5,p.2,¶5; E2,p.18,¶4; E2,p.35,¶5; E2,p.43,¶1; E2,p.56,¶4; E2,p.62,¶2; E2,p.80,¶1]

Response:

Excavation of the hazardous wastes at the Sheffield site has been fully evaluated. US Ecology initially eliminated exhumation in the document titled "Preliminary Screening of Remedial Technologies and Development of Alternatives" (dated August 19, 1988). U.S. EPA required, however, that exhumation be evaluated further in the FS documents and this was done. For reasons stated in the Proposed Plan (e.g., short-term hazards to workers and nearby residences from potential explosions or releases of volatiles to the air; a longer implementation time; the need for special equipment and permits; and disposal capacity issues), exhumation was not selected by U.S. EPA as a component of the preferred alternative. As such, solidification and incineration, processes performed following the exhumation of the hazardous wastes, are also eliminated from further consideration. Aboveground storage of land disposal restricted wastes in waste piles is banned and storage in tanks and containers is not permitted under the regulations (40 CFR 268.50(a)) for more than one year absent appropriate treatment (40 CFR 265.41 to 268.43).

7. Concern:

The reliability and effectiveness of proposed slurry walls and landfill caps as components of a containment system were questioned. [A1,p.1,¶7; C5; C6; C7,p.1,¶3; B1,App.A,p.1,¶1 and p.2,¶2; E2,p.18,¶5]

Response:

Landfill caps are a commonly used technology for reducing surface water infiltration into burial trenches containing hazardous wastes. U.S. EPA issued a technical guidance document for caps/covers titled "Final Covers on Hazardous Wastes Landfills and Surface Impoundments" (EPA/530-SW-89-047; July 1989). During cap design, many factors will be considered including, but not limited to: existing trench bottom liner permeability; slope of the final cap (to promote runoff, but to minimize erosion); inclusion of drainage layers in the design; a top vegetative or armored surface component; and freeze-thaw phenomena. In addition to designing effective and appropriate covers for the landfills, the design will also rely on sumps and/or extraction wells to permit collection and removal of any surface water that does infiltrate the cover.

Regarding the reliability and effectiveness of slurry walls, please refer to the responses to concerns I.2 and I.5.

8. Concern:

Several commenters questioned the effectiveness of slurry walls proposed for the New Site. One commenter suggested that the

slurry walls will not be tied into lateral barriers and will be aligned parallel to ground-water flow. Thus, they will have little effect on contaminant migration. Another commenter suggests that the existing barrier wall around the New Site is not keyed into the bedrock. Since slurry walls will be constructed along only a small portion of the barrier wall, they will not be effective in stopping ground-water flow along most of the wall. [A5,p.6,¶1; B2,p.2,¶3; B7,p.1,¶3; B7,p.15,¶2; B6,p.II-3,§10]

Response:

Existing New Site barrier walls were not required or designed to be keyed into bedrock under the construction permit. The barriers to vertical flow in the New Site consist of in situ scraped and reworked glacial materials in the east portion of the site and, in the western portion, a ten- (10) foot thick low-permeability, imported material recompacted under the trenches. Lateral barriers were also constructed of recompacted, low-permeability materials. Slurry walls, installed in a semi-circular configuration, are proposed which will both tie into existing lateral barrier walls and key into bedrock in two locations around the New Site where ground-water contamination has indicated releases from the facility (i.e., G-120 and 18EWC areas). These slurry walls are expected to be effective by practically encircling the areas of releases by slurry walls and lateral barrier walls, covering the encircled areas with an effective landfill cover, installing extraction wells positioned inside the slurry walls such that they capture any existing or continuing releases of contaminated ground water, and reducing the likelihood of further releases from landfill trenches by installing additional sumps (or more aggressively pumping existing sumps) and installation of a more effective cap over the New Site.

9. Concern:

Eloise Baker, speaking on the behalf of the Associated Citizens for Protection of the Environment (ACPE), stressed the importance of extracting the water in the New Site trenches and preventing ground water from entering waste disposal cells by installing protective caps. [C7,p.1,¶6]

Response:

U.S. EPA concurs with the comment. Removal of any water in trenches reduces the head or vertical driving force.

10. Concern:

One commenter agreed with U.S. EPA's proposed corrective action plan for the New Site. [C2,p.2,¶1]

Response:

U.S. EPA appreciates the input of all parties.

11. Concern:

The remedy should be total encapsulation of the Old Site, New Site, and LLRW site. The vertical containment barrier should be constructed of concrete and extended downward five (5) feet into the top of the Canton Shale, the uppermost bedrock unit with hydraulic integrity. This remedy should include a perimeter drain along the inside of the containment wall and a cap covering all waste disposal areas and extending beyond the containment wall. The estimated cost of this remedy, not including the cap, is $225 million. [B2,p.3,¶1; B7,p.1,¶4; B7,p.16,¶1; C7,p.1,¶8; E2,p.32]

Response:

Dr. Robert Nelson's proposal for total encapsulation of all three waste disposal sites would involve two different owners (i.e., the Old and New Sites are owned by US Ecology and the LLRW site is owned by the State of Illinois), ignores the existence of separate jurisdictional authorities/agencies (i.e., U.S. EPA and IDNS), is not developed or designed to the degree necessary to evaluate either its feasibility as an alternative or its costs as required in the FS guidance, and is not necessary based on data in the RI/FS reports.

"Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" (EPA/540/G-89/004; October 1988) specifies that each alternative for proposed remedies be evaluated against factors such as effectiveness, implementability, and cost. Dr. Nelson states that estimating the cost of total encapsulation "is difficult because of the need to dig trenches to a depth of 120 to 150 feet through unstable surficial material into bedrock" (B7,p. 16). The cost estimate ("on the order of $225 million") does not detail cost of individual components (e.g., equipment, materials, labor, operation and maintenance, associated ground-water extraction costs to allow containment implementation, etc.). It is not even clear if this estimate includes the cost of a cap over the three sites. It appears that the cap cost is not calculated or considered.

Based on the results of the RI report, ongoing indicator parameter evaluation and assessment monitoring of ground water at the New Site, and on the geologic maps, cross sections and statements in Dr. Nelson's report, dated July 11, 1990, U.S. EPA's selected remedy will work. This is true for the following reasons. The bedrock wells, if Dr. Nelson's models 1 and 2 were appropriate theoretical models of contaminant migration, would be extensively contaminated. However, ground water sampled from the six bedrock wells screened in the Herrin Coal (i.e., the deepest penetration

of the coal exploration borings) yielded only low levels (≤ 36 parts per billion (ppb) of laboratory contaminants (e.g., methylene chloride, acetone, bis(2-ethylhexyl) phthalate). Even if some contamination were migrating preferentially in a vertical direction (a conclusion not supported by most of the RI data), Dr. Nelson's cross sections, geologic map of the bedrock, and text would support contamination migrating vertically to the Herrin Coal (the base of coal borings) and then moving preferentially horizontally at that depth. Dr. Nelson states, on page two, that the "Herrin Coal is highly jointed with vertical and horizontal joint spacing measured in inches or fractions of an inch" and, on page four, that the "coals are aquifers because ground water moves relatively easily along the abundant joints in the coal beds. Springs and seeps typically occur where coal units outcrop." Thus, any contamination migrating through unplugged boreholes would eventually move laterally away from the landfills and be captured within the cones of influence of extraction wells required for the selected corrective measures. Because the Old and New Site landfills are isolated on their own bedrock high (i.e., away from the LLRW site) and because U.S. EPA's selected remedy does not require a vertical barrier wall encircling the LLRW site and the Old and New Sites, it will be possible to install effective slurry walls without tying them into the Canton Shale. If additional boreholes, to be taken along the final location of the slurry walls during the CMI design phases, indicate the need to tie into deeper shale (i.e., below the Danville coal), that would then be required by U.S. EPA. Refer also to the response to concern III.3.

12. Concern:

Slurry walls keyed into the top of bedrock will not stop the potential leakage of contaminants from the Old Site. Contaminants will migrate downward through unplugged boreholes, along the bedrock aquifers, and into glacial aquifers where bedrock aquifers subcrop beneath the Old Site. [B2,p.2,¶3; B7,p.1,¶3; B7,pp.14-15; E2,p.30,¶2]

Response:

Please refer to the response directly above concerning capture of potentially migrating contaminated ground water.

13. Concern:

The cap proposed for the Old Site should include a geomembrane and should be thick enough to prevent infiltration of water through cracks caused by desiccation. [C4,p.5,¶1]

Response:

Issues such as the one involving desiccation will be carefully evaluated during review of cap designs submitted to U.S. EPA and IEPA for approval. Technical guidance documents and experience available from other sites will assist in selecting an effective cap design. Flexible membrane liners (FML) may not be required for these landfills because neither one has an FML in the bottom and 40 CFR §265.310(a) requires that the final cover "have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present."

14. Concern:

US Ecology believes that releases from the 18EWC area of the New Site have already been effectively controlled by prior activities. With the addition of the proposed slurry walls, modifications to the existing trench barrier wall are not necessary. [D2,p.15,¶1; D2(Att.1),p.14,¶4]

Response:

Although US Ecology has shown some evidence indicating possible shrinkage in the 18EWC plume size, U.S. EPA is not convinced that this issue is adequately resolved. The selected remedy will require further review during the design phase of CMI to evaluate the existing trench barrier wall's effectiveness in containing leachate in the trench thereby allowing removal by sumps in the trench. If the barrier wall is ineffective as constructed, repair will be required to tie the wall into a low-permeability stratum.

15. Concern:

US Ecology believes that Resource Conservation and Recovery Act (RCRA) land disposal restrictions will not apply to soil removed during construction of slurry walls, as long as the removed soil is mixed with bentonite and backfilled as part of the wall. [D2,p.16,¶5]

Response:

Soil excavated during construction of slurry walls will trigger land disposal restrictions. The appropriate handling and disposal of the contaminated soil and debris will be established during the design phase of the CMI. The soils and debris generated may qualify for a treatability variance under 40 CFR 268.44(h). Please refer also to a March 8, 1990, Federal Register (55 FR 8666), which discusses these issues in relation to RCRA corrective action. In the past, US Ecology was required to handle all borehole cuttings as hazardous waste. This request is consistent with past practices.

16. Concern:

Since the submittal of the draft FS for source control, potential advantages of a new barrier wall technique have become evident. The technique, called deep soil mixing (DSM), requires that little contaminated soil be excavated and brought to the land surface. [D2,(Att.1),p.14,¶1-3]

Response:

Without any details on DSM, it is impossible to compare this newer, less proven procedure technically with soil-bentonite slurry walls and to evaluate its overall implementability and effectiveness. It seems likely that the DSM techniques would be more difficult to quality assure during construction and less likely to achieve performance standards approaching those of a well-constructed, well-designed slurry wall.

17. Concern:

The Illinois Attorney General's Office states that there is no long-term history of slurry walls at hazardous waste sites and that slurry walls are not reliable. [A5,p.2,¶2]

Response:

A review of U.S. EPA's Record of Decision (ROD) database indicates that nineteen (19) Superfund RODs have included installation of slurry walls as part of site response actions. In addition, slurry walls have been implemented at non-Superfund sites. Slurry walls are generally included as one component of an overall remedy. When used in conjunction with ground-water extraction and capping, U.S. EPA has considered slurry wall technology a viable part of remedial actions which are protective of overall human health and the environment. Although the technology's use for environmental control is relatively new, significant experience has been gained in implementing this technology. A few examples of successful slurry wall implementation are included below.

A slurry wall was installed in 1984 at the Lipari Landfill in New Jersey. Site contaminants included a wide range of volatile and semi-volatile organic compounds. The slurry wall completely encircled this 16-acre site. Fred Cataneo, Remedial Project Manager, stated that since this slurry wall was installed, water migration from the site has been reduced 90 to 95 percent. Due to the effectiveness of containment, an innovative batch flushing remediation method will be implemented at the site. This system will inject fresh water into the containment area. This water will then be extracted, in effect "flushing" out contaminants. A treatment system will be used and treated water discharged to a Publicly Owned Treatment Works (POTW). Batch flushing will be

conducted two to three times per year. In addition to the slurry wall and treatment system, a cap has been placed over the site.

Another site which has implemented slurry walls is the Rocky Mountain Arsenal site in Colorado. Contaminants consisted chiefly of pesticide components and by-products and army agent by-products (although several hundred of unknowns were also detected). Two slurry walls were installed at different subsites in the early 1980s. Each one was built downgradient of the contaminant plume in an effort to reduce migration. Each wall is approximately one-half mile long. One wall has been extended as the contaminant plume was detected moving around the wall's ends. In addition, extraction wells were installed upgradient of the wall to pump and treat ground water. Treated water is injected to the downgradient side of the wall. Project Officer, J.D. Smith, reports that the walls have performed well in reducing migration.

Slurry wall installation capabilities are rapidly developing. Recently, for example, a slurry wall was installed around the entire circumference of the South Side Landfill in Indiana. This site is an operating sanitary landfill, currently on the National Priorities List (NPL). A permit application renewal required that a slurry wall and ground-water pump and treatment system be installed. A slurry wall surrounding the site's 265 acres was installed using Italian equipment which simultaneously digs a trench and fills it with water to prevent collapse. The slurry wall was installed to a depth of 100 feet and keyed into bedrock.

Another site, located in Mountain View, California, also involved construction of a slurry wall to a depth of 100 feet. However, this wall was not keyed into bedrock. Instead, ground water is to be extracted from within the barrier to prevent contaminants from leaving the site. Site contaminants included a range of industrial solvents in the soil and ground water underneath a semiconductor manufacturing facility. Extracted ground water will be treated by air stripping and filtration. Installation of the wall involved a staged approach. First, a backhoe with an extension arm was used to excavate to a depth of fifty (50) feet. A pair of cranes utilizing 13-ton cable grab buckets excavated to the 100 foot depth. Initial permeability tests conducted on the wall had a result of 1.1×10^{-8} centimeters/second. U.S. EPA will seek to achieve a performance standard in this range at US Ecology.

Several technical considerations are important in ensuring that the overall alternative will provide both short- and long-term effectiveness. The considerations include: (1) compatibility between site wastes and the slurry wall; (2) a knowledge of site specific requirements (geology, depth of wall, hydrology, etc.); and (3) assurance that other components of the remedial action work with the slurry wall to provide an effective overall remedy.

In addition, quality assurance is important in assuring wall design and installation results in a highly impermeable wall. These considerations will be addressed in the CMI design phase.

18. Concern:

U.S. EPA should consider in-situ bioremediation as an option for cleaning up the US Ecology hazardous waste sites. [B1,App.A,p.2,¶1; C4,p.6,¶4]

Response:

U.S. EPA evaluated the potential effectiveness of in-situ bioremediation as a cleanup method for both soil and ground water at US Ecology. However, at the present time, this technology does not appear to be feasible based on site-specific conditions. The major organic contaminants at US Ecology are primarily chlorinated compounds, such as tetrachloroethene, trichloroethene, 1,2-dichloroethane, and others. To date, in-situ biodegradation of chlorinated organics has not been demonstrated at a hazardous waste site in either pilot- or full-scale tests. Several technology developers claim to have demonstrated biodegradation of chlorinated organics in the laboratory and at smaller facilities. U.S. EPA is currently evaluating these claims and plans to test a bioremediation technology in the near future under the Superfund Innovative Technology Evaluation (SITE) Program.

If in-situ bioremediation is demonstrated as an effective technology for chlorinated organic compounds, the technology could be employed at US Ecology in the future to: (1) enhance the remedies proposed by U.S. EPA and (2) reduce the amount of time needed to reach ground-water cleanup goals.

19. Concern:

Slurry walls will be ineffective in containing the types of wastes and leachate present at the US Ecology sites. The buried wastes include some organic liquids with densities greater than water. "At concentrations above their respective solubilities in water, these will form separate phases which will sink to the bottom of the water phase and adversely" affect the bottom and side liners or slurry wall barriers. [B1,App.A,p.2,¶2; B1,p.6,¶1; B1, p.17,¶1]]

Response:

It is unlikely that organic chemicals are present in ground water at sufficient concentrations to form separate phases. The highest concentrations detected in remedial investigation ground-water samples were found in wells at the northern and eastern boundaries of the Old Site. (One well in the center of the Old Site had much lower concentrations.) However, even those organic chemicals

detected at the highest concentrations (chloroform, tetrachloroethene, 1,2-dichloroethane, and others) were well below their water solubility limits. For example, the maximum tetrachloroethene concentration in ground water was 96 parts per million (ppm) while the water solubility of this organic chemical is 150 ppm. Based on this comparison, there is little evidence to support the theory that organic chemicals in the ground water will sink to form concentrated layers.

II. GROUND-WATER CORRECTIVE MEASURES

1. Concern:

Additional monitoring wells are needed north and west of the New Site to detect potential continuing or future releases of contaminants to the ground water. [A2,p.3,§6; A5,p.6,¶2]

Response:

In the Proposed Plan (page 5), U.S. EPA stated that facility activities have contaminated ground water along the west side of the New Site. US Ecology disputes this claim [D2,p.14,¶2] by referencing data from 1987 and 1988. Data from 1987 showed contamination in the ground water west of trenches 23 and 24 in wells G-131, G-145, and G-146. Contaminants were tetrachloroethylene (PCE) and methyl ethyl ketone (MEK). Data from 1988 did not show contaminants in the ground water in those wells. US Ecology labels the 1987 results "anomalous". However, soil gas and ground-water sampling results (in G-131) from November and July of 1986, respectively, indicated the release of methylene chloride, trichloroethylene (TCE), PCE, and chloroform at locations along the north and west sides of the New Site. Please refer to the Final Remedial Investigation (RI) Report (pages 4-46 and 4-55) and to analytical data in Appendix C to the RI report. Page 4-55 states that "these data indicate that a ground-water contaminant plume, if one exists, may be isolated between G-145 and G-146." In 1987, well water from G-109 and G-147 contained the contaminants chloroform and PCE. Based on the comment and the data, U.S. EPA will require submittal of a work plan to install additional monitoring wells north and west of the New Site to decrease the existing spacing between wells G-160, G-161, G-162, G-146, G-169, G-170, G-145, and G-147.

2. Concern:

Additional monitoring wells are necessary south and east of the New Site to detect potential present or future releases to ground water. A contingency plan should specify actions to be taken in the event a new release is detected. [A5,p.6,¶2; A5,p.7,¶1]

Response:

There are at least eighteen (18) monitoring wells (for indicator parameter evaluation, assessment, and RI activities) south of trenches 20, 21, and the three 18EW trenches. (See page 5-14 of the RI report.) This is a linear distance of about 800 feet. Well spacing appears to be less of a concern in these locations than east of trenches 14c, 15, and 16 B of the New Site, west of trench 22, and south of trench 23. US Ecology will be required to submit a work plan to reduce well spacing at these locations. Under the RCRA program that IEPA is monitoring and directing, the "contingency plan" for actions to be taken if significant increases (or decreases in the case of pH) over background water quality are detected in specific wells, is described in 35 Ill. Adm. Code 725.193. Resampling of ground water would be done to confirm the initial results, a ground-water quality assessment plan would be submitted to IEPA, and the facility would be required to implement an assessment program capable of determining the rate and extent of the ground-water contamination and the concentration of the hazardous constituents. Upon confirmation of a new release of contaminants from the facility, corrective action would be addressed either under the existing corrective action order or under an IEPA-issued post-closure permit.

3. Concern:

To limit or possibly halt the commingling of chemical and radioactive contamination, and the eventual discharge into Trout Lake, IDNS recommends U.S. EPA consider installing additional extraction wells south and southeast of the Old Site. [A3,p.2,¶1; A4,p.2,¶2; E2,p.71,¶2]

Response:

US Ecology modeled ground-water flow to assist in predicting the transport and concentrations of contaminants over time specifically in the vicinity of the Old Site for the Feasibility Study (FS) report. (See the FS for Ground-Water Remediation Vol.I, Section 4.4.3 and Vol. II, Appendix C.) The locations of the extraction wells and subsurface drains depicted on page 4-40 of Vol. I were selected by US Ecology based on modeled ground-water flow which indicated those were the optimum locations, considering proposed ground-water extraction rates, to specifically address this concern. However, further modeling will be required under the CMI design phases. U.S. EPA is also cognizant of the concerns that the ground-water extraction system implemented under corrective action must not negatively impact existing ground-water flow conditions at the LLRW site. Modeling will be required to address these concerns as well.

4. Concern:

One commenter suggests placing additional extraction wells in any permeable saturated units encountered beneath the Toulon Sand above the bedrock to capture contaminants which could "sink" below the capture system, and suggests recalculation of the estimated total water flow from extraction wells and subsurface drains. [A2,p.2,§2b-c]

Response:

This concern cannot be discounted and will be carefully evaluated during the design phase of the CMI. The draft FS for ground-water remediation (Vol.I, p.4-39) discusses placement of well screens (also referred to as subsurface drains) at an elevation four (4) feet above the bottom elevation of the Toulon Sand. The stated reason was that this elevation was "adequate to capture the Old Site plume without significantly affecting the regional flow directions outside the drain." The final extraction well design will have to consider the need to capture "sinkers" and "floaters", to reduce additional mixing of the chemical plume with the radionuclide plume, and to minimize potentially adverse effects on regional ground-water flow. Based on the numbers, locations, and pumping rates of the wells in the finalized extraction well design, a recalculation of estimated total water flow will be possible.

5. Concern:

The exact locations where U.S. EPA is proposing that US Ecology place additional extraction wells is unclear. [A2,p.2,§2e; B6,p.II-3,§8]

Response:

In the Proposed Plan (p.22) U.S. EPA states that US Ecology must modify its proposed extraction well system to "include placement of additional extraction wells at or near plume boundaries which will hydraulically prevent further migration of contaminated ground water." Conceptually it is clear that the extraction well design must capture the plume and prevent its expansion. Further modeling will indicate the optimal numbers and locations (i.e., the detailed design) necessary to accomplish the established design goals.

6. Concern:

A commenter supports the proposed alternatives for extraction and treatment of contaminated ground water, but says the effectiveness depends upon immediate implementation. [A1,p.1,¶6; E2,p.18,¶4]

Response:

Based on ground-water remediation activities conducted at U.S. EPA Superfund sites, experience has shown that early implementation of a ground-water extraction and treatment system is advantageous for both controlling expansion and for remediation of the contamination in a more timely manner. Early installation and operation of a limited extraction system which is partially effective (i.e., not achieving all the established design goals) is preferable to delaying installation of the extraction-well system for months or years during extensive RI/FS and design and modeling phases. In fact, because of the actual data provided (e.g., ground-water levels and flow rates) during operation of a more limited ground-water extraction system, the iterative process of developing an effective, long-term, final design is advanced greatly. Design and installation of the extraction wells and treatment system is presently estimated to take eighteen (18) months.

7. Concern:

U.S. EPA's preferred alternative for ground water is unacceptable because it will not provide long-term effective or permanent care to prevent or minimize the release of hazardous substances and will not protect the water supply. [A5,p.1,¶2; B3,p.1,¶4; E2,p.34,¶1]

Response:

U.S. EPA respectfully disagrees with these commenters. The source control measures, when completely and acceptably implemented and maintained, will prevent or minimize the release of hazardous waste, hazardous constituents, and substances from burial trenches. In conjunction with the source control components, the ground-water extraction system will be designed to stop plume expansion while remediating the contaminated ground water maintained under US Ecology property. US Ecology will be required to maintain and operate the ground-water extraction and treatment system until the company can demonstrate that established ground-water protection standards (GPS) have been achieved for the remaining ground water beneath the landfills and that the residual levels of contamination left in the ground water will not pose a future threat to human health or to the environment. Therefore, ground-water and surface water supplies adjacent to US Ecology will be protected.

8. Concern:

IDNS monitoring data indicate that radioactive contaminants have migrated to the ground water east of Trout Lake and suggest that chemical contaminants will do the same. Therefore, existing water supplies to the east of the US Ecology site may be threatened by

migrating contaminants from the LLRW and Old Sites. [A5,p.8,¶1; A5,p.5; A2,p.2,§2f; B6,p.I-4,¶1 and p.I-7,¶1; E2,p.55,¶2]

Response:

U.S. EPA is aware and concerned about data indicating that radioactive contamination (tritium) is present east of Trout Lake. RI data confirmed also that some chemical contamination from the Old Site ground-water plume was discharging to Trout Lake. These data necessitate an effective system of extraction wells designed to prevent further plume expansion as soon as technically feasible. Some existing monitoring wells may have sufficient casing diameter and construction and be appropriately located to be used as interim or final design extraction wells. Unfortunately, however, the delays in actually initiating the ground-water extraction and treatment system on site will most likely be associated with design and construction of the treatment system itself and with obtaining a permit for discharge of treated ground water to surface water. Current tritium concentrations are not yet a significant concern (see response to concern VI.1). However, ongoing ground-water monitoring will continue to assess concentrations and the effectiveness of all source controls implemented.

9. Concern:

The glacial units beneath the US Ecology sites are complex and do not function as a "single heterogeneous unit" with respect to subsurface contaminant migration. The site hydrogeology has not been adequately defined. Without this information, migration routes and velocities of plumes cannot be defined sufficiently to develop an adequate ground-water cleanup plan. [B4,¶2; B6,p.I-1, ¶2 through 4 and p.I-2,¶1-2; E2,pp.44-45]

Response:

The following statement is included in the RI report on page 4-96: "In general, the glacial deposits can be treated as a single heterogeneous hydrogeologic unit." This sentence followed several pages (e.g., 4-15 through 4-23; 4-95) documenting the observed heterogeneity of the geologic units which comprise the glacial aquifer. The RI report states (page 4-95) that the ground-water flow is "controlled by variable ground surface topography . . . and by the heterogeneous hydraulic conductivities of the various hydrogeologic units" in the glacial aquifer. The fact that the geology is complex does not eliminate from consideration use of a ground-water extraction system for remediation purposes. Complex hydrogeology simply makes the design phases of the extraction well system more challenging. Initial ground-water modeling done for the feasibility study indicated that the glacial aquifer, although complex lithologically, could be modeled credibly as a single layer with heterogeneous zones (see pp. C-18 to C-33; C-39 to C-

65; and C-82 of Vol. II of the draft Ground Water FS Report). Implementing an effective extraction well system is an iterative process. Characterizing the geology and ground-water modeling provides limited information. Actual installation of wells and observation of the effects of pumping on water levels is the final step in design.

10. Concern:

U.S. EPA should identify sites where a ground-water extraction system (like the one proposed for US Ecology) has worked effectively in such a complex geological environment. [B4,¶3; E2,p.37,¶2]

Response:

Utilization of a ground-water extraction system for halting plume expansion and remediation of ground-water contamination is not uncommon. Geologic complexity associated with glacial activity is by no means unique to the Sheffield, Illinois, area. Many areas of the central and eastern United States have been affected by glacial erosional and depositional activity.

U.S. EPA has developed a summary of pump-and-treat applications nationwide in a March 1990 document (EPA/600/8-90/003). Locations (by site name and state) where this technology has been used in glacial sediments include: Des Moines, Iowa; Verona Well Field, Michigan; General Mills, Inc., Minnesota; Amphenol Corp., New York; and Black and Decker, New York.

11. Concern:

U.S. EPA's assertion that the cleanup of the US Ecology could continue "indefinitely" is not consistent with the Agency's positions under either CERCLA or RCRA. Proposed U.S. EPA rules for corrective action at RCRA sites require that the Agency "specify a schedule for .... completing remedial activities." [D2(Att.1),p.17,¶3-5]

Response:

Existing statutory provisions and regulations regarding corrective action under RCRA, and with which this action must be consistent, require the owner/operator to, among other things:

1. After the Regional Administrator of U.S. EPA has specified the ground-water protection standard (GPS) in a permit (in this case under a Consent Order) (40 CFR §264.100(a)), the owner/operator must implement, within a specified time, a corrective action program that prevents hazardous constituents from exceeding the GPS for individual

constituents at the established compliance point by removing or treating them in place" (40 CFR §264.100(b) and (c);

2. Establish and implement a ground-water monitoring program to demonstrate the effectiveness of the corrective action program (40 CFR §264.100(d)); and

3. "Continue that corrective action for as long as necessary to achieve compliance with the ground-water protection standard" (40 CFR §264.100(f)). The subpart states that corrective measures may be terminated if the owner/operator can demonstrate that the GPS has not been exceeded for a period of three consecutive years as indicated by the ground-water monitoring program established under 40 CFR 264.100(d) to demonstrate the effectiveness of the corrective action program.

US Ecology is subject to regulations requiring the facility to eventually obtain a post-closure permit. It is, therefore, logical to be consistent with the existing requirements for permitted facilities.

If US Ecology is concerned about the prospect of perpetual extraction and treatment of contaminated ground water, it is certainly to the company's advantage to: (1) design, install, and maintain the source control components of the selected corrective measures to be as effective as possible; (2) implement, as soon as technically feasible, the ground-water extraction well system and treatment system meeting the guidelines established herein; and (3) consider voluntarily implementing available or emerging technologies to enhance recovery of organic contaminants (e.g., soil vapor extraction, in-situ bioremediation, etc.) and achieve the GPS within a shorter timeframe.

12. Concern:

A 30-year period will not be sufficient to clean ground water if the source of contamination remains in place. [B5,p.2,¶4; E2,p.42,¶2]

Response:

Please refer to the response immediately above regarding US Ecology's responsibility to undertake corrective action and to remediate the ground water and the time involved to do so. Because the contaminant sources will remain in place, it is essential that all components of the selected corrective action are well designed, carefully installed, and properly maintained and operated to control future releases from the Old and New Sites. The main objective of the CMI will be appropriate design and effective implementation of each component of the remedy. As a result of these corrective measures, contaminated ground water

will be addressed to achieve protection of human health and the environment.

13. Concern:

It appears that ground-water cleanup will continue indefinitely. Without a defined end point, the success or failure of the cleanup plan will be difficult to measure. [B5,p.2,¶4; E2,p.42,¶3]

Response:

The primary objectives of the selected remedy are: (1) to halt further contaminant plume migration; and (2) to effectively stop further release from the sources of contamination. A secondary objective is remediation of the contaminated ground water while the contamination is hydraulically controlled from further expansion. The effectiveness of the extraction well system will be gauged by continued regular ground-water monitoring of wells inside and outside of the plumes to monitor both for plume concentrations (increases or decreases) and expansion or shrinkage of the plumes.

III. SITE GEOLOGY AND HYDROGEOLOGY

1. Concern:

Steve Barlow, a resident of Princeton, Illinois, and other commenters, argued that because of the presence of numerous cracks, joints, and fissures in the bedrock below the US Ecology site (which contains the Old Mississippi River Bed Aquifer), the contaminants are moving through the glacial fill toward the Princeton Bedrock Valley that many people depend on as a source of drinking water. [C2,p.1,¶4 and p.2,¶1; B1,p.3,¶2; E2,p.56,¶2]

Response:

The RI report contains three years worth of ground-water data from numerous monitoring wells. When this RI investigation began in June 1986, 226 wells existed on site. Nineteen (19) more wells were added in late 1986 and thirty-six (36) bedrock and glacial wells were installed in 1988. Bedrock contamination has been shown to be minimal except in the G-120 area and north slope seeps where the #7 coal seam contains contaminated ground water. Ground water is being drained to the north slope area by pipes inserted in the coal seam. Contaminated water has been collected in this manner for a couple of years and sent off site for treatment and disposal. Now, however, an on-site treatment plant is being constructed to properly handle the extracted water on site and treat it to State-approved contaminant discharge limits. There is no evidence to suggest contamination of the bedrock in the north slope area wells (glacial or bedrock) except the G-120 assessment

well area. The contamination in the G-120 area is predominantly above and in the #7 coal. Because empirical data show limited bedrock ground-water contamination on site, geologic conditions slow vertical movement of ground water, and eventual implementation of a ground-water extraction well system will halt plume expansion and remove and treat bedrock and glacial ground water on site, the threat of contamination of any drinking water supplies will be minimized if not eliminated.

2. Concern:

Roy Mahnesmith and Edward Glubczynski posed the question of what effect catastrophic events (i.e., statistical outliers) and the presence of unknown materials might have on containment structures and hydrogeology at the site. [C3,§3]

Response:

Although the records are incomplete regarding hazardous wastes disposed of in the Old Site trenches, considerable information exists on the general types of waste buried there. Considerable information is known about the types of hazardous constituents that have been released to ground water by infiltrating surface water since the Old Site ceased receiving waste in 1974. The hazardous constituents in the ground water are essentially a finger print of the waste buried in the landfill and after sixteen (16) years of surface water leaching constituents and of drums leaking to ground water, future significant changes to the general composition of the existing chemicals in the ground water are not anticipated. Future releases will be reduced by the placement of an effective landfill cap on both the Old and New Sites. Catastrophic events, such as very heavy rainfalls, can cause erosion of landfill caps (which can be repaired) and a rise in the ground-water table. During the CMI design phases, contingencies will be developed for addressing such events should they occur.

3. Concern:

One commenter suggested that coal exploration borings may have been drilled in the areas of the Old Site, New Site, and LLRW site prior to waste disposal activities at the US Ecology site. These exploratory borings would have penetrated to the Herrin Coal, and it is likely that the borings were never plugged or backfilled. If present, the borings would provide a direct pathway for contaminant migration from waste disposal areas into the glacial aquifers and deeper into the bedrock below the sites. [B2,p.2,¶2; B7,pp.11-14; C2,p.1,¶4; C10,p.2,¶1; E2,pp.27-31]

Response:

This is a valid concern. However, RI ground-water data suggest that the potential impact of unplugged coal exploratory borings on

the vertical migration of contaminant from the Sheffield chemical disposal sites is very limited. This may be the case for many reasons: (1) The number of boreholes for coal exploratory purposes that are actually now covered with hazardous waste disposal cells is small (possibly as many as eight to ten). Compared to the total landfilled area of about forty-five (45) acres, the effect from these boreholes (each two or three inches in diameter) is not expected to be significant; (2) The "unplugged" boreholes are certainly not unobstructed conduits for contamination. Upon withdrawal of drilling equipment from an exploratory borehole, some drilling muds would remain and become compacted in the borehole, other consolidated materials above bedrock would be expected to collapse into the corehole, and the reworking of glacial materials by heavy equipment during burial trench construction activities would also contribute to reducing the potential impact of abandoned boreholes; (3) The RI data suggest ground water moves more readily in a horizontal direction through the glacial sediments than vertically into the lower permeability bedrock. For whatever reason, ground-water data from bedrock wells, especially in those screened in the Nos. 6 and 7 coals, generally show little or no contamination compare to glacial wells. It is difficult to definitively correlate any of the contamination in bedrock wells with the known approximate locations of the exploratory borings. If any of these boreholes are acting to any extent as contaminant migration pathways, the components of the corrective action for both source control and ground-water remediation will reduce those effects over time. To further discount or test the potential validity of the migration pathway hypothesis, US Ecology has proposed to install seven (7) new monitoring wells screened in the #6 coal (i.e., the deepest bedrock penetrated by the exploratory borings). U.S. EPA is reviewing that proposal now prior to approving it.

4. Concern:

U.S. EPA owes the public a "debt of explanation" for either failing to identify mining company test borings near the waste sites or withholding this information from the public. [C10,p.2,¶2]

Response:

Under a RCRA corrective action, U.S. EPA directs studies. U.S. EPA approved US Ecology's RI work plan in 1986 which included a search for all existing borehole data. The chronology of the search for these data was presented by US Ecology in its comments to the Proposed Plan [D2,Att.1,p.15] and more fully in a September 11, 1990, document. US Ecology submitted logs of exploratory boreholes and their approximate location in September 1990. U.S. EPA neither knew of nor withheld any information regarding these exploratory boreholes.

5. Concern:

US Ecology contends that ground water west of the New Site is not contaminated, based on the results of numerous samples collected after January 1987. [D2,p.14,2¶; D2(Att.1),p.1,¶2]

Response:

Please refer to the response to concern II.1 which addresses IEPA's request for additional monitoring wells based on soil gas survey results west and north of the New Site. There is sufficient documentation to confirm past releases and enough doubts about the adequacy of the present number of wells to require a closer well spacing in those locations.

6. Concern:

US Ecology contends that there is no evidence to support migration of inorganic contaminants to Trout Lake, as implied by U.S. EPA's Proposed Plan. [D2,p.14,¶3]

Response:

U.S. EPA concurs with this statement in that it is difficult to say definitely whether or not the inorganic contaminants in the Trout Lake water resulted from strip-mining activities primarily or could have migrated from the Old Site in ground water discharging to the lake. The inorganics under discussion were barium and zinc. What is virtually certain is that PCE, at 5 µg/L, was related to the Old Site plume discharging to Trout Lake.

7. Concern:

U.S. EPA's Proposed Plan incorrectly implies that inorganic compounds detected in ground water, surface water, soil, and sediment are site-related. Background concentrations an the effects of adjacent coal strip mining activities have not been considered. [D2(Att.1),p.1,¶4; D(Att.2),p.13,¶1-3]

Response:

US Ecology had failed, prior to the Soils Addendum to the RI report, to successfully argue its own case (i.e., to show that observed levels of inorganic compounds are more likely related to strip-mining than waste disposal activities). Many of the wastes accepted for disposal contained inorganics and, while agreeing with US Ecology that strip-mining activities have affected the concentration and distribution of inorganics, the origin of these must not be automatically assumed to be non-site related. US Ecology has stated on page 5-1 of the RI report that "organic and inorganic constituents have migrated from burial trenches and have

entered shallow ground water in three areas" (underline added here for emphasis).

8. Concern:

It is clear that contaminants are migrating from ground water to Trout Lake. A complete study of the hydraulic interaction between ground water and the lake should be conducted. Is IDNS or US Ecology responsible for developing hydrogeologic data and investigating contaminant levels for Trout Lake? [B5,p.2,¶3; B6,p.II-3,§9; E2,p.41,¶4]

Response:

US Ecology has conducted a study for IEPA in the area north, east, and south of Trout lake. In December 1989, several borings were completed and new monitoring wells were installed. This was a one-time study to further characterize the hydrogeologic conditions in the southern half of Trout Lake. A report on the additional studies is expected to be submitted to IEPA in the near future. Ground-water samples were taken from these new wells and were analyzed for both radionuclides and organics.

Under the Consent Order with IDNS, US Ecology is required to sample specific IDNS monitoring wells on a stated regular basis and to analyze for the presence and concentration of specified radionuclides and organics. US Ecology is also required to analyze ground-water samples in some instances for the full list of 40 CFR Part 264 Appendix IX parameters.

9. Concern:

Contradicting statements are made in the RI report regarding "laterally continuous" geologic units and fractures and joints in those low-permeability rock sequences. [B1,p.25,¶4; B1,p.8,¶2; B1,p.15,¶2]

Response:

A basic concept in geology is that of the law of original continuity wherein the same sedimentary stratum is observed to be present in borings from place to place. Lateral continuity of a geologic unit (e.g., the Farmington Shale) beneath the landfills and the presence of joints or fractures within that unit are not mutually exclusive conditions.

10. Concern:

Some commenters criticized the RI reports (e.g., no easy way to locate the 200+ monitoring wells; figures are too small; geologic cross-sections are too simplistic, although "a wealth of data is contained on the bore logs"; wanted additional bore holes to

better define bedrock contours, etc.; over simplifications of glacial geology and hydrology; potentiometric surface maps may be misrepresenting actual conditions; data points are not labelled or are inaccurate; maps and figures are poorly labeled and difficult to read; appendices do not include all data collected; the reference list is incomplete; material in the text is attributed to the wrong source; and contradictory information is presented. [B1,pp.9-13; B5,p.1,¶5-7; B5,p.2,¶1-2; B6,p.I-5.¶3 and p.I-6,¶1-2; E2,pp.39-41 and pp.43-51]

Response:

The Final RI Report was approved by U.S. EPA in April 1989, following its original submittal (March 18, 1987), the appended version (October 5, 1988) after completion of one year of additional study, and two subsequent revisions requested by U.S. EPA. It is not easy to present the vast amount of data generated for this RI report without some simplification or generalization of hydrogeologic conditions found on site. The goal in the RI process is to distill from the RI study the information necessary to make decisions regarding corrective measures selection. U.S. EPA RI/FS guidance states: "the objective of the RI/FS process is not the unobtainable goal of removing all uncertainty, but rather to gather information sufficient to support an informed risk management decision regarding which remedy appears to be most appropriate for a given site." Choices made during the RI investigations, "like the remedy selection itself, involve the balancing of a wide variety of factors and the exercise of best professional judgment" (EPA/540/G-89/004; October 1988; p.1-3). Based on this guidance, U.S. EPA determined that the Final RI Report contained and presented sufficient data (e.g., borelogs, ground-water analyses, plume dimensions, etc.) to develop, evaluate, and make decisions regarding remedial alternatives.

With respect to the specific comments raised by Ms. Morse (B6), most comprise a summary and reintroduction of comments she submitted as a former employee of the State of Illinois. In fact, her submittal attaches the complete list of IEPA comments on the October 5, 1988, draft of the RI report transmitted to U.S. EPA on February 2, 1989. All of these comments were reviewed by U.S. EPA before approval of the Final RI Report in April 1989. US Ecology satisfactorily addressed all significant comments in response to: (1) Revisions requested by U.S. EPA <u>prior</u> to receipt of IEPA comments; (2) A second set of revisions requested by U.S. EPA after receipt and inclusion of most IEPA comments; and (3) Direct responses to IEPA on each issue raised in their February 2, 1989 comments. It is not useful to itemize herein the responses to all these comments. They are already present in the record.

U.S. EPA, using professional judgment, approved the Final RI Report after determining that sufficient information had been generated under the RI to allow informed decisions to be made

regarding the corrective measures study and that the information was adequately presented in the RI report. It is U.S. EPA's position that sufficient information is available to allow technical decisions to be made in selecting the corrective measures appropriate for this facility.

11. Concern:

The Old Site plume has migrated to bedrock in spite of what US Ecology says on page 5-34 of the RI report. See page 5-22, Table 5-5. [B1,p.18,¶1]

Response:

The RI report states (p.5-34) "it can be concluded that the plume remains confined primarily to the glacial aquifer and has not penetrated into the bedrock to any great extent." Table 5-5 does indicate the detection of four organics in four bedrock wells (not all four in the same well). Three of these chemicals are common laboratory contaminants and the other, benzene, was found in only one well at 14 ppb. All concentrations were below 37 ppb. These concentrations are minimal when compared, for example, to glacial aquifer contaminant concentrations (see Table 5-4, p.5-17) of up to 180,000 ppb for chloroform. No one is stating that the bedrock aquifer is unaffected by releases. However, empirical data support the first sentence of this response. The distribution of contamination indicates that the ground water transporting it shows a greater tendency to move horizontally than vertically (i.e., through unconsolidated glacial sediments rather than into fractures in bedrock).

12. Concern:

One commenter described several problems with hydraulic gradients presented in the RI report; gradients are based on incorrect calculations of screened intervals or well depth; hydraulic conductivity values attributed to one unit are based on data from a different unit; vertical gradients were not calculated from supplemental RI well data as planned; and no ground-water velocities or horizontal gradients are provided. [B6,p.I-4,¶3 and I-5,¶1; E2,pp.48-51]

Response:

It appears these comments are based on those originally submitted by IEPA regarding the October 5, 1988, draft RI report. All hydraulic gradients were recalculated for the Final RI Report.

13. Concern:

Ground-water surface maps presented in the RI are inaccurate because data used to construct the maps were collected over too

long a time span and data from different glacial units are combined. [B6,p.I-4,¶3 and p.I-5,¶1; E2.p.48,¶3-4]

Response:

Certainly, the time span over which ground-water levels are recorded in monitoring wells can affect the final map produced in some cases. Readings were taken by US Ecology for all wells usually on one day, when possible, but never over a time period exceeding 48 hours. For example, the June 1988 water levels were taken on June 6 and 7. Wells screened in different glacial units undoubtedly will cause some minor inaccuracies. However, the data generated during the RI, using many wells and water level readings from three years, compare favorably to potentiometric maps from the site from as early as 1976 to the present and show similar ground-water flow directions and gradients. These maps also generally agree with those produced in studies of the LLRW site.

14. Concern:

Data collected during the RI (e.g., core descriptions, drilling water loss, and influx records) refute the claim that shallow bedrock strata act as an impediment to ground-water flow. [B6,p.I-2,¶3; E2,p.45,¶3-4]

Response:

While review of such records kept during installation of monitoring wells may indicate this is true in some instances, the fact remains that empirical data from ground-water sampling and analysis in bedrock and glacial wells generated during the RI show limited vertical migration of contamination. The data suggest a much greater inclination to move laterally through shallow, unconsolidated glacial sediments than vertically through the bedrock.

IV. REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

1. Concern:

A few commenters questioned the reliability of the RI as pertaining to the ground-water sampling because of the extreme drought conditions that were present in the county dating back to 1986. [C1; C3,2§; B1,p.22,¶1; E2,p.53]

Response:

Ground-water sampling has been conducted at US Ecology since 1981 and continues to be done. Results are sent to IEPA on a regular basis for assessment and indicator parameter evaluation monitoring wells. Wells which initially detected releases of hazardous

wastes or hazardous constituents leading to the 1985 Consent Order to perform corrective action did so prior to the drought conditions and have continued, when sampled, to show evidence of contamination. Drought conditions could have the following effect on the ground-water table and the results from the sampling and analysis in the wells: (1) A general lowering of the water table potentially leaving some hazardous constituents adhering to soil particles; and (2) Less infiltration of surface water through the buried wastes and, therefore, lower levels of constituents in the ground-water samples. A review of ground-water contours under the Old Site, on October 20, 1976, (p.4-19 of RI report) and June 1988 (p.4-99 of the RI report) show that the elevations (west to east) were about 760 to 730 feet and 750 to 730 feet, respectively. These pages indicate some decreases in water table elevation over the twelve (12) years, but the changes in the contours on the four glacial aquifer maps are not striking. The contamination has been shown to be present by reliable sampling and analytical techniques and the effect the drought conditions had on the concentrations is difficult to assess. The contaminated ground water requires remediation and it must be hydraulically controlled to stop further plume migration.

U.S. EPA obtained annual precipitation data from Moline, Geneseo, Walnut, Tiskilwa, and Kewanee for the years 1980 to 1988. These data do not support fully the claim that drought conditions affected sampling results. Annual precipitation for most sites (Kewanee is the exception) tended to exceed long-term averages during this period.

2. Concern:

Climatological data presented in the RI report (such as average and maximum 24-hour rainfall) are incorrect and underestimate real conditions. This could have an effect on hydrologic modeling of the site and on the design of corrective measures. [B7,p.18,¶1]

Response:

The commenter has pointed out that certain data contained in the RI report were incorrect (e.g., the mean annual precipitation for Moline, Illinois, was stated to be 35.70 inches rather than 35.83 inches and the 24-hour rainfall was stated to be 5.7 inches rather than in excess of six (6) inches). Further hydrologic modeling of the sites will be performed during the CMI design phases. Data inputs will be updated as necessary.

3. Concern:

The RI report does not include any geologic maps of the site, such as a bedrock geologic map. [B7,p.18,¶2]

Response:

While this is true, many cross section maps depicting the thickness and distribution of geologic strata are included for the Old and New Sites. These, along with the bedrock contour map, were sufficient to provide an adequate two and three dimensional picture of the geology.

4. Concern:

Several maps in the RI report are computer-generated and do not accurately represent site conditions. [B7,p.19,¶1; B6,p.I-3,¶2]

Response:

Subsurface maps, whether drawn by hand or computer generated, are based on a limited number of data points. A map drawn by one geologist or hydrologist may not exactly resemble that drawn by another using the exact same data. The goal, however, is to produce maps which, in spite of their inherent inexactness, provide tools which will allow decisions to be made regarding the corrective measures selection. The RI report has provided the detail necessary for technical decisions. The U.S. EPA has provided comments to US Ecology on Figure 4-22 of the RI report. That bedrock topography map indicates a closed-contour depression in the bedrock which does seem illogical and may be a result of too few data points at the east end near Trout Lake.

V. INTERACTIONS BETWEEN CHEMICAL AND RADIOACTIVE WASTE

1. Concern:

Commenters say that the preferred ground-water alternative does not address remediation of ground water contaminated with radionuclides. They suggest that extracted water from wells south and southeast of the Old Site be monitored and treated for radioactive contamination, if such contamination is found. [A2,p.2,§2d; A3,p.2,¶2; A4,p.2,¶3; E2,p.71,¶3]

Response:

U.S. EPA does not agree with the first part of the comment. The very last item in Section V of the Proposed Plan (page 22) states that US Ecology must:

> "Provide for regular sampling of the extracted ground water for those radionuclide parameters in Table 5-7 of the RI plus I-129. A plan and schedule for these sampling activities will be required."

Regarding the second portion of the concern raised, U.S. EPA stated in the Proposed Plan (page 36):

> "The alternative will require testing of extracted ground water for the presence of a specified list of radionuclides and, if any are detected, appropriate treatment of the water and management of associated wastes generated."

South or southeast of the Old Site are the locations where the chemical/radioactive ("mixed") plume is most likely to be encountered.

2. Concern:

Commenters are concerned that alterations in the ground-water flow patterns will cause radioactively contaminated ground water from the LLRW site to combine with chemically contaminated ground water from the Old Site. [A5,p.4]

Response:

This is a valid concern and certainly will be an important factor in designing the extraction well system (e.g., number of wells, well locations, pumping rates, possible use of reinjection wells, etc.). The CMI will include additional ground-water modeling as various designs are considered to address concerns of U.S. EPA and several commenters. The modeling already done by US Ecology (p. 4-39 of the ground-water FS) indicated a desire to limit southerly and southeasterly flow: "The eastern edge of the drain is designed to prevent further migration of the plume toward the tritium plume." Also on page 4-39, US Ecology discusses design considerations related to adequately capturing "the old site plume without significantly affecting the regional flow directions outside the drain."

3. Concern:

Commenters share concerns of the Illinois Department of Nuclear Safety (IDNS) about ground-water flow and problems this may cause at the Low Level Radioactive Waste (LLRW) site. They suggest that U.S. EPA select a remedy that will not adversely affect the LLRW site. [A2,p.1,§1d; A5,p.8,¶2; A1,p.1,¶7; E2,p.19,¶2; E2,p.55,¶1]

Response:

Please refer to the response immediately above.

4. Concern:

The mixture of radioactive and chemical contaminants, pumped from the Old Site, will complicate safe handling and treatability of extracted ground water. [A5,p.4]

Response:

U.S. EPA concurs with this statement. However, it is unacceptable to allow continued expansion of the Old Site plume of contaminated ground water. U.S. EPA's position remains unchanged: the Old Site plume must be managed so as to preclude further plume expansion and the contaminated ground water must be extracted and treated until established ground-water protection standards are achieved in spite of the presence of radionuclides mixed in with the chemical plume. The details of how the extracted water will be managed will be determined during the CMI design phase.

5. Concern:

US Ecology believes that: (1) draft U.S. EPA guidance on "Corrective Action for Solid Waste Management Units (SWMU) at Hazardous Waste Management Facilities" supports a position of non-action on portions of the ground-water plume that are contaminated with both chemical and radioactive wastes and (2) natural attenuation is an appropriate remedy for this part of the plume. [D2,p.10,¶2]

Response:

The "guidance" cited by US Ecology is from the Proposed Rule (55 Federal Register 30798) dated July 27, 1990. U.S. EPA disagrees with this comment by US Ecology on page 10 of their submittal. US Ecology quotes preamble language from the proposed rule (page 30825) to support their position. However, US Ecology's argument is unsupportable because: (1) It is unlikely that, in this situation, "ground-water cleanup standards can be achieved through natural attenuation within a reasonable time frame"; (2) The contaminant plume is already greater than twenty-three (23) acres in size, contains multiple contaminants of concern to human health and the environment, including radioactive constituents; (3) tritiated water is already detected in ground water east of Trout Lake and the RI report contains data showing organics from the Old Site plume have been discharged to Trout Lake; and (4) The plume will continue to increase in size until an extraction well and treatment system is installed and operational under the CMI. These points argue for active restoration of the contaminated ground water and for hydraulic controls on further migration of the plumes.

6. Concern:

Commenters recommend that U.S. EPA require US Ecology to show (through modeling and monitoring) that construction of the slurry walls and cap will have no adverse effects on the known hydrology of the radioactive site. [A3,p.3,¶1-2; A4,p.3,¶2-3; E2,p.73,¶2-3]

Response:

US Ecology will be required to conduct additional ground-water modeling during the design phase of the CMI. Prior modeling for the ground-water FS did not take into account the effects of a slurry wall around the Old Site on the hydrology of the radioactive site. Modeling will provide insight into the probable effects on the ground-water elevations and flow directions in the vicinity of the LLRW site. Upon implementation of the source control components, piezometers will be installed (or existing ones could be used, if appropriately located) to assess, on a regular basis, the effects on the hydrology. The design of the extraction well system for ground-water remediation will be such that increased or decreased pumping rates from suitably located wells will assist in maintaining the desired design water table levels.

7. Concern:

Commenters recommend that U.S. EPA require a sequential approach during application of ground-water remediation and source control measures so that any effects of either activity on the radiological site can be distinguished and assessed. [A3,p.1,¶4; A4,p.1,¶3; E2,p.70,¶3]

Response:

U.S. EPA believes that it is necessary to install extraction wells in the whole plume rather than sequentially extracting and treating portions of the plume, as is suggested by this comment. The commenter can be assured that additional ground-water modeling, prior to installation of components, will be performed and ground-water levels will be monitored to assess potentially adverse effects on the hydrology after installation. A contingency plan will be prepared to respond to any observed adverse effects.

8. Concern:

Laboratory analysis of ground water contaminated with both radionuclides and chemicals poses unique problems. Potential delays in receiving laboratory results could affect the flow of ground water through the treatment processes. The accuracy of analytical results is important if this information will be used to make treatment or disposal decisions for radioactively contaminated water. [B6,p.II-3,§7]

Response:

U.S. EPA concurs with these concerns and every effort will be made during the design of the ground-water extraction and treatment system to fully address them.

9. Concern:

The hazardous waste sites and the LLRW site at US Ecology should be dealt with together in a comprehensive cleanup plan. [B6,p.I-7,¶2; E2,p.51,¶5-6]

Response:

In response to the suggestion that the various units be treated as one large facility, there are reasons why the current approach is preferable. First, various government agencies have independent jurisdiction over the various units located at the site. IDNS has jurisdiction over the radioactive waste site. IEPA is responsible for overseeing the closure activities at the New Site as this would be part of its authorized program. U.S. EPA has jurisdiction over the corrective action activities at the hazardous waste units under the Consent Order. This Order was entered into between U.S. EPA and US Ecology and is binding upon them and no other parties. Second, it makes sense to split off the remedies related to the radioactive site from the hazardous waste sites as the contamination related to each are different in nature and should be addressed independently. To a degree, the ground-water activities set forth here will address contamination emanating from all of the units at the site.

10. Concern:

Several commenters stated that the chemical and low level radioactive waste sites should not be considered separately in terms of public health or proposed cleanup plans. The entire area should be treated as one problem. [B3,p.1,¶5; B7,p.15,¶3; C10,p.1,¶4; E2,p.34,¶2] However, others believe that the chemical and radioactive waste sites at Sheffield are distinct facilities with separate ownership, and should be regulated as such. [D2,p.9,¶3]

Response:

Please refer to responses to concerns I.11, V.9, and VI.1.

VI. HEALTH EFFECTS AND CLEANUP LEVELS

1. Concern:

The Public Health Risk Evaluation did not address risks associated with ground water contaminated with low level radioactive waste. [A2,p.2,§3; C3,§4]

Response:

This is a correct statement. The calculated risks to health presented in the RI report focused on the risks associated with the multiple chemical contaminants being released to ground water principally from the Old Site. The radioactive constituents in the ground water are more restricted in their distribution than these chemical constituents and are associated solely with specific portions of the Old Site plume. In addition, the levels of chemicals contaminants in the overlapping areas of the chemical and radioactive plumes are lower relative to the more contaminated areas of the plume. See figures on pages 5-30, 5-31, and 5-32 for maps showing contoured chemical concentrations in the Old Site plume. Table 5-7 on page 5-36 of the RI report lists the levels of radioactive contaminants detected in the ground water in 1988. Figure 1-10 of the ground-water FS (page 1-48) illustrates overlapping areas of the two plumes.

Using sampling data supplied in Appendix M of the Remedial Investigation (RI) report, the estimated lifetime excess cancer risk from ingesting the ground water containing radionuclides from the LLRW has been estimated. The sampling data included data for samples taken from 20 wells in the area affected by the LLRW that were analyzed for 19 radionuclides (radioactive elements). Of the 19 radionuclides sampled for, eleven were identified at the site. To be conservative, any radionuclide concentration detected was assumed to come from the site. (Many radionuclides are found to occur naturally.)

Two methods were used to estimate the excess cancer risk resulting from exposure to the radionuclides identified at the site. Exposure was assumed to result from ingestion of ground water as drinking water. The first method, using risk factors generated by the U.S. EPA, estimated an excess cancer risk of 4×10^{-4}. This means that under a recreational use scenario, four (4) excess cancer cases can be expected out of each 1,000,000 recreational users.

The second method, using similar calculations, but with incorporating risk factors generated by the International Commission on Radiological Protection (ICRP), estimates an excess cancer risk of 5×10^{-3}. This means that the excess cancer cases expected from the previously-discussed exposure will be five (5) excess cancer cases for every 100,000 recreational users.

The difference in risk estimates between the two methods exists because the second method allows more of the radionuclides identified at the site to be considered in the final risk estimate. The first method (using U.S. EPA risk factors) allows inclusion of seven (7) of the eleven (11) nuclides identified.

The second method (using ICRP risk factors) allows inclusion of all eleven (11).

2. Concern:

One commenter expressed a growing concern that there may be a cancer cluster near Sheffield, with an increasing "number of cancers of the nature of those normally associated with radioactivity." [C10,p.1,¶6]

Response:

An investigation into the incidence of cancer in Bureau County, Illinois, was performed by the Illinois Department of Public Health (IDPH), Division of Epidemiological Studies. A report on the results of this investigation, entitled "Incidence of Cancer in Buda, Mineral, Neponset, and Sheffield in Bureau County, Illinois," was released in September, 1990. The investigation was performed under the administration of Dr. Holly L. Howe, Chief of the Division of Epidemiological Studies.

Data for all cancer incidence in the designated area from 1985 to 1988 were obtained from the Illinois State Cancer Registry (an incidence of cancer is a newly diagnosed case). These data, the "observed" incidence of cancer, were compared to data from an area in the State of similar population and age distribution, the "expected" incidence of cancer. Statistical tests were then performed on these data to see if there were any statistically significant differences between the incidence of cancer for each population. A statistically significant difference could indicate that the incidence of cancer in Bureau County is higher than "normal."

The results for all types of cancer combined were as follows. In males, 37 cases were observed, with 38 expected. For females, 45 cases were observed, with 40 expected. These differences were not found to be statistically significant for either sex. Therefore, with regard to combined cancers, no cancer cluster was identified in the report. Incidence of site-specific cancers was also compared in the report, with no conclusions being made.

It is possible that with a larger data set, possibly facilitated by using mortality data, more conclusions could be drawn from the report. (Mortality data is based on deaths attributable to a particular cause.)

3. Concern:

US Ecology questions the assumptions behind the risk assessment used as a basis for determining ground-water cleanup levels. These assumptions result in an overestimate of risk by nearly two orders of magnitude. The risk assessment uses an exposure

scenario that assumes future residential use of the site, with residents drinking two (2) liters of ground water per day over a 70-year period. Current U.S. EPA guidance on risk assessment for Superfund sites suggests that 30 years is a more appropriate time period to estimate "reasonable maximum exposure." Further, future residential use of the US Ecology Sheffield sites is highly unlikely, and alternate exposure scenarios, such as recreational use of the site, should be considered if the risk assessment process will be used to derive ground-water cleanup goals. [D1,p.2,¶5; D2,p.4,¶2; D2,p.5,¶1; D2(Att.1),pp.5-10; D2(Att.2),pp.2-3,12,14-15,19-21,23]

Response:

As this comment indicates, risk estimates in the Final Remedial Investigation Report (April 1989) were based on the assumptions of future residential use of the US Ecology site and a 70-year period of exposure to the most contaminated ground water. These assumptions were carried through to the risk assessment summary in U.S. EPA's May 1990, Proposed Plan.

U.S. EPA has carefully considered this comment in light of the most recent Agency guidance on conducting risk assessments at hazardous waste sites (Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, December 1989 [EPA/540/1-89/002]). This guidance states that cleanup actions "should be based on an estimate of the reasonable maximum exposure (RME) expected to occur under both current and future land-use conditions." The guidance further indicates that "an assumption of future residential use may not be justifiable if the probability that the site will support residential use in the future is exceedingly small." For example, "if the site is . . . located in a very rural area with a low population density and projected low growth, . . . a more likely alternate future land use may be recreational."

U.S. EPA believes that future residential use of the US Ecology site is highly unlikely. The corrective measures proposed by the Agency will be designed to effectively contain wastes in place and long-term management and maintenance of the facility will be required, including continued extraction and treatment of ground water. Thus, U.S. EPA agrees that a recreational use exposure scenario is more appropriate for evaluating future risks at this site. U.S. EPA has adopted the exposure assumptions suggested in this comment (ingestion of 2 liters of water per day for 32 days per year over a 20-year period). The Agency has used these assumptions to evaluate future risks associated with various ground-water cleanup goals, as described in the next response.

4. Concern:

US Ecology disagrees with the ground-water remediation goals in the May 1990 Proposed Plan. The company states: (1) that U.S. EPA's use of RCRA practical quantitation limits (PQLs) to establish ground-water cleanup levels is excessive and unwarranted and is not supported by any agency guidance and (2) that PQLs have no basis in the protection of human health and do not consider conditions specific to the US Ecology site, such as background concentrations of chemicals. US Ecology further states that the ground-water remediation goals proposed in the draft FS for ground water are acceptable and will protect human health and comply with all applicable or relevant regulations. However, US Ecology's comments propose two additional sets of ground-water cleanup levels, based primarily on Maximum Contaminant Levels (MCLs), regulatory standards for drinking water. [D1,p.2,¶3-4; D2,pp.4-6; D2,p.8,¶1; D2(Att.1),pp.3-13; D2(Att.2),pp.1-2,6,9-11,21-23]

Response:

In this Response to Comments, U.S. EPA is proposing a set of ground-water remediation goals slightly different from the goals listed in the Proposed Plan. In putting forth these goals, the Agency has considered: (1) regulatory requirements for ground-water protection standards in 40 CFR 264; (2) the Proposed Rule for Corrective Action for Solid Waste Management Units at Hazardous Waste Management Facilities (55 FR 30798, July 27, 1990); (3) background concentrations for the 11 contaminants that account for the majority of risk; and (4) the exposure and risk assessment assumptions described in the previous response.

According to 40 CFR 264.94(a), ground-water protection standards should be set at background levels of the hazardous constituents or at the maximum contaminant levels (MCLs) established by U.S. EPA under the Safe Drinking Water Act. Alternate concentration limits (ACL) are appropriate only if the use of these limits will not pose a substantial present or potential hazard to human health. The Proposed Rule for Corrective Action requires ground-water cleanup standards that ensure protection of human health, taking into account the potential uses of ground water.

Background concentrations for all eleven (11) contaminants were evaluated by reviewing sampling results from well 434, designated in the RI as the background well for the glacial aquifer. Nine of the eleven (11) contaminants were not detected in this well; arsenic and methylene chloride were found in two (2) of eight (8) samples with maximum concentrations of 7 μg/L and 10 μg/L, respectively. Based on these results and on the guidelines listed above, U.S. EPA has selected ground-water protection standards that reflect either site-specific background concentrations (based on routinely achievable analytical detection limits) or MCLs. These goals are as follows:

10 μg/L	arsenic
5 μg/L	benzene, chloroform, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethene, 1,2-dichloropropane, methylene chloride, tetrachloroethene, trichloroethene
2 μg/L	vinyl chloride

Ingestion of ground water with these concentrations, under the exposure assumptions described in the previous response, will result in an excess cancer risk of 2×10^{-5}. This value is within the 10^{-4} to 10^{-6} target range defined as the "protective risk range" in the Proposed Rule for Corrective Action.

U.S. EPA believes these goals to be reasonable, achievable, and protective of human health under the assumptions that: (1) ground water above these concentrations has not and will not migrate beyond the current facility boundary; and (2) the facility will remain under active management and post-closure care by US Ecology. Should either of these conditions change, the cleanup goals and exposure assumptions on which they are based would be reevaluated.

5. Concern:

Risk assessment of hazardous waste sites is an uncertain process. The results of this process must be viewed as estimates, with a range of possible values, rather than as single value, invariant results. U.S. EPA has failed to acknowledge that the uncertainty about the results of risk assessments is generally at least an order of magnitude. [D2(Att.1),p.5,¶1; D2(Att.2),p.19,¶2]

Response:

U.S. EPA recognizes the uncertainty inherent in the risk assessment of hazardous waste sites and has specifically considered this uncertainty in proposing ground-water cleanup goals for the US Ecology site. The estimated risk for ingestion of ground water containing chemical contamination at the proposed cleanup levels is approximately 2×10^{-5}. This estimate is near the middle of U.S. EPA's target risk range of 10^{-4} to 10^{-6}. The Agency believes that these cleanup goals are more appropriate than less protective goals suggested by US Ecology <u>because</u> of the uncertainties that must be factored into the risk assessment. These uncertainties include: (1) the potential synergistic effects of exposure to multiple chemicals; (2) the additional risks due to radionuclides in ground water at the site (see response to concern VI.1 above); and (3) the need to maintain adequate post-closure care at the facility.

6. Concern:

The Risk Assessment Summary in the proposed plan indicates that if ground water were cleaned up to the RCRA Practical Quantitative Limits proposed, risks from exposure would still be above the target risk range established by U.S. EPA. [A2,p.2,§4]

Response:

The Proposed Plan estimated the cancer risks for future ground-water consumption to be slightly higher than 10^{-4} (one (1) case of cancer for every 10,000 people exposed). The 10^{-4} figure represents the lower limit of U.S. EPA's target risk range. This risk estimate was based on the assumptions that: (1) ground water would contain contamination at the proposed cleanup goals; (2) the US Ecology site would be used for future residential development; and (3) persons drinking the ground water would reside in this development for seventy (70) years.

As indicated in the response to comment VI.3 above, future residential development of the US Ecology site is extremely unlikely. Current U.S. EPA guidance on risk assessment suggests that recreational use of the site is a more plausible scenario for future exposure to ground water, after cleanup goals proposed in this document have been achieved. Under these conditions, the estimated cancer risk of 2×10^{-5} would be within U.S. EPA's target risk range.

7. Concern:

Risks due to arsenic in ground water should be reconsidered for two reasons: (1) the uncertainty about the carcinogenic potency of this chemical and (2) the high background levels of arsenic near the site. US Ecology believes that the carcinogenic effects of arsenic should not be considered in establishing cleanup levels for this metal. [D2,p.5,¶3; D2,p.6,¶2; D2(Att. 1),p.13,¶3-4]

Response:

U.S. EPA strongly disagrees with both portions of this comment. First, there is little debate about the carcinogenicity of arsenic. This metal can cause cancer in humans after inhalation exposure and from ingestion of drinking water. The specific carcinogenic potency of arsenic via ingestion is currently under review. However, this is not sufficient justification for ignoring arsenic in estimating risks or proposing cleanup goals for ground water at US Ecology. U.S. EPA has used the most recently available unit risk for arsenic (from the Agency's Integrated Risk Information System database, June 1990) to estimate ground-water ingestion risks. This assessment can be

repeated when a new risk factor is available, and the risks and ground-water cleanup goal adjusted, if necessary.

Second, ground-water sampling data from the RI do not support the statement that background concentrations of arsenic in ground water are high. Arsenic was detected in only two of eight samples from well 434, the glacial aquifer background well for the RI. The maximum concentration detected was 7 µg/L. Further, although most of the waste volume for the Old Site is unknown, the known portion includes arsenic-containing wastes. Thus, arsenic found in ground water near the Old Site is much more likely due to waste disposal activities than background, and arsenic must be considered when evaluating site risks and proposing cleanup goals.

VII. MISCELLANEOUS COMMENTS

1. Concern:

Hazardous and toxic wastes buried at the landfill pose a present and future danger to the environment and to the health and welfare of the People of the State of Illinois. Every possible step to protect citizens' health and welfare has not been examined; a final cleanup plan must promote long-term effectiveness. [A5,p.1,¶2; A1,p.1,¶4-5; C3,§5; C3,§8; E2,p.19,¶3]

Response:

U.S. EPA has required US Ecology to conduct the Remedial Investigation and Feasibility Study (RI/FS) following U.S. EPA guidance. A document titled "Initial Screening of Remedial Technologies" was submitted by US Ecology in August 1988. U.S. EPA required US Ecology to consider further (in the draft FS) exhumation and other technologies <u>not</u> screened out in the August 1988, document. All viable, practical, proven technologies have been evaluated. U.S. EPA has selected a remedy which will be protective of human health by reducing greatly the chances of future releases through effective source control and by addressing the previous releases by stopping plume expansion and extracting and treating contaminated ground water until established ground-water protection standards specified by U.S. EPA in this document are achieved. US Ecology will be required to manage the source control and ground-water remediation components of the corrective measure so that long-term protection is assured. Should any additional areas of release be identified around the New Site which were not apparent during the RI/FS process, further studies would be conducted and a separate decision made as to how to address them.

2. Concern:

One commenter stressed a need for corrective action to begin as soon as possible. [C4,p.7,¶2]

Response:

U.S. EPA concurs with the commenter. Experience with ground-water remediation at other hazardous waste sites has shown the importance of early installation and operation of extraction wells. This is conducive to controlling plume expansion and a more rapid remediation of the ground water. In addition, identified releases of hazardous wastes or constituents will likely continue until source control measures are in place. However, all components of the corrective measures require further design phases prior to implementation and some components may require obtaining a permit before certain procedures can be performed.

3. Comment:

As a result of IDNS and U.S. EPA's meeting on December 21, 1989, to discuss proposed alternatives, U.S. EPA concluded that IDNS "concurred" with the preferred alternative, specifically, slurry walls. IDNS feels 'concurrence' is not entirely accurate. [A3,p.2,¶4; A4,p.2,¶5; E2,p.72,¶3-5]

Response:

The Proposed Plan (page 36) did not wish to imply total concurrence with the Plan; rather it qualified the degree to which IDNS and U.S. EPA agreed on the conceptual approach for remediation during discussion at that meeting. Specifically, discussions resulted in the conclusion that, among other things: (1) Placing slurry walls around the Old Site, rather than subsurface drains, was expected to ultimately result in fewer changes to the local hydraulic gradients thus impacting the existing conditions around the LLRW site to a lesser degree. Ground-water levels outside the slurry wall can be maintained at a higher level than inside, whereas drains would be more likely to cause a more general lowering of the water table. (2) Extracted ground water, which may contain radioactive constituents, would require testing for the presence of specified radionuclides. Appropriate treatment and management would be required if detected.

4. Concern:

There is some concern that the cost of remedying the site will ultimately fall on the taxpayers. Several commenters stated that the corporation responsible for problems at the site should bear the full financial responsibility for cost of corrective action.

[A5, transmittal letter, ¶2; B3,p.2,¶2-4; C3,p.1,§1; C9,p.1,¶2; C11; E2,p.35,¶1]

Response:

US Ecology signed the Consent Order in 1985 to conduct an RI/FS and to implement the corrective action selected by U.S. EPA. To date, US Ecology has performed each task required under the Consent Order at considerable expense to the company (i.e., estimated, in a US Ecology press release, to be about $4.5 million so far). US Ecology provided financial assurance $2.50 million), as required in the Consent Order, to guarantee performance of the RI/FS and implementation of the selected corrective action. US Ecology has absorbed the costs of the RI/FS and has given every indication that the company intends to comply with the Consent Order and implement the selected remedy.

5. Concern:

Area citizens should be the final judge of the plan's effectiveness. [A1,p.2,¶1]

Response:

U.S. EPA policy and guidance promotes public involvement and comment during the decision-making process. The State of Illinois, public officials, and private citizens have commented on the Proposed Plan. The next step, that of selecting the remedy, is left to U.S. EPA under its statutory mandate. The preferred alternative from the Proposed Plan can be, and has been, modified based on comments received during the comment period.

6. Concern:

Commenter says that the cost of the remedy is secondary to citizens' protection. [A1,p.2,¶2]

Response:

U.S. EPA has selected corrective measures based on the ability of the technologies chosen to protect human health and the environment. Under RCRA, cost is not considered as a factor except when deciding between alternatives which are determined to be equally protective.

7. Concern:

Several individuals emphasized the need for some type of contingency plan to deal with components of the corrective action, such as slurry walls, caps, and ground-water monitoring, extracting, and treatment. The contingency plan is necessary because these components are not totally reliable and are not

described in sufficient detail in U.S. EPA's proposed plan. The contingency plan should describe the required care, maintenance, and repairs for slurry walls and other components. The plan should also include provisions to use advances in technology as these become available. [A5,p.3,¶1; B4,¶3-6; C4,p.4,¶5,p.2,¶2, and p.7,¶2; B6,p.I-7,¶3; E2,p.37,¶3; E2,p.52,¶3]

Response:

U.S. EPA's Proposed Plan selected alternatives from the two draft FS reports submitted by US Ecology as a conceptual approach to remediate the site and suggested some modifications to the alternatives proposed. While it is true that the Proposed Plan itself does not contain design detail, the individual alternatives themselves are described in considerable detail in the draft FS reports and their appendices. It is clear that estimated costs for construction and for operation and maintenance of specific components could not have been calculated and presented in these reports if considerable detail had not been generated. However, during the CMI, much more detail will be added prior to approval of a final design. U.S. EPA will require that specific performance criteria be established for each component of the corrective measures. In conjunction with the performance standards, procedures will be established for evaluating each component's performance and, if the performance is not adequate, an existing contingency plan will be implemented to address the problem identified. If a specific technology is shown to not be effective, the company will be required to implement other technologies, as approved by U.S. EPA.

8. Concern:

US Ecology points out that the Old Site ceased operation before the passage of RCRA and should not be referred to as a RCRA site. [D2,p.14,¶1]

Response:

The US Ecology site is a RCRA hazardous waste disposal facility. A RCRA Part A permit application was submitted by US Ecology for the New Site activities and US Ecology obtained interim status allowing it to operate at this facility. The New Site was operated from 1974 into 1983. The Old Site was operated from 1963 to 1974 prior to passage of RCRA in 1976. However, the wastes disposed of in both disposal sites consist of wastes currently defined as hazardous under RCRA. The Old Site is most correctly called a "solid waste management unit" (SWMU) and both sites are subject to post-closure permit requirements. Releases of hazardous waste or hazardous waste constituents from a permitted facility require remediation under the permit. Under interim status, a corrective action consent order has been used to implement corrective action activities. In this case, U.S. EPA

and US Ecology entered into a Consent Order to address corrective action at this interim status facility.

9. Concern:

One commenter questions the reasons US Ecology purchased 84.5 acres during the period 1985-1987. Did they fear "off-site migration of plume?" [B1,p.4¶3]

Response:

US Ecology has purchased property at various times for at least three different reasons: (1) For remedial investigation studies, including placement of RI monitoring wells (see purchased blocks of property labeled numbers "7" and "10" on Figure 2-2, page 2-6 of the RI report); (2) For creation of a "buffer zone" required under a Consent Order with IDNS (see blocks of property labeled numbers "5," "6," "8," and "9"); and (3) For use as "borrow areas," including clay for the LLRW site cap (see property labeled number "4").

10. Concern:

U.S. EPA's Proposed Plan does not include detailed design and construction information. When a complete remediation plan is developed at a later date, the public should be allowed to comment on this document. [B6,p.II-1,¶2]

Response:

No statutory authority requires U.S. EPA to solicit public participation or comment on the various stages of design under the CMI (i.e., preliminary, intermediate, prefinal, and final) and no guidance or framework has been developed for incorporating public comments or such documents which, by their nature, are draft until approved. However, U.S. EPA will continue to update citizens and send documents to the repository for review as they become available.

11. Concern:

U.S. Ecology is concerned about IEPA's role in overseeing corrective action at the Sheffield sites and that IEPA will impose unnecessarily stringent and unrealistic requirements in this role. [D2,p.12,¶1]

Response:

IEPA has authority to review closure activities at hazardous waste facilities because Illinois has been authorized to carry out these activities in lieu of U.S. EPA in the State of Illinois. U.S. EPA believes that IEPA has responsibility and authority to review

closure activities at the New Site. It is U.S. EPA's understanding that IEPA and US Ecology jointly waived the 90-day review requirement for closure/post-closure plans in 1985. Thus, IEPA will continue to be involved in closure activities for the New Site.

The US Ecology landfills are also subject to a post-closure permit to be issued by IEPA. As of this year (April 1990), IEPA has been authorized to include the corrective action portions of post-closure permits in the permits it issues as an authorized State.

12. Concern:

US Ecology believes that U.S. EPA should take full RCRA jurisdiction over the US Ecology Sheffield sites and that the Agency should declare that corrective action implemented pursuant to the §3008(h) order is equivalent to final closure of the facility. [D2,p.12,¶3]

Response:

It has also been suggested that the Old and New Site should be treated as a corrective action management unit. The basis for this suggestion is the proposed corrective action rule issued on July 20, 1990, at 55 Federal Register 30798. Under this proposal, the Agency has the authority to designate corrective action management units (CAMU) which may contain more than one unit in a contaminated area under certain circumstances. The Agency does not feel it is appropriate to designate these units as a CAMU at the current time. First, the Agency under the proposed regulations has discretion to designate units as CAMUs based on site-specific circumstances. In this case, the old and new units are sufficiently independent of each other such that the Agency feels that they should not be designated as a CAMU. Second, to date, the proposed regulations have not been finalized; and therefore, the process for designating units as CAMUs is not in force at this point. As far as IEPA's jurisdiction over this facility, Illinois is an authorized State for portions of the RCRA program.

RESPONSE TO PUBLIC CONCERN

All of the significant concerns raised by the public were answered as described above. Although the major components of the selected corrective measures are the same as those proposed in the Proposed Plan, several significant details and requirements were amended based on comments received.

1. Several new monitoring wells will be added around the New Site to facilitate detection of any future or presently undetected releases to ground water.

2. Revised ground-water protection standards are included.

3. Ground-water modeling will be required to predict the effect of these corrective measures, once implemented, on the LLRW site.

4. Contingency plans will be developed to negate any potentially adverse effects on the LLRW site which may result during or after implementation of the corrective measures.

5. Performance standards will be required and established for each component of the corrective measures. This will allow for evaluation of the component's effectiveness.

REMAINING CONCERNS

One remaining concern is the request from at least one group of commenters that they be allowed to review and comment on the CMI design details as they are developed prior to implementation of the selected corrective measures. At this time, no mechanism exists to grant this request. Certainly, the community will be provided with updates on the project during the CMI process through citizen letters and documents sent to the repository in Sheffield, Illinois.

DECLARATIONS

It has been determined that the selected remedy being implemented is appropriate and will be protective of human health and the environment.

October 19th, 1990.

Date

Valdas V. Adamkus
Regional Administrator
U.S. Environmental Protection Agency
Region 5

ATTACHMENT I

CORRECTIVE MEASURE IMPLEMENTATION AT US ECOLOGY, INC., SHEFFIELD, ILLINOIS

The purpose of this Corrective Measure Implementation (CMI) program is to design, construct, operate, maintain, and monitor the performance of the corrective measure or measures selected to protect human health and the environment. Respondent will furnish all personnel, materials and services necessary for the implementation of the corrective measure or measures.

I. Corrective Measure Implementation Program Plan

The Respondent shall prepare a Corrective Measure Implementation Program Plan. This program will include the development and implementation of several plans, which require concurrent preparation. It may be necessary to revise plans as the work is performed to focus efforts on a particular problem. The Program Plan includes the following:

A. Program Management Plan

The Respondent shall prepare a Program Management Plan which will document the overall management strategy for performing the design, construction, operation, maintenance and monitoring of corrective measure(s). The plan shall document the responsibility and authority of all organizations and key personnel involved with the implementation. The Program Management Plan will also include a description of qualifications of key personnel directing the Corrective Measure Implementation Program, including contractor personnel.

B. Community Relations Plan

Respondent shall propose a Community Relations Plan, or revise an existing one, to include any changes in the level of concern of information needs to the community during design and construction activities.

1. Specific activities which must be conducted during the design stage are the following:

   a. Revise the facility Community Relations Plan to reflect knowledge of citizen concerns and involvement at this stage of the process; and

   b. Prepare and distribute a public notice and an updated fact sheet at the completion of engineering design.

2. Specific activities to be conducted during the construction stage could be the following: Depending on citizen interest at a facility at this point in the corrective action process,

community relations activities could range from group meetings to fact sheets on the technical status.

C. Data Collection Quality Assurance Plan

The Respondent shall prepare a plan to document all monitoring procedures: sampling, field measurements and sample analysis performed during the design, construction, and operation phases of the corrective measures implementation and the long-term monitoring of the performance of the measures. The plan shall be designed to ensure that all information, data and resulting decisions are technically sound, statistically valid, and properly documented.

1. Data Collection Strategy

The strategy section of the Data Collection Quality Assurance Plan shall include, but not be limited to the following:

a. Description of the intended uses for the data, and the necessary level of precision and accuracy for these intended uses;

b. Description of methods and procedures to be used to assess the precision, accuracy and completeness of the measurement data;

c. Description of the rational used to assure that the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition or an environmental condition. Examples of factors which shall be considered and discussed include:

i. Environmental conditions at the time of sampling;

ii. Number of sampling points;

iii. Representativeness of selected media; and

iv. Representativeness of selected analytical parameters.

d. Description of the measures to be taken to assure that the following data sets can be compared to each other:

i. RFI data generated by the Respondent over some time period;

ii. RFI data generated by an outside laboratory or consultant versus data generated by Respondent;

iii. Data generated by separate consultants or laboratories; and

iv. Data generated by an outside consultant or laboratory over some time period; and

e. Details relating to the schedule of, and information to be provided in quality assurance reports. The reports should include but not be limited to:

i. Periodic assessment of measurement data accuracy, precision, and completeness;

ii. Results of performance audits;

iii. Results of system audits;

iv. Significant quality assurance problems and recommended solutions; and

v. Resolutions of previously stated problems.

2. Sampling

The Sampling section of the Data Collection Quality Assurance Plan shall discuss:

a. Selecting appropriate sampling locations, depths, etc.;

b. Providing a statistically sufficient number of sampling sites;

c. Measuring all necessary ancillary data;

d. Determining conditions under which sampling should be conducted;

e. Determining which media are to be sampled (e.g., ground water, air, soil, sediment, etc.);

f. Determining which parameters are to be measured and where;

g. Selecting the frequency of sampling and length of sampling period;

h. Selecting the types of samples (e.g., composites vs. grabs) and number of samples to be collected;

i. Measures to be taken to prevent contamination of the sampling equipment and cross contamination between sampling points;

j. Documenting field sampling operations and procedures, including:

i. Documentation of procedures for preparation of reagents or supplies which become an integral part of the sample (e.g.,filters, and adsorbing reagents);

ii. Procedures and forms for recording the exact location and specific considerations associated with sample acquisition;

iii. Documentation of specific sample preservation methods;

iv. Calibration of field devices;

v. Collection of replicate samples;

vi. Submission of field-biased blanks, where appropriate;

vii. Potential interferences present at the facility;

viii. Construction materials and techniques, associated with monitoring wells and piezometers;

ix. Field equipment and sample containers listing;

x. Sampling order; and

xi. Decontamination procedures;

k. Selecting appropriate sample containers;

l. Sample preservation; and

m. Chain-of-custody, including:

i. Standardized field tracking reporting forms to establish sample custody in the field prior to shipment and during shipment; and

ii. Pre-prepared sample labels containing all informationnecessary for effective sample tracking.

3. Field Measurements

The Field Measurements section of the Data Collection Quality Assurance Plan shall discuss:

a. Selecting appropriate field measurement locations, depths, etc.;

b. Providing a statistically sufficient number of field measurements;

c. Measuring all necessary ancillary data;

d. Determining conditions under which field measurement should be conducted;

e. Determining which media are to be addressed by appropriate field measurements (e.g., ground water, air, soil, sediment, etc.);

f. Determining which parameters are to be measured and where;

g. Selecting the frequency of field measurement and length of the field measurements period; and

h. Documenting field measurement operations and procedures, including:

i. Procedures and forms for recording raw data and the exact location, time, and facility-specific considerations associated with the data acquisition;

ii. Calibration of field devices;

iii. Collection of replicate measurements;

iv. Submission of field-biased blanks, where appropriate;

v. Potential interference present at the facility;

vi. Construction material and techniques associated with monitoring wells and piezometers used to collect field data;

vii. Field equipment listing;

viii. Order in which field measurements were made; and

ix. Decontamination procedures.

4. Sample Analysis

The Sample Analysis section of the Data Collection Quality Assurance Plan shall specify the following:

a. Chain-of-custody procedures, including:

i. Identification of a responsible party to act as sample custodian at the laboratory, who is

authorized to sign for incoming field samples, obtain documents of shipment, and verify the data entered onto the sample custody records;

ii. Provision for a laboratory sample custody log consisting of serially numbered standard lab-tracking report sheets; and

iii. Specification of laboratory sample custody procedures for sample handling, storage, and dispersion for analysis;

b. Sample storage procedures and storage times;

c. Sample preparation methods;

d. Analytical procedures, including:

i. Scope and application of the procedure;

ii. Sample matrix;

iii. Potential interferences;

iv. Precision and accuracy of the methodology; and

v. Method detection limits;

e. Calibration procedures and frequency;

f. Data reduction, validation and reporting;

g. Internal quality control checks, laboratory performance and system audits and frequency, including:

i. Method blanks;

ii. Laboratory control samples;

iii. Calibration check samples;

iv. Replicate samples;

v. Matrix-spiked samples;

vi. "Blind" quality control samples;

vii. Control charts;

viii. Surrogate samples;

ix. Zero and span gases; and

x. Reagent quality control checks;

h. Preventative maintenance procedures and schedules;

i. Corrective action (for laboratory problems); and

j. Turnaround time.

D. Data Management Plan

The Respondent shall develop and initiate a Data Management Plan to document and track investigation data and results. This plan shall identify and set up data documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents. The plan shall also provide the format to be used to present the raw data and conclusions of the data collected (e.g., ground-water elevations, hydraulic conductivities, permeabilities, analytical data, particle-size analysis, etc.).

1. Data Record

The data record shall include the following:

a. Unique sample or field measurement code;

b. Sampling or field measurement location and sample or measurement type;

c. Sampling or field measurement raw data;

d. Laboratory analysis identification number;

e. Property or component measured; and

f. Result of analysis (e.g., concentration).

2. Tabular Displays

The following data shall be presented in tabular displays:

a. Unsorted (raw) data;

b. Results for each medium, or for each constituent monitored;

c. Data reduction for statistical analysis;

d. Sorting of data by potential stratification factors (e.g., location, soil layer, topography); and

e. Summary data.

3. Graphical Displays

The following data shall be presented in graphical formats (e.g., bar graphs, line graphs, area or plan maps, isopleth plots, cross-sectional plots or transacts, three dimensional graphs, etc.):

a. Display sampling location and sampling grid;

b. Indicate boundaries of sampling area,and areas where more data are required;

c. Displays levels of contamination at each sampling location;

d. Display geographical extent of contamination;

e. Display contamination levels, averages, and maxima;

f. Illustrate changes in concentration in relation to distance from the source, time, depth or other parameters; and

g. Indicate features affecting intramedia transport and show potential receptors.

II. Corrective Measure Design

Respondent shall prepare final construction plans and specifications to implement the corrective measure(s) at the facility as defined in the Corrective Measure Study.

A. Design Plans and Specifications

Respondent shall develop clear and comprehensive design plans and specifications which include, but are not limited to the following:

1. Discussion of the design strategy and the design basis, including:

a. Compliance with all applicable or relevant environmental and public health standards; and

b. Minimization of environmental and public impacts.

2. Discussion of the technical factors of importance including:

a. Use of currently accepted environmental control measures and technology;

b. The constructability of the design; and

c. Use of currently acceptable construction practices and techniques.

3. Description of assumptions made and detailed justification of these assumptions;

4. Discussion of the possible sources of error and references to possible operation and maintenance problems;

5. Detailed drawings of the proposed design including:

a. Qualitative flow sheets; and

b. Quantitative flow sheets.

6. Tables listing equipment and specifications;

7. Tables giving material and energy balances;

8. Appendices including:

a. Sample calculations (one example presented and explained clearly for significant or unique design calculations);

b. Derivation of equations essential to understanding the reports; and

c. Results of laboratory or field tests.

9. Detailed performance standards for each component of the corrective measures and development of procedures to evaluate performance and also contingency plans to address inadequate performance.

B. Operation and Maintenance Plan

Respondent shall prepare an Operation and Maintenance Plan to cover both implementation and long-term maintenance of the corrective measure components. The plan shall be composed of the following elements:

1. Description of normal operation and maintenance (O&M):

a. Description of tasks for operation;

b. Description of tasks for maintenance;

c. Description of prescribed treatment or operation conditions; and

d. Schedule showing frequency of each O&M task;

2. Description of potential operating problems:

   a. Description and analysis of potential operation problems;

   b. Sources of information regarding problems; and

   c. Common and/or anticipated remedies;

3. Description of routine monitoring and laboratory testing:

   a. Description of monitoring tasks;

   b. Description of required laboratory tests and their interpretation;

   c. Required QA/QC; and

   d. Schedule of monitoring frequency and date, if appropriate, when monitoring may cease;

4. Description of alternate O&M:

   a. Should systems fail, alternate procedures to prevent undue hazard; and

   b. Analysis of vulnerability and additional resource requirements should a failure occur;

5. Safety plan:

   a. Description of precautions, of necessary equipment, etc., for site personnel; and

   b. Safety tasks required in event of systems failure;

6. Description of equipment:

   a. Equipment identification;

   b. Installation of monitoring components;

   c. Maintenance of site equipment; and

   d. Replacement schedule for equipment and installed components; and

7. Records and reporting mechanisms required:

   a. Daily operating logs;

b. Laboratory records;

c. Records for operating costs;

d. Mechanism for reporting emergencies;

e. Personnel and maintenance records; and

f. Monthly/annual reports to the Illinois Environmental Protection Agency.

An initial Draft Operation and Maintenance Plan shall be submitted simultaneously with the Prefinal Design Document submission and the Final Operation and Maintenance Plan with the Final Design Documents.

C. Cost Estimate

Respondent shall develop cost estimates for the purpose of assuring that the facility has the financial resources necessary to construct and implement the corrective measure. The cost estimate developed in the Corrective Measure Study shall be refined to reflect the more detailed/accurate design plans and specifications being developed. The cost estimate shall include both capital and operation and maintenance costs.

D. Project Schedule

Respondent shall develop a Project Schedule for construction and implementation of the corrective measure or measures which identifies timing for initiation and completion of all critical path tasks. Respondent shall specifically identify dates for completion of the project and major interim milestones. An Initial Project Schedule shall be submitted simultaneously with the Prefinal Design Document submission and the Final Project Schedule with the Final Design Document.

E. Construction Quality Assurance Objectives

Respondent shall identify and document the objectives and framework for the development of a construction quality assurance program including, but not limited to the following: responsibility and authority; personnel qualifications; inspection activities, sampling requirements; and documentation.

F. Health and Safety Plan

Respondent shall prepare a facility Health and Safety Plan to address the activities to be performed at the facility to implement the corrective measures.

1. Major elements of the Health and Safety Plan shall include:

a. Facility description including availability of resources such as roads, water supply, electricity and telephone service;

b. Describe the known hazards and evaluate the risks associated with the incident and with each activity conducted;

c. List key personnel and alternates responsible for site safety, response operations, and for protection of public health;

d. Delineate work area;

e. Describe levels of protection to be worn by personnel in work area;

f. Establish procedures to control site access;

g. Describe decontamination procedures for personnel and equipment;

h. Establish site emergency procedures;

i. Address emergency medical care for injuries and toxicological problems;

j. Describe requirements for an environmental surveillance program;

k. Specify any routine and special training required for responders; and

l. Establish procedures for protecting workers from weather-related problems.

2. The Facility Health and Safety Plan shall be consistent with:

a. NIOSH Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985);

b. U.S. EPA Order 1440.1 - Respiratory Protection;

c. U.S. EPA Order 1440.3 - Health and Safety Requirements for Employees engaged in Field Activities;

d. Facility Contingency Plan;

e. U.S. EPA Standard Operating Safety Guide (1984);

f. OSHA regulations particularly in 29 CFR 1910 and 1926;

g. State and local regulations; and

h. Other U.S. EPA guidance as provided.

G. Design Phases

The design of the corrective measures should include the phases outlined below.

1. Preliminary design

The Respondent shall submit the preliminary design when the design effort is approximately 30% complete. At this stage the Respondent shall have field verified the existing conditions of the facility. The preliminary design shall reflect a level of effort such that the technical requirements of the project have been addressed and outlined so that they may be reviewed to determine if the final design will provide an operable and usable corrective measure. Supporting data and documentation shall be provided with the design documents defining the functional aspects of the program. The preliminary construction drawings by Respondent shall reflect organization and clarity. The scope of the technical specifications shall be outlined in a manner reflecting the final specifications. The Respondent shall include with the preliminary submission design calculations reflecting the same percentage of completion as the design they support.

2. Intermediate design

Complex project design may necessitate review of the design documents between the preliminary and the prefinal/final design. At the discretion of the Agency, a design review may be required at 60% completion of the project. The intermediate design submittal should include the same elements as the prefinal design.

3. Correlating plans and specifications

General correlation between drawings and technical specifications is a basic requirement of any set of working construction plans and specifications. Before submitting the project specifications the Respondent shall:

a. Coordinate and cross-check the specifications and drawings; and

b. Complete the proofing of the edited specifications and required cross-checking of all drawings and specifications.

These activities shall be completed prior to the 95% prefinal submittal to the Agency.

4. Equipment start-up and operator training

The Respondent shall prepare, and include in the technical specifications governing treatment systems, contractor requirements for providing: appropriate service visits by experienced personnel to supervise the installation, adjustment, start-up and operation of the treatment systems, and training covering appropriate operational procedures once the start-up has been successfully accomplished.

5. Additional studies

Corrective Measure Implementation may require additional studies to supplement the available technical data. At the direction of the Agency for any such studies required, the Respondent shall furnish all services, including field work as required, materials, supplies, plant, labor, equipment, investigations, studies and superintendence. Sufficient sampling, testing an analysis shall be performed to optimize the required treatment and/or disposal operations and systems. There shall be an initial meeting of all principal personnel involved in the development of the program. The purpose will be to discuss objectives, resources, communication channels, role of personnel involved and orientation of the site, etc. The interim report shall present the results of the testing with the recommended treatment or disposal system (including options). A review conference shall be scheduled after the interim report has been reviewed by all interested parties. The final report of the testing shall include all data taken during the testing and a summary of the results of the studies.

6. Prefinal and final design

The Respondent shall submit the prefinal/final design documents in two parts. The first submission shall be at 95% completion of design (i.e., prefinal). After approval of the prefinal submission, the Respondent shall execute the required revisions and submit the final documents 100% complete with reproducible drawings and specifications.

The prefinal design submittal shall consist of the Design Plans and Specifications, Operation and Maintenance Plan, Capital and Operating and Maintenance Cost Estimate, Project Schedule, Quality Assurance Plan and Specifications for the Health and Safety Plan.

The final design submittal shall consist of the Final Design Plans and Specifications (100% complete), the Respondent's

Final Construction Cost Estimate, the Final Operation and Maintenance Plan, Final Quality Assurance Plan, Final Project Schedule and Final Health and Safety Plan specifications. The quality of the design documents should be such that the Respondent would be able to include them in a bid package and invite contractors to submit bids for the construction project.

III. Corrective Measure Construction

Following U.S. EPA approval of the final design, the Respondent shall develop and implement a construction quality assurance (CQA) program to ensure, with a reasonable degree of certainty, that a completed corrective measure(s) meets or exceeds all design criteria, plans and specifications. The CQA plan is a facility specific document which must be submitted to U.S. EPA for approval prior to the start of construction. At a minimum, the CQA plan should include the elements, which are summarized below. Upon U.S. EPA approval of the CQA plan the Respondent shall construct and implement the corrective measures in accordance with the approved design, schedule and the CQA plan. Respondent shall also implement the elements of the approved Operation and Maintenance plan.

A. Responsibility and Authority

The responsibility and authority of all organizations (i.e., technical consultants, construction firms, etc.) and key personnel involved in the construction of the corrective measure shall be described fully in the CQA plan. Respondent must identify a CQA officer and the necessary supporting inspection staff.

B. Construction Quality Assurance Personnel Qualifications

The qualifications of the CQA officer and supporting inspection personnel shall be presented in the CQA plan to demonstrate that they possess the training and experience necessary to fulfill their identified responsibilities.

C. Inspection Activities

The observations and tests that will be used to monitor the construction and/or installation of the components of the corrective measure(s) shall be summarized in the CQA plan. The plan shall include the scope and frequency of each type of inspection. Inspections shall verify compliance with all environmental requirements and include, but not be limited to air quality and emissions monitoring records, waste disposal records (e.g., RCRA transportation manifests), etc. The inspection should also ensure compliance with all health and safety procedures. In addition to oversight inspections, Respondent shall conduct the following activities:

1. Preconstruction inspection and meeting

   Respondent shall conduct a preconstruction inspection and meeting to:

   a. Review methods for documenting and reporting inspection data;

   b. Review methods for distributing and storing documents and reports;

   c. Review work area security and safety protocol;

   d. Discuss any appropriate modifications of the construction quality assurance plan to ensure that site-specific considerations are addressed; and

   e. Conduct a site walk-around to verify that the design criteria, plans, and specifications are understood and to review material and equipment storage locations.

   The preconstruction inspection and meeting shall be documented by a designated person and minutes should be transmitted to all parties.

2. Prefinal inspection

   Upon preliminary project completion Respondent shall notify U.S. EPA for the purposes of conducting an prefinal inspection. The prefinal inspection will consist of a walk-through inspection of the entire project site. The inspection is to determine whether the project is complete and consistent with the contract documents and the U.S. EPA approved corrective measure. Any outstanding construction items discovered during the inspection will be identified and noted. Additionally, treatment equipment will be operationally tested by the Respondent.

   Respondent will certify that the equipment has performed to meet the purpose and intent of the specifications. Retesting will be completed where deficiencies are revealed. The prefinal inspection report should outline the outstanding construction items, actions required to resolve items, completion date for these items, and date for final inspection.

3. Final inspection

   Upon completion of any outstanding construction items, Respondent shall notify U.S. EPA for the purposes of conducting a final inspection. The final inspection will consist of a walk-through inspection of the project site.

The prefinal inspection report will be used as a checklist with the final inspection focusing on the outstanding construction items identified in the prefinal inspection. Confirmation shall be made that outstanding items have been resolved.

D. Sampling Requirements

The sampling activities, sample size, sample locations, frequency of testing, acceptance and rejection criteria, and plans for correcting problems as addressed in the project specifications should be presented in the CQA plan.

E. Documentation

Reporting requirements for CQA activities shall be described in detail the CQA plan. This should include such items as daily summary reports, inspection data sheets, problem identification and corrective measures reports, design acceptance reports, and final documentation. Provisions for the final storage of all records also should be presented in the CQA plan.

IV. Reports

Respondent shall prepare plans, specifications, and reports as set forth in Tasks I through IV of this attachment to document the design, construction, operation, maintenance, and monitoring of the corrective measure. The documentation shall include, but not be limited to the following:

A. Progress

Respondent shall at a minimum provide the U.S. EPA with signed, bimonthly progress reports during the design and construction phases and quarterly progress reports for operation and maintenance activities containing:

1. A description and estimate of the percentage of the CMI completed;

2. Summaries of all findings;

3. Summaries of all changes made in the CMI during the reporting period;

4. Summaries of all contacts with representative of the local community, public interest groups or State government during the reporting period;

5. Summaries of all problems or potential problems encountered during the reporting period;

6. Actions being taken to rectify problems;

7. Changes in personnel during the reporting period;

8. Projected work for the next reporting period; and

9. Copies of daily reports, inspection reports, laboratory/monitoring data, etc.

B. Draft

1. Respondent shall submit a draft Corrective Measure Implementation Program Plan, etc. as outlined in Task I of this attachment;

2. Respondent shall submit draft Construction Plans and Specifications, Design Reports, Cost Estimates, Schedules, Operation and Maintenance plans, and Study Reports as outlined in Task II of this attachment;

3. Respondent shall submit a draft Construction Quality Assurance Program Plan and Documentation as outlined in Task III of this attachment; and

4. At the "completion" of the construction of the project, the Respondent shall submit a Corrective Measure Implementation Report to U.S. EPA. The Report shall document that the project is consistent with the design specifications, and that the corrective measure is performing adequately. The Report shall include, but not be limited to the following elements:

   a. Synopsis of the corrective measure and certification of the design and construction;

   b. Explanation of any modifications to the plans and why these were necessary for the project;

   c. Listing of the criteria established before the corrective measure was initiated, for judging the functioning of the corrective measure and also explaining any modification to these criteria;

   d. Results of facility monitoring, indicating that the corrective measure will meet or exceed the performance criteria; and

   e. Explanation of the operation and maintenance (including monitoring) to be undertaken at the facility.

   This report should include inspection summary reports, inspection data sheets, problem identification and corrective

measure reports, block valuation reports, photographic reporting data sheets, design engineers' acceptance reports, deviations from design and material specifications (with justifying documentation) and as-built drawings.

C. Final

Respondent shall finalize the Corrective Measure Implementation Program Plan, Construction Plans and Specifications, Design Reports, Cost Estimates, Project Schedule, Operation and Maintenance Plan, Study Reports, Construction Quality Assurance Program Plan/Documentation and the Corrective Measure Implementation Report incorporating comments received on draft submissions.

Facility Submission Summary

A summary of the information reporting requirements contained in the Corrective Measures Implementation Scope of Work is presented below.

Facility Submission	Due Date
Draft Program Plan Community Relations Plan and Data Collection and Data Management Plans (Task I)	45 days after submittal of the final CMS report
Final Program Plan Community Relations Plan, and Data Collection and Data Management Plant (Task I)	30 days after receipt of U.S. EPA comments on these Draft Plans
Design Phases (Task II A)	
- Preliminary Design (30% completion)	30 days after submittal of Final Program Plan
- Intermediate Design (60% completion)	60 days after approval of Preliminary Design
- Prefinal Design (95% completion)	90 day after approval of Intermediate Design
- Final Design (100% completion)	14 days after approval of Prefinal Design
(Task II B through G)	
- Draft Submittals	Concurrent with Prefinal Design
- Final Submittals	Concurrent with Final Design
Additional Studies: Interim Report (Task II F)	(Due date established prior to Final Design)
Additional Studies: Final Report (Task II F)	30 days after receipt of U.S. EPA comments on Interim Report
Draft Construction Quality Assurance Plan (Task III)	Prior to construction
Final Construction Quality Assurance Plan (Task III)	30 days after U.S. EPA comments on Construction Quality Assurance Plan