

915066

**REMEDIAL DESIGN AND REMEDIAL ACTION
WORK PLAN**

**NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION INACTIVE
HAZARDOUS WASTE SITE NO. 9-15-066**

Prepared for

**RESPONDENTS FOR NYSDEC ORDER ON
CONSENT AND SETTLEMENT AGREEMENT
INDEX NO. 89-0381-91-08
Cheektowaga, New York**

April 3, 1998



**ICF KAISER ENGINEERS CORPORATION
Gateway View Plaza
1600 W. Carson Street
Pittsburgh, Pennsylvania 15219**

REMEDIAL DESIGN AND REMEDIAL ACTION WORK PLAN

NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066 CHEEKTOWAGA, NEW YORK

This Remedial Design and Remedial Action Work Plan (RD/RA Work Plan) identifies the tasks to be performed to complete the remedial design and remedial action at New York State Department of Environmental Conservation (NYSDEC) Inactive Hazardous Waste Site No. 9-15-066 in Cheektowaga, New York (Site).

In addition to the plans indicated below, the following documents prepared by Blasland, Bouck & Lee, Inc., are incorporated, by reference, into this Statement of Work:

- The March 1996 *Pre-Design Investigation Health and Safety Plan*,
- The March 1996 *Pre-Design Investigation Work Plan*, and
- The July 1996 *Pre-Design Investigation Summary Report*.

I. PRE-DESIGN EVALUATIONS

Pre-design evaluations will be conducted as follows:

- A storm sewer evaluation to assess the modifications necessary for storm sewer system use as a shallow groundwater collection system,
- A storm sewer discharge quality evaluation to assess groundwater treatment system requirements,
- A sample collection and analysis program to confirm the limits of U-Crest Ditch sediment removal and to characterize these materials for treatment and/or disposal,
- A test boring program to develop the geotechnical data needed to predict the stability of soil excavation sidewalls, and
- An evaluation to identify remedial action permit requirements (substantive requirements) and compliance issues.

The following plans provide the protocols necessary to conduct pre-design evaluations and other field activities prefatory to remedial design and remedial action:

- *Pre-Design Evaluation Work Plan*,
- *Health and Safety Plan*,
- *Community Air Monitoring Plan*, and
- *Quality Assurance Project Plan*.

These plans are incorporated into this RD/RA Work Plan as Appendices A through D, respectively.

Pre-design evaluations will be initiated within 30 days of the effective date of the Consent Order.

II. REMEDIAL DESIGN

Within 60 days of completion of the pre-design evaluations (including all laboratory analyses and engineering evaluations), the pre-final (90-percent) remedial design documents will be submitted to NYSDEC for review. Upon NYSDEC completion of review of the 90-percent remedial design, the final (100-percent) remedial design documents will be completed, addressing NYSDEC comments on the pre-final remedial design.

Remedial design documents include the following (see annotated tables of contents, Appendix E):

- Sediment Removal, Stabilization and Disposal Plan,
- Soil Removal, Treatment and Backfilling Plan,
- Storm Sewer Closure and Augmentation Plan,
- Groundwater Collection and Permanent Treatment Plant Plans and Specifications (if necessary),
- Permanent Groundwater Treatment Plant Start-Up Plan (if necessary),
- Construction Quality Assurance Plan,
- Erosion and Sedimentation Control Plan,
- Release Contingency Plan ,
- Citizen Participation Plan,
- Groundwater Monitoring Plan,
- Updated Health and Safety Plan (as required), and
- Tentative Remedial Action Schedule.

III. REMEDIAL ACTION

Within 30 days of NYSDEC approval of the final remedial design documents, the final remedial action schedule will be submitted to NYSDEC. Remedial action work will then commence and proceed in accordance with the final remedial action schedule and the final remedial design documents.

Concurrent with start-up of the permanent groundwater treatment plant (if necessary), the draft Groundwater Collection and Permanent Treatment Plant Operations and Maintenance Manual (O&M Manual) (if necessary; see annotated table of contents, Appendix E) will be submitted to the NYSDEC for review. Upon NYSDEC review of the draft O&M Manual, the O&M Manual will be finalized by addressing NYSDEC comments.

IV. SCHEDULE

Assuming that the Consent Order is in place in time for pre-design evaluation field activities to be conducted without adverse impacts due to either winter weather conditions or Site demolition activities (by others), the following calendar-days schedule applies to this RD/RA Work Plan.

Order on Consent Entry	Day 0
Initiate Pre-Design Evaluations	Day 30
Complete Pre-Design Evaluations	Day 70
Submit Pre-Final Remedial Design to NYSDEC	Day 125
NYSDEC Completion of Review (Pre-Final Remedial Design)	Day 125 plus X
Submit Final Remedial Design to NYSDEC	Day 155 plus X
NYSDEC Approval of Final Remedial Design	Y
Submit Final Remedial Action Schedule to NYSDEC	Day 155 plus X plus Y plus 7 days

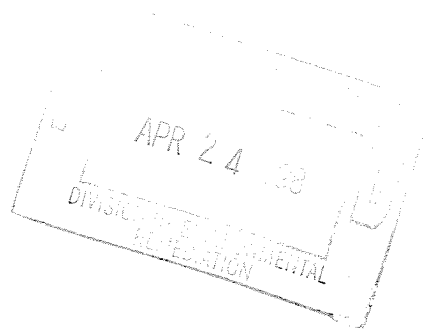
"X" and "Y" are NYSDEC review periods, in days, for the pre-final remedial design and the final remedial design, respectively.

Should winter weather conditions or Site demolition activities (by others) adversely impact pre-design evaluation field activities, a revised schedule, mutually agreeable to NYSDEC and the Respondents for NYSDEC Order on Consent and Settlement Agreement Index No. 89-0381-91-08, will be established.

V. APPENDICES

The following appendices are incorporated into this RD/RA Work Plan:

- Appendix A Pre-Design Evaluation Work Plan,
- Appendix B Health and Safety Plan,
- Appendix C Community Air Monitoring Plan,
- Appendix D Quality Assurance Project Plan,
- Appendix E Tables of Contents for Remedial Design Documents.



REMEDIAL DESIGN AND REMEDIAL ACTION WORK PLAN

**NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION INACTIVE
HAZARDOUS WASTE SITE NO. 9-15-066**

CHEEKTOWAGA, NEW YORK

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Prepared by
ICF Kaiser Engineers Corporation
Pittsburgh, Pennsylvania

Prepared for
Respondents for NYSDEC Order on Consent and Settlement Agreement
Index No. 89-0381-91-08



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APPENDIX A

PRE-DESIGN EVALUATION WORK PLAN

**NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066
CHEEKTOWAGA, NEW YORK**

PRE-DESIGN EVALUATION WORK PLAN

NYSDEC INACTIVE HAZARDOUS WASTE SITE No. 9-15-066
CHEEKTOWAGA, NEW YORK

April 3, 1998

Prepared for
Respondents for NYSDEC Order on Consent and Settlement Agreement
Index No. 89-0381-91-08

Prepared by
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Pittsburgh, Pennsylvania

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LIST OF ACRONYMS AND ABBREVIATIONS

ASTM	American Society for Testing and Materials
BACA	Buffalo Airport Center Associates
CAMP	Community Air Monitoring Plan
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	Chain-of Custody
ECIDA	Erie County Industrial Development Agency
HASP	Health and Safety Plan
ICF Kaiser	ICF Kaiser Engineers Corporation
NFTA	Niagara Frontier Transportation Authority
NYCRR	Official Compilation of Codes, Rules, and Regulations of the State of New York
NYSDEC	New York State Department of Environmental Conservation
OSWER	Office of Solid Waste and Emergency Response
OU1	Operable Unit 1
OU2	Operable Unit 2
PCBs	Polychlorinated biphenyls
PDWP	Pre-Design Evaluation Work Plan
PPE	personal protection equipment
PVC	polyvinyl chloride
QAPP	Quality Assurance Project Plan
QC	Quality control
RA	remedial action
RCRA	Resource Conservation and Recovery Act
RD	remedial design
Respondents	Respondents for NYSDEC Order on Consent and Settlement Agreement
RI	remedial investigation
ROD1	March 1995 Record of Decision
ROD2	December 1995 Record of Decision
Site	Inactive Hazardous Waste Site No. 9-15-066 in Cheektowaga, New York
SPOTS	Spill Prevention Operations Technology Series
SVOCs	semi-volatile organic compounds
TAGM	Technical Administrative Guidance Memoranda
TCLP	toxicity characteristic leaching procedure
TOGS	Technical and Operational Guidance Series
U-Crest Ditch	non-contiguous, surface water channel
USEPA	United States Environmental Protection Agency
VOCs	volatile organic compounds
Westinghouse	Westinghouse Electric Corporation

1.0 INTRODUCTION

This Pre-Design Evaluation Work Plan (PDWP) has been prepared by ICF Kaiser Engineers Corporation (ICF Kaiser) on behalf of the Respondents for New York State Department of Environmental Conservation (NYSDEC) Order on Consent and Settlement Agreement, Index No. 89-0381-91-08 (Respondents) for remedial action (RA) at NYSDEC Inactive Hazardous Waste Site No. 9-15-066 in Cheektowaga, New York (Site). Supplementing the information provided in existing Site documents, implementation of the PDWP will provide the data necessary to complete remedial design (RD) activities consistent with both the March 1995 Record of Decision (ROD1) and the December 1995 Record of Decision (ROD2).

Combining Operable Unit 1 (OU1) and Operable Unit 2 (OU2), the PDWP [in conjunction with the Health and Safety Plan (HASP) (ICF Kaiser, 1998a), the Community Air Monitoring Plan (CAMP) (ICF Kaiser, 1998b), and the Quality Assurance Project Plan (ICF Kaiser, 1998c) (QAPP)] documents the protocols necessary to complete the following Site evaluations:

- Storm sewer evaluation,
- Groundwater treatment system data collection,
- U-Crest Ditch evaluation,
- Soil excavation evaluation, and
- Permit and compliance evaluation.

Following this Introduction, Section 2 describes pre-design evaluation activities, Section 3 documents pre-design evaluation protocols, and Section 4 presents the anticipated pre-design evaluation schedule.

1.1 SITE DESCRIPTION SUMMARY

Inactive Hazardous Waste Site No. 9-15-066 is located at 4454 Genesee Street in Cheektowaga, New York (Figure 1-1). The Site is bordered to the north and west by the Greater Buffalo International Airport, to the south by Genesee Street, and to the east by Holtz Drive. A non-contiguous, surface water channel (U-Crest Ditch) receives storm water from the Site via two outfall discharges. Both the Site and the U-Crest Ditch, which is located on the opposite side of Genesee Street, are located in a mixed setting of commercial and industrial properties.

The 143-acre Site includes an abandoned 2.5 million square-foot manufacturing building, several smaller buildings, large areas of paved ground surface, and the Flying Tigers Restaurant. With the exception of the restaurant, located in the northern extreme of the Site, the Site is inactive and surrounded by chain-link fencing.

1.2 SITE HISTORY SUMMARY

The Site was developed in the early 1940s by the United States Government for the manufacture of military aircraft, and a large plant building¹, approximately 2.5 million square feet, and various ancillary structures were constructed for this purpose. Curtiss-Wright Corporation operated this plant until 1945. In 1946,

¹ Now referred to as the "abandoned manufacturing building."

Westinghouse Electric Corporation (Westinghouse) purchased the Site from the United States Government and converted the plant for the manufacture of electric motors and related electrical components.

In 1964 and 1984, Westinghouse sold two parcels at the northern tip of the Site, to what is known today as the Niagara Frontier Transportation Authority (NFTA). In 1984, Westinghouse sold the remainder of the Site to an individual who, in 1985, assigned his rights to this property to the Erie County Industrial Development Agency (ECIDA). ECIDA subsequently entered into a lease-purchase agreement for the property with Buffalo Airport Center Associates (BACA).

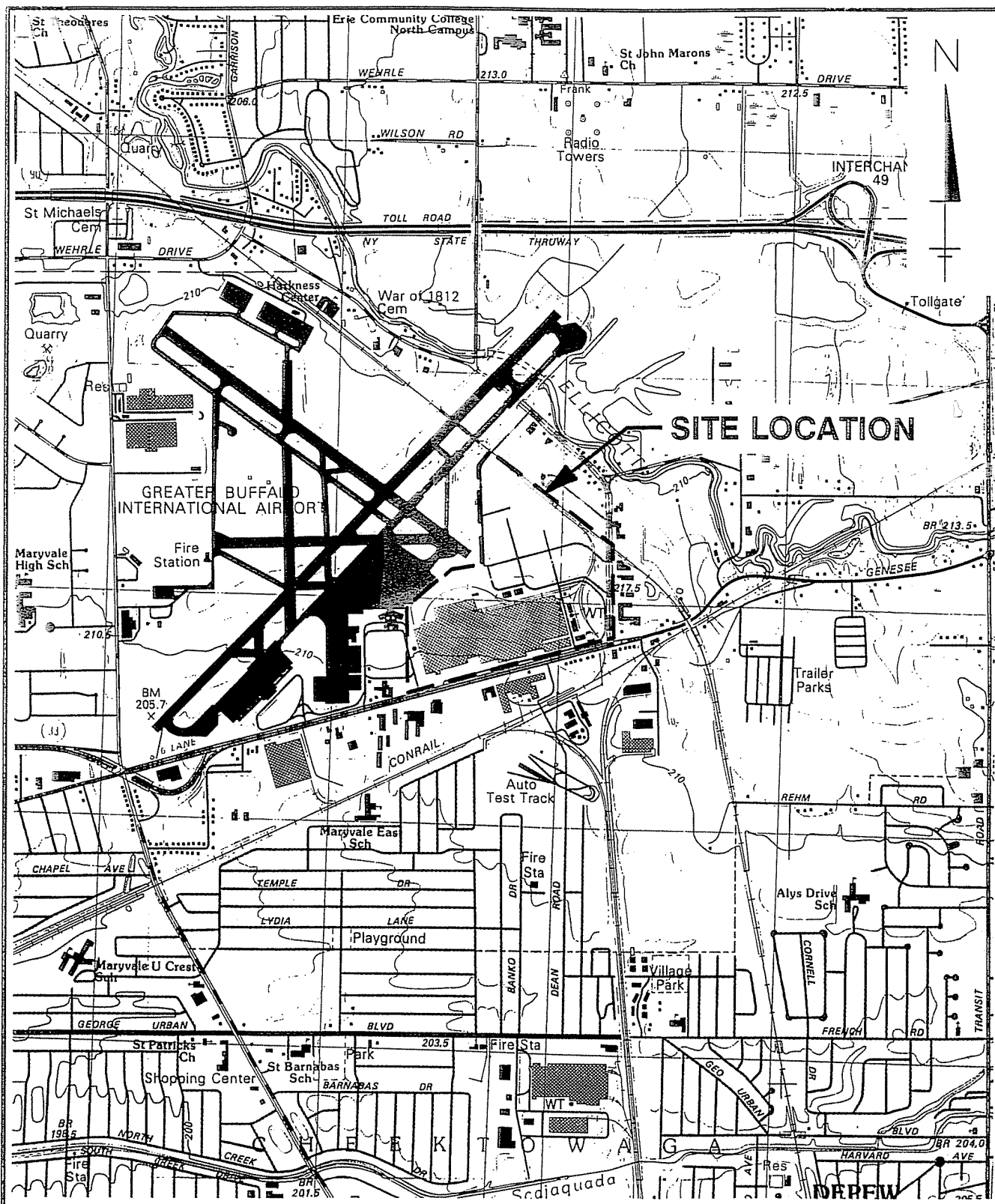
After selling the Site, Westinghouse continued to lease a small portion of the plant; while other plant areas were leased by BACA to third parties for various manufacturing and warehousing operations. The Site was vacated in 1991, and, except for some removal actions undertaken by BACA and the NYSDEC remedial investigations (RI), the Site has been unoccupied since that time.

NFTA is currently expanding the Buffalo International Airport. These airport expansion plans call for acquisition of the Site, demolition of Site buildings, and use of Site land for taxi-ways and runway clear zones.

In 1985 and 1986 a NYSDEC Phase I Investigation was conducted at the Site. That investigation triggered a series of assessments and evaluations that led to the RD/RA process. Abandoned Site structures are scheduled for demolition in 1998. RA activities, planned for both the Site and the U-Crest Ditch, will be coordinated with demolition activities as needed.

Figure 1-2² shows a layout of the Site.

² The excavation areas shown on Figure 1-2 are approximate only. Refer to Section 3.4 and Figures 3 through 9 of the July 1996 *Pre-Design Investigation Summary Report* by Blasland, Bouck & Lee, Inc., for explicit excavation area limits.



SITE LOCATION

FIGURE 1-1

ICF KAISER ENGINEERS

NYSDEC INACTIVE HAZARDOUS WASTE
SITE 9-15-066 - CHEEKTOWAGA, N.Y.

SITE LOCATION MAP

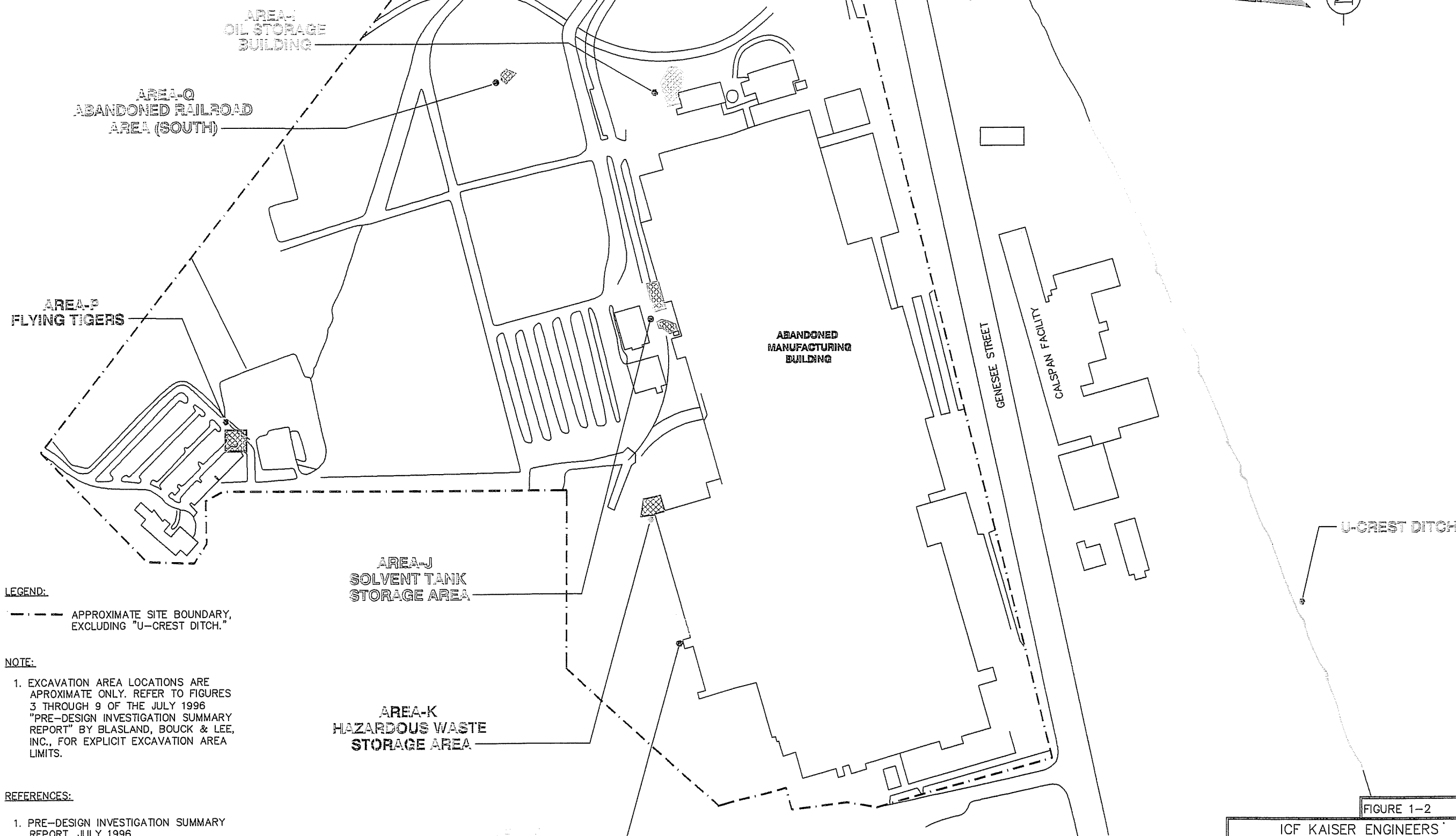
DATE: 10/17/97

DR.: D. EVANS

SCALE: AS SHOWN

FILE NAME: 90151002

REFERENCE: LANCASTER, N.Y. USGS QUAD. 1982



LEGEND:

--- APPROXIMATE SITE BOUNDARY, EXCLUDING "U-CREST DITCH."

NOTE:

1. EXCAVATION AREA LOCATIONS ARE APPROXIMATE ONLY. REFER TO FIGURES 3 THROUGH 9 OF THE JULY 1996 "PRE-DESIGN INVESTIGATION SUMMARY REPORT" BY BLASLAND, BOUCK & LEE, INC., FOR EXPLICIT EXCAVATION AREA LIMITS.

REFERENCES:

1. PRE-DESIGN INVESTIGATION SUMMARY REPORT, JULY 1996.
2. REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT, VOLUME 1: REMEDIAL INVESTIGATION REPORT (TEXT) SEPTEMBER, 1994 (DUNN ENGINEERING COMPANY).

0' 150' 300'
 SCALE: 1" = 150'

FIGURE 1-2

ICF KAISER ENGINEERS	
NYSDEC INACTIVE HAZARDOUS WASTE SITE 9-15-066 - CHEEKTOWAGA, N.Y.	
SITE LAYOUT PLAN	
DATE: 10/17/97	DR.: B. SNYDER
SCALE: AS SHOWN	FILE NAME: 20153003

2.0 EVALUATION ACTIVITIES

Pre-design evaluations will be conducted concurrent with initial RD and prior to RA. Consistent with the evaluations listed in Section 1.0, above, five pre-design tasks have been established. Tasks descriptions are provided below. Task protocols are documented in Section 3.

2.1 TASK 1: STORM SEWER EVALUATION

An evaluation of the storm sewer system beneath the abandoned manufacturing building will be conducted. The evaluation will assess the modifications needed to use existing storm sewers as a shallow groundwater collection system and to predict the effectiveness of the system for this purpose.

The storm sewer evaluation will consist of:

- Reviewing the existing storm sewer information and survey video,
- Surveying storm sewer manhole elevations and locations,
- Measuring groundwater elevations,
- Sealing surface storm sewer inlets, and
- Smoke testing to assess storm sewer piping and inlet seals integrity.

Existing Data Review

Existing storm sewer data include sewer diagrams, construction history, video survey(s), outfall sediment data, outfall discharge quantity data, and outfall discharge quality data. These data sources will be reviewed to obtain the following information:

- The lateral extent of the storm sewer system,
- Construction materials of the storm sewers,
- The physical condition of the storm sewers,
- The amount of sediment contained in the storm sewer system, and
- Evidence of groundwater infiltration.

Storm Sewer Survey

A comprehensive survey of the storm sewer manholes and inverts will be performed by a New York State licensed surveyor. The manholes and inverts will be surveyed to the nearest 0.01 foot vertically and 0.1 foot horizontally and will be tied into a Site coordinate system. This information will be used to correlate the location of subsurface storm sewer components with the surface of the shallow groundwater table. The resulting data, when combined with Site-specific groundwater elevation data, will indicate which portions of the existing storm water system will be augmented to enhance groundwater infiltration and which portions will be permanently sealed (i.e., those portions of the existing storm sewer system that are above the seasonal high groundwater table). Specifically, the survey will establish:

- Manhole construction (concrete, brick, etc.)
- Horizontal location of the Site manholes,

- Elevations of manhole tops and bottoms,
- Elevations of manhole pipe inverts,
- Diameters and alignments of manhole pipes, and
- The current condition of each manhole and its associated visible piping,

During the survey, storm sewer inlets will be field-marked and documented.

Groundwater Elevation Measurements

Concurrent with the storm sewer survey, data will be collected so that historic Site groundwater elevations can be compared with those of existing storm sewer system components. Specifically, the locations and elevations of at least two existing monitoring wells will be re-surveyed (vertical control only) to confirm the accuracy of the existing monitoring well survey. The newly surveyed locations and elevations will be compared to the previously existing RI data to assess differences. Any significant differences will be reconciled by additional survey work as needed. Additionally, groundwater elevation data will be obtained from shallow groundwater monitoring wells proximate to the abandoned manufacturing building. This information will be used as a baseline groundwater condition to compare to historical data showing seasonal groundwater high and low elevations. This information will then be used to help assess which portions of the existing storm sewer system will be augmented to enhance groundwater infiltration and which portions will be permanently sealed.

Surface Inlets Sealing³

Storm sewer inlets will be sealed at the surface to prevent precipitation and runoff from directly entering the storm sewer system. Sealing inlets will reduce Site discharges to the U-Crest Ditch and allow data to be collected regarding the current rate of groundwater infiltration to the existing (un-augmented) storm sewer system.

Sealing methods for storm sewer inlets will vary according to diameter and material type. Small diameter inlets (6 inches or less in diameter) will be sealed with low-slump concrete, steel caps, or polyvinyl chloride (PVC) caps. Medium diameter inlets (7 inches to 18 inches in diameter) will be sealed with low-slump concrete. Large diameter inlets (19 inches and larger in diameter) will be sealed with low-slump concrete in combination with bricks or pre-fit concrete plugs to fill voids. For irregularly shaped inlets, the most appropriate method listed above will be selected. Inlet seals will be constructed of materials designed for a 30-year operational life.

Smoke Testing⁴

Smoke testing of the existing storm sewer system will be performed following the completion of surface inlets sealing activities. Smoke testing will be used to confirm that surface inlets have been sealed as needed. The locations of sealed inlets within an individual smoke test area (several smoke test areas within are anticipated) will be marked and identified using survey flags to facilitate rapid identification during subsequent smoke testing. Smoke testing will be conducted on calm, relatively wind-free days to facilitate rapid identification of fugitive smoke emissions. In addition, smoke testing activities will be coordinated

³ Should Site demolition work (by others) conflict with or prevent the sealing of inlets during pre-design evaluations, storm sewer inlets will be sealed during remedial action.

⁴ Should Site demolition work (by others) conflict with or prevent the sealing of inlets during pre-design evaluations, smoke testing will be conducted during remedial action, following storm sewer inlet sealing.

through Buffalo International Airport authorities and others (i.e., the local fire department) so that fugitive smoke is not identified by others as an indication of a fire.

Following final notifications to Buffalo International Airport authorities and others as appropriate, a smoke generation device capable of producing an extended cloud of durable smoke⁵ will be placed in a down-line manhole in the region of the storm sewer to be tested. The outfall (downgradient) side of the manhole will be temporarily blocked using either a flexible bladder or plywood barrier to isolate the upgradient piping and force smoke to migrate only upgradient. A portable positive displacement blower will be placed next to the manhole with flexible ductwork piped into the manhole. The manhole entrance with the ductwork will be sealed off using a plywood cover. The smoke generation device will be activated and the blower turned on. Following the recommended time for smoke dispersal specified by the manufacturer, the pre-marked locations will be visually surveyed to assess if an entry point to the storm sewers exists by the eminence of the smoke. This inspection will be recorded in the field logbook for later evaluation. Following examination of the pre-marked locations, a visual survey of the entire storm sewer region undergoing testing will also be performed. Additional entry points into the storm sewer system identified by the eminence of smoke will be marked and recorded in the field logbook.

Following testing of the storm sewer system beneath the abandoned manufacturing building, smoke test data will be reviewed and surface inlets which exhibited fugitive smoke emissions will be sealed or resealed. Smoke testing and surface inlet sealing will continue until the storm sewer is shown to exhibit no surface entry points or until it is determined that sealing individual surface inlets is an ineffective method of preventing precipitation from directly entering the existing storm sewer system.

2.2 TASK 2: GROUNDWATER TREATMENT PLANT DATA COLLECTION

In accordance with ROD2, a permanent groundwater treatment plant may be constructed to treat the discharge from the augmented storm sewer system beneath the abandoned manufacturing building (i.e., the shallow groundwater collection system). To properly design this treatment plant, both its influent flow rate and chemical characteristics must be defined. Combined with shallow Site groundwater flow data, storm sewer outfall monitoring will be used to assess these parameters.

Storm Sewer Monitoring

Monitoring of the storm sewers will be accomplished using the existing gaging stations located at each of the three storm sewer outfalls. The gaging stations will be reconstructed, as necessary (e.g., installation of weirs), and/or re-calibrated to read discharge levels and flows following plugging of the storm sewer inlets and isolation of the storm sewers from surface water drainage. The gaging stations will be allowed to continue to monitor outfall discharge until the permanent groundwater treatment plant design is finalized. By documenting these data, design influent rates to the permanent groundwater treatment plant can be more fully assessed.

⁵ The volume of smoke generated during each smoke test will be proportional to the size of the sealed storm sewer section being tested. If possible, smoke will be initially be introduced slowly or introduced in successively larger volumes until the total test volume has been released. These protocols should minimize the potential for and amount of fugitive smoke emissions.

Storm Sewer Sampling⁶

Storm sewer sediment and infiltration water samples will be collected to classify the expected discharge from the augmented storm sewer system. Samples will be collected from each of the three existing outfall lines, with two water samples and one sediment sample being collected from each outfall drainage line. For each outfall, a water and sediment sample will be collected from the final manhole before the outfall line begins and one additional sample will be collected at an upstream manhole location from the final manhole.

Both sediment and infiltration water samples will be analyzed for the following constituents:

- Metals,
- Volatile organic compounds,
- Semi-volatile organic compounds, and
- Polychlorinated biphenyls (PCBs).

In addition, infiltration water samples will be analyzed for:

- Major cations and anions,
- Total organic carbon,
- Total dissolved solids,
- Total suspended solids,
- Alkalinity, and
- pH.

With the acquisition of these data, constituent loadings to the permanent groundwater treatment plant can be more fully assessed.

2.3 TASK 3: U-CREST DITCH EVALUATION

The U-Crest Ditch sediments will be measured and sampled to determine the volume and constituent characteristics of the affected material. The sediment (and underlying soil, if applicable) will be sampled every 50 feet along the ROD2-specified reach⁷. To minimize the potential for cross-contamination of samples, sediment sample collection will begin at the extreme downstream location and proceed upstream. Samples will initially be collected at 49 locations and expanded if needed. Sediment sample collection locations will be noted in a field log so that they can be re-established during RA. Stationing from existing permanent or semi-permanent manmade features (e.g., utility poles, culverts, bridge trestle, etc.) will be used to identify and document sediment sample collection locations.

⁶ Should Site demolition work (by others) conflict with or prevent the sealing of inlets during pre-design evaluations, storm sewer sampling will be conducted on days with minimal surface water infiltration into the storm sewers.

⁷ The approximate reach of the U-Crest Ditch that requires remedial action is defined in Section 3.4.7 and Figure 9 of the July 1996 *Pre-Design Investigation Summary Report* by Blasland, Bouck & Lee, Inc.

It is assumed that the quality of the upper 6" of sediment⁸ along the ROD2-specified reach of the U-Crest Ditch exceeds ROD2 remedial objectives. With two exceptions, therefore, sediment samples collected from 0" to 6" below the sediment surface only need to be evaluated to assess their disposal disposition. At each sediment sample collection location, one grab sample will be collected from 0" to 6" below the sediment surface. Of these forty-nine 0" to 6" sediment samples, the inner 47 will be grouped by location and combined into nine composite samples. The most upstream sediment grab sample and the most downstream sediment grab sample will not be composited; they will remain discrete samples that will be used to confirm the horizontal limits of the U-Crest Ditch reach that requires RA. The nine composite sediment samples will be analyzed for disposal disposition parameters [e.g., PCBs, toxicity characteristic leaching procedure (TCLP) volatile organic compounds (VOCs), TCLP semi-volatile organic compounds (SVOCs), and TCLP Resource Conservation and Recovery Act (RCRA) metals]. The two discrete sediment samples will be analyzed for ROD-specified remedial objective parameters⁹. Analysis results of the nine composite samples collected from 0" to 6" below the sediment surface will determine the disposal disposition of all U-Crest Ditch sediments that require excavation (i.e., whether the sediments require disposal as characteristic hazardous waste, PCB waste, or non-hazardous waste.) The analysis results of the two discrete samples collected from 0" to 6" below the sediment surface will determine whether additional upstream or downstream samples need to be collected. Should the quality of the sediment within the two discrete grab samples meet ROD2 remedial objectives, the horizontal limits of the U-Crest Ditch reach that require RA (as established in the July 1996 *Pre-Design Investigation Summary Report*) will have been confirmed and no additional sample collection locations will be needed. Should the quality of the sediment within the two discrete grab samples collected from 0" to 6" below the sediment surface exceed ROD2 remedial objectives, additional sediment sample collection locations will be established on 50-foot centers (upstream and/or downstream, as appropriate). These additional sample collection locations will be added to the original 49 locations for subsequent discrete sample collection and analyses as described below for 6" to 12" samples and 12" to 18" samples¹⁰.

If the sediment thickness at an individual sample collection location (i.e., the original 49 plus others as appropriate) exceeds 12", a second sediment grab sample will be collected from that location at a depth of 6" to 12" to assess if the sediments at that location and depth meet ROD2 remedial objectives. These discrete 6" to 12" sediment grab samples will each be analyzed for ROD-specified remedial objective parameters. Sample analytical results will be used to pre-determine sediment excavation depths along the reach of the U-Crest Ditch that requires RA. The collection and analysis of these discrete samples will preclude the need for confirmatory sediment sample collection during U-Crest Ditch remedial activities.

If the sediment thickness at an individual sample collection location exceeds 18", a third sediment grab sample will be collected at a depth of 12" to 18" (or 12" to 24", if the sediment depth at an individual sample collection allows) to assess if the sediments at that location and depth meet ROD2 remedial objectives. Should the corresponding, overlying 6" to 12" discrete sediment grab sample exceed the ROD2 remedial objectives, the discrete 12" to 18" sediment grab sample from that individual location will be analyzed for ROD-specified remedial objective parameters. As with the discrete 6" to 12" sediment

⁸ For the purposes of remedial action, U-Crest Ditch sediments are defined as unconsolidated materials within the normal high stage level of the channel.

⁹ Throughout pre-design evaluations and remedial action, when analyzing soil, sediment or water samples for organic compounds, all compounds quantified using the specified analytical method will be reported.

¹⁰ Additional upstream and downstream sediment sample collection locations will be added as needed to establish the horizontal limits of the U-Crest Ditch reach that require remedial action.

samples, the analysis results from these discrete samples will be used to pre-determine sediment excavation depths along the reach of the U-Crest Ditch that requires RA.

2.4 TASK 4: SOIL EXCAVATION EVALUATION

No soil samples will be collected for analytical analyses during pre-design evaluations. The vertical and horizontal limits of the six soil excavation areas (Areas I, J, K, M, P, and Q) are already defined¹¹.

Geotechnical soil samples will be collected from Areas I and P to provide data on deep excavation stability relative to pending soil excavation activities. At least one geotechnical test boring will be drilled at both Areas I and P, the deepest of the pending soil excavation areas. Five Shelby tubes samples will be collected from each geotechnical test boring at 5, 10, 15, 20 and 25 feet below ground surface (ft-bgs). Two of the Shelby tube samples will be selected for direct shear testing. The remaining three Shelby Tube samples will be archived for back-up or verification purposes. Test borings will be abandoned (backfilled with drill cuttings and grout as necessary to completely fill the borehole) immediately following the collection of the deepest sample.

2.5 TASK 5: PERMIT AND COMPLIANCE EVALUATION

As the inactive sites regulations contained in the Official Compilation of Codes, Rules, and Regulations of the State of New York (NYCRR) 375-1.7 provide, on-site actions are exempt from permits but require substantive compliance with the regulations. For on-Site actions, work will include evaluating pertinent Federal and New York regulations and guidance to assist in work plan development so that subsequent field activities are performed in substantive compliance with the same. Guidance documents that will be consulted include, but are not limited to, the following:

- Guidance prepared by the United States Environmental Protection Agency (USEPA), particularly Office of Solid Waste and Emergency Response (OSWER) Directives, prepared under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the RCRA; and
- New York guidance prepared under various programs including:
 - Technical Administrative Guidance Memoranda (TAGM) prepared by the Division of Solid and Hazardous Materials,
 - Spill Prevention Operations Technology Series (SPOTS) memoranda, which pertain to petroleum storage tanks and chemical bulk storage facilities,
 - TAGM prepared by the Division of Environmental Remediation,
 - Air Guides and Air Program Memo Series prepared by the Division of Air,
 - Enforcement Directives prepared by the Division of Environmental Enforcement, and
 - Technical and Operational Guidance Series (TOGS) prepared by the Division of Water.

¹¹ Refer to Section 3.4 and Figures 3 through 9 of the July 1996 *Pre-Design Investigation Summary Report* by Blasland, Bouck & Lee, Inc., for explicit excavation area limits.

For off-Site actions, the permit and compliance evaluation will also include evaluating regulations and guidances. Necessary permits will be identified, and the type of information necessary for those permits (e.g., data or design information) will be described. Work will include identifying what variances or exemptions (if any) are available.

3.0 SAMPLE COLLECTION PROTOCOLS

Pre-design evaluation Tasks 2, 3, and 4 include on-Site sampling activities. Under Task 2, **Groundwater Treatment System Data Collection**, water and sediment samples will be collected from the storm sewer manholes and analyzed in accordance with the procedures discussed in this section.

Under Task 3, **U-Crest Ditch Evaluation**, sediment samples from the U-Crest Ditch will be collected, and analyzed in accordance with the procedures discussed in this section.

Under Task 5, **Soil Excavation Evaluations**, geotechnical samples from two soil excavation areas will be collected and tested in accordance with the procedures discussed in this section.

3.1 GENERAL

Pre-design evaluations will be managed by ICF Kaiser's Project Manager, Mr. Lawrence M. Martin. Field personnel and subcontractors will coordinate pre-design activities through him. Phone and facsimile numbers for Mr. Martin are (412) 497-2222 and (412) 497-2212, respectively.

Site access will be provided by the Respondents and coordinated through the Project Coordinator, Mr. Leo M. Brausch. Mr. Martin will apprise Mr. Brausch of pre-design activities and their results through weekly meetings or teleconferences. Phone and facsimile numbers for Mr. Brausch are (724) 444-0377 and (724) 444-0351, respectively.

NYSDEC will be advised of pre-design evaluations and their results by Mr. Brausch, or by Mr. Martin at the direction of Mr. Brausch.

Water and sediment samples will be collected by ICF Kaiser. The collection and analysis of soil samples via geotechnical test borings will be performed by a qualified subcontractor and observed by ICF Kaiser. Water and sediment samples will be analyzed by a NYSDEC authorized analytical laboratory.

The NYSDEC will be notified at least one week in advance of all on-Site pre-design evaluation activities. Notification will be made by either Mr. Brausch, or by Mr. Martin at the direction of Mr. Brausch.

ICF Kaiser will contact NYSDEC to arrange for review of pertinent NYSDEC files. The arrangements will either be facilitated by Mr. Brausch or Mr. Martin will inform Mr. Brausch in advance of such arrangements.

Pre-design activities may include modifications to the surface water controls that will need to be established during building demolition activities. If needed, such modifications will be pre-approved by the NYSDEC and will address the incremental increase in potential Site surface water runoff resulting from ROD-specified modifications to the existing storm water system.

3.2 HEALTH AND SAFETY PLAN

Information regarding the required levels of protection and personnel decontamination procedures are provided in the HASP (ICF Kaiser 1998a).

3.2.1 Air Monitoring Procedures

Information regarding air monitoring is provided in the HASP (ICF Kaiser 1998a) and the CAMP (ICF Kaiser 1998b).

3.3 SAMPLE COLLECTION PROTOCOLS

Pre-design evaluation sample collection protocols are presented below.

3.3.1 Equipment and Supplies

Before proceeding with sample collection, a routine equipment check will be performed to confirm that the necessary equipment and materials are available and on-Site. Such items include:

- HASP-required and CAMP-required equipment,
- Appropriate laboratory supplied sample containers with labels,
- Sample shipping containers,
- Ditch flow diversion ring,
- Field notebook and indelible ink marker,
- Boring Well Log forms,
- Chain-of-Custody (COC) forms,
- Potable water and phosphate-free detergent,
- Buckets, scrub brushes, and drop cloths, and
- Trowels, hand augers, and spilt-barrel samplers.

3.3.2 Water Sample Collection

Water samples will be collected by immersing the appropriate sample bottle directly into the water. Water samples will be preserved in accordance with USEPA method protocols. Preservatives, where needed, will be provided by the analytical laboratory in the appropriate sample bottle.

3.3.3 Storm Sewer Sediment Sample Collection

Sediment samples will be collected from storm water line manholes via single-use, dedicated trowels. If a water sample and a sediment sample are required from the same location, the sediment sample will be collected after the water sample is collected. The samples will be considered to be grab samples.

3.3.4 U-Crest Ditch Sediment Sample Collection

Three samples from different depths will be collected from each U-Crest Ditch sediment sample collection location using the following procedures:

1. Sample collection will begin at the most downstream location and proceed upstream. To reduce disturbance to the ditch, flowing or stagnant water within the ditch will be diverted around each sample

collection location by temporarily placing a clean, 18" high by 26" to 36" diameter ring around the sample collection location.

2. Sediment samples collected from the 0" to 6" depth interval will be collected using either a trowel or hand auger.
3. Sediment samples collected from the 6" to 12" depth interval and 12" to 18" (or 12" to 24") depth interval will be collected using either a 2' long split-barrel sampler or a hand auger.
4. The sample device used (trowel, hand auger or split-barrel sampler) will be cleaned after each sample is collected in accordance with the procedures presented in Section 3.8. The flow diversion ring will be similarly cleaned between each sediment sample collection (station).

3.3.5 Shelby Tube Sample Collection

Five soil samples will be collected from each sample location. The following procedures apply:

1. Shelby Tube soil sampling will be performed at five foot intervals (starting 5 ft-bgs) to twenty-five ft-bgs. Soil borings will be advanced using standard augers drilling techniques. Each Shelby Tube soil sample collection depth will be verified prior to sample collection.
2. Shelby Tube samples will be collected using the procedures set forth in Standard Practice for Thin-Walled Tube Sampling of Soils, American Society for Testing and Materials (ASTM) D 1587.
3. Boreholes advanced for Geotechnical soil samples will be abandoned by filling it with the boring derived drill cuttings to approximately one ft-bgs. The top one foot will be filled with bentonite slurry via a tremie pipe to the ground surface. Measurements and quantities of materials used during boring abandonment will be recorded.
4. All associated equipment will be cleaned in accordance with the procedures in Section 3.8.

3.4 SAMPLE IDENTIFICATION AND SHIPMENT

All samples will be labeled in a clear and consistent fashion. Each sample container will be identified via a label on the container(s). The label information will include the sample identification number, date and time of sample collection, source of sample, preservative(s) used, if any, and the collector's initials. The label will be completed with waterproof ink. This information will also be recorded in a bound, water-resistant field book. Each sample collected during PDWP implementation will be assigned a unique code number that identifies its collection location and media.

1. The first character set (BAS-X) will identify the "Buffalo International Airport Site" and the Site area from which the sample was collected, "X." The abandoned manufacturing building will utilize the identifier "B." U-Crest Ditch will utilize the identifier "E."
2. The second character set (XX) will indicate the sample matrix: "SS" for a soil sample, "SE" for a sediment sample, and "SSW" for a storm sewer water sample.
3. The third character set (N) will uniquely identify the sample collection location such as a manhole number, a geotechnical test boring number, or a station location.

4. The last character set (NN-NN) will identify the sampling interval from which the sample was collected. For geotechnical test boring samples and U-Crest Ditch sediment samples, this will be the depth in ft-bgs. For storm sewer samples, this will be the depth below the upper surface of the media being sampled. Numbers used in this position can range from 0 to 99.

To eliminate sample number confusion, a forward slash (/) will be placed between each set of characters used. Blind duplicate samples will be assigned a unique location code not immediately identifiable with the sample location to avoid potential laboratory analytical bias. For example, a soil sample that is collected 15 ft-bgs from geotechnical test boring number 101 in Area I would be labeled, "BAS-I/SS/101/15-15."

Shipping containers will be designed to prevent breakage, spillage and contamination of the samples and will be securely sealed and clearly labeled. Shelby Tube samples will be handled and transported in accordance with the procedures in ASTM D4220, "Preserving and Transporting Soil Samples." In addition to the protocols within this PDWP, shipped samples will be packaged and shipped in accordance with applicable United States Department of Transportation regulations.

3.5 RECORD KEEPING

Pertinent details of the field activities described in this PDWP will be documented in a bound, water-resistant field notebook. The information will include observations made, results obtained and pertinent logistical information. As specified above, the following forms will be used to supplement field notebook information:

- Test Boring Log Forms,
- COC Forms,
- CAMP-specified forms, and
- HASP-specified Forms.

3.6 SAMPLE CUSTODY

In order to document sample possession from time of collection to time of sample receipt by the laboratory, a COC Form will be maintained for each sample set. The COC Form will be placed in a plastic bag, secured inside the sample shipping container and accompany the sample shipment to the laboratory. Individuals relinquishing and receiving the sample will sign, date and note the time on the COC Form. COC seals, signed and dated by the field personnel and packing tape will be used to seal the shipping container. As applicable, shipping records and airbills also provide means of tracking the sample shipment and will be retained as part of the COC documentation. As applicable, airbill numbers for each shipping container will be recorded in the field notebook.

3.7 CALIBRATION PROCEDURES AND FREQUENCY

Instruments and equipment used to gather, generate, or measure environmental data will be calibrated with sufficient frequency to confirm that accuracy and reproducibility results are consistent with the manufacturer's specifications.

Equipment to be used during the field sampling will be examined to evaluate its operating condition. This will include checking the manufacturer's operating manual and the instructions for each instrument to determine that maintenance requirements are being followed.

3.8 EQUIPMENT CLEANING PROCEDURES

Equipment cleaning procedures will be employed during sample collection activities to reduce the possibility of cross-contamination. Cleaning procedures for geotechnical test boring and field sampling equipment are provided below. Cleaning solvents, such as methanol, hexane, and acetone, are never to be used in association with this project.

3.8.1 Drilling Equipment

During geotechnical test boring work, drilling equipment will be cleaned using a high-pressure, low-flow rate hot-water power washer. The drilling rig will be cleaned within the Site area from which the soil samples are being collected. Drilling equipment will also be inspected before use to determine if fluids (oils, lubricants, hydraulic fluids, etc.) are leaking. Fluid leaks will be repaired before drilling begins. Drilling equipment will be cleaned following the collection of geotechnical samples and before leaving an individual Site area (i.e., Area I or Area P).

Following cleaning, all such equipment will be kept clean and dry prior to its re-use.

Because drilling equipment cleaning will be performed in areas to be excavated, cleaning water will be allowed to infiltrate into the ground.

3.8.2 Field Sampling Equipment

Field sampling equipment used for geotechnical sampling will be cleaned within the Site area where the samples were collected (i.e., Area I or Area P), allowing the rinse water to infiltrate into the ground. Field equipment used for U-Crest Ditch sediment sample collection will be cleaned within U-Crest Ditch, allowing cleaning water to flow downstream. Field sampling equipment for the storm sewers will be single-use, dedicated equipment.

Non-dedicated, field sampling equipment will be cleaned between sample collection procedures by washing the exterior surface of equipment with a mild solution of phosphate-free detergent and potable water. Washing will be followed by a thorough potable water rinse of exposed equipment surfaces to remove excess detergent.

3.9 MANAGEMENT OF INVESTIGATION DERIVED WASTES

Implementation of PDWP activities will produce drill cuttings, equipment cleaning water, and personal protection equipment (PPE) (gloves, tyveks, etc.). This section address the handling and disposition of such investigation derived waste.

3.9.1 Drilling Cuttings

Drill cuttings that are generated during geotechnical test borings will be placed back into the boring (in reverse order from which they were generated) as part of test boring abandonment.

3.9.2 Solid Waste

PPE, and other general trash will be managed as a solid waste and disposed of in a dumpster located on-Site or carried off-Site for disposal as general trash.

3.9.3 Equipment Cleaning Water

Wash and rinse water generated from the cleaning of drilling and sample collection equipment will be allowed either to infiltrate into the ground at the sample collection location or allowed to flow downstream within the U-Crest Ditch or the storm sewer.

3.10 SAMPLE ANALYSES

Water and sediment samples will be analyzed in the laboratory using the methods specified in Table 3-1. Analytical analysis protocols will be consistent with those described in QAPP (ICF Kaiser, 1998c). Geotechnical tests on soil samples will be performed in the laboratory following the procedures set forth in Standard Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions, ASTM D 3080.

3.11 QUALITY ASSURANCE/QUALITY CONTROL

Quality control (QC) samples will be collected during sampling activities for the U-Crest Ditch and the storm sewer evaluation. The field QC sample set for the U-Crest Ditch sediment samples will include one trip blank, one equipment blank, and one blind duplicate sample for every twenty samples collected. The field QC sample set for the storm sewer evaluation will include one trip blank, one equipment blank, and one blind duplicate sample for every twenty water samples and every twenty sediment samples collected. Field QC sample types that are associated with sediment sampling are described below.

Trip blanks. Trip blanks will be prepared in the laboratory and will consist of high purity water. The blanks will be sealed in a VOC sample container and shipped to the Site with the sample collection containers, kept in the sealed container, and shipped back to the laboratory with the field sample containers for VOC analysis via USEPA Method 8260. Trip blanks are used to assess the potential for cross-contamination that may occur during a sample shipment or handling.

Equipment blank. Equipment blanks are used to assess the effectiveness of the procedures used for decontamination, storage, and handling of field sampling equipment. One equipment blank will be prepared by rinsing decontaminated sampling equipment with deionized water and collecting the rinsate in a sample container. The equipment blank will be shipped to the laboratory for VOC analysis via USEPA Method 8260.

Blind Duplicate Sample. Blind duplicate samples are used to evaluate the precision of the methods for each parameter. Blind duplicate samples are prepared by splitting a single groundwater sample into two portions and assigning each a unique sample identification number that does not indicate to the laboratory that the two samples are related. The blind duplicate sample will be shipped to the laboratory for VOC analysis via USEPA Method 8260.

**TABLE 3-1
ANALYTICAL METHODS FOR SAMPLE COLLECTION**

**NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066
CHEEKTOWAGA, NEW YORK**

SAMPLE MEDIA	ANALYTICAL PARAMETERS	ANALYTICAL METHOD
Water, Sediment	VOCs	USEPA 8260
Water, Sediment	SVOCs	USEPA 8270
Water, Sediment	PCBs	USEPA 8081A
Water	Major cations	USEPA 6010 & 7000 Series
Water	Chloride	USEPA 9250
Water	Nitrate	USEPA 352.1
Water	Sulfate	USEPA 9038
Water	Alkalinity	USEPA 310
Water	pH	USEPA 150.1
Water	Total organic carbon	USEPA 9060
Water	Total dissolved solids	USEPA 160.1
Water	Total suspended solids	USEPA 160.2
Sediment	Metals	USEPA 6010A
Sediment	TCLP for VOCs	USEPA 1311/8260A
Sediment	TCLP for SVOCs	USEPA 1311/8270B
Sediment	TCLP for metals	USEPA 1311/6010A

Notes:

1. VOCs -- Volatile Organic Compounds
2. SVOCs -- Semi - Volatile Organic Compounds
3. PCBs -- Polychlorinated Biphenyls
4. TCLP -- Toxicity Characteristic Leaching Procedure
5. USEPA -- United States Environmental Protection Agency

4.0 SCHEDULE

Using the effective date of the Consent Order as Day Zero, the following schedule is anticipated:

<u>Activity</u>	<u>Start Date</u>	<u>Completion Date</u>
Storm Sewer Evaluation	Day 30	Day 70
Groundwater Treatment Plant Data Collection	Day 30	Day 70 ¹²
U-Crest Ditch Evaluation (Including analytical sample analyses)	Day 40	Day 70
Soil Excavation Evaluation (Including geotechnical sample analyses)	Day 40	Day 70
Permit and Compliance Evaluation	Day 30	Day 70

The above schedule assumes that the Consent Order is in place in time for field activities to be conducted without adverse impacts due to either winter weather conditions or Site demolition activities (by others).

Following completion of pre-design evaluations, the NYSDEC will be advised of all findings and how they will be reflected in the pre-final (90-percent) design.

¹² Outfall discharge rate data collection will continue into remedial design activities.

5.0 REFERENCES

Blasland, Bouck & Lee, Inc., Pre-Design Investigation Summary Report, Westinghouse Site Participating Parties, Cheektowaga, New York, July 1996.

ICF Kaiser, 1998a. Health and Safety Plan, NYSDEC Inactive Hazardous Waste Site No. 9-15-006, Cheektowaga, New York, ICF Kaiser Engineers Corporation, April 3, 1998.

ICF Kaiser, 1998b. Community Air Monitoring Plan, NYSDEC Inactive Hazardous Waste Site No. 9-15-006, Cheektowaga, New York, ICF Kaiser Engineers Corporation, April 3, 1998.

ICF Kaiser, 1998c. Quality Assurance Project Plan, NYSDEC Inactive Hazardous Waste Site No. 9-15-006, Cheektowaga, New York, ICF Kaiser Engineers Corporation, April 3, 1998.

New York State Department of Environmental Conservation, Division of Hazardous Waste Remediation, Record of Decision, Westinghouse Electric Corporation Site, Town of Cheektowaga, Erie County, Site No. 9-15-066, March 1995.

New York State Department of Environmental Conservation, Division of Hazardous Waste Remediation, Record of Decision, Westinghouse Electric Corporation Site, Town of Cheektowaga, Erie County, Site No. 9-15-066, December 1995.

New York State Official Compilation of Codes.

APPENDIX B

HEALTH AND SAFETY PLAN

**NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066
CHEEKTOWAGA, NEW YORK**

HEALTH AND SAFETY PLAN

NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066
CHEEKTOWAGA, NEW YORK

April 3, 1998

Prepared for
Respondents for NYSDEC Order on Consent and Settlement Agreement
Index No. 89-0381-91-08

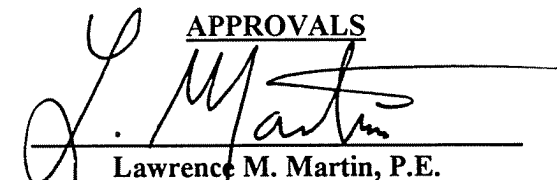
Prepared by
ICF Kaiser Engineers Corporation
Pittsburgh, Pennsylvania

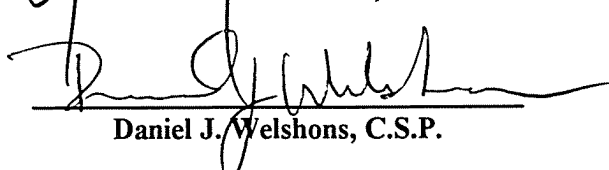
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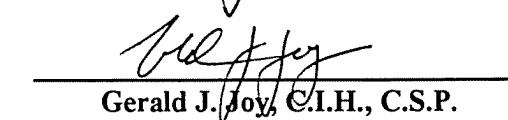
This Health and Safety Plan was prepared for use by ICF Kaiser Engineers Corporation employees and subcontractors during performance of the Pre-Design evaluation at New York State Department of Environmental Conservation Inactive Hazardous Waste Site No. 9-15-066. It was prepared based on available information regarding the physical and chemical hazards known, or suspected, to be present on the project Site (including U-Crest Ditch). It is not possible in advance, to discover, evaluate, and protect against possible hazards which may be encountered during the completion of this project. Adherence to the requirements of this HASP will significantly reduce, but not eliminate, the potential for occupational injury and illness at the project Site(s). The guidelines contained in this Plan were developed specifically for the project Site (including U-Crest Ditch) and scope of work described herein, and should not be used at any other Site (including U-Crest Ditch) without the review and approval of a qualified health and safety professional.

This HASP has been prepared in accordance with the specifications presented in the ICF Kaiser Safety and Health Program Requirement Procedures (Attachment A) and Occupational Safety and Health Administration 29 CFR parts 1910 and 1926.

APPROVALS


Lawrence M. Martin, P.E.


Daniel J. Welshons, C.S.P.


Gerald J. Joy, C.I.H., C.S.P.

SITE HEALTH AND SAFETY PLAN SIGNATURE FORM

Prior to the initiation of field activities, I have read, and have been given an opportunity to question the contents of this Site Health and Safety Plan. By my signature, I certify that I understand, and agree to comply with the information and directions set forth in this Plan. I further certify that I am in full compliance with OSHA 29 CFR 1910.120 in regards to training and medical monitoring requirements.

SITE PERSONNEL

Printed Name

Signature

Date

_____	_____	_____
_____	_____	_____
_____	_____	_____
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Site Safety Officer Signature

Date

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List of Attachments

- Attachment A ICF Kaiser Safety and Health Requirements (Procedures)
Attachment B Supervisor's Injury/Incident Report Form

LIST OF ACRONYMS AND ABBREVIATIONS

ASTM	American Society for Testing and Materials
BACA	Buffalo Airport Center Associates
BBP	Bloodborne Pathogens
°C	degrees centigrade
CFR	Code of Federal Regulations
CO	carbon monoxide
CFP	Chemical Protective Clothing
CRZ	Contamination Reduction Zone
ECIDA	Erie County Industrial Development Agency
°F	Degrees Fahrenheit
GFCI	ground fault circuit interrupter
HASP	Health and Safety Plan
HBV	hepatitis B virus
HIV	human immunodeficiency virus
ICF Kaiser	ICF Kaiser Engineers Corporation
IDLH	immediately dangerous to life and health
LEL	Lower Explosive Limit
mg/kg	milligrams per kilogram
mg/M ³	milligrams per cubic meter
MSDS	Material Safety data Sheet(s)
MSHA	Mine Safety and Health Administration
NFTA	Niagara Frontier Transportation Authority
NIOSH	National Institute of Occupational Safety and Health
NYSDEC	New York State Department of Environmental Conservation
OSHA	Occupational Safety and Health Administration
PDWP	Pre-Design Evaluation Work Plan
PEL	Permissible Exposure Limit
PHSO	Project Health and Safety Officer
PID	Photoionization Detection Instrument
PPE	personal protection equipment
ppm	parts per million
PVC	polyvinyl chloride
RA	remedial action
RI	remedial investigation
ROD	Record of Decision
S&H	Safety & Health
Site	Inactive Hazardous Waste Site No. 9-15-066 in Cheektowaga, New York
SSO	Site Safety Officer
U-Crest Ditch	non-contiguous, surface water channel
µm	micrometers micrometers
USEPA	United States Environmental Protection Agency
Westinghouse	Westinghouse Electric Corporation

1.0 INTRODUCTION

1.1 GENERAL SITE INFORMATION

SITE NAME: NYSDEC Inactive Hazardous Waste Site No. 9-15-066
(Buffalo Airport Site)
Operable Units 1 and 2

SITE ADDRESS: 4454 Genesee Street
Cheektowaga, New York 14225

ICF KAISER PROJECT NUMBER: 70717

PROPOSED DURATION OF SITE WORK: START DATE: May 1998
END DATE: October 1999

1.2 SITE DESCRIPTION SUMMARY

Inactive Hazardous Waste Site No. 9-15-066 is located at 4454 Genesee Street in Cheektowaga, New York (Figure 1-1). The Site is bordered to the north and west by the Greater Buffalo International Airport, to the south by Genesee Street, and to the east by Holtz Drive. A non-contiguous, surface water channel (U-Crest Ditch) receives storm water from the Site via two outfall discharges. Both the Site and the U-Crest Ditch, which is located on the opposite side of Genesee Street, are located in a mixed setting of commercial and industrial properties.

The 143-acre Site includes an abandoned 2.5 million square-foot manufacturing building, several smaller buildings, large areas of paved ground surface, and the Flying Tigers Restaurant. With the exception of the restaurant, located in the northern extreme of the Site, the Site is inactive and surrounded by chain-link fencing.

1.3 SITE HISTORY SUMMARY

The Site was developed in the early 1940s by the United States Government for the manufacture of military aircraft, and a large plant building¹, approximately 2.5 million square feet, and various ancillary structures were constructed for this purpose. Curtiss-Wright Corporation operated this plant until 1945. In 1946, Westinghouse Electric Corporation (Westinghouse) purchased the Site from the United States Government and converted the plant for the manufacture of electric motors and related electrical components.

¹ Now referred to as the "Abandoned Manufacturing Building."

In 1964 and 1984, Westinghouse sold two parcels at the northern tip of the Site, to what is known today as the Niagara Frontier Transportation Authority (NFTA). In 1984, Westinghouse sold the remainder of the Site to an individual who, in 1985, assigned his rights to this property to the Erie County Industrial Development Agency (ECIDA). ECIDA subsequently entered into a lease-purchase agreement for the property with Buffalo Airport Center Associates (BACA).

After selling the Site, Westinghouse continued to lease a small portion of the plant; while other plant areas were leased by BACA to third parties for various manufacturing and warehousing operations. The Site was vacated in 1991, and, except for some removal actions undertaken by BACA and the New York State Department of Environmental Conservation (NYSDEC) remedial investigations, the Site has been unoccupied since that time.

NFTA is currently expanding the Buffalo International Airport. These airport expansion plans call for acquisition of the Site, demolition of Site buildings, and use of Site land for taxi-ways and runway clear zones.

In 1985 and 1986 a NYSDEC Phase I Investigation was conducted at the Site. That investigation triggered a series of assessments and evaluations that led to the remedial design (RD) and remedial action (RA) process. Abandoned Site structures are scheduled for demolition, beginning in 1998. RA activities, planned for both the Site and the U-Crest Ditch, will be coordinated with demolition activities as needed.

1.4 PREVIOUS INVESTIGATIONS SUMMARY

The Site has been subject to several investigations dating back to 1985, the most extensive of which was a Remedial Investigation (RI) conducted by the NYSDEC between May 1993 and September 1994. The RI provided the majority of information used by the NYSDEC in the completion of a Feasibility Study (FS) and in selection of on-Site, low temperature thermal desorption as the source control remedy.

A pre-design investigation was conducted between April and June 1996 to obtain selected information needed for the remedial design. The primary component of the investigations was the collection of soil and sediment samples from Site areas subject to remediation. (Areas I, J, K, M, P, Q; abandoned manufacturing building; U-Crest Ditch; See Figure 1-22). The specific scope of activities for each area varied depending on the particular constituent(s) of interest, the extent of the available laboratory data, the remedial objectives identified in the Records of Decision (RODs), and the nature of identified data needs.

2 The excavation areas shown on Figure 1-2 are approximate only. Refer to Section 3.4 and Figures 3 through 9 of the July 1996 "Pre-Design Investigation Summary Report" by Blasland, Bouck & Lee, Inc., for explicit excavation area limits.

1.5 POTENTIAL CONSTITUENTS

Table 1-1 presents a list of constituents that may be encountered within pre-design evaluation areas. Figure 1-2 shows the areas of the Site where these constituents are most likely to be encountered (Areas I, J, K, M, P, Q; abandoned Manufacturing Building; U-Crest Ditch). Potential chemical hazards include the following:

Chlorinated Solvents	X	Gasoline/Diesel/Mineral Oil	X
Heavy Metals	X	Asbestos ³	X
Pesticides	X	Non-Chlorinated Solvents	X
Corrosives		Oxidizers	
Radiological			

1.6 SCOPE OF WORK

This Health and Safety Plan (HASP) only addresses pre-design evaluation activities and will be updated during the remedial design to address remedial action activities. The following activities will be performed as part of pre-design evaluation.

1.6.1 Mobilization

ICF Kaiser will mobilize the appropriate labor, materials and furnishings, mechanical equipment, inspection and specified emergency response equipment/supplies, and manual tools to complete the work. No evaluation work will be initiated until the specified facilities and equipment are available, including health and safety equipment.

1.6.2 Site Preparation

ICF Kaiser will perform the necessary preparation activities prior to safely performing on-Site activities. Site preparation activities may include the clearing of vegetation from the project work limits and from areas to be used for staging. Site preparation may also include the identification of existing utilities.

1.6.3 Storm Sewer Evaluation

To more fully characterize the usefulness of the storm sewers for groundwater collection and control, ICF Kaiser will perform a storm sewer evaluation beneath the abandoned manufacturing building. The purpose of the evaluation is to predict the effectiveness of the storm sewers as groundwater capture devices and to reduce discharge to the U-Crest Ditch by sealing off unnecessary storm sewer inlets.

³ Asbestos-containing material may be present within the abandoned Manufacturing Building.

Storm Sewer Survey

A storm sewer manhole/piping elevation survey will be conducted by a New York State licensed surveyor. This information will be used to correlate the location of subsurface piping and manholes with the groundwater table.

Surface Inlets Sealing

Sealing of storm sewer inlets will be done to prevent surface runoff from entering the storm sewers and to minimize the amount of water needed to be treated by the permanent groundwater treatment plant (if required). Several different options will be available to the field team depending on the configuration of the opening.

Smoke Tests

Smoke tests will be performed following surface inlet sealing to assess that surface inlets and side laterals have been adequately sealed.

1.6.4 Permanent Groundwater Treatment Plant Data Collection

To design the permanent groundwater treatment system (if required), both the flow and chemical characteristics of its influent sources will be evaluated.

Storm Sewer Monitoring

Existing storm sewer outfall gauge stations will be calibrated to read discharge levels and flows following sealing of the storm sewer inlets and isolation of the storm sewers from surface water drainage.

Storm Sewer Sampling

Storm sewer sampling will consist of collection of both infiltration waters and storm sewer sediments. Two water samples and one sediment sample will be collected from each of three outfall drainage lines.

1.6.5 U-Crest Ditch Evaluation

U-Crest Ditch sediments will be manually sampled (e.g. hand auger, trowel, split-spoon sampler) to assess the waste characteristics of the sediment and the volume of sediments that exceed ROD-specified remedial objectives. Samples will be collected from 0-6" to characterize the sediment for waste disposal. In addition, grab samples will be collected at each sample location to assess the sediment quality at depths greater than 6".

1.6.6 Soil Excavation Evaluation

Test borings will be used to collect geotechnical soil samples from Areas I and P. Analysis of these samples will provide data for stability analysis on deep excavations resulting from soil removal activities.

1.6.7 Water Level Measurements

Groundwater levels will be measured from existing Site monitoring wells. This data will assist with understanding the Site's groundwater movement and design of the shallow groundwater collection system (i.e., augmentation of the existing storm sewer system).

**Table 1-1
Potential Constituents**

NYSDEC Inactive Hazardous Waste Site No. 9-15-066
Cheektowaga, New York

ICF Kaiser Engineers Corporation
Project No. 70717
April 3, 1998

Parameter ¹	Media ²	Maximum Conc. ³ (ppm)	Symptoms of Overexposure	OSHA Permissible Exposure Limits
Volatile Organic Compounds				
1,1,1-Trichloroethane	S/W/SE	2,400	Irritation of eyes and skin, headache, lassitude, CNS depression, dermatitis	350 ppm
1,1,2,2-Tetrachloroethane	W	0.01	Nausea, vomiting, abdominal pain, jaundice, hepatitis, dermatitis	5 ppm
1,1-Dichloroethane ⁴	S/W/SE	7.8	Irritation of skin, CNS depression, liver, kidney and lung damage	100 ppm
1,1-Dichloroethene	S/W	0.12	Irritation of eyes, skin, throat, dizziness, headache, nausea,	5 ppm
1,2-Dichloroethane	S	0.007	Irritation of eyes, nausea, vomiting dermatitis, CNS depression, [carc]	50 ppm
1,2-Dichloroethene (total)	S/W/SE	170	Irritation of eyes and respiratory system, CNS depression	200 ppm
4-Methyl-2-Pentanone	W/S	11	Irritation of eyes, skin and mucous membrane, headache, narcosis, coma, dermatitis	100 ppm
2-Butanone	S/W/SE	140	Irritation of eyes, skin and nose, throat, hemolysis, CNS depression, headache, vomiting	200 ppm
Acetone	S/W/SE	22	Irritation of eyes, nose and throat, headache, dizziness, CNS depression, dermatitis	1000 ppm
Benzene	S/W	1.5	Irritation of eyes, skin, nose, and respiratory system, giddiness, headache, nausea, fatigue, lassitude, dermatitis, [carc]	1 ppm
Carbon Disulfide	S	0.008	Dizziness, headache, poor sleep, fatigue, nervous, low-weight, psychosis, gastritis, eye/skin burns, dermatitis	20 ppm
Carbon Tetrachloride	S/W	2.4	Irritation of the eyes and skin,	10 ppm
Chlorobenzene	S/W/SE	0.38	Irritation, eyes, skin, nose, drowsiness, incoherent, CNS depression	75 ppm
Chloroform	W	0.01	Irritation of eyes and skin; dizziness, mental dullness, nausea, confusion, headache, fatigue,	C 50 ppm
Chloromethane	W	0.003	Dizziness, nausea, vomiting, visual distortion, slurred speech, convulsions	100 ppm
Ethylbenzene ⁴	S/SE	480	Irritation of yes and skin, mucous membrane headache, dermatitis, narcosis	100 ppm
Methylene Chloride	S/W	5.2	Irritation of eyes, and skin, fatigue, weakness, lightheadedness, numb tingling limbs, nausea	25 ppm
Tetrachloroethene	S/W/SE	3.6	Irritation of eyes, nose and throat, nausea, flush face and neck, vertigo, dizziness, incoherent, headache, [carc]	100 ppm
Toluene	S/W/SE	210	Irritation of eyes and nose, fatigue, weakness, confusion euphoria, dizziness, headache, dilated pupils, muscle fatigue, insomnia, dermatitis	200 ppm
Xylenes ⁴	S/W/SE	2,900	Irritation of eyes skin and nose, throat, dizziness, excitement, drowsiness, incoherent, nausea, vomiting, abdominal pain, dermatitis	100 ppm
Trichloroethene ⁵	S/W/SE	2,600	Irritation of eyes, skin, headache, vertigo, visual distortion, fatigue, giddiness, nausea, vomiting, dermatitis, [carc]	100 ppm
Vinyl Chloride	W	29	Weakness, abdominal pain, GI bleeding, [carc]	1 ppm

**Table 1-1
Potential Constituents**

NYSDEC Inactive Hazardous Waste Site No. 9-15-066
Cheektowaga, New York

ICF Kaiser Engineers Corporation
Project No. 70717
April 3, 1998

Parameter ¹	Media ²	Maximum Conc. ³ (ppm)	Symptoms of Overexposure	OSHA Permissible Exposure Limits
Semi-Volatile Organic Compounds				
1,2,4-Trichlorobenzene	S	0.071	Irritation of eyes, skin and mucous membrane	NE
1,2-Dichlorobenzene	S/W/SE	17	Irritation of eyes and nose, liver and kidney damage, skin blisters	C 50 ppm
1,3-Dichlorobenzene	W/SE	0.79	NE	NE
1,4-Dichlorobenzene	W/SE	1.7	Eye irritation, profuse rhinitis, headache, nausea, vomiting, jaundice, cirrhosis [carc]	75 ppm
2,4-Dimethylphenol ⁴	S/W/SE	260	Irritation, skin burns	NE
2-Methylphenol ⁴	S/W/SE	100	Irritation of eyes, skin and mucous membrane, CNS effects, confusion, depression, weakness pulse, eye, skin burns, dermatitis	5 ppm skin
2-Methylnaphthalene	S/SE	28	Irritation, difficulty breathing	NE
4-Methylphenol ⁴	S/W/SE	880	Irritation of eyes skin and mucous membrane, CNS effects, confusion, depression, irregular rapid respiration, weakness pulse, eye and skin burns, dermatitis	5 ppm
Acenaphthylene	S/SE	1	Irritation of eyes and nose, dermatitis, bronchitis	0.2 mg/m ³
Anenaphthene	S/W/SE	160	Irritation of eyes, nose and throat, skin irritation, may cause phototoxic reaction	0.2 mg/m ³
Anthracene	S/W/SE	230	Dermatitis, bronchitis, [carc]	0.2 mg/m ³
Benzo(a)anthracene	S/W/SE	590	Dermatitis, bronchitis, [carc]	0.2 mg/m ³
Benzo(a)pyrene	S/W/SE	440	Dermatitis, bronchitis, [carc]	0.2 mg/m ³
Benzo(b)fluoranthene	S/W/SE	590	Dermatitis, bronchitis, [carc]	0.2 mg/m ³
Benzo(k)fluoranthene	S/W/SE	210	Dermatitis, bronchitis, [carc]	0.2 mg/m ³
Benzo(g,h,i)perylene	S/W/SE	160	Irritation of eyes and nose, dermatitis, bronchitis	0.2 mg/m ³
bis(2-ethylhexyl)phthalate	S/W/SE	9.4	Mild irritation of skin and eyes	5 mg/m ³
Butylbenzylphthalate	S/W/SE	18	Irritation of eyes, nose and throat, headache, drowsiness, drunkenness	NE
Carbazole	S/W/SE	280	Mild irritation	NE
Chrysene	S/W/SE	610	Dermatitis, bronchitis, [carc]	0.2 mg/m ³
Di-n-butylphthalate	S/W/SE	2	Irritation of eyes, upper respiratory system and stomach	5 mg/m ³
Di-n-octylphthalate	S/W/SE	2.3	Irritation, eyes damage, nausea, vomiting, headache, drunkenness	5 mg/m ³ as octyl
Dibenz(a,h)anthracene	S/W/SE	77	Irritation of eyes, skin and upper respiratory system	0.2 mg/m ³
Dibenzofuran	S/W/SE	150	NE	NE
Diethylphthalate	S	1.4	Irritation, of eyes, nose and skin, headache, numbness in arms and legs	NE
Dimethylphthalate	S	0.22	Irritation, of eyes, nose and skin, headache, numbness in arms and legs	NE

**Table 1-1
Potential Constituents**

NYSDEC Inactive Hazardous Waste Site No. 9-15-066
Cheektowaga, New York

ICF Kaiser Engineers Corporation
Project No. 70717
April 3, 1998

Parameter ¹	Media ²	Maximum Conc. ³ (ppm)	Symptoms of Overexposure	OSHA Permissible Exposure Limits
Fluoranthene	S/SE/W	1,600	Dermatitis, bronchitis, [carc]	0.2 mg/m ³
Fluorene	S/SE/W	180	Dermatitis, bronchitis, [carc]	0.2 mg/m ³
Indeno(1,2,3-cd)pyrene	S/W/SE	190	Irritation of eyes, and nose, dermatitis, bronchitis	0.2 mg/m ³
N-Nitrosodiphenylamine	S	0.19	Nausea, vomiting, diarrhea, headache, stomach pain	NE
Naphthalene	S/W/SE	98	Irritation of the eyes, headache, confusion, excitement, nausea, vomiting, abdominal pain, jaundice, dermatitis	10 ppm
Phenanthrene	S/W/SE	1,800	Dermatitis, bronchitis, [carc]	0.2 mg/m ³
Pentachlorophenol	W	0.009	Irritation of eyes, nose and throat, sneezing, cough, weakness, dizziness, nausea, vomiting, chest pain, high fever, dermatitis	0.5 mg/m ³
Phenol ⁴	S/W/SE	72	Irritation of eyes nose and throat, weakness, muscle ache and pain, dark urine, skin burns, dermatitis	5 ppm skin
Pyrene	S/W/SE	1,300	Irritation of skin	0.2 mg/m ³
Pesticides/PCBs				
4,4'-DDD	S/W/SE	0.17	Nausea, vomiting, diarrhea, headache, dizziness, convulsions	NE
4,4'-DDE	S/W/SE	0.074	Ingestion problems, menstrual disorders	NE
4,4'-DDT	S/W/SE	0.27	Irritation of eyes, nose and throat, dizziness, headache	1 mg/m ³
Aldrin	SE	0.008	Headache, dizziness, nausea, vomiting, myoclonic, jerks of limbs	0.25 mg/m
Alpha-BHC	S	0.001	Irritation	NE
Alpha-Chlorodane	S/W	0.002	Blurred vision, confusion, delirium, cough, abdominal pain, nausea, vomiting, diarrhea, irritability, convulsions	0.5 mg/m ³
Aroclor - 1242	S/SE/W	2.8	Irritation of eyes, chloracne	1 mg/m ³
Aroclor - 1254	S/W/SE	5.6	Irritation of eyes, chloracne	0.5 mg/m ³
Aroclor - 1260	S/W/SE	6.9	Irritation liver damage	NE
Dieldrin	W/S/SE	0.03	Headache, dizziness, nausea, vomiting, limb jerks, convulsions, coma	0.25 mg/m ³
Endosulfan I	S/W/SE	0.03	Irritation of skin, nausea, confusion, agitation, headaches, dry mouth	NE
Endosulfan II	S/W/SE	0.255	Irritation of skin, nausea, confusion, agitation, headaches, dry mouth	NE
Endosulfan Sulfate	W	0.001	Nausea, vomiting, headache, dizziness, convulsions	NE
Endrin	S/SE	0.15	Epileptic convulsions, stupor, headache, dizziness, abdominal discomfort, nausea, vomiting, insomnia, aggressiveness, confusion	
Endrin Aldehyde	S/W/SE	0.1	Nausea, vomiting, difficulty breathing, dizziness, convulsions	NE
Endrin Ketone	S/W/SE	0.46	Fever, nausea, headache, twitching, convulsions	NE
Gamma-BHC	S/W/SE	0.015	Irritation	NE

**Table 1-1
Potential Constituents**

NYSDEC Inactive Hazardous Waste Site No. 9-15-066
Cheektowaga, New York

ICF Kaiser Engineers Corporation
Project No. 70717
April 3, 1998

Parameter ¹	Media ²	Maximum Conc. ³ (ppm)	Symptoms of Overexposure	OSHA Permissible Exposure Limits
Gamma-Chlordane	S/W/SE	0.15	Irritation, headache, dizziness, distortion, blurred vision, convulsions, nausea	0.5 mg/m ³ skin
Heptachlor	S/W/SE	0.017	Tremors, convulsions, kidney damage, respiratory collapse, death	0.5 mg/m ³
Heptachlor epoxide	W/SE/S	0.016	Tremors, convulsions, liver damage [carc]	0.5 mg/m ³
Methoxchlor	S/W/SE	0.036	Nausea, vomiting headache, dizziness	15 mg/m ³
Inorganics				
Aluminum	S/W/SE	23,100	Irritation of eyes, skin and respiratory system	15 mg/m ³
Antimony	S/W/SE	117	Irritation, dizziness, skin itching, nausea	0.5 mg/m ³
Arsenic	S/W/SE	1,030	Irritation of skin, possible dermatitis, respiratory distress, diarrhea	0.01 mg/m ³
Barium	S/W/SE	1,150	Irritation of eyes, skin and upper respiratory tract, muscle spasms	0.5 mg/m ³
Beryllium	S/W/SE	4.1	Irritation of eyes, weakness, chest pain, cough, dermatitis	0.002 mg/m ³
Cadmium	S/W/SE	5,330	Irritation of eyes, nose and respiratory system, headache, dizziness, weakness, giddiness, confusion, nausea, vomiting	0.005 mg/m ³
Calcium	S/W/SE	239,000	Irritation of eyes, skin and upper respiratory system	5 mg/m ³
Chromium ⁴	S/W/SE	829	Irritation of eyes, skin and lungs	0.5 mg/m ³
Cobalt	S/W/SE	47	Cough, wheezing, decreased pulmonary function, dermatitis, asthma	0.1 mg/m ³
Copper	S/W/SE	1,400	Irritation of eyes, nose and pharynx, metallic taste, dermatitis, anemia	1.0 mg/m ³
Iron	S/W/SE	266,000	Benign pneumoconiosis	10 mg/m ³ as iron oxide
Lead	S/W/SE	2,950	Weakness, lassitude, insomnia, facial pallor, constipation, abdominal pain, gingival lead line	0.05 mg/m ³
Magnesium	S/W/SE	43,800	Irritation of eyes and nose, blurred vision, nausea, vomiting	15 mg/m ³ as oxide
Manganese	S/W/SE	2,580	Insomnia, mental confusion, metal fume fever, dry throat, cough	C 5 mg/m ³
Mercury	S/W/SE	0.85	Irritation of eyes and skin, cough, chest pain, insomnia, irritability, headache, fatigue, weakness	0.01 mg/m ³
Nickel	S/W/SE	202	Allergic asthma, sensitized dermatitis	1.0 mg/m ³
Potassium	S/W/SE	2,220	Irritation of eyes, skin and respiratory system	NE
Selenium	S/W/SE	124	Irritation of eyes, skin, nose, and throat, headache, chills, fever, metallic taste, garlic breathe, dermatitis, eye and skin burns	0.2 mg/m ³
Silver	S/W/SE	47.6	Irritation of throat and skin, blue-gray eyes, ulceration of skin	0.01 mg/m ³
Sodium	S/W/SE	582	Irritation of eyes, skin and upper respiratory system	NE
Vanadium	S/W/SE	37	Irritation of eyes, skin and throat, green tongue, metallic taste, cough, wheezing, bronchitis	0.5 mg/m ³

**Table 1-1
Potential Constituents**

**NYSDEC Inactive Hazardous Waste Site No. 9-15-066
Cheektowaga, New York**

**ICF Kaiser Engineers Corporation
Project No. 70717
April 3, 1998**

Parameter ¹	Media ²	Maximum Conc. ³ (ppm)	Symptoms of Overexposure	OSHA Permissible Exposure Limits
Thallium	S/SE/W	1.1	Nausea, diarrhea, vomiting, abdominal pain, chest pain, pulmonary edema, tremor	0.1 mg/m ³
Cyanide	S	0.42	Headache, confusion, nausea, vomiting	10 ppm as H ² S
Zinc	S/W/SE	3,780	Metal fume fever, chills, muscle ache, nausea, fever, dry throat, cough, weakness, metallic taste, headache	15 mg/m ³ as zinc oxide

1. Parameters, media and maximum concentrations from the 1994 Dunn Remedial Investigation report (Section 6 summary tables), unless otherwise noted (Airport drainage ditch and Elicott creek not included).

2. S: soil; W: water; SE: sediment

3. Maximum concentration is largest constituent detection of soil, water and sediment.

4. Maximum concentration from the July 1996 Blasland, Bouck, & Lee, Inc. Pre-Design Investigation Summary Report.

5. Maximum concentration from the 1991 ERM-Northeast Summary Report: Site Characterization and Recommended Remedial Measure Outfalls 001, 002 and 003.

NE - Not Established

CNS - Central Nervous System

skin - potential for dermal absorption

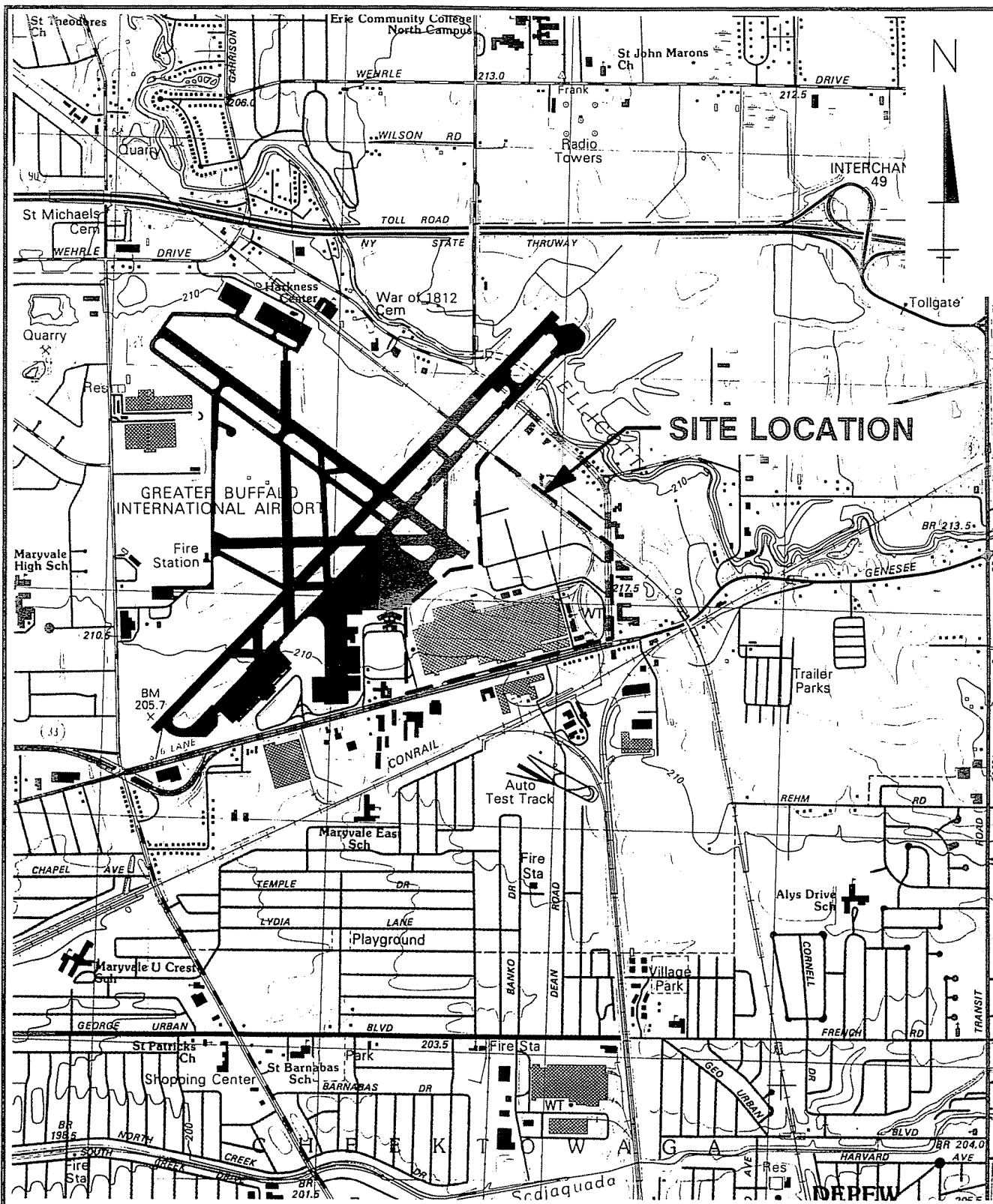
carc - carcinogenic

GI - Gastrointestinal

C - OSHA Ceiling Concentration

mg/m³ - milligrams per cubic meter

ppm - parts per million



0 500m 1000m

APPROX. SCALE: 1cm = 250m

MAP LOCATION

REFERENCE: LANCASTER, N.Y. USGS QUAD. 1982

FIGURE 1-1

ICF KAISER ENGINEERS

NYSDEC INACTIVE HAZARDOUS WASTE
SITE 9-15-066 - CHEEKTOWAGA, N.Y.

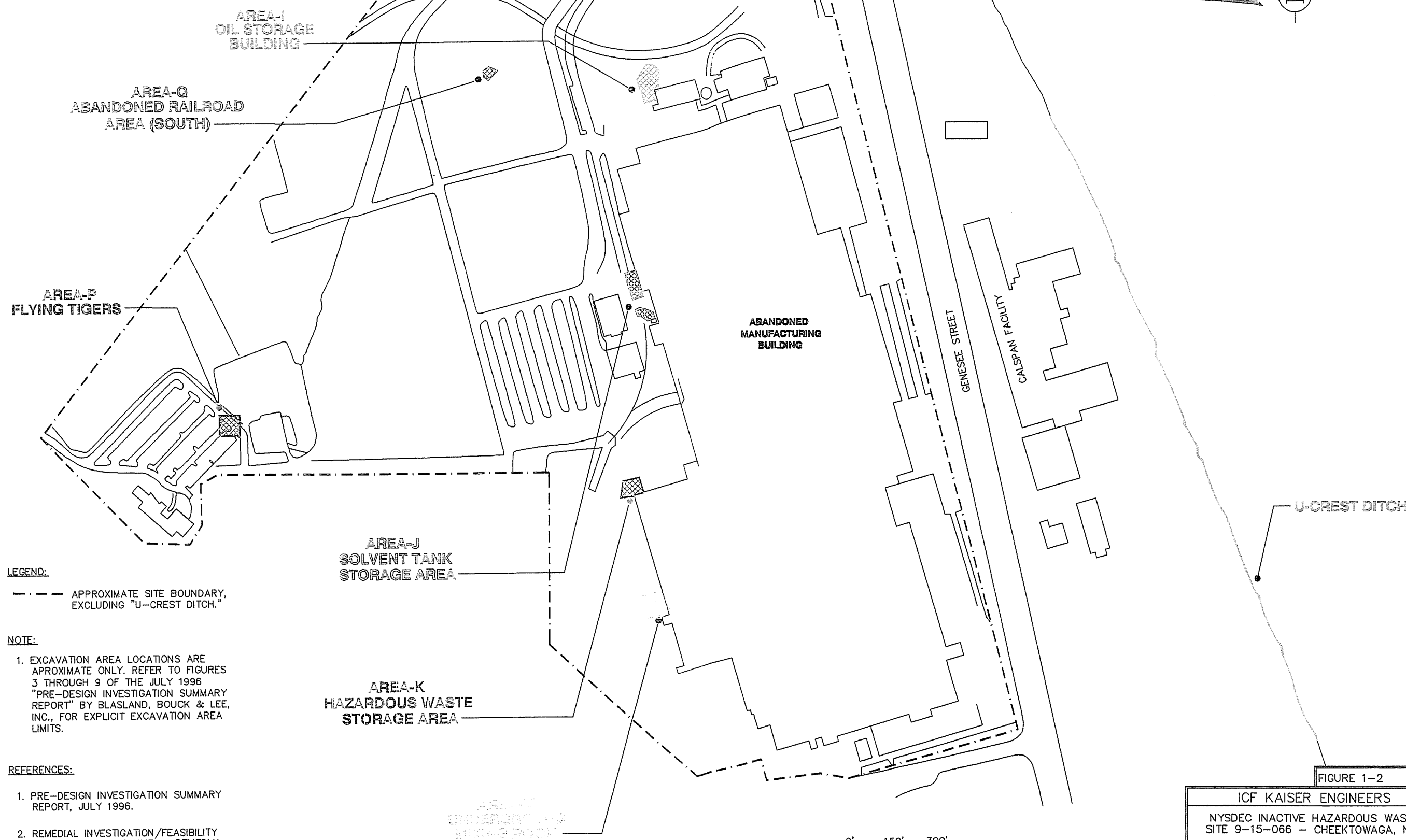
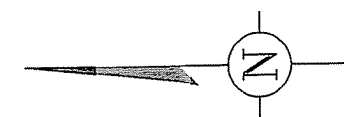
SITE LOCATION MAP

DATE: 10/17/97

DR.: D. EVANS

SCALE: AS SHOWN

FILE NAME: 90151002



LEGEND:

--- APPROXIMATE SITE BOUNDARY, EXCLUDING "U-CREST DITCH."

NOTE:

1. EXCAVATION AREA LOCATIONS ARE APPROXIMATE ONLY. REFER TO FIGURES 3 THROUGH 9 OF THE JULY 1996 "PRE-DESIGN INVESTIGATION SUMMARY REPORT" BY BLASLAND, BOUCK & LEE, INC., FOR EXPLICIT EXCAVATION AREA LIMITS.

REFERENCES:

1. PRE-DESIGN INVESTIGATION SUMMARY REPORT, JULY 1996.
2. REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT, VOLUME 1: REMEDIAL INVESTIGATION REPORT (TEXT) SEPTEMBER, 1994 (DUNN ENGINEERING COMPANY).

FIGURE 1-2

ICF KAISER ENGINEERS	
NYSDEC INACTIVE HAZARDOUS WASTE SITE 9-15-066 - CHEEKTOWAGA, N.Y.	
SITE LAYOUT PLAN	
DATE: 10/17/97	DR.: B. SNYDER
SCALE: AS SHOWN	FILE NAME: 20153003

2.0 PROJECT ORGANIZATION

The organization chart for the work to be performed is shown on Figure 2-1.

The Project Manager will be Mr. Lawrence M. Martin, P.E., of ICF Kaiser. He will be responsible for the implementation of the pre-design activities. He is also responsible for the project budget, schedule and team performance. In addition, Mr. Martin will be responsible for keeping the Respondents for NYSDEC Order on Consent and Settlement Agreement, Index No. 89-0381-91-08, informed of work progress.

The Project Health and Safety Officer (PHSO), Daniel J. Welshons, C.S.P., is responsible for aiding the Group Health and Safety Director in the performance of his normal duties. The duties include: maintaining health and safety records; providing guidance for on-Site health and safety developments; approving HASP addendum/revisions; and communication between on-Site and corporate health and safety personnel. The Project Health and Safety Officer reports directly to the Director of Industrial Hygiene. His or her minimum qualifications include:

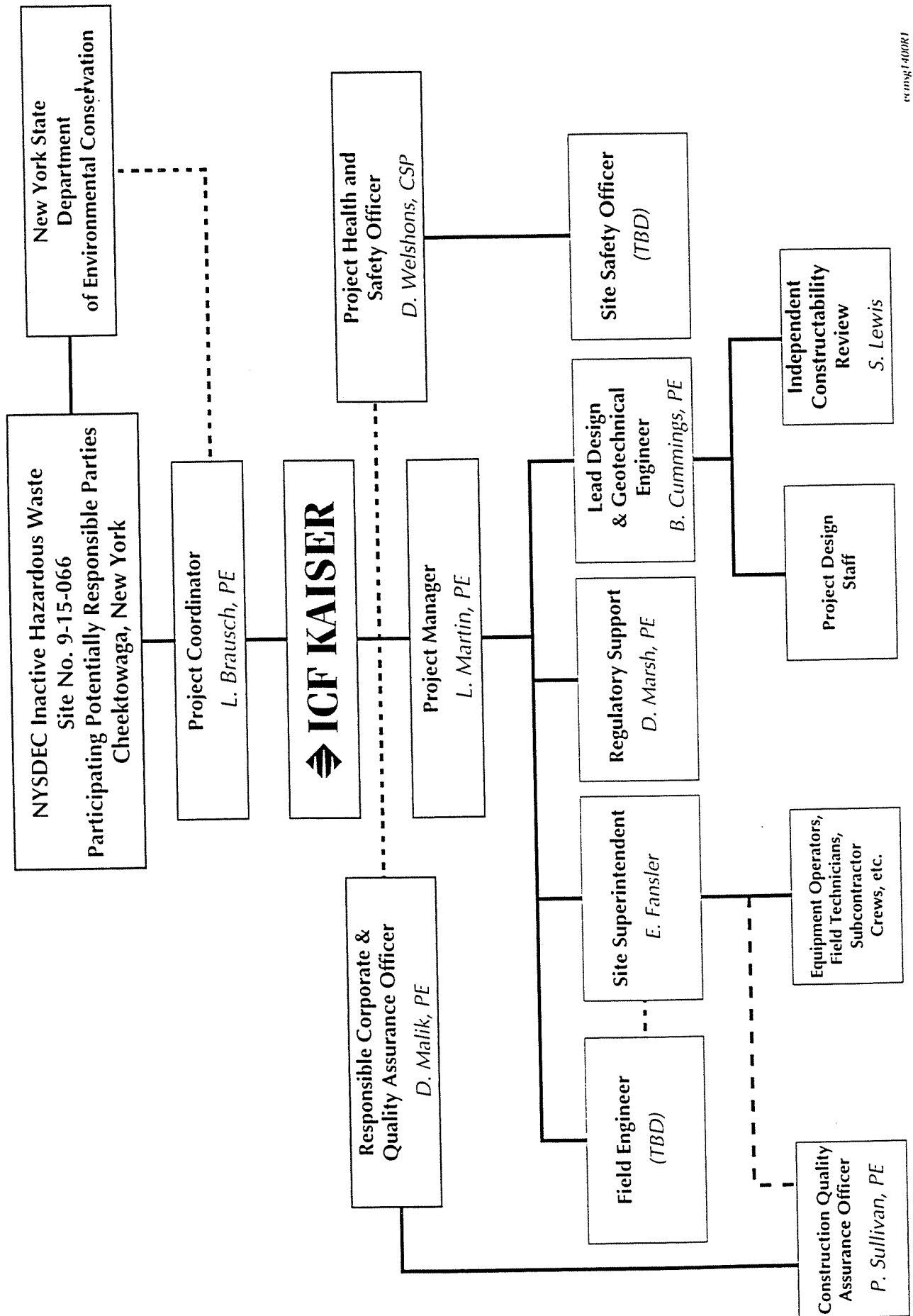
- Three years work experience in the chemical or hazardous waste remediation industries,
- Demonstrable expertise in air monitoring techniques and in the development of personal protective equipment programs for work activities in potentially toxic atmospheres,
- Working knowledge of Federal and New York State occupational safety and health regulations, and
- Registration as a Certified Safety Professional.

The Site Safety Officer (SSO) is responsible for the field coordination of the HASP and other aspects of the ICF Kaiser Safety and Health Program. Among the specific duties of the SSO are: hazard assessment, air monitoring, evaluation of the personal protective equipment program, and consulting with the project health and safety officer on matters related to the project. The SSO reports to the project manager, and has authority to stop work when necessary to maintain the well being of Site workers. His or her minimum qualifications include:

- A minimum of one year of work experience at hazardous waste sites where Level C of personal protective equipment was required,
- Specialized training in personal and respiratory protective equipment program implementation and in the proper use of air monitoring instruments,
- Current certification in first aid and in cardio pulmonary resuscitation by the American Red Cross,
- 40 hour OSHA training, annual refresher training, enrollment in a medical monitoring program, and OSHA supervisor training for hazardous waste sites, and
- Working knowledge of Federal and New York State occupational safety and health regulations.

Project team members will be familiar with the contents of this HASP the project work plan, and the project quality assurance plan; and will observe specifications set forth within those plans, and with further direction they may receive from time to time. No employee may, for any reason, perform an act, or create a condition that may cause harm to themselves, co-workers, or third parties. All employees shall immediately report unsafe conditions to the SSO.

Figure 2-1
Project Organization



3.0 SITE WORKER REQUIREMENTS

3.1 MEDICAL SURVEILLANCE

All project personnel who may be required to enter the exclusion zone or contamination reduction zone (CRZ) shall have successfully completed a preplacement or periodic/update physical examination in accordance with 29 Code of Federal Regulations (CFR) 1910.120.

Subcontractor personnel, because of their job assignments, who may incur exposures to the hazardous materials present at the Site, must have successfully completed a physical examination similar in content to the ICF Kaiser preplacement physical exam, unless this requirement is waived by ICF Kaiser's Industrial Hygiene Director.

3.2 EMPLOYEE TRAINING AND INDOCTRINATION

All project personnel assigned to this project shall have completed, at a minimum, the appropriate mandatory formal training courses. 29 CFR 1910.120 requires 40, or 24 hours of initial training, and 8 hours annual refresher training; plus three days supervised on-Site training for hazardous waste workers. An additional 8 hours training is required for supervisors. State regulations shall be consulted to identify alternate or additional requirements.

All subcontractor personnel shall have completed minimum training in compliance with 29 CFR 1910.120, as appropriate, or requirements as specified by other regulations, or this HASP.

Daily safety meetings (toolbox meetings), detailing specific hazards of the work to be performed and safety precautions and procedures for each task, shall be conducted by a qualified person at the beginning of each shift and shall be documented in writing in the field log. Any authorized changes to this HASP or additional SSO task requirements will be communicated and documented during daily safety meetings.

Material safety data sheets (MSDS) will be obtained for all hazardous materials introduced for use on Site. A copy of each MSDS shall be available on the Site. General chemical information in the form of MSDSs for residual or waste materials of concern will also be available from the ICF Kaiser Pittsburgh Office.

4.0 HAZARD EVALUATION

4.1 SUMMARY OF HAZARDS

<u>PHYSICAL</u>	Slip & Fall	X	Elevated Work Locations	
	Thermal Stress	X	Vehicular Traffic	X
	Fire	X	Manual Lifting	X
	Noise	X	Moving Machinery	X
<u>BIOLOGICAL</u>	Poisonous Plants	X	Insects/Spiders	X
	Snakes	X	Other Animals	
<u>CHEMICAL</u>	Corrosives		Systemic Poisons	X
	Irritants	X	Sensitizers	

Chemical hazards may be encountered while conducting pre-design investigation activities in the areas of potentially contaminated material. These specific areas are shown on Figure 1-2.

The planned Site operations will increase existing hazards and introduce additional hazards to the Site. The hazard analysis identifies the work areas of the Site, tasks to be performed, expected hazards and control measures are summarized in Table 4-1. The following presents the control measures in more detail.

Confined space entry activities will be performed for conducting the sewer evaluation tasks. Prior to physically entering work areas that may be considered a confined space, the space will be visually inspected by the field manager. The field sample collection team and SSO will evaluate the applicability of confined space entry procedures. ICF Kaiser Procedure Safety & Health (S&H) -101, Confined Space Entry, presented in Attachment A presents a flow chart for determining if the space to be entered is considered a confined space and whether the entry activities would require permit or non-permit procedures to be implemented. Upon completion of the evaluation and agreement between the above mentioned parties, the confined space decision making criteria will be clearly documented in the field log book. Subsequently, a pre-entry safety meeting will be held with field staff participating in the entry activities to confirm that entry procedures are communicated to field staff.

In general, members of the confined space entry team will be formally trained prior to initiating entry activities. Only trained and authorized personnel will be permitted to enter the space or perform other duties associated with entry. Ingress/egress points will be identified and secured. ICF Kaiser Procedure S&H-101, Confined Space Entry, will be implemented for this activity.

Heavy equipment such as drilling rigs, etc. may be used to evaluate Site soil, etc. The operator of equipment must be aware of all workers in the area and maintain a line of vision with those workers in

close proximity to the equipment operation. Hand signals will be followed. Only operators that demonstrate proficient operating skills shall be permitted to use heavy equipment.

At the discretion of the SSO, a noise survey may be conducted on-Site using a sound level meter. The results of the survey will be documented in the field log book. Noise levels in excess of 85 dBA shall require the use of hearing protection devices. Use of hearing protection shall also be documented in the Site field notebook. Of particular concern are noise levels associated with the use of heavy equipment. Site workers must wear hearing protection when working around heavy equipment.

Ladders, ramps, stairways, etc. will be used when a vertical or horizontal break of 19 inches or more in a means of access. The means of access shall be designed, constructed and maintained to withstand four times the expected load. The means of access shall be kept clear for free usage of Site workers. Additional guidance can be found in ICF Kaiser Procedure S&H-111 and 120 CFR 1926.1053.

Site workers will be protected by standard guardrail or personal fall protection devices when using access ways (excluding ladders) or work platforms from which exposed to a fall exceeding 6 feet or more or while using a runway which exposes Site workers to a fall of four feet or more.

Open pits and sumps create the potential for Site workers to inadvertently step/fall into the opening. Upon initiating work in the vicinity of open pits, sumps or other unguarded openings, barricades or secure covers will be used to insure Site personnel are physically unable to access these areas.

Electrical equipment using flexible cords will be protected at all times at the source by a ground fault circuit interrupter (GFCI). All overhead electric lines are considered "live" unless the utility company has confirmed the contrary. Working within close proximity (< 10 feet for less than 50 kV) is prohibited unless the utility company has removed power from the line. An underground utility clearance must be obtained prior to initiating subsurface evaluation activities.

Clearing and grubbing activities will be performed to remove vegetation from the work area. Brush will be removed from the work area eliminate possible hazards. If a chipper is used, Site workers will be trained in its operation. Eye and hearing protection shall be worn at all times while operating a chipper. Loose fitting garments shall not be worn by chipper operators.

Asbestos has been identified in the existing buildings on-Site. In the event asbestos or suspected asbestos containing material (e.g., insulation, etc.) are identified in a damaged condition, Site workers will exit the building and contact the Project Manager and PHSO immediately.

Contaminated media has been identified in the soils/sediments/groundwater. At the discretion of the SSO, an exposure assessment will be performed to characterize each classification of Site worker who may be exposed to airborne contaminated media during disturbance activities. Donning Level D to initiate the task, the exposure assessment will consist of collecting full-shift industrial hygiene air samples using personal air sampling pumps and the appropriate collection media. The exposure assessment results will be used to confirm that Level D protection is adequate.

4.2 DISCUSSION OF COMMON PHYSICAL HAZARDS

4.2.1 Heat Stress

Adverse climatic conditions are important considerations in planning and conducting Site operations. High ambient temperature can result in health effects ranging from transient heat fatigue, physical discomfort, reduced efficiency, personal injury, increased accident probability, to serious illness or death. Heat stress is of particular concern when chemical protective garments are worn, since these garments prevent evaporative body cooling. Wearing personal protective equipment (PPE) puts a worker at considerable risk of developing heat stress.

Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and the individual characteristics of the worker. Because heat stress is probably one of the most common (and potentially serious) illnesses at Sites, regular monitoring and other preventive measures are vital.

Note: PPE clothing is defined as, but not limited to:
Clothing constructed of Tyvek, or coated-Tyvek
Polyvinyl Chloride (PVC) rainsuits or coveralls, and
Chemical Protective Clothing (CPF) Series Coveralls.

Heat stress manifests in progressive stages, increasing in severity. The initial stage is commonly termed heat fatigue, which is usually transient, and subsides with rest and replenishment of fluids. Heat fatigue is characterized by discomfort, and reduced mental awareness, with a greater effect in unacclimated workers. Medical treatment is usually not needed.

Heat exhaustion results from sustained exertion in heat, combined with failure to replace water and salts lost in sweat. Symptoms include fatigue, nausea, headache, and clammy, moist skin, which may be flushed or pale. Replacement of water and salts is required to recover, victims may faint upon standing. Electrolyte replacement fluids should be taken until urine volume increases.

Heat syncope results in fainting, and is caused by standing immobile in heat. It is caused by pooling of venous blood in the dilated vessels of the skin and lower body. Recovery is complete and rapid following rest in a recumbent position at a cool location.

The most serious heat illness is heat stroke. Heat stroke is a **medical emergency**, treatment must be immediate, and professional medical attention must be obtained. Heat stroke is caused by a combination of factors including heavy exertion in heat, inadequate replacement of fluids, poor physical condition, and individual susceptibility. Failure of the sweat response occurs, leading to a rapidly accelerated increase in core temperature. The victim usually has hot, dry red skin, and if conscious, is confused; convulsions may be present. The victim must be cooled immediately, heat stroke is fatal if treatment is incomplete or delayed.

As with any illness, the best cure is prevention. Heat stress is most likely early in the summer, prior to acclimatization. Full acclimatization takes from 5 to 7 consecutive days of controlled exertion in heat. Individual physical conditioning, pre-existing illnesses, and use of alcohol contribute significantly to the potential for heat stress. Elevated core temperatures are associated with fetal developmental abnormalities.

Operational Guidance

Determine a baseline heart rate and oral temperature for each employee prior to on-Site activities by counting the radial pulse and using a clinical thermometer to measure oral temperature. A work/rest schedule should be developed prior to initiating field activities, whenever ambient temperatures are greater than 70 degrees Fahrenheit (°F) and chemical protective clothing is used; and when temperatures are greater than 85°F without chemical protective garments. The schedule must be constantly assessed to ensure effectiveness, and may need to be modified during the work day. Note that subcontractors performing physically more demanding work may need to establish a more restrictive schedule.

Increasing Work Rate

1. If a worker's heart rate and oral temperature do not increase, or only increase slightly (10% or less for the heart rate and 0.5.0°F less for the oral temperature) from the baseline readings after the first work cycle, the work period (according to the established work-rest regimen) can be increased by 20%.
2. The worker shall be monitored closely after the next work cycle period and if there are still no significant increases in heart rate and oral temperature, the work period can be increased by an additional 10% and the rest period remains the same.
3. Increases in the work period can be made throughout the shift if there are no significant increases in the physiological monitoring indices.
4. Note that the increases to the work period are made based on the work-rest regimen established prior to initiation of work activities.

Decreasing Work Rate

1. Count the radial pulse as early as possible in the rest period.
2. If a worker's heart rate exceeds 110 beats per minute immediately after a work period, shorten the next work cycle by 30% and keep the rest period the same.
3. If the heart rate still exceeds the 110 beats per minute after the next work period, shorten the following work cycle by 30%.
4. Continue to shorten the employee's work cycle until the heart beat is below 110 beats per minute.

Adequate liquids must be provided to replace lost body fluids. Employees must replace water and salt lost from sweating. Employees must be encouraged to drink more than the amount required to satisfy thirst. Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement.

Replacement fluids can be a 0.1% salt water solution, a commercial mix, such as Gatorade or Quik Kick, or a combination of these with fresh water. Employees should be encouraged to salt their foods more heavily. Salt pills are prohibited.

The replacement fluid temperature should be kept cool.

Cooling devices such as vortex tubes or cooling vests can be worn beneath protective garments.

All breaks are to be taken in a cool, shaded rest area (<80°F).

Employees shall remove chemical protective garments during rest periods.

Employees shall not be assigned other tasks during rest periods.

All employees shall be informed of the importance of adequate rest and proper diet in the prevention of heat stress.

Employees shall be informed of the harmful effects of excessive alcohol consumption in the prevention of heat stress.

Training

Those personnel (including workers, supervisors, and contractor employees) potentially exposed to heat stress conditions shall have been trained in the following:

1. Sources of heat stress, influence of protective clothing, and importance of acclimatization,
2. How the body handles heat,
3. Heat related illnesses,
4. Preventative/Corrective measures, and
5. First Aid procedures.

Additional guidance is provided in ICF Kaiser Procedure S&H-208, Hot Environments, presented in Attachment A.

4.2.2 Cold Stress

As with high temperatures, outdoor work in low temperatures can result in risks to the health of employees exposed without adequate preparation. To minimize impacts from cold stress, the information and precautions given below shall be observed.

Cold-related worker fatalities have resulted from failure to escape low environmental air temperatures, or from immersion in low temperature water. Most hypothermia cases develop in air temperatures between 30 - 50°F. The single most important aspect of life-threatening hypothermia is a fall in the deep core temperature of the body.

Employees shall be protected from exposure to cold so that the deep core temperature does not fall below 38 degrees centigrade (°C) (100.4°F). Lower body temperature will very likely result in reduced mental alertness, reduction in rational decision making, or loss of consciousness with the threat of fatal consequences.

Persons working outdoors in temperatures at or below freezing may be frostbitten. Extreme cold for a short time may cause severe injury to the surface of the body, or result in profound generalized cooling, causing death. Areas of the body that have high surface-area-to-volume ratio such as fingers, toes, and ears, are the most susceptible.

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite of the extremities can be categorized into:

- Frost nip or initial frostbite - characterized by sudden blanching or whitening of skin,
- Superficial frostbite - skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient,
- Deep frostbite - tissues are cold, pale, and solid; extremely serious injury, and
- Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. Its symptoms are usually exhibited in five stages: 1) shivering, 2) apathy, listlessness, sleepiness, and sometimes rapid cooling of the body to less than 95°F, 3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate, 4) freezing of the extremities, and finally 5) death.

Operational Guidance

Proper dress is critical to the prevention of hypothermia. The following information provides a useful starting point:

If the clothing of an employee might become wet on a job Site, the outer layer of the clothing must be impermeable to water.

Employees should layer their clothing, i.e., wear thinner, lighter clothing next to the body with heavier clothing layered outside the inner clothing.

Avoid overdressing when going into warm areas or when performing activities which are strenuous. This could lead to heat stress problems.

Auxiliary heated versions of handwear, footwear, etc., can be used in lieu of mittens, insulated socks, etc. if extremely cold conditions exist.

Employees handling evaporative liquids (gasoline, hexane, alcohol, etc.) shall take special precautions to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling.

Work shall be arranged in such a way that sitting still or standing for long periods is minimized.

Thermal socks, long cotton or thermal underwear, hardhat liners and other cold weather gear can aid in the prevention of hypothermia.

Blankets, warm drinks (other than caffeinated coffee) and warm break areas are essential.

An overall goal is to keep from getting wet. If one does get wet, dry off and change clothes.

All eyewash/shower units shall be winterized for flow in cold weather.

Because of temperature and wind, operations may be suspended by the field operations leader as advised by the health and safety officer.

Training

All employees who may work in cold areas shall be trained in:

1. Proper first aid treatment,
2. Proper clothing practices,
3. Proper eating and drinking habits,
4. Recognition of impending adverse health effects, and
5. Safe work practices.

Clothing for warmth, which is worn under chemical protective clothing, can be laundered in normal fashion, without the wash water being collected as contaminated water. If there is a rip or tear in the chemical protective clothing in a contaminated area, the clothing for warmth must be handled as potentially contaminated, and the water in which it is washed must be collected as potentially contaminated water. More rigorous steps may be required if materials handled are extremely toxic (dioxin, etc.).

Additional guidance is provided in ICF Kaiser Procedure S&H-207, Cold Environments, is presented in Attachment A.

4.2.3 Manual Lifting

Manual lifting is common to Site evaluation activities; and is a potential source of serious injury. The common concern about lifting is causing an injury to the back; but improper lifting techniques can also injure the neck, shoulder, knee, and hands. Site conditions (poor footing, inadequate lighting, and weather) can compound the hazards associated with lifting. To minimize potential hazards from manual lifting, follow the guidance presented below:

Prior to lifting, size up the job; look at the weight, size, shape, and condition of the object to be lifted, and decide if you can lift it unassisted.

Obtain help if the lift will exceed your abilities. When lifting/carrying an object with another person, the weight should be evenly distributed, and movements coordinated.

If you are lifting an object on your own, place your feet close to the object, get a good grip (palm of the hand is stronger than fingers, watch for sharp edges, nails, splinters), and straighten your back.

Keeping your back straight, keep the object close to your body, and use the muscles in your legs to lift the object. Complete the lift before turning, and turn by repositioning your feet, never twist while lifting or carrying an object.

Reverse the procedure when setting the object down, and keep your fingers clear of pinch points.

If you do injure yourself lifting, or suspect you may have, report the injury immediately, do not attempt self treatment, or ignore the problem.

4.3 BIOLOGICAL HAZARDS

Biological hazards which may be encountered during Site work include:

- Small mammals (bites, rabies);
- Snakes;
- Insects (ticks);
- Poisonous plants;
- Bloodborne Pathogens; and
- Bird and Bat Excrement.

Small Mammals

Rabies may be carried by bats, raccoons, foxes, and skunks. Care should be taken to avoid all types of wild animals. Personnel involved in trapping wild animals for biological studies or surveys will wear appropriate protective clothing designated by the SSO or PHSO to minimize being bitten. All animal bites should be reported immediately to the SSO.

Snakes

Species of poisonous snakes may be found at the Site. Personnel bitten by a poisonous or unknown snake should remain calm and as sedentary as possible and have someone summon help. If it is possible to be done safely, the snake should be killed for identification by medical authorities to facilitate appropriate treatment.

Insects

The primary biological hazard of those identified to date is the presence of ticks. Ticks vector the agent which causes Lyme disease. ICF Kaiser personnel will be informed of the presence of ticks at the Site. In addition, personnel exhibiting symptoms of Lyme disease (fever, headache, malaise, nausea, stiff muscles and joints, enlarged lymph glands, and a "bull's eye" rash around the area of the tick bite) will be monitored and may be given a blood test for anti-Lyme titer as a confirmatory screen. Treatment of Lyme disease is with antibiotics. Personnel who believe that they exhibit symptoms of Lyme disease will contact the PHSO so that medical tests may be performed as necessary. Permanone® will be used under the direction of the ICF Kaiser SSO for protection against ticks; his/her instructions will be strictly followed to avoid sample contamination.

Hornets, wasps, yellow jackets, and other bees may be found at the Site. Personnel should be aware of their surroundings at all times so that these stinging insects can be avoided. Personnel with a sensitivity or known allergic reaction to these insects must inform the SSO and field team operations leader so that appropriate actions may be taken if that individual is stung. Bee anti-venom will be stocked in the first aid kit maintained on-Site.

Poisonous Plants

Poison ivy, poison oak, or poison sumac may grow within the boundaries of the Site. Personnel will familiarize themselves with these plants so that they may be avoided. Personnel who are particularly sensitive to these plants may wish to use a barrier cream or ointment which neutralizes the rash-causing toxic oils. Barrier creams or ointments will be used at the direction of the ICF Kaiser SSO to avoid sample contamination.

Bloodborne Pathogens

In July of 1992, OSHA issued a final Standard for Protection of Workers Potentially Exposed to Bloodborne Pathogens (BBP) (29 CFR 12910.1030). This primarily involves medical and research personnel. BBP are pathogenic microorganisms which may be present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).

Potential exposure during site activities results from workers who are infected. The OSHA Standard specifically includes first aid providers and is enforceable on site subject to the Hazardous Waste Site Work and Emergency Response Standard (29 CFR 1910.120). The basic concept of this standard is that medical care workers and first aiders must take the "Universal Precaution" of assuming that any blood containing fluid or person bleeding or contaminated with blood containing fluid is positive (infected) with both viruses.

Protection involves training and the use of personal protection such as gloves, eye shields, one-way valve rescue breather devices, which can be found in the first aid kits on site. In order to effectively protect against any hazards, workers must have a basic understanding of the hazard. This is particularly true of Site Superintendents, SHSOs, and others expected to administer first aid if necessary.

Procedure S&H 205, Bloodborne Pathogens, is presented in Attachment A.

Bird and Bat Excrement

Bird and bat excrement may have accumulated within the Site's abandoned manufacturing building. These accumulations, commonly referred to as "droppings," provide an excellent growth medium for potential pathogenic organisms. Serious illnesses such as cryptococcosis and histoplasmosis can be contracted by inhaling dusts arising from dry bird or bat droppings. Therefore, should dropping accumulations exist at locations that may be disturbed during on-Site activities, the PHSO must be notified. Upon notification and clarification of the situation, the PHSO will specify protocols for mitigating potential exposure risks to bird and bat excrement accumulations.

TABLE 4-1

HAZARD ANALYSIS

NYSDEC Inactive
Hazardous Waste Site No. 9-15-066
Checktowaga, New York

ICF Kaiser Engineers Corporation
Project No. 70717
April 3, 1998

Work Location	Tasks	Hazards	Control Measures
Storm Sewer	■ Sewer Survey ■ Surface Inlet Plugging ■ Smoke Testing ■ Storm Sewer Gauge Monitoring ■ Storm Sewer Outfall Sampling	■ Confined Space entry ■ Combustible gas/O₂ content ■ Ladder use ■ Falls ■ Illumination ■ Rodents/Biological ■ Communication ■ Contact Contaminated Media	■ CSE Training ■ Air monitoring ■ Ventilate space ■ Extraction device(s) ■ Barricade openings ■ Secure ladder ■ Portable lighting ■ Disturb before entering ■ PPE ■ Two-way radios
Groundwater Monitoring Wells	■ Water Level Measurements	■ Contact Contaminated Media	■ Air monitoring ■ PPE ■ Two-way radios
U-Crest Ditch	■ Sediment Sampling	■ Manual Lifting ■ Contact Contaminated Media	■ Air monitoring ■ PPE ■ Two-way radios
Soil Excavation Area(s)	■ Shelby Tube Sampling	■ Heavy equipment operation ■ Noise ■ Fire ■ Manual lifting	■ Equipment inspections ■ Operator awareness ■ Air monitoring ■ Barricade work area ■ PPE ■ Two-way radios

Notes:

1. PPE -- Personal protective equipment.
2. CSE - Confined Space Entry.

NYSDEC Inactive
Hazardous Waste Site No. 9-15-066
70717-05-C

Health and Safety Plan
April 3, 1998

5.0 PROJECT SAFETY REQUIREMENTS

Control of hazards through application of engineering controls is the most desirable course of action. The transitory nature of field projects, and the uncontrolled conditions prevalent at Sites make the use of engineering controls infeasible much of the time. As a result, administrative controls and personal protective equipment are the most effective options to reduce hazards to workers.

At the beginning of the project, each work shift, and as often as necessary to ensure safety, a competent person shall conduct an area survey to locate work place hazards and determine appropriate safety control measures.

5.1 EMPLOYEE HEALTH AND SAFETY RULES

The following general safety rules are to be observed at the project Site.

- At least one copy of this plan shall be available at the work Site.
- Horseplay, practical joking, or any other actions that jeopardize safety will not be tolerated.
- Running is not permitted.
- Alcoholic beverages and non-medicinal drugs are not permitted at the project Site. Employees suspected of being under the influence of alcohol or drugs will be removed from the Site.
- Radios (excepting two-way radios), tape players or other forms of entertainment devices are prohibited in work or support zones (i.e., the exclusion zone or CRZ).
- Activities will be performed in such a manner to minimize or prevent the disbursement or release of contaminants.
- Contaminated protective equipment, such as respirators, hoses, boots, etc., shall not be removed from the regulated area until it has been cleaned, or properly packaged and labeled.
- Legible and understandable precautionary labels shall be affixed prominently to containers of contaminated scrap, waste, debris, and clothing.
- Removal of contaminated soil from protective clothing or equipment by blowing, shaking or any other means which disperse contaminants into the air is prohibited.
- Transportation and disposal of contaminated materials shall comply with applicable local, state, and federal regulations. These items will be addressed by the generator, transporter and disposer.
- Contaminated materials shall be stored in tightly closed containers in well-ventilated areas.
- Containers shall be moved only with the proper equipment and shall be secured to prevent dropping or loss of control during transport.
- Emergency equipment shall be located in readily accessible locations.
- Trenching, shoring, and excavation work must comply with applicable federal Occupational Safety and Health Administration (OSHA) rules.
- No food or beverages shall be present or consumed in the regulated area. No tobacco products shall be present or used and cosmetics shall not be applied in the regulated area.

- Employees shall be required to wash their hands and face before eating, drinking, smoking, or applying cosmetics.
- Portable or fixed emergency shower/eyewash stations shall be located outside the regulated area near work activities.
- All personnel shall avoid contact with potentially contaminated substances. Walking through puddles or mud, kneeling on the ground, or leaning against drums shall be avoided.
- Monitoring equipment shall not be placed on potentially contaminated surfaces.
- Field personnel must observe each other for signs of toxic exposure. Indications of adverse effects include, but are not limited to:
 - changes in complexion and skin discoloration
 - changes in coordination
 - changed in demeanor
 - excessive salivation and pupillary response
 - changes in speech pattern
- Field personnel shall be cautioned to inform each other of non-visual effects of toxic exposure such as:
 - headaches or dizziness
 - nausea
 - blurred vision
 - cramps
 - irritation of eyes, skin, or respiratory tract
- Prompt remedial action shall be taken whenever an inadvertent release of a hazardous material occurs.
- Appropriate action to provide secure footing shall be taken at locations where personnel will be working.
- Provision must be made for cleaning gross contamination from boots and suits in the CRZ.
- Whenever solvents, cleaners, or other chemical substances are used for cleaning, a properly completed Material Safety Data Sheet for the chemicals shall be available at the work Site.
- Whenever flammable or combustible solvents are used for cleaning, specific procedures for the control of flammable gases and vapors may be necessary. When concentrations of flammable vapors cannot be controlled by ventilation, this would include, but is not limited to, the following:
 - Tests shall be made by a qualified person to ensure that concentrations of flammable vapors in the work area do not exceed 20% of the lower explosive limit.
 - As appropriate, equipment on Site shall be bonded and grounded, spark proof, and explosion resistant.
 - An adequate supply of fire extinguishes with a minimum rating of 10 pound, class B:C, shall be strategically located throughout the work area so as to limit the travel distance required by any worker to reach the extinguisher to less than 75 linear feet.
- A qualified person shall take positive steps to ensure that employees are protected from physical hazards which would include, but are not limited to, the following:
 - Discharge of steam, high pressure air, water or oil;

- Tools or other objects dropping from overhead;
- Falls from scaffolds, stairs, or ladders;
- Tripping over hoses, pipes, tools or equipment;
- Slipping on wet, oily surfaces;
- Insufficient or faulty personal protective equipment;
- Insufficient or faulty operations equipment and tools; and
- Noise in excess of acceptable levels.
- Sanitation facilities will be available on-Site. This will include the appropriate number of toilets, wash facilities, a clean break area, and drinking water. Waste materials (e.g. rubbish, debris) will be managed to avoid an unsanitary environment.

5.2 SITE CONTROL

5.2.1 Access

The Site is inactive except for the Flying Tiger Restaurant. As needed, portions of the property may be restricted due to the nature of the pre-design tasks and types of hazards that may be present. Access to the various work areas of the Site shall be restricted to authorized personnel. All personnel working on pre-design implementation tasks will be required to sign-in at the beginning of each shift and sign-out at the end of the shift. In addition, entry into exclusion zones will be controlled by the SSO. The exclusion zones within the Site boundaries are those areas which have been identified as contaminated and evaluation activities will be performed. These zones will be clearly marked using banner guard or like means to immediately notify Site personnel of restricted entry. All personnel shall enter and exit the regulated area through the CRZ.

5.2.2 Buddy System/Site Communications

The topography of the Site and existence of buildings is such that operations will be conducted out of continuous visual contact with support zone personnel. Therefore, the buddy system will be implemented. Two-way radio communication will also be maintained continuously.

5.2.3 Posting

The Site should be posted to warn the public of potential hazards. Also, notices regarding the use of protective equipment (hardhats, safety glasses, etc.) should be placed at the access points to the Sites. Additional notices of specific hazardous areas should be posted where needed.

5.2.4 Visitors

All visitors to the Site shall notify the field operations leader or SSO of their presence upon arrival. Visitors shall sign-in/out and be escorted at times.

5.2.5 Support Areas

The support areas or support zone such as the on-Site trailer and vehicles will provide means for expediting emergency situations. Equipment such as fire extinguishers, first aid kits, two-way radios, cellular telephones, emergency eye wash, etc., will be available in these areas. These areas will be maintained "clean" from contaminated media.

5.3 PERSONAL PROTECTIVE EQUIPMENT

The PPE identified for use on the Site is consistent with the ICF Kaiser Procedure S&H-202, Personal Protection Program.

5.3.1 Levels of Protection

Level A

Level A PPE will not be utilized on this project.

Level B

Level B PPE must be used when:

1. The type and atmospheric concentration of toxic substances has been identified and requires a high level of respiratory protection.
2. Atmospheric conditions do not meet the selection criteria for use of air-purifying respirators.
3. Atmospheric concentrations are immediately dangerous to life and health (IDLH).
4. It is unlikely high concentrations of vapors, gases, or particulates will be generated that would effect the skin.

Level C

Level C PPE must be used when:

1. The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin;
2. The types of air contaminants have been identified, concentrations measured, and an air-purifying respirator is available that can remove the contaminants; and
3. All criteria for the use of air-purifying respirators are met.

Level D

Level D PPE must be used when:

1. The atmosphere contains no known hazard; and
2. Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.

The standard level of protection for work on this project is Level D PPE, consisting of:

Hardhat,
Steel toe shoes,
Safety glasses w/ side shields,
Long pants and long-sleeve shirt, and

Canvas or leather work gloves.

5.3.2 Respiratory Protection (General)

The respiratory protective equipment associated with the levels of protection identified for use on the Site is consistent with the ICF Kaiser Procedure S&H-203, Respiratory Protection Program.

- Only properly cleaned and maintained, NIOSH/MSHA approved respirators shall be used on Site.
- Selection of respirators, as well as any decisions regarding upgrading or downgrading of respiratory protection will be made by the regional health and safety officer.
- Air purifying cartridges shall be replaced at the beginning of each shift or when load-up or breakthrough occur, whichever occurs first.
- No employee shall be assigned to tasks requiring the use of respirators if, based upon the most recent examination, a physician determined that the employee will be unable to function normally wearing a respirator or that the safety or health of the employee or other employees will be impaired by use of a respirator. This shall be so stated on the medical certificate.
- Only employees who have had pre-issue qualitative fit tests and annual fit tests thereafter shall be allowed to work in atmospheres where respirators are required.
- If an employee has demonstrated difficulty in breathing during the fitting test or during use, he or she shall have a supplemental physical examination to determine the cause of the difficulty.
- Where practical, respirators will be assigned to individuals for their exclusive use.
- Respiratory devices will be cleaned, sanitized, and inspected at the completion of each shift activities.
- Contact lenses are not to be worn while using any type of respiratory protection.
- Excessive facial hair (beards) prohibits proper face fit and effectiveness of respirators. persons required to wear respirators must not have excessive growth of beard. All personnel wearing respirators will be required to be clean shaven prior to each day's shift.
- Regular eyeglasses cannot be worn with fullface respirators (breaks the facepiece seal). Inserts must be used.
- The respiratory protection utilized on Site will be in compliance with 29 CFR 1910.134.
- Where respirators are designated for protection against particulate contaminants, the employee shall be permitted to change canisters or cartridges whenever an increase in breathing resistance (load-up) is detected.

5.4 TASK/PROTECTION MATRIX

The following initial levels of protection are based on the potential for inhalation, ingestion, and direct contact with contaminated media. The SSO must implement additional engineering, administrative and/or personal protective equipment requirements when the potential for exposure through the established pathways increases.

5.4.1 Levels of Protection

<u>ACTIVITY</u>	<u>INITIAL LEVEL OF PROTECTION</u>
General Site Work	D
Mobilization	D
Site Preparation	D
Storm Sewer Survey	D1
Storm Sewer Inlet Sealing	D2
Smoke Testing (w/o Confined Space Entry)	D1
Smoke Testing (w/ Confined Space Entry)	D2
Storm Sewer Flow Monitoring	D1
Storm Sewer Water/Sediment Sampling	D2
U-Crest Ditch Sediment Sampling	D2
Geotechnical Soil Sampling	D
Demobilization	D

Definition of PPE Levels

Level D	Hardhat; Safety glasses w/ permanent side shields; Steel toe shoes; Long pants, long-sleeve shirt.
Level D1	Hardhat; Safety glasses w/ side shields; Steel toe rubber boots; Long pants, long-sleeve shirt; Nitrile outer and inner gloves.
Level D2	Hardhat; Safety glasses w/ side shields; Steel toe rubber boots or equivalent; Long pants, long-sleeve shirt; Nitrile outer and inner gloves; Polycoated Tyvek coveralls; Face shields (for power washing).
Level C	Hardhat; Full-face air purifying respirator w/ organic vapor/high efficiency particulate cartridges; Steel toe rubber boots or equivalent; Long pants, long-sleeve shirt; Nitrile outer and inner gloves; Polycoated tyvek coveralls (when exposed to potentially contaminated liquids; Kleenguard when no exposure to potentially contaminated liquids)

Level B Hardhat;
Full-face supplied-air respirator;
Steel toe rubber boots or equivalent;
Long pants, long-sleeve shirt;
Nitrile outer and inner gloves;
Hooded saranex coveralls.

Note: Five-minute escape respirators must be carried by confined space entry personnel entering sewers.

5.4.2 Action Levels

The following breathing zone action levels shall be used in conjunction with air monitoring. The breathing zone is defined as the area from the workers' waist up, forward of the shoulders. Except for particulate monitoring, instrument readings should be stable and continuous for at least 5 minutes or four instantaneous peaks over a 15-minute period. Readings must be documented in the field notebook. The following air monitoring instruments shall be used during intrusive activities.

Volatile Organic Compounds

Volatile organic compounds have been identified as chemicals of concern. Photoionization detector (PID) will be used during intrusive activities at the Site.

Background to Background +5 parts per million (ppm)	Continue work/monitor
Background +5 ppm to Background +10 ppm	Use Level C respiratory protection
> Background +10 ppm	Stop work/investigate/initiate controls;

Benzene

Detector tubes sensitive to benzene will be used to determine if PID readings above 1 ppm consist of benzene. If benzene is present in the breathing zone above 1 ppm, the level of protection will be upgraded to Level C. If benzene concentrations in the breathing zone is less than 1 ppm, the level of protection will remain at Level D. If benzene is present in any concentration, periodic detector tube evaluations will be performed to insure concentrations of benzene do not exceed the OSHA Permissible Exposure Limit (PEL) of 1 ppm without Level C protection.

Vinyl Chloride

Detector tubes sensitive to vinyl chloride will be used to determine if PID readings above 1 ppm consist of vinyl chloride. If vinyl chloride is present in the breathing zone above 1 ppm, the level of protection will be upgraded to Level B. If vinyl chloride concentrations in the breathing zone is less than 1 ppm, the level of protection will be upgraded to Level C. If vinyl chloride is present in any concentration, periodic detector tube evaluations will be performed to insure concentrations of vinyl chloride do not exceed the OSHA Permissible Exposure Limit (PEL) of 1 ppm without Level B protection.

Lower Explosive Limit (LEL)

Explosive gases and oxygen enriched/deficient atmospheres are not anticipated as part of the proposed activities, however, this instrument will be used to confirm the absence of explosive compounds or oxygen deficient/enriched atmospheres as part of confined space entry procedures.

< 5% LEL	Continue work/monitor
> 5% and < 10% LEL	Stop work/investigate/initiate controls
> 10% LEL	Leave Area

NOTE: The stop work level may be increased to >50% when measured within a two foot radius of an opening.

Oxygen

19.5% to 23.5% oxygen	Continue work/monitor
<19.5% or >23.5% oxygen	Stop work/leave area

Carbon Monoxide

A carbon monoxide (CO) monitor will be used to monitor carbon monoxide levels within deep excavations when internal combustion engines are being used in the area and also for confined space entry activities. The following CO action levels will be implemented.

0 ppm - 25 ppm CO	Continue work
25 ppm - 50 ppm CO	Ventilate Area
> 50 ppm CO	Evacuate the space/ Continue ventilation

Hydrogen Sulfide

Hydrogen sulfide monitoring will be conducted during confined space entry activities.

< 10 ppm hydrogen sulfide	Continue work
>10 ppm hydrogen sulfide	Evacuate space; Ventilate

Particulate

Dusty conditions may be generated during soil disturbance activities. Dust suppression protocols for remedial action work will be (are) included in the *Soil Removal, Treatment and Backfilling Plan* and the *Sediment Removal, Stabilization and Disposal Plan*. At the discretion of the SSO based of visual dust generation, an aerosol monitor will be used to monitor PM-10 breathing zone concentrations of particulate at the work area in question.

Consistent with NYSDEC TAGM HWR-89-4031, the following PM-10 breathing zone action levels apply:

< 0.150 milligrams per cubic meter (Above upwind background concentrations, sustained for a 15 minute averaging period)	Level D
≥ 0.150 milligrams per cubic meter (Above upwind background concentrations, sustained for a 15 minute averaging period)	Initiate additional dust suppression techniques and upgrade to Level C the condition persist.

5.5 CLEANING PROCEDURES

Cleaning procedures are outlined in the following sections to clarify the CRZ setup and procedures for decontaminating personnel and equipment.

5.5.1 Personnel

Personnel cleaning facilities will be established on-Site so that personnel maintain a high degree of hygiene and minimize the possibility of exposure to chemical hazards. These facilities will be setup in the CRZ.

Within the CRZ, which will be located at the entry/exit point of the exclusion zones, personnel cleaning areas will be established to facilitate controlled removal of contamination and protective clothing. These CRZs will be clearly identified using signage. All personnel exiting the exclusion zone will pass through the cleaning area to remove gross contamination. This will be accomplished via two-stage washing of outer gloves, boots and respirators, the first stage using soap and water, and the second stage being a clean water rinse. An emergency eyewash will be located in the immediate area for employees who may come in contact with contaminated materials. Outer disposable coveralls, gloves, boot covers, etc. will be removed and disposed of. Disposable outer coveralls, gloves and boot covers, etc. clothing will not be reused.

Personnel are required to wash hands, face, and other exposed skin areas prior to leaving for breaks or lunch.

5.5.2 Instrument

Instruments used in potentially contaminated areas should be protected from contamination by plastic wrap to the extent feasible (take care not to cover air inlets or exhaust ports). Cleaning of instruments is to be conducted using appropriate solvents (alcohol, distilled water, etc.) so that the instruments are visually clean.

5.5.3 Equipment

Equipment used in potentially contaminated areas (bucket augers, trowels, heavy equipment, etc.) will be decontaminated prior to entering the Site. Upon completion of the project, or prior to leaving the Site, the equipment will be cleaned with a sequential wash/rinse procedure to remove potentially contaminated media.

5.5.4 Investigation Derived Waste

Investigation derived wastes (IDW) generated during personnel, instrument, and equipment cleaning (water, solvents, rags, paper towels, etc.) will be handled in accordance with Section 3.9 of the *Pre-Design Evaluation Work Plan* (ICF Kaiser 1998a).

5.6 EMERGENCY PROCEDURES

5.6.1 Notifications

In the event of an emergency response requiring notification of off-Site personnel for prevention of property damage or emergency medical care, the field operations leader is responsible for immediately contacting the appropriate agencies. If the field operations leader is unavailable, the SSO will perform this function. A

list of phone numbers for emergency agencies and utilities will be posted near each phone and in the field office.

Each day, or as often as necessary, the field operation leader shall designate an assembly point in case of emergency. Whenever an employee reports, or becomes aware of an emergency condition, an air horn will be sounded simultaneously with communication via two-way radios to Site workers. All employees must immediately evacuate their work area and proceed to the assembly point. The field operation leader shall account for personnel on Site, and shall provide instructions on further actions to be taken. This may include instructions to support staff to notify effected occupants of nearby buildings who may be affected by the incident. The field operations leader shall secure the immediate area around the incident and await local response personnel to arrive on the scene. At the conclusion of the incident response, a written report will be prepared by the field operations leader and issued to the Project Manager. The report needs to discuss the events leading to the incident and a critique of the efficiency of the response.

Within the CRZ, personnel will be standing-by to perform rescue operations within the exclusion zone. The need for rescue support will be via the air horn and two-way radio communication.

During permit required confined space entry activities, a confined space rescue team will be on call and in close proximity to the Site. If rescue services are required, the team will be summoned using the Site telephone. Once on-Site, the rescue team will communicate directly with the attendant and entrants via two-way radio. The need for rescue support by the field team will be via two-way radio communication with the support zone.

5.6.2 Emergency Numbers

The emergency phone numbers shall be identified, and posted at the project Site (Table 5-1). Information regarding the nearest source of emergency medical care is provided to Site workers as Table 5-2. A route map from the Site to the nearest hospital is provided as Figure 5-1.

5.6.3 Emergency Equipment On-Site

The following emergency equipment will be available at each Site:

- First aid kits
- Fire extinguishers
- Emergency eyewash stations

5.6.4 First Aid Procedures

Physical Injury

- For minor injuries, routine first aid procedures shall be applied by trained personnel. If required, the injured employee shall then be transported to the hospital.
- For major injuries, an ambulance shall immediately be called, the emergency medical responders shall assess the nature and extent of the injury. In cases of severe injury occurring along with chemical contamination of the victim, and if injuries permit, the victim shall be decontaminated or have the contaminated garments removed prior to being transported in the ambulance, but only if these actions

will not pose risk to the victim's health. Ambulance and hospital personnel shall be advised if cleaning was not performed.

Chemical Injury

- Appropriate safety gear shall be worn when treating the victim.
- The victim shall be removed to fresh air
- The victim's vital signs shall be assessed, and resuscitation shall be initiated if necessary.
- If clothing is chemically contaminated and injuries permit, clothing shall be removed and the skin flooded with copious amounts of water.
- If the eyes are contaminated, they shall be irrigated immediately with copious amount of water for 15 minutes minimum. Medical attention shall be obtained immediately for any injury involving the eyes.
- Call the nearest Poison Control Center for technical advice and assistance.

5.6.5 Fires

Small Fires

A small fire is defined as a fire that can be extinguished with a single 10-pound dry chemical fire extinguisher. In the event of a small fire, Site personnel will take the following actions:

- Evacuate unnecessary personnel from the area, if possible to an upwind location.
- Attempt to extinguish fire using portable fire extinguishes or by smothering with soil.
- Request emergency response assistance (ambulance, fire, hospital, poison control center).

Large Fires

In the event of a large fire or a small fire which cannot be extinguished, the following actions will be taken:

- Evacuate unnecessary personnel from the Site, preferably to an upwind location.
- Notify the fire department and other emergency response services (police, ambulance, hospital, poison control center).

NEVER RISK A LIFE TO SAVE EQUIPMENT.

5.6.6 Spills

If a spill of hazardous material occurs, the following actions will be taken:

- Notify the field operations leader immediately.
- Take immediate measures to control and contain the spill within Site boundaries.
- Keep unnecessary personnel away, isolate the hazardous area and deny entry.
- Stay upwind and keep out of low-lying areas.

- Allow no flares, smoking, or flames in hazard area.
- For liquids, keep combustibles away from the spilled materials.

Small Dry Spills

Shovel contaminated materials into dry containers and cover. Use care not to make material airborne. Label the containers as to contents and remove to a secure area.

Small Liquid Spills

Absorb the liquid with sand, clean fill, or other noncombustible absorbent material. Place contaminated material in a container, cover and label it, and remove it to a secure area.

5.6.7 Severe Weather

In the event of severe weather, as determined by observation of lightning, high winds, or heavy rain, Site work shall be suspended until the weather has passed. If the area of the project is under a severe weather warning issued by the National Weather Service, the SSO shall maintain continuous observation of approaching weather.

Following a severe weather episode (including earthquakes), Site work shall not resume until the Site area has been inspected and a qualified person has determined that the Site is secure.

5.7 LOGS, REPORTS AND RECORDKEEPING

5.7.1 Accident Reports

Following any accident, near-miss, or declared emergency, the field manager shall prepare a report describing the incident using the Supervisor's Injury/Incident Report Form (Attachment B). This report will be submitted to ICF Kaiser's Industrial Hygiene Director within one working day of the event.

5.7.2 Air Monitoring Records

Real time monitoring (PID/LEL/oxygen/CO/hydrogen sulfide/DataRAM™) records shall be maintained in a project field notebook. Instrument field calibration and maintenance records shall be maintained in the same log.

STORM SEWERS

Surveyed $\rightarrow$ ACAD? DWS?

What about fluids from
Dust + suppression $\rightarrow$ Drainage?

Collection? Filtration?

Plans/Drawings for filtration system?

CM/HASP - What some
contaminants during
clean - dust suppression

5-9: S.S. 2. Instruments
Note that Instruments should
Also be Intrinsic depending
on potential for ignition.

2-6 Task 4:

Test borings should
be filled w/grout, not drill
cuttings. no conduits for
possible surface contaminants.

Airport proximity: Airborne
Particulates: Do they pose a
hazard to Jet engine intake?

3-5 - 3.9.1 - Drill cuttings
~~Drill~~ Back in hole, provided that
the parent breccia a confining
layer.

2-1 - Air monitoring

Perimeter Mon.:

FID will not tarize
strong ~~at~~ the chemicals
list ed. ensure that H_2 SO_4
FID (anything else?) is
available. Drier tubes?

**TABLE 5-1
EMERGENCY CONTACT**

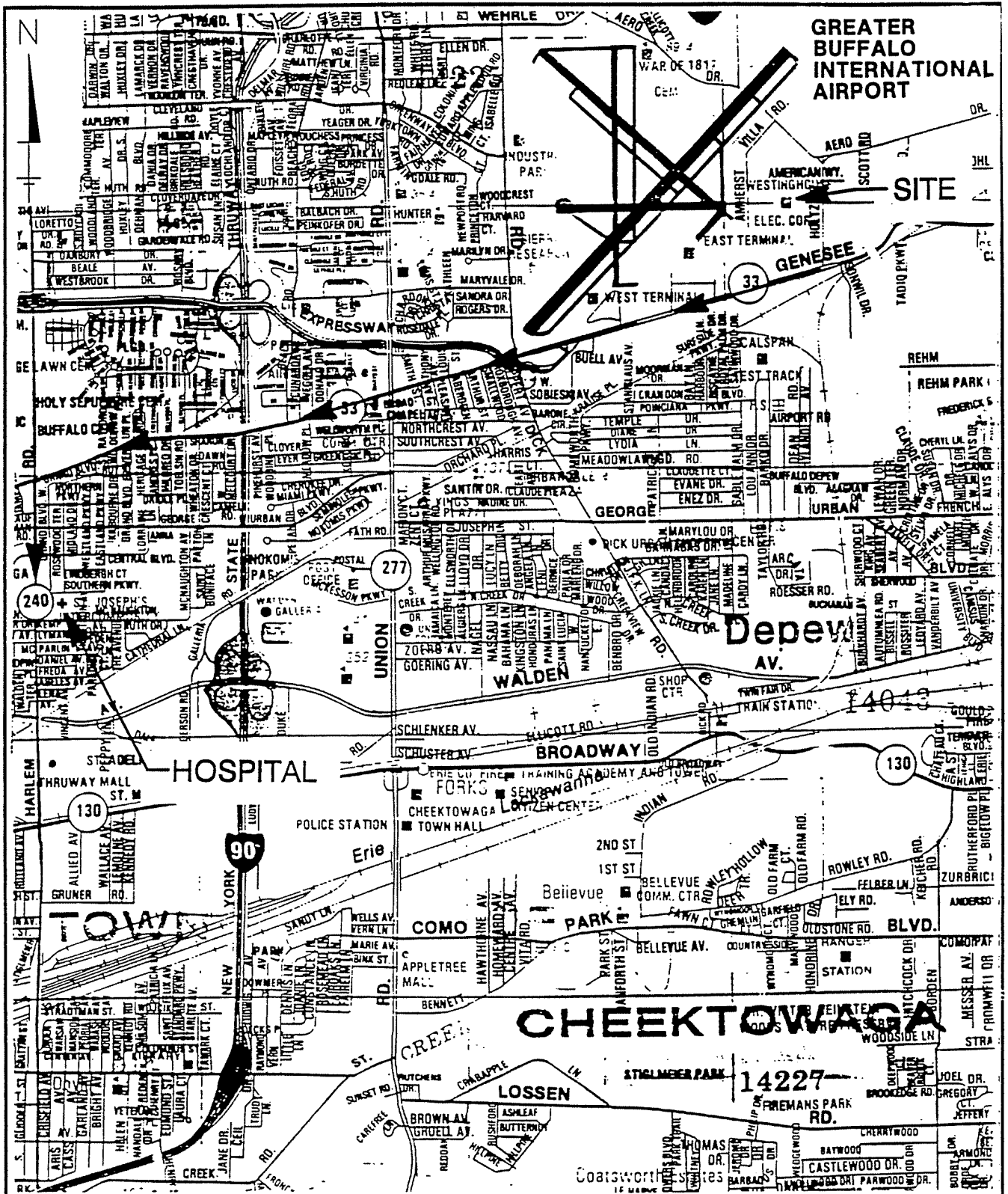
NYSDEC Inactive
Hazardous Waste Site No. 9-15-066
Cheektowaga, New York

ICF Kaiser Engineers Corporation
Project No. 70717
April 3, 1998

EMERGENCY PHONE NUMBERS	
FIRE	911 or (716) 685-1212
RESCUE	911
AMBULANCE	911
POLICE	911 or (716) 683-6100
POISON CONTROL CENTER	(800) 888-7655 or (800) 878-7654
CHEMTREC	(800) 424-9300 (24 Hr.)
NYS Dept. of Health - Buffalo	(716) 847-4500
NYSDEC - Region 9	(716) 851-7220
Erie County Dept. of Health	(716) 858-7677
Center for Disease Control	(770) 639-2888 (24 Hr.)
REGIONAL RESPONSE CENTER	(212) 264-2525 (24 Hr.)
ELECTRIC UTILITIES - NYSEG	(800) 572-1131
WATER UTILITIES - ERIE COUNTY	(716) 684-0900
GAS UTILITY - ERIE COUNTY	(800) 365-3234
CHEEKTOWAGA DISASTER SERVICES	(716) 896-8091
AT&F (EXPLOSIVES INFORMATION)	(800) 424-9555

**TABLE 5-2
EMERGENCY MEDICAL INFORMATION**

HOSPITAL/EMERGENCY MEDICAL SOURCE	
NAME	St. Joseph Hospital
PHONE	(716) 891-2450
ADDRESS	2605 Harlem Road, Cheektowaga, New York
DIRECTIONS	(Hospital route map presented as Figure 5-1) Turn right out of Site onto Genesee Street. Travel southwest on Genesee Street for approximately 2.3 miles. Turn left onto Harlem Road. Travel south on Harlem Road for approximately 0.5 miles. Hospital will be visible.



APPROXIMATE SCALE:
1" = 3,200'

MAP LOCATION

REFERENCE: RAND MCNALLY & CO.
BUFFALO, N.Y. - CITY MAP, 1992.

FIGURE 5-1

ICF KAISER ENGINEERS

NYSDEC INACTIVE HAZARDOUS WASTE
SITE 9-15-066 - CHEEKTOWAGA, N.Y.

HOSPITAL ROUTE

DATE: 10/17/97

DR.: D. EVANS

SCALE: AS SHOWN

FILE NAME: 90151004

6.0 REFERENCES

Blasland, Bouck & Lee, Inc., Pre-Design Investigation Summary Report, Westinghouse Site Participating Parties, Cheektowaga, New York, July 1996.

ICF Kaiser, 1998a. Pre-Design Evaluation Work Plan, NYSDEC Inactive Hazardous Waste Site No. 9-15-006, Cheektowaga, New York, ICF Kaiser Engineers Corporation, April 3, 1998.

New York State Department of Environmental Conservation, Division of Hazardous Waste Remediation, Record of Decision, Westinghouse Electric Corporation Site, Town of Cheektowaga, Erie County, Site No. 9-15-066, March 1995.

New York State Department of Environmental Conservation, Division of Hazardous Waste Remediation, Record of Decision, Westinghouse Electric Corporation Site, Town of Cheektowaga, Erie County, Site No. 9-15-066, December 1995.

ATTACHMENT A

ICF KAISER SAFETY AND HEALTH PROCEDURES

TITLE: CONFINED SPACE ENTRY

1. PURPOSE

To establish the minimum requirements for ICF Kaiser Engineers (ICF KE) to perform confined space entry; and to serve as the foundation of the mandatory written permit-required confined space entry program.

2. SCOPE

This procedure applies in its entirety to all ICF KE projects unless a variance from its requirements is granted by the ES&H Service Unit Manager.

3. DEFINITIONS

- (a) **Acceptable entry conditions** means the conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.
- (b) **Attendant** means an individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit space program.
- (c) **Authorized entrant** means an employee who is authorized by the employer to enter a permit space.
- (d) **Confined space** means a space that: (1) Is large enough and so configured that an employee can bodily enter and perform assigned work; and (2) Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and (3) Is not designed for continuous employee occupancy.
- (e) **Entry** means the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.
- (f) **Entry permit (permit)** means the written or printed document that is provided by the employer to allow and control entry into a permit space and that contains the information specified in Section 8 of this procedure.
- (g) **Entry supervisor** means the person (such as the employer, foreman, or crew chief) responsible for determining if acceptable entry conditions are present at a

permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this section. *NOTE: An entry supervisor also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required by this section for each role he or she fills. Also, the duties of entry supervisor may be passed from one individual to another during the course of an entry operation.*

- (h) **Hazardous atmosphere** means an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:
- (1) Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL); (2) Airborne combustible dust at a concentration that meets or exceeds its LFL; *NOTE: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) or less.* (3) Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent; (4) Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart G, Occupational Health and Environmental Control, or in Subpart Z, Toxic and Hazardous Substances, of 29 CFR 1910, and which could result in employee exposure in excess of its dose or permissible exposure limit; *NOTE: An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this provision.* (5) Any other atmospheric condition that is immediately dangerous to life or health. *NOTE: For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Material Safety Data Sheets that comply with the Hazard Communication Standard, 29 CFR 1910.1200, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.*
- (i) **Immediately dangerous to life or health (IDLH)** means any condition that poses an immediate or delayed threat to life, or that would cause irreversible adverse health effects, or that would interfere with an individual's ability to escape unaided from a permit space. *NOTE: Some materials – hydrogen fluoride gas and cadmium vapor, for example – may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse 12-72 hours after exposure. The victim "feels normal" from recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be "immediately" dangerous to life or health.*

- (j) **Inerting** means the displacement of the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible. *NOTE: this procedure produces an IDLH oxygen-deficient atmosphere.*
- (k) **Isolation** means the process by which a permit space is removed from service and completely protected against the release of energy and introduction of material into the space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy (see Procedure No. S&H-103); or blocking or disconnecting all mechanical linkages.
- (l) **Non-permit confined space** means a confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.
- (m) **Oxygen deficient atmosphere** means an atmosphere containing less than 19.5 percent oxygen by volume.
- (n) **Oxygen enriched atmosphere** means an atmosphere containing more than 23.5 percent oxygen by volume.
- (o) **Permit-required confined space (permit space)** means a confined space that has one or more of the following characteristics: (1) contains or has a potential to contain a hazardous atmosphere; (2) contains a material that has the potential for engulfing an entrant; (3) has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or (4) contains any other recognized serious safety or health hazard.
- (p) **Prohibited condition** means any condition in a permit space that is not allowed by the permit during the period when entry is authorized.
- (q) **Rescue service** means the personnel designated to rescue employees from permit spaces.
- (r) **Retrieval system** means the equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.
- (s) **Testing** means the process by which the hazards that may confront entrants of a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space. *NOTE: Testing enables*

employers both to devise and implement adequate control measures for the protection of authorized entrants and to determine if acceptable entry conditions are present immediately prior to, and during, entry.

4. RESPONSIBILITIES

- (a) The project manager has overall responsibility for establishing and ensuring compliance with this procedure.
- (b) The field safety and health staff is responsible for implementing and/or monitoring activities associated with this procedure.
- (c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

5. GENERAL REQUIREMENTS

- (a) The project manager shall have a competent person evaluate the workplace to determine if any spaces are permit-required confined spaces. *NOTE: Proper application of the decision flow chart in Attachment A would facilitate compliance with this requirement.*
- (b) If the workplace contains permit spaces, the project manager shall inform exposed employees (and subcontractors if applicable), by posting danger signs or by any other equally effective means, of the existence and location of and the danger posed by the permit spaces. *NOTE: A sign reading DANGER – PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER or using other similar language would satisfy the requirement for a sign.*
- (c) If permit spaces exist in the workplace, and employees will not be permitted to enter permit spaces, the project manager shall take effective measures to prevent employee entry into permit spaces.
- (d) If non-permit spaces are modified, or experience any change that causes an increased hazard to entrants, the project manager shall reevaluate that space and if necessary reclassify it as a permit-required confined space.
- (e) If any subcontract employee is to enter a permit space, prior to the initial entry, the project manager shall: (1) inform the subcontract employer that the workplace contains permit spaces, and that entry must comply with 29 CFR 1910.146; (2) inform the subcontract employer of the elements, including known hazards and experiences from any previous entries into the space, that classify the space as a permit space; (3) inform the subcontract employer of any

controls or procedures implemented to protect employees near the subcontractor's work area; (4) coordinate entry operations among client, contractor and subcontractor personnel when necessary; and (5) debrief the subcontract employer at the conclusion of entry operations regarding the permit space entry program and any hazards or problems encountered during the entry operations.

6. IMPLEMENTATION

- (a) **Non-Permit Confined Spaces** Entry into non-permit confined spaces will be subject to the following controls:
- (1) The project manager (or designee) and project safety officer shall be informed in advance of the planned entry.
 - (2) The entry shall be coordinated with any work activities near the non-permit space so that hazardous conditions will not be created in or around the space.
 - (3) The buddy system will be used for all entries.
 - (4) Entrants will immediately withdraw upon recognition of any hazardous condition.
 - (5) The project manager and project safety officer will be advised of any unanticipated incidents related to the non-permit space entry.
- (b) **Permit-Required Confined Spaces** Entry into permit-required confined spaces will be subject to the following controls:
- (1) Unauthorized entries shall be prohibited, and measures implemented to prevent such entries.

The project manager shall develop additional written program controls which will specifically address the permit spaces and entries unique to the individual project scope of work and conditions.
 - (2) Hazards shall be identified and evaluated prior to entry. Hazards to be addressed include:
 - (i) Chemical exposure (via inhalation, ingestion, or dermal absorption) from the contents or residues of previous contents of the space, from chemicals introduced into the space as part

of the entry operation, and from chemicals used near the space;

- (ii) Oxygen deficiency or enrichment;
 - (iii) Discharge of steam, high-pressure air, water or oil into the confined space, or against personnel working outside.
 - (iv) Structural failure of the space walls, roof, roof support members, swing line cables or other structural members.
 - (v) Tools, debris, or other objects dropping from overhead.
 - (vi) Falls through or from the roof, or from scaffolds, stairs or ladders.
 - (vii) Tripping over hoses, pipes, tools, or equipment.
 - (viii) Slipping on wet, oily surfaces or colliding with objects in inadequately lighted interiors.
 - (ix) Insufficient or faulty personal protective equipment.
 - (x) Insufficient or faulty operations equipment and tools.
 - (xi) Noise in excess of acceptable levels.
 - (xii) Temperature extremes which may require additional protection or shorter work periods.
- (3) The project manager shall, as part of the written material under 6(b)(1) above, develop procedures and practices to ensure safe conduct of entry operations. The following points at least shall be fully addressed:
- (i) acceptable entry conditions shall be specified (both chemical and physical conditions shall be addressed, and conditions which could arise as a result of operations performed outside the space shall be considered).
 - (ii) procedures to fully isolate the space (this may not be feasible in sewers, see Attachment C). Isolation of a space shall include the following steps as applicable:

- (A) Depressurize the confined space.
- (B) Prevent accidental introduction into the confined space of hazardous materials through interconnecting equipment such as piping, ducts, vents, drains, or other means.
- (C) De-energize, lockout, and tagout machinery, mixers, agitators, or other equipment containing moving parts that are in the confined space.
- (D) Removing a valve, spool piece, or expansion joint in piping to, and as close as possible to, the confined space, and blanking or capping the open end of the pipe leading to the confined space.
- (E) Inserting a suitable full-pressure blank in piping between the flanges nearest to the confined space.
- (F) Closing, locking, and tagging at least two valves in the piping leading to the confined space, and locking or tagging open to atmosphere a drain valve between the two closed valves, which shall be checked to ensure that it is not plugged.
- (G) In all cases, blanks or caps shall be of a material that is compatible with the liquid, vapor, or gas with which they are in contact.
- (H) The material shall also have sufficient strength to withstand the maximum operating pressure, including surges, which can be built up in the piping.
- (I) In addition, all electrical and mechanical devices within or attached to the confined space shall be disconnected, or locked, and tagged to prevent accidental movement or energizing of such systems.
- (J) All employees who will be working in the confined space shall be informed of the isolation devices in use at the jobsite during safety meetings.

- (iii) Purge, inert, flush, or ventilate the space as necessary to eliminate or control atmospheric hazards.
 - (iv) Provide barriers to protect entrants from external hazards
 - (v) Verify that conditions in the permit space are acceptable throughout the duration of the entry.
- (4) The following equipment shall be provided, maintained and utilized whenever necessary for safe entry operations:
- (i) Testing and monitoring equipment needed to perform specified atmospheric testing.
 - (ii) Ventilating equipment needed to create and maintain acceptable entry conditions. Ventilation of permit spaces shall be performed as follows:
 - (A) Prior to ventilating a confined space, a qualified person shall take positive steps to ensure that no pyrophoric materials that will ignite in the presence of air are present in the confined space.
 - (B) All confined spaces shall be mechanically ventilated to remove and/or prevent the accumulation of hazardous atmospheres.
 - (C) Air or steam driven air movers shall be used to ventilate confined spaces. Use of electric powered ventilators is strictly limited to spaces that have not contained flammable or combustible materials.
 - (D) Oxygen shall not be used to power air-driven ventilators or to ventilate any confined space location.
 - (E) The entry supervisor shall check periodically to ensure that contaminated air from a confined space is exhausted to a location where it presents no hazard.
 - (F) Whenever possible, air movers shall be used with ducting to increase the efficiency of ventilation in the confined space and to prevent recirculation of contaminated air due to ventilation "short circuiting".

- (G) When two or more air movers are used for ventilation, all such units should be operated in the same flow direction to maximize efficiency, i.e., all in the exhaust mode or all in the supply mode.
- (iii) Communications equipment necessary to permit immediate, understandable communications between the entrant(s) and the attendant(s).
- (iv) Personal protective equipment necessary to supplement feasible engineering and work practice controls.
- (v) Lighting equipment necessary for safe operations and emergency exit. Temporary lighting used in confined spaces shall meet the following requirements:
 - (A) All lighting shall be approved for use in Class I, Division I, Groups A, B, C, and D atmospheres.
 - (B) Extension cords used for temporary lighting shall be equipped with connectors or switches approved for hazardous locations.
 - (C) Temporary lighting shall be equipped with adequate guards to prevent accidental contact with the bulb.
 - (D) The lighting shall not be suspended by the electric cords, unless they are designed for this method of suspension.
 - (E) Electric cords shall be kept clear of working spaces and walkways or other locations in which they may be exposed to damage.
 - (F) Temporary lighting and electric cords shall be inspected regularly for signs of damage to insulation and wiring.
- (vi) Specified barriers and shields.
- (vii) Equipment such as ladders needed for safe ingress and egress.

- (viii) Rescue and emergency equipment unless provided by local rescue services.
 - (ix) Any other equipment necessary for safe entry and rescue from permit spaces.
- (5) Prior to authorizing entry, tests shall be conducted by a competent person to determine if acceptable entry conditions exist. When spaces are not fully isolated due to their size or design (sewers), pre-entry testing will be conducted to the extent feasible, and if entry is authorized, conditions shall be continuously monitored in the work area.
- During the course of entry operations, test or monitor the permit space as necessary to determine if acceptable entry conditions are being maintained; and
- When testing for atmospheric hazards, test first for oxygen, then for combustible gases and vapors, and then for toxic gases and vapors.
NOTE: Atmospheric testing conducted in accordance with Attachment B would be considered as satisfying these requirements. For permit space operations in sewers, atmospheric testing conducted in accordance with Attachment B, as supplemented by Attachment C, would be considered as satisfying these requirements.
- (6) At least one attendant shall be stationed outside the permit space for the duration of the entry operations. *NOTE: Attendants may be assigned to monitor more than one permit space provided the duties described in Section 10(b) of this procedure can be effectively performed for each permit space that is monitored. Likewise, attendants may be stationed at any location outside the permit space to be monitored as long as the duties described in Section 10(b) of this procedure can be effectively performed for each permit space that is monitored.*
- If multiple spaces are to be monitored by a single attendant, include in the permit program the means and procedures to enable the attendant to respond to an emergency affecting one or more of the permit spaces being monitored without distraction from the attendant's responsibilities under Section 10(b) of this procedure.
- (7) The roles and duties of each person participating in an entry operation (as, for example, authorized entrants, attendants, entry supervisors, or persons who test or monitor the atmosphere in a permit space) shall be

established and each person shall receive training commensurate with the duties assigned.

- (8) Procedures for summoning rescue and emergency services, for rescuing entrants from permit spaces, for providing necessary emergency services to rescued employees, and for preventing unauthorized personnel from attempting a rescue shall be developed and implemented.
- (9) Procedures to coordinate entry operations among multi-employer workforces shall be developed and implemented.
- (10) The permit space shall be secured and entry-related documentation shall be completed and retained in project files for a period of at least one year.
- (11) The entry program shall be reviewed and any deficiencies corrected whenever evidence exists that employee protection is inadequate.
NOTE: Examples of circumstances requiring the review of the permit-required confined space program are: any unauthorized entry of a permit space, the detection of a permit space hazard not covered by the permit, the detection of a condition prohibited by the permit, the occurrence of an injury or near-miss during entry, a change in the use or configuration of a permit space, and employee complaints about the effectiveness of the program.
- (12) The permit-required confined space program shall be reviewed, using the canceled permits retained under Section 7(f) of this procedure, within 1 year after each entry and revised as necessary, to ensure that employees participating in entry operations are protected from permit space hazards. *NOTE: Employers may perform a single annual review covering all entries performed during a 12-month period. If no entry is performed during a 12-month period, no review is necessary.*

(c) Alternate Entry Procedure.

A simpler, alternate procedure may be followed for permit-required space entry if all of the following conditions are met:

- (1) The only hazard posed by the permit space is from an existing, or potential hazardous atmosphere.
- (2) Continuous forced air ventilation alone is sufficient to maintain the space safe for entry.

- (3) Monitoring and inspection data supporting the above two conditions is collected and documented. Entries conducted to obtain this data must be conducted according to Section 6(b) above.
- (4) Supporting data must be made available to each employee who enters the permit space under this alternate procedure.
- (5) The alternate entry procedure shall conform to the following:
 - (i) Any conditions making it unsafe to remove an entrance cover shall be eliminated before the cover is removed.
 - (ii) When entrance covers are removed, the opening shall be promptly guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and that will protect each employee working in the space from foreign objects entering the space.
 - (iii) Before an employee enters the space, the internal atmosphere shall be tested, with a calibrated direct-reading instrument, for the following conditions in the order given: (1) oxygen content, (2) flammable gases and vapors, and (3) potential toxic air contaminants.
 - (iv) There may be no hazardous atmosphere within the space whenever any employee is inside the space.
 - (v) Continuous forced air ventilation shall be used, as follows: (1) an employee may not enter the space until the forced air ventilation has eliminated any hazardous atmosphere; (2) the forced air ventilation shall be so directed as to ventilate the immediate areas where an employee is or will be present within the space and shall continue until all employees have left the space; (3) The air supply for the forced air ventilation shall be from a clean source and may not increase the hazards in the space.
 - (vi) The atmosphere within the space shall be periodically tested as necessary to ensure that the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere.

- (vii) If a hazardous atmosphere is detected during entry: (1) each employee shall leave the space immediately; (2) the space shall be evaluated to determine how the hazardous atmosphere developed; and (3) measures shall be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place.
- (viii) The employer shall verify that the space is safe for entry and that the measures required by 6(c)(1) have been taken, through a written certification that contains the date, the location of the space, and the signature of the person providing the certification.
- (ix) The certification shall be made before entry and shall be made available to each employee entering the space.

7. ENTRY PERMIT SYSTEM

- (a) Before authorization to enter is granted, the completion of hazard control measures specified in 6(b) and 6(c) above shall be documented on an entry permit (Attachment D).
- (b) The entry supervisor shall authorize the entry by signing the completed permit.
- (c) The signed permit shall be posted or otherwise made available to all authorized entrants so that they may confirm that all pre-entry preparations are in place.
- (d) The duration of the permit may not exceed the time required to complete the assigned purpose of the entry.
- (e) The entry supervisor will terminate the entry and cancel the permit when either of the following occur:
 - (1) the operations covered by the permit have been completed;
 - (2) any condition not allowed under the entry permit occurs in or near the permit space.
- (f) Canceled entry permits shall be retained for at least 1 year so that the program review required under 6(b)(13) above may be performed. Any problems which occur during an entry shall be noted on the permit.

8. ENTRY PERMIT

- (a) The entry permit shall contain the following information:
- (1) The permit space to be entered;
 - (2) The purpose of the entry;
 - (3) The date and the authorized duration of the entry permit;
 - (4) The authorized entrants within the permit space, by name or by such other means (for example, through the use of rosters or tracking systems) as will enable the attendant to determine quickly and accurately, for the duration of the permit, which authorized entrants are inside the permit space; *NOTE: This requirement may be met by inserting a reference on the entry permit as to the means used, such as a roster or tracking system, to keep track of the authorized entrants within the permit space.*
 - (5) The personnel, by name, currently serving as attendants;
 - (6) The individual, by name, currently serving as entry supervisor, with a space for the signature or initials of the entry supervisor who originally authorized entry;
 - (7) The hazards of the permit space to be entered;
 - (8) The measures used to isolate the permit space and to eliminate or control permit space hazards before entry; *NOTE: Those measures can include the lockout or tagging of equipment and procedures for purging, inerting, ventilating, and flushing permit spaces.*
 - (9) The acceptable entry conditions;
 - (10) The results of initial and periodic tests performed under section 6(b)(6) of this procedure, accompanied by the names or initials of the testers and by an indication of when the tests were performed;
 - (11) The rescue and emergency services that can be summoned and the means (such as the equipment to use and the numbers to call) for summoning those services;

- (12) The communication procedures used by authorized entrants and attendants to maintain contact during the entry;
- (13) Equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment, to be provided for compliance with this section;
- (14) Any other information whose inclusion is necessary, given the circumstances of the particular confined space, in order to ensure employee safety; and
- (15) Any additional permits, such as for hot work, that have been issued to authorize work in the permit space.

9. TRAINING

The project manager shall assure that all employees assigned to tasks under this procedure have been trained, and have the understanding, knowledge, and skills necessary for the safe performance of their duties.

(a) Training shall be provided to each employee on the following occasions:

- (1) Before the employee is first assigned duties under this procedure;
- (2) Before there is a change in assigned duties;
- (3) Whenever there is a change in permit space operations that presents a hazard about which an employee has not previously been trained;
- (4) Whenever the employer has reason to believe either that there are deviations from the permit space entry procedures required by 6(b) and 6(c) of this procedure or that there are inadequacies in the employee's knowledge or use of these procedures.

- (b) The training shall establish employee proficiency in the duties required by this procedure and shall introduce new or revised practices, as necessary, for compliance with this procedure.
- (c) Training required by this section shall be certified. The certification shall contain each employee's name, the signatures or initials of the trainers, and the dates of training. The certification shall be available for inspection by employees and their authorized representatives.

10. ASSIGNMENT OF DUTIES

(a) **Authorized Entrants.** The employer shall ensure that all authorized entrants:

- (1) Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
- (2) Properly use equipment as required by section 6(c) of this procedure;
- (3) Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space as required by section 10(b)(6) of this procedure;
- (4) Alert the attendant whenever:
 - (i) The entrant recognizes any warning sign or symptom of exposure to a dangerous situation, or
 - (ii) The entrant detects a prohibited condition; and
- (5) Exit from the permit space as quickly as possible whenever:
 - (i) An order to evacuate is given by the attendant or the entry supervisor,
 - (ii) The entrant recognizes any warning sign or symptom of exposure to a dangerous situation,
 - (iii) The entrant detects a prohibited condition, or
 - (iv) An evacuation alarm is activated.

(b) **Attendant.** The employer shall ensure that each attendant:

- (1) Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
- (2) Is aware of possible behavioral effects of hazard exposure in authorized entrants;
- (3) Continuously maintains an accurate count of authorized entrants in the permit space and ensures that the means used to identify authorized

entrants under section 8(a) of this procedure accurately identifies who is in the permit space;

- (4) Remains outside the permit space during entry operations until relieved by another attendant; *NOTE: When the employer's permit entry program allows attendant entry for rescue, attendants may enter a permit space to attempt a rescue if they have been trained and equipped for rescue operations as required by Section 11(a) of this procedure and if they have been relieved as required by Section 10(b)(4) of this procedure.*
- (5) Communicates with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space under Section 10(b)(6) of this procedure:
- (6) Monitors activities inside and outside the space to determine if it is safe for entrants to remain in the space and orders the authorized entrants to evacuate the permit space immediately under any of the following conditions;
 - (i) If the attendant detects a prohibited condition;
 - (ii) If the attendant detects the behavioral effects of hazard exposure in an authorized entrant;
 - (iii) If the attendant detects a situation outside the space that could endanger the authorized entrants; or
 - (iv) If the attendant cannot effectively and safely perform all the duties required under section 10(b) of this procedure.
- (7) Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards;
- (8) Takes the following actions when unauthorized persons approach or enter a permit space while entry is underway:
 - (i) Warn the unauthorized persons that they must stay away from the permit space;
 - (ii) Advise the unauthorized persons that they must exit immediately if they have entered the permit space; and

- (iii) Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space;
 - (iv) Performs non-entry rescues as specified by the employer's rescue procedure; and
 - (v) Performs no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.
- (c) **Entry supervisor.** The employer shall ensure that each entry supervisor:
- (i) Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
 - (ii) Verifies, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin;
 - (iii) Terminates the entry and cancels the permit as required by Section 7(e) of this procedure;
 - (iv) Verifies that rescue services are available and that the means for summoning them are operable;
 - (v) Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations; and
 - (vi) Determines, whenever responsibility for a permit space entry operation is transferred and at intervals dictated by the hazards and operations performed within the space, that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

11. RESCUE AND EMERGENCY SERVICES

- (a) The following requirements apply to employers who have employees enter permit spaces to perform rescue services.
 - (1) The employer shall ensure that each member of the rescue service is provided with, and is trained to use properly, the personal protective

equipment and rescue equipment necessary for making rescues from permit spaces.

- (2) Each member of the rescue service shall be trained to perform the assigned rescue duties. Each member of the rescue service shall also receive the training required of authorized entrants under Section 9 of this procedure.
 - (3) Each member of the rescue service shall practice making permit space rescues at least once every 12 months, by means of simulated rescue operations in which they remove dummies, manikins, or actual persons from the actual permit spaces or from representative permit spaces. Representative permit spaces shall, with respect to opening size, configuration, and accessibility, simulate the types of permit spaces from which rescue is to be performed.
 - (4) Each member of the rescue service shall be trained in basic first-aid and in cardiopulmonary resuscitation (CPR). At least one member of the rescue service holding current certification in first aid and in CPR shall be available.
- (b) When an employer (host employer) arranges to have persons other than the host employer's employees (outside rescuer) perform permit space rescue, the host employer shall ensure that:
- (1) The outside rescuer can effectively respond in a timely manner to a rescue summons.
 - (2) The outside rescuer is equipped, trained and capable of functioning appropriately to perform permit space rescues at the host employer's facility.
 - (3) The outside rescuer is aware of the hazards they may confront when called on to perform rescue at the host employer's facility.
 - (4) The outside rescuer is provided with access to all permit spaces from which rescue may be necessary so that the outside rescuer can develop appropriate rescue plans and practice rescue operations.
- (c) To facilitate non-entry rescue, retrieval systems or methods shall be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. Retrieval systems shall meet the following requirements.

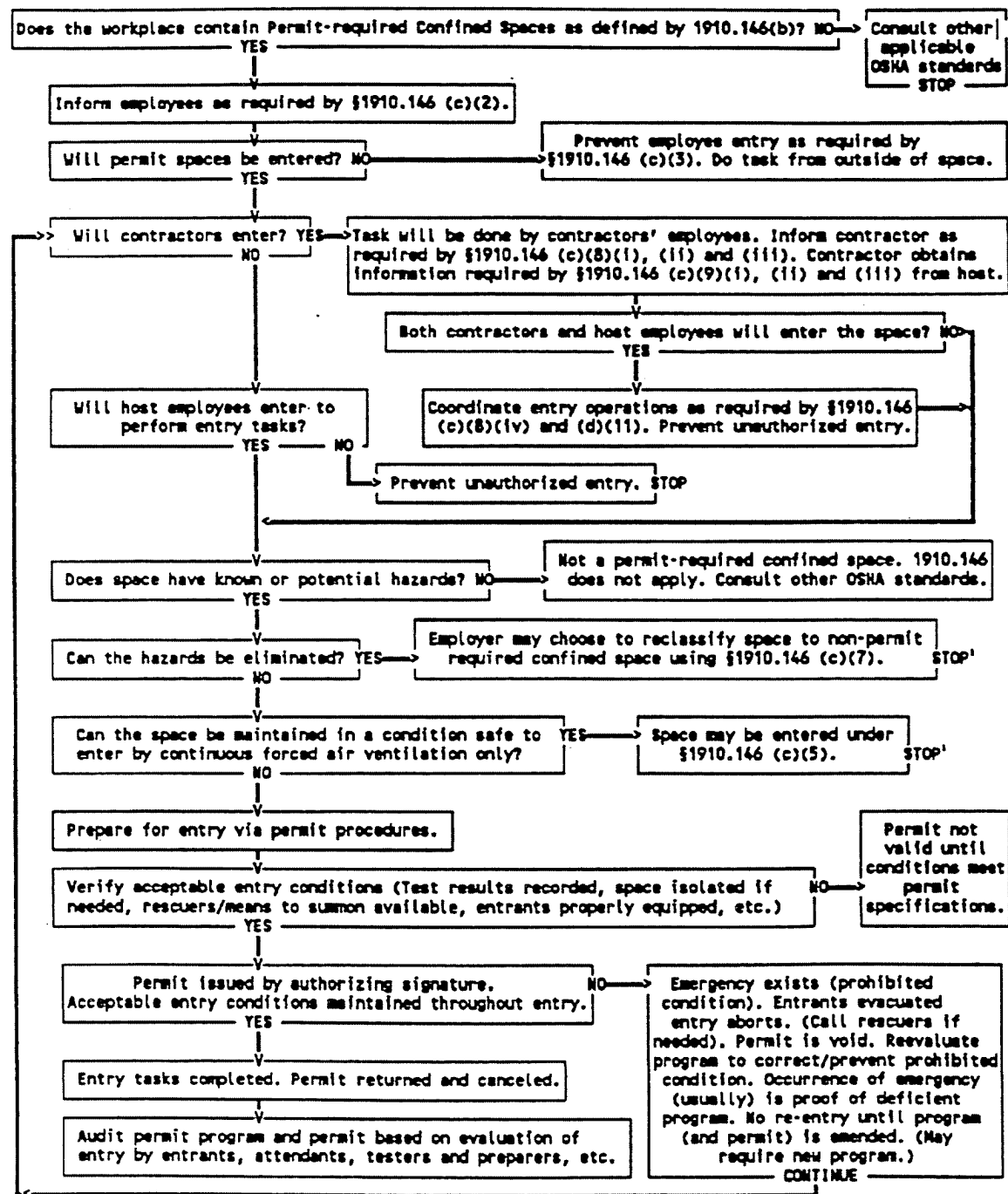
- (1) Each authorized entrant shall use a chest or full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level, above the entrant's head or other point which the employer can establish will ensure that the entrant will present the smallest possible profile during removal.
- (2) The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device shall be available to retrieve personnel from vertical type permit spaces more than 5 feet deep.
- (d) If an injured entrant is exposed to a substance for which a Material Safety Data Sheet (MSDS) or other similar written information is required to be kept at the worksite, that MSDS or written information shall be made available to the medical facility treating the exposed entrant.

12. EXHIBITS/ATTACHMENTS

The Confined Space Entry Permit (Attachment D) is used for documenting activities associated with this procedure. The completed Permits shall be maintained for a period of 1 year from the date of cancellation, in accord with section 7(f) above.

Appendix A

Permit-required Confined Space Decision Flow Chart



¹ Spaces may have to be evacuated and re-evaluated if hazards arise during entry

ATTACHMENT B – PROCEDURES FOR ATMOSPHERIC TESTING.

Atmospheric testing is required for two distinct purposes: evaluation of the hazards of the permit space and verification that acceptable entry conditions for entry into that space exist.

- B.1. Evaluation testing.** The atmosphere of a confined space should be analyzed using equipment of sufficient sensitivity and specificity to identify and evaluate any hazardous atmospheres that may exist or arise, so that appropriate permit entry procedures can be developed and acceptable entry conditions stipulated for that space. Evaluation and interpretation of these data, and development of the entry procedure, should be done by, or reviewed by, a technically qualified professional (e.g., certified industrial hygienist, marine chemist registered safety engineer, certified safety professional, etc.) based on evaluation of all serious hazards.
- B.2. Verification testing.** The atmosphere of a permit space which may contain a hazardous atmosphere should be tested for residues of all contaminants identified by evaluation testing using permit specified equipment to determine that residual concentrations at the time of testing and entry are within the range of acceptable entry conditions. Results of testing (i.e., actual concentration, etc.) should be recorded on the permit in the space provided adjacent to the stipulated acceptable entry condition.
- B.3. Duration of testing.** Measurement of values for each atmospheric parameter should be made for at least the minimum response time of the test instrument specified by the manufacturer.
- B.4. Testing stratified atmospheres.** When monitoring for entries involving a descent into atmospheres that may be stratified, the atmospheric envelope should be tested a distance of approximately 4 feet (1.22 m) in the direction of travel and to each side. If a sampling probe is used, the entrant's rate of progress should be slowed to accommodate the sampling speed and detector response.

ATTACHMENT C – SEWER SYSTEM ENTRY.

Sewer entry differs in three vital respects from other permit entries; first, there rarely exists any way to completely isolate the space (a section of a continuous system) to be entered; second, because isolation is not complete, the atmosphere may suddenly and unpredictably become lethally hazardous (toxic, flammable or explosive) from causes beyond the control of the entrant or employer, and third, experienced sewer workers are especially knowledgeable in entry and work in their permit spaces because of their frequent entries. Unlike other employments where permit space entry is a rare and exceptional event, sewer workers' usual work environment is a permit space.

- C.1. **Adherence to procedure.** The employer should designate as entrants only employees who are thoroughly trained in the employer's sewer entry procedures and who demonstrate that they follow these entry procedures exactly as prescribed when performing sewer entries.
- C.2. **Atmospheric monitoring.** Entrants should be trained in the use of, and be equipped with, atmospheric monitoring equipment which sounds an audible alarm, in addition to its visual readout, whenever one of the following conditions is encountered: oxygen concentration less than 19.5 percent; flammable gas or vapor at 10 percent or more of the lower flammable limit (LFL); or hydrogen sulfide or carbon monoxide at or above their PEL (10 ppm or 50 ppm, respectively); or, if a broad range sensor device is used, at 100 ppm as characterized by its response to toluene. Normally, the oxygen sensor/broad range sensor instrument is best suited for sewer entry. However, substance specific devices should be used whenever actual contaminants have been identified. The instrument should be carried and used by the entrant in sewer line work to monitor the atmosphere in the entrant's environment, and in advance of the entrants' direction of movement, to warn the entrant of any deterioration in atmospheric conditions. Where several entrants are working together in the same immediate location, one instrument, used by the lead entrant, is acceptable.
- C.3. **Surge flow and flooding.** Sewer crews should develop and maintain liaison, to the extent possible, with the local weather bureau and fire and emergency services in their area so that sewer work may be delayed or interrupted and entrants withdrawn whenever sewer lines might be suddenly flooded by rain or fire suppression activities, or whenever flammable or other hazardous materials are released into sewers during emergencies by industrial or transportation accidents.
- C.4. **Special Equipment.** Entry into large bore sewers may require the use of special equipment. Such equipment might include such items as atmosphere monitoring devices with automatic audible alarms, escape self-contained breathing apparatus (ESCBA) with at least 10 minute air supply (or other NIOSH approved self-rescuer), and waterproof flashlights, and may also include boats and rafts, radios and rope stand-offs for pulling around bends and corners as needed.

ATTACHMENT D -- CONFINED SPACE ENTRY PERMIT

*** VALID FOR ONE SHIFT ONLY ***

PROJECT #		CLIENT		DATE	TIME
LOCATION OF SPACE					
PURPOSE OF ENTRY					
PRIOR CONTENTS OF SPACE				TYPE OF SPACE	
PRE ENTRY ATMOSPHERIC TESTING					
COMPOUND	ACCEPTABLE RANGE	TIME	YES	NO	N/A
OXYGEN	>19.5% AND <23.5%				
LEL	<10%				
CO	<35 PPM				
H ₂ S	<10 PPM				
HYDROCARBONS	<1 PPM				
OTHER	< PEL				
HAZARD CONTROLS IMPLEMENTED					
ACTION COMPLETED			YES	NO	N/A
SPACE FULLY ISOLATED					
SPACE EMPTIED AND FREE OF RESIDUE					
MECHANICAL VENTILATION OPERATING					
SPACE SECURE FROM ACCIDENTAL ENTRY					
SAFE ACCESS INTO/FROM SPACE AVAILABLE					
EQUIPMENT USED IN SPACE INTRINSICALLY SAFE					
ELECTRICAL GROUNDING AND BONDING IN PLACE					
ALL ENTRANTS, ATTENDANTS, AND SUPERVISORS TRAINED					
RESPIRATORY PROTECTION PROVIDED					
SKIN/BODY PROTECTION PROVIDED					
EYE, EAR, AND HEAD PROTECTION PROVIDED					
EMERGENCY RESCUE SERVICES AVAILABLE					
SIGNATURES					
ALL ITEMS ABOVE MUST BE YES OR N/A					
ENTRY AUTHORIZED BY: (ENTRY SUPERVISOR)					
ATTENDANT:			ATTENDANT:		
ENTRANT:			ENTRANT:		
ENTRANT:			ENTRANT:		

USE THIS FORM ONLY IN ACCORDANCE WITH ICF KE PROCEDURE S&H-101

TITLE: USE, HANDLING, AND STORAGE OF LADDERS

1. PURPOSE

To establish the minimum requirements for ICF Kaiser Engineers (ICF KE) to use, handle, and store ladders.

2. SCOPE

This procedure applies in its entirety to all ICF KE projects unless a variance from its requirements is granted by the ES&H Service Unit Manager.

3. DEFINITIONS

Not applicable.

4. RESPONSIBILITIES

- (a) The project manager has overall responsibility for establishing and ensuring compliance with this procedure.
- (b) The field safety and health staff is responsible for implementing and/or monitoring activities associated with this procedure.
- (c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

5. GENERAL REQUIREMENTS

The following are minimum requirements for the use and care of ladders by ICF KE personnel. Compliance is also required with ANSI A14.1, ANSI A14.3, and applicable State Regulations.

- (a) Ladders shall be maintained in good condition at all times. Those that are defective in any way shall be removed from service and tagged with an unsafe equipment tag until made safe for use or destroyed.
- (b) Ladders purchased for use on ICF KE sites shall be appropriate for industrial applications (Class 1-A). Light-duty household ladders are not acceptable.
- (c) Ladder safety devices may be used in lieu of cage protection on ladders of unbroken length. Landing platforms are not required in these cases except at regular step-off points. All ladder safety devices shall be compatible with the ladders with which they are used.

- (d) Fixed ladders shall be installed wherever regular access by ladder is necessary.
- (e) Metal ladders shall not be used where potential electrical hazards exist.
- (f) Ladders having metal parts (other than hardware) shall not be used where potential electrical hazards exist unless they bear a manufacturer's label that indicates:
 - (1) The ladder complies with ANSI 14.5
 - (2) It is approved for electrical use
- (g) Job-made ladders shall be constructed in accordance with OSHA 1926.1053.
- (h) All personnel involved in the use of ladders on the project shall be instructed to the requirements of this procedure in accordance with Procedure No. S&H-6.

6. IMPLEMENTATION

- (a) Use of Ladders
 - (1) Ladders shall be inspected by the user before each use.
 - (2) Straight ladders shall be tied, blocked, and equipped with safety shoes, or otherwise secured to prevent displacement.
 - (3) Straight ladders shall be used at an angle of approximately 75 degrees from the horizontal. (This position may be readily established by placing the base of the ladder 1/4 of its working length from the vertical plane of the top support.)
 - (4) When working from a ladder, the ladder shall be secured at both top and bottom.
 - (5) No type of work that requires the use of both hands to perform the work shall be performed on a ladder over 10 feet from the ground or floor unless a safety belt is worn and the safety lanyard is secured.
 - (6) No objects that restrict use of both hands for climbing shall be carried in the climber's hands.
 - (7) A ladder shall not be placed in front of a door opening toward the ladder unless the door is blocked open, locked, or guarded.

- (8) Ladders must only be used on firm, stable bases. Ladders shall not be placed on boxes, barrels, or other unstable bases to form longer sections.
- (9) Ladders shall not be spliced together to form longer sections.
- (10) Ladders used to gain access from one level to another shall be long enough for the top to extend 3 feet above the landing or suitable grab rails, for safe moving to or from the point of access.
- (11) The platform and top step of ordinary types of stepladders shall not be used as steps.
- (12) Stepladders shall not be used as straight ladders, and will be used with legs fully extended.

(b) Care of Ladders

- (1) Ladders shall be inspected by the user before each use.
- (2) Ladders shall be handled with care and not be subjected to unnecessary abuse or misuse.
- (3) Immediate inspection and appropriate maintenance is required of any ladder exposed to fire, subjected to damaging chemicals, involved in a fall or collision, or which has become coated with oil or grease.
- (4) When not in use, ladders shall be stored where they are protected from potential damage by collision, temperature, moisture, etc.
- (5) Users shall return ladders to proper storage location when the job is completed.
- (6) Ladders shall not be painted.

7. EXHIBITS/ATTACHMENTS

Not applicable.

TITLE: PERSONAL PROTECTIVE EQUIPMENT

1. PURPOSE

To establish the minimum requirements for ICF Kaiser Engineers (ICF KE) to utilize personal protective equipment.

2. SCOPE

This procedure applies in its entirety to all ICF KE operations unless a variance from its requirements is granted by the ES&H Service Unit Manager.

3. DEFINITIONS

Not applicable.

4. RESPONSIBILITIES

- (a) The project manager has overall responsibility for establishing and ensuring compliance with this procedure.
- (b) The field safety and health staff is responsible for implementing and/or monitoring activities associated with this procedure.
- (c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

5. GENERAL REQUIREMENTS

- (a) ICF KE will provide suitable personal protective equipment (PPE) as required for the nature of the job being performed, such as, but not limited to, steel-toe boots, chemical protective clothing, respirators, eye and face protection, hard hats, and gloves.
- (b) Employees shall use assigned protective equipment on any task where there is potential exposure to physical hazards such as equipment operation, falling objects, or exposure to materials which may cause respiratory injury or skin irritation. Specific requirements shall be established through a hazard assessment and documented in the applicable Job Safety Analysis, project safety and health plan, or other applicable planning documents.
- (c) All personal protective equipment shall meet all applicable current ANSI standards for the particular equipment.

6. IMPLEMENTATION

- (a) A hazard assessment of the workplace, and employee exposure to hazards therein shall be conducted to identify the need for personal protective equipment, and select the type(s) of PPE to be used. This hazard assessment may be performed as part of a job safety analysis, during preparation of a site specific safety and health plan, or separately. Guidance for conducting a hazard assessment is provided in Attachment A to this procedure.

Performance of the workplace hazard assessment must be verified by a written certification. The certification must include the identity of the workplace (operation) evaluated, the name of the person certifying the assessment, the date of the assessment, and must be identified as a certification of a hazard assessment for PPE selection and use.

- (b) Following completion of the hazard assessment and selection of PPE, employees shall receive training on the proper use, inspection and maintenance of the assigned PPE. The training shall include:

- (1) how to know when PPE is required;
- (2) how to know what PPE is required;
- (3) how to properly don, doff, adjust and wear PPE;
- (4) limitations of the PPE; and
- (5) the proper care, maintenance, useful life, and disposal of the PPE.

Employee training must be verified by a written certification. The certification must include the names of the employees trained, and the date of training; and must be identified as a certification of training on the use of PPE.

Training shall be repeated whenever the workplace changes, specified PPE changes, or when incorrect or incomplete use of PPE is observed.

- (c) Eye Protection

- (1) Basic Eye Protection

- (i) As standard eye protection, approved, non-prescription industrial standard safety glasses with side shields are considered as minimum protection.
- (ii) Standard eye protection is required in all designated construction, warehouse areas, and maintenance/equipment yards.

- (iii) Standard eye protection may be required in work atmospheres other than construction and warehouse areas as hazards dictate (determined by the field safety and health staff).
- (2) **Contact Lenses:** Contact lenses are not recommended for use at the worksite due to the possibility of particles and chemicals getting behind the contact lens, the lens being broken into small particles in the eye or welding spatter fusing the lens to the eye. These can be very serious injuries.
- (3) **Impact-Type Goggles**
 - (i) Approved impact-type mono-goggles shall be provided to ensure greater eye protection from flying particles. Tasks which need such eye wear include:
 - Chipping
 - Scraping
 - Buffing
 - Blowing
 - Sawing
 - Hammering
 - Grinding
 - Pneumatic tool use
 - (ii) Impact-type goggles should not be worn in conjunction with basic eye protection because a good seal cannot be obtained, but they may be worn in conjunction with a face shield. Such may be recommended for certain tasks.
- (4) **Chemical (splash-proof) Goggles**
 - (i) Approved chemical mono-goggles shall be provided to ensure eye protection from the hazards associated with handling or dispensing liquid chemicals.
 - (ii) Hazards from irritant chemical operations may include:
 - Irritant dust
 - Irritant mist/sprays/vapors
 - Irritant splashes
 - Working with melted metal or tar
 - (iii) The field safety and health staff and the appropriate Material Safety Data Sheets (MSDS) can provide specific use information. The MSDSs can be obtained in accordance with Procedure No. S&H-201.

- (iv) Basic eye protection and chemical goggles should not be worn at the same time, but a face shield may be worn in conjunction with chemical goggles and may be required for certain operations.

(5) Face Shield

- (i) An approved full-face shield shall be worn to provide face protection to the employee from flying particles, splashes, or mist. A face shield only provides protection to the face from direct impact objects, and does not provide acceptable eye protection. Additional standard eye protection or goggles must be worn in conjunction with a face shield.

- (ii) Tasks which dictate the use of a face shield include:

● Chipping	● Sawing
● Scraping	● Grinding
● Blowing	● Pneumatic tool use
● Hot tar work	● Pouring of irritants
● Liquid metal work	● Steam cleaning

- (6) Burning Goggles: Approved burning goggles shall be worn to provide employee protection from optical radiation. Burning goggles shall be worn whenever an oxy-gas torch is used for cutting or burning.
- (7) Welding Hood: A welding hood with a filtered lens of number 10 shade or darker shall be used to provide protection from the optical radiation produced during electric arc welding. Approved safety glasses with side shields shall be worn in conjunction with the welding hood to ensure protection from popping hot slag when the hood is raised. Welding hoods shall meet ANSI standards.
- (8) Further detail on filtered lenses is provided in Attachment B of this procedure.

(d) Head Protection

- (1) Basic Head Protection: Approved hard hats include both plastic and fiberglass hats which meet ANSI Z89.1 standards for Class I and II only. Metal hard hats or bumper caps are not considered approved head protection and shall not be used on Company projects. Approved hard hats shall be worn by ALL employees exposed to overhead hazards from moving equipment or falling objects.

- (2) **Issuance of Head Protection:** An approved hard hat shall be issued to all employees exposed to overhead hazards. The decision to charge a fee for replacement hard hats shall depend on the requirements of the individual project.
- (3) **Color Coding:** Color coding of hard hats will be at the discretion of the individual project.
- (4) **General Requirements:** Hard hats shall conform to the approved specifications of ANSI Z89.1. Therefore, it shall be forbidden for employees to:
 - (i) Drill holes in the shell of the hard hat
 - (ii) Alter the shape of the hard hat or bill
 - (iii) Remove the suspension straps or cut/alter them in any way
 - (iv) Paint the hat or cover in non-approved decals
 - (v) Wear hard hats with the brim to the rear.

(e) **Hearing Protection**

- (1) Employees shall not be exposed to noise in excess of the Occupational Exposure Limits established by OSHA. Procedure No. S&H-204 provides guidance on hearing conservation.
- (2) The two types of recognized hearing protection available for use in effectively reducing noise exposure are ear plugs and ear muffs.
- (3) In most instances, universal-fit ear plugs are acceptable hearing protection. Cotton plugs are not acceptable and shall not be used.
- (4) When using ear muffs for hearing protection, special ^{CARE} car shall be given to ensure that the muffs are disinfected before being issued to another employee.

(f) **Hand Protection:** Practically every part of every job requires the use of the hands, and it is imperative that adequate hand protection be utilized by the employee to reduce the possibility of injury.

- (1) **General Purpose Gloves:** General purpose work gloves should be worn by the employee for protection against:
 - Splinters
 - Jagged surfaces
 - Glass
 - Sharp edges
 - Wire rope
 - Metal splinters

(2) Special Purpose Gloves

- (i) Special purpose work gloves should be worn and, at times, shall be required when employees are performing certain tasks. Special purpose gloves include:
 - Electric "hot" gloves
 - Cut resistant gloves
 - Chemical resistant gloves
 - Standard rubber gloves
 - Heat resistant gloves
- (ii) Tasks which require the use of special purpose gloves include:
 - Working with solvents or fuels (thinners, degreasers, gasoline, safety solvents, etc.)
 - Handling pesticides, herbicides, or any poison
 - Working with insulating materials
 - Assisting welders or handling hot materials
- (iii) Hydrocarbon resistant rubber gloves should be worn to protect the hands when using petroleum based cleaning agents.

(3) Barrier Creams/Moisturizing Lotions

- (i) Barrier creams provide protection from minor exposure to some irritants. Such barrier creams should be evaluated to ensure the proper protection is provided. Barrier creams are NOT a substitute for gloves.
- (ii) Moisturizing lotions/creams should be utilized to restore the natural oils to the skin which are removed through or frequent hand washing.

(g) Foot Protection

(1) Basic Foot Protection

- (i) Steel-toed footwear will be used as specified.
- (ii) Various clients or industrial operations, i.e., sandblasting, MSHA, may require steel-toed footwear.

- (iii) Sneakers, sandals, tennis shoes, high heels, leather soled, street or dress shoes, and thongs shall not be considered approved industrial or construction footwear.

(2) Special Purpose Footwear

- (i) Special purpose footwear, i.e., PVC, or neoprene boots, shall be selected to provide maximum protection to the employee. Strong consideration should be given to such footwear which incorporates a steel shank.
- (ii) Whenever employees may possibly be exposed to corrosives or irritant chemicals, they shall wear the appropriate special purpose footwear.

- (3) Foot Protectors: Employees performing tasks which potentially expose them to extreme foot injury hazards (i.e., operating a ground tamper, or chipping concrete with jackhammer), shall wear metal foot protectors.

(h) Clothing

(1) Standard Work Clothing

- (i) Employees performing tasks on construction projects shall wear appropriate clothing. Cotton is the best all-around material to wear. Synthetic materials are not recommended because some melt easily, and may burn rapidly when exposed to small ignition sources. Pants should fit properly and not have bell bottoms, large cuffs, or frayed bottoms.
- (ii) Clothing shall be in good repair. Frayed or tattered clothing can be a hazard to the employee.
- (iii) Tank tops or sleeveless (less than 4 inches below shoulder) shirts shall not be worn on the site. If dictated by the client, or the exposures, long sleeve shirts shall be required.
- (iv) Shirts shall be worn tucked in at all times. Employees flame cutting or welding must have clothing suitable for that operation. Clothing should be worn to preclude slag from being caught in cuffs, waist, or pocket openings.

- (v) Neckties, gauntlet type gloves, and baggy, loose, or ragged clothing shall not be worn around, or when working with moving machinery.
 - (vi) The wearing of jewelry such as rings, watchbands, necklaces, earrings, or the like can cause or contribute to accidents; therefore, the wearer should take the proper precautions. Loose, dangling jewelry shall not be allowed.
- (2) Special Clothing
- (i) Situations may arise that require the use of special protective clothing to protect the employee from exposure to hazardous materials, such as:
 - Corrosives
 - Heat
 - Irritants
 - Toxins
 - Fire
 - Sensitizers
 - (ii) The task exposure shall be evaluated and the employee shall wear the appropriate clothing for the hazard.
- (i) Elevation Safety Equipments

ALSO REFER TO ICF KE PROCEDURE NUMBER S&H-108.

NOTE: BODY HARNESSES MUST BE USED IN PERSONAL FALL PROTECTION SYSTEMS. USE OF BODY BELTS (SAFETY BELTS) IS PROHIBITED.

- (1) Body Harnesses: Harnesses in association with life lines shall be used as employee protection against falls to a lower level when working without guard rails 6 or more feet above the ground floor or work surface. Client and Company local facility safety policies may require usage at lesser heights. Harnesses shall meet ANSI Standard A10.14 requirements. Buckles, rings and hooks on harnesses should be of the drop forged, pressed or formed steel type. Only locking type snaphooks are permitted.
- (i) Heights: As a minimum, employees working from an unprotected elevation more than 6 feet above the ground floor shall be required to wear an approved safety belt and be secured to an object of substantial capacity capable of

- supporting 5,000 pounds per employee (i.e., pipe, structure, cable, or rope life line).
- (ii) **Suspension:** Employees shall additionally wear a harness and be secured when working from floats, needle beam scaffolds, boatswain chairs, painter's spiders, etc. Independent life lines shall be required to secure the harness.
 - (iii) **Aerial Lifts:** Harnesses shall be worn and attached to aerial lifts, personnel baskets, etc., when employees are required to work from these mechanical personnel hoists.
- (2) **Lanyard and Lifelines:** The following requirements and specifications shall be strictly adhered to:
- (i) Lanyards shall be a minimum of one-half inch nylon rope or the equivalent, with a breaking strength of at least 5,400 pounds.
 - (ii) Lanyards shall have a maximum length to provide for a fall of no greater than 6 feet.
 - (iii) Life lines and lanyards shall be secured above the point of operation of an anchorage or structural member capable of supporting a minimum dead weight of 5,000 pounds per employee.
 - (iv) Personnel performing work on electrical equipment shall use a minimum of one-half inch nylon rope or equivalent. Flexible steel shall not be used.
 - (v) Life lines, lanyards, and harnesses shall be used for employee safeguarding, not as work belts. Using lanyards for other than their intended uses as fall protection is prohibited.
 - (vi) Life lines and lanyards shall be protected from cutting, pinching, or burning and shall not be placed over a sharp edge.
 - (vii) In hot work operations or work involving the use of acids, solvents, or caustic; lifelines and lanyards shall be kept clear to avoid burning or damage.
 - (viii) Flexible steel lanyards are to be restricted to use in rock sealing operations only.

- (ix) A two lanyard system (one lanyard on each side "D" ring) may be needed in climbing from walls, working pipe racks, working on structural iron, etc.
- (3) **Storage/General Use:** Harnesses and all supporting equipment shall be stored in a clean, dry place free from abrasive or cutting materials and excessive heat. Any lifeline, harness, or lanyard actually subjected to in-service loading, as distinguished from static load testing, shall be immediately removed from service and shall not be used again for employee protection.
- (4) **Equipment Inspection**
 - (i) Prior to issuance, harnesses, lanyards, and lifelines shall be inspected. In addition, they shall be inspected on a regular basis by the wearer. In the event the wearer feels that his or her harness, lanyard, or lifeline is not in good condition, it shall be returned immediately for inspection and/or replacement.
 - (ii) Inspection shall consist of a visual inspection of:

Harnesses

Stitching
Rivets
Buckle Tabs
"D" Rings
Rust and Abrasion
Burns
General Appearance

Lanyards/life lines

Frayed Strands
Broken Strands
Rot
Burns
Corrosion
General Appearance

7. EXHIBITS/ATTACHMENTS

Attachment "A" - Guideline For Hazard Assessment - may be used to further assist in selecting the correct PPE.

Attachment "B" - Filter Lenses For Protection Against Radiant Energy - may be used to select correct lense protective devices.

ATTACHMENT A

GUIDELINE FOR HAZARD ASSESSMENT

1. Controlling hazards.

PPE devices alone should not be relied on to provide protection against hazards, but should be used in conjunction with guards, engineering controls, and sound operating practices.

2. Assessment and selection.

It is necessary to consider certain general guidelines for assessing the foot, head, eye and face, and hand hazard situations that exist in an occupational operation or process, and to match the protective devices to the particular hazard. It is the responsibility of the project manager, with support from the field safety and health staff, to exercise common sense and appropriate expertise to accomplish these tasks.

3. Assessment guidelines.

In order to assess the need for PPE the following steps should be taken:

- (a) Survey. Conduct a walk-through survey of the areas in question. The purpose of the survey is to identify sources of hazards to workers and co-workers. Consideration should be given to the basic hazard categories:

- (1) Impact
- (2) Penetration
- (3) Compression (roll-over)
- (4) Chemical
- (5) Heat
- (6) Harmful dust
- (7) Light (optical) radiation

- (b) Sources. During the walk-through survey the evaluator should observe:

- (1) sources of motion; i.e., machinery or processes where any movement of tools, machine elements or particles could exist, or movement of personnel that could result in collision with stationary objects;
- (2) sources of high temperatures that could result in burns, eye injury or ignition of protective equipment, etc.;
- (3) types of chemical exposures;
- (4) sources of harmful dust;
- (5) sources of light radiation, i.e., welding, brazing, cutting, furnaces, heat treating, high intensity lights, etc.;

- (6) sources of falling objects or potential for dropping objects;
- (7) sources of sharp objects which might pierce the feet or cut the hands;
- (8) sources of rolling or pinching objects which could crush the feet;
- (9) layout of workplace and location of co-workers; and
- (10) any electrical hazards.

In addition, injury/accident data should be reviewed to help identify problem areas.

- (c) Organize data. Following the walk-through survey, it is necessary to organize the data and information for use in the assessment of hazards. The objective is to prepare for an analysis of the hazards in the environment to enable proper selection of protective equipment.
- (d) Analyze data. Having gathered and organized data on a workplace, an estimate of the potential for injuries should be made. Each of the basic hazards (paragraph 3.a.) should be reviewed and a determination made as to the type, level of risk, and seriousness of potential injury from each of the hazards found in the area. The possibility of exposure to several hazards simultaneously should be considered.

NOTE: Steps 3(c), and 3(d) can be incorporated into a Job Safety Analysis.

4. Selection guidelines. After completion of the procedures in paragraph 3, the general procedure for selection of protective equipment is to:

- (a) Become familiar with the potential hazards and the type of protective equipment that is commercially available, and what it can do; i.e., splash protection, impact protection, etc.;
- (b) compare the magnitude of the hazards associated with the environment; i.e., impact velocities, masses, projectile shape, radiation intensities, with the capabilities of the available protective equipment;
- (c) select the protective equipment which ensures a level of protection greater than the minimum required to protect employees from the hazards; and
- (d) fit the user with the protective device and give instructions on care and use of the PPE. It is very important that end users be made aware of all warning labels for and limitations of their PPE.

5. Fitting the device. Careful consideration must be given to comfort and fit. PPE that fits poorly will not afford the necessary protection. Continued wearing of the device is more likely if it fits the wearer comfortably. Protective devices are generally available in a variety of sizes. Care should be taken to ensure that the right size is selected.

6. Devices with adjustable features. Adjustments should be made on an individual basis for a comfortable fit that will maintain the protective device in the proper position. Particular care should be taken in fitting devices for eye protection against dust and chemical splash to ensure that the devices are sealed to the face. In addition, proper fitting of helmets is important to ensure that it will not fall off during work operations. In some cases a chin strap may be necessary to keep the helmet on an employee's head. (Chin straps should break at a reasonably low force, however, so as to prevent a strangulation hazard). Where manufacturer's instructions are available, they should be followed carefully.

7. Reassessment of hazards. It is the responsibility of the project manager to reassess the workplace hazard situation as necessary, by identifying and evaluating new equipment and processes, reviewing accident records, and reevaluating the suitability of previously selected PPE.

8. Selection chart guidelines for eye and face protection. Some occupations (not a complete list) for which eye protection should be routinely considered are: carpenters, electricians, machinists, mechanics and repairers, millwrights, plumbers and pipe fitters, sheet metal workers and tinsmiths, assemblers, sanders, grinding machine operators, lathe and milling machine operators, sawyers, welders, laborers, chemical process operators and handlers, and timber cutting and logging workers. The following chart provides general guidance for the proper selection of eye and face protection to protect against hazards associated with the listed hazard "source" operations.

EYE AND FACE PROTECTION SELECTION CHART

SOURCE	ASSESSMENT OF HAZARD	PROTECTION
IMPACT - Chipping, grinding machining, masonry work, woodworking, sawing, drilling, chiseling, powered fastening, riveting, and sanding.	Flying fragments, objects, large chips, particles sand, dirt, etc.	Spectacles with side protection, goggles, face-shields. See notes (1), (3), (5), (6), (10). For severe exposure use face-shield.
HEAT - Furnace operations, pouring, casting, hot dipping, and welding.	Hot sparks	Faceshields, goggles, spectacles with side protection. For severe exposure use face-shield. See notes (1), (2), (3).
	Splash from molten metals.	Faceshields worn over goggles. See notes (1), (2), (3).
	High temperature exposure.	Screen face-shields, reflective face-shields. See notes (1), (2), (3).

SOURCE	ASSESSMENT OF HAZARD	PROTECTION
<u>CHEMICALS</u> - Acid and chemicals handling, shield, degreasing plating.	Splash	Goggles, eyecup and cover types. For severe exposure use face- See notes (3), (11).
	Irritating mists	Special-purpose goggles.
<u>DUST</u> - Woodworking, buffing, general dusty conditions.	Nuisance dust	Goggles, eyecup and cover types. See note (8).
<u>LIGHT and/or RADIATION</u> - Welding: Electric arc	Optical radiation	Welding helmets or welding shields. Typical shades: 10-14. See notes (9), (12).
Welding: Gas shields.	Optical radiation	Welding goggles or welding Typical shades: gas welding 4-8; cutting 3-6; brazing 3-4. See note (9).
Cutting, Torch brazing, Torch soldering	Optical radiation	Spectacles or welding face-shield. Typical shades 1.5-3. See notes (3), (9).
Glare	Poor vision	Spectacles with shaded or special-purpose lenses, as suitable. See notes (9), (10).

NOTES TO EYE AND FACE PROTECTION SELECTION CHART:

- (1) Care should be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Adequate protection against the highest level of each of the hazards should be provided. Protective devices do not provide unlimited protection.
- (2) Operations involving heat may also involve light radiation. As required by the standard, protection from both hazards must be provided.
- (3) Faceshields should only be worn over primary eye protection (spectacles or goggles).
- (4) As required by the standard, filter lenses must meet the requirements for shade designations in 1910.133(a)(5). Tinted and shaded lenses are not filter lenses unless they are marked or identified as such.
- (5) As required by the standard, persons whose vision requires the use of prescription (Rx) lenses must wear either protective devices fitted with prescription (Rx) lenses or protective devices designed to be worn over regular prescription (Rx) eyewear.
- (6) Wearers of contact lenses must also wear appropriate eye and face protection devices in a hazardous environment. It should be recognized that dusty and/or chemical environments may represent an additional hazard to contact lens wearers.
- (7) Caution should be exercised in the use of metal frame protective devices in electrical hazard areas.
- (8) Atmospheric conditions and the restricted ventilation of the protector can cause lenses to fog. Frequent cleansing may be necessary.
- (9) Welding helmets or faceshields should be used only over primary eye protection (spectacles or goggles).
- (10) Non-sideshield spectacles are available for frontal protection only, but are not acceptable eye protection for the sources and operations listed for "impact."
- (11) Ventilation should be adequate, but well protected from splash entry. Eye and face protection should be designed and used so that it provides both adequate ventilation and protects the wearer from splash entry.
- (12) Protection from light radiation is directly related to filter lens density. See note (4). Select the darkest shade that allows task performance.

9. Selection guidelines for head protection. All head protection (helmets) is designed to provide protection from impact and penetration hazards caused by falling objects. Head protection is also available which provides protection from electric shock and burn. When

selecting head protection, knowledge of potential electrical hazards is important. Class A helmets, in addition to impact and penetration resistance, provide electrical protection from low-voltage conductors (they are proof tested to 2,200 volts). Class B helmets, in addition to impact and penetration resistance, provide electrical protection from high-voltage conductors (they are proof tested to 20,000 volts). Class C helmets provide impact and penetration resistance (they are usually made of aluminum which conducts electricity), and should not be used around electrical hazards.

Where falling object hazards are present, helmets must be worn. Some examples include: working below other workers who are using tools and materials which could fall; working around or under conveyor belts which are carrying parts or materials; working below machinery or processes which might cause material or objects to fall; and working on exposed energized conductors. Some examples of occupations for which head protection should be routinely considered are: carpenters, electricians, linemen, mechanics and repairers, plumbers and pipe fitters, assemblers, packers, wrappers, sawyers, welders, laborers, freight handlers, timber cutting and logging, stock handlers, and warehouse laborers.

10. Selection guidelines for foot protection. Safety shoes and boots which meet the ANSI Z41-1991 Standard provide both impact and compression protection. Where necessary, safety shoes can be obtained which provide puncture protection. In some work situations, metatarsal protection should be provided, and in other special situations electrical conductive or insulating safety shoes would be appropriate. Safety shoes or boots with impact protection would be required for carrying or handling materials such as packages, objects, parts or heavy tools, which could be dropped; and, for other activities where objects might fall onto the feet. Safety shoes or boots with compression protection would be required for work activities involving skid trucks (manual material handling carts) around bulk rolls (such as paper rolls) and around heavy pipes, all of which could potentially roll over an employee's feet. Safety shoes or boots with puncture protection would be required where sharp objects such as nails, wire, tacks, screws, large staples, scrap metal etc., could be stepped on by employees causing a foot injury.

Some occupations (not a complete list) for which foot protection should be routinely considered are: shipping and receiving clerks, stock clerks, carpenters, electricians, machinists, mechanics and repairers, plumbers and pipe fitters, structural metal workers, assemblers, drywall installers and lathers, packers, wrappers, craters, punch and stamping press operators, sawyers, welders, laborers, freight handlers, gardeners and grounds-keepers, timber cutting and logging workers, stock handlers and warehouse laborers.

11. Selection guidelines for hand protection. Gloves are often relied upon to prevent cuts, abrasions, burns, and skin contact with chemicals that are capable of causing local or systemic effects following dermal exposure. OSHA is unaware of any gloves that provide protection against all potential hand hazards, and commonly available glove materials provide only limited protection against many chemicals. Therefore, it is important to select the most appropriate glove for a particular application and to determine how long it can be worn, and whether it can be reused.

It is also important to know the performance characteristics of gloves relative to the specific hazard anticipated; e.g., chemical hazards, cut hazards, flame hazards, etc. These performance characteristics should be assessed by using standard test procedures. Before purchasing gloves, the employer should request documentation from the manufacturer that the gloves meet the appropriate test standard(s) for the hazard(s) anticipated. Other factors to be considered for glove selection in general include:

- (a) As long as the performance characteristics are acceptable, in certain circumstances, it may be more cost effective to regularly change cheaper gloves than to reuse more expensive types; and,
- (b) The work activities of the employee should be studied to determine the degree of dexterity required, the duration, frequency, and degree of exposure of the hazard, and the physical stresses that will be applied.

With respect to selection of gloves for protection against chemical hazards:

- (a) The toxic properties of the chemical(s) must be determined; in particular, the ability of the chemical to cause local effects on the skin and /or to pass through the skin and cause systemic effects;
- (b) Generally, any "chemical resistant" glove can be used for dry powders;
- (c) For mixtures and formulated products (unless specific test data are available), a glove should be selected on the basis of the chemical component with the shortest breakthrough time, since it is possible for solvents to carry active ingredients through polymeric materials; and,
- (d) Employees must be able to remove the gloves in such a manner as to prevent skin contamination.

12. Cleaning and maintenance. It is important that all PPE be kept clean and properly maintained. Cleaning is particularly important for eye and face protection where dirty or fogged lenses could impair vision. For the purposes of compliance with 1910.132 (a) and (b), PPE should be inspected, cleaned, and maintained at regular intervals so that the PPE provides the requisite protection. It is also important to ensure that contaminated PPE which cannot be decontaminated is disposed of in a manner that protects employees from exposure to hazards.

ATTACHMENT B

FILTER LENSES FOR PROTECTION AGAINST RADIANT ENERGY

Operations	Electrode Size (1/32 inch)	Arc Current	Minimum* Protective Shade
Shielded metal arc welding	Less than 3	Less than 60	7
	3 - 5	60 - 160	8
	5 - 8	160 - 250	10
	More than 8	250 - 550	11
Gas metal arc welding and flux cored arc welding		Less than 60	7
		60 - 160	10
		160 - 250	10
		250 - 500	10
Gas Tungsten arc welding		Less than 50	8
		50 - 150	8
		150 - 500	10
Air carbon Arc cutting	(Light)	Less than 500	10
	(Heavy)	500 - 1000	11
Plasma arc welding		Less than 20	6
		20 - 100	8
		100 - 400	10
		400 - 800	11
Plasma arc cutting	(Light)**	Less than 300	8
	(Medium)**	300 - 400	9
	(Heavy)**	400 - 800	10
Torch brazing			3
Torch soldering			2
Carbon arc welding			14

FILTER LENSES FOR PROTECTION AGAINST RADIANT ENERGY

Operations	Plate thickness - inches	Plate thickness - mm	Minimum* Protective Shade
Gas Welding:			
	Light	Under 1/8	Under 3.2
	Medium	1/8 to 1/2	3.2 to 12.7
	Heavy	Over 1/2	Over 12.7
Oxygen Cutting:			
	Light	Under 1	Under 25
	Medium	1 to 6	25 to 150
	Heavy	Over 6	Over 150

*As a rule of thumb, start with a shade that is too dark to see the weld zone. Then go to a lighter shade which gives sufficient view of the weld zone without going below the minimum. In oxyfuel gas welding or cutting where the torch produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line in the visible light of the (spectrum) operation.

**These values apply where the actual arc is clearly seen. Experience has shown that lighter filters may be used when the arc is hidden by the workpiece.

TITLE: RESPIRATORY PROTECTION PROGRAM

1. PURPOSE

To establish the minimum requirements for ICF Kaiser Engineers (ICF KE) to utilize respiratory protection.

2. SCOPE

This procedure applies in its entirety to all ICF KE projects unless a variance from its requirements is granted by the ES&H Service Unit Manager.

3. DEFINITIONS

Not applicable.

4. RESPONSIBILITIES

- (a) The project manager has overall responsibility for establishing and ensuring compliance with this procedure.
- (b) The field safety and health staff is responsible for implementing and/or monitoring activities associated with this procedure.
- (c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

5. GENERAL REQUIREMENTS

- (a) Respirator wearers cannot be afforded protection from hazardous airborne contaminants when conditions prevent a complete gas-tight face seal. Facial hair, head hair, and eyeglasses are among these physical obstructions. While eyeglasses are in the category of obstructions that prevent a gas-tight face seal, primarily in the case of full-face supplied-air respirators, this problem is correctable by use of mounting devices to hold the eyeglass frames inside the respirator facepiece. The criteria is that there can be no obstruction of contact between the wearer's skin and the mask whatsoever. Beard stubble constitutes a physical obstruction. Affected employees shall be required to be clean shaven, as a condition of employment.
- (b) Candidates for employment objecting to this policy shall be made aware that their versatility may be limited and that this can affect their job assignments. As a consequence, an individual's attitude regarding the removal of gas-tight face seal obstructions should be assessed prior to employment.

- (c) Respirators shall be provided by the ICF KE whenever a qualified person determines that such equipment is necessary to protect the health of the employee from significant inhalation exposure.
- (d) Only that respirator equipment that has been jointly approved by the Mine Safety and Health Administration (MSHA) and the National Institute for Occupational Safety and Health (NIOSH) shall be provided.
- (e) Employees shall be instructed and trained in the need, use, sanitary care, and limitations of such respiratory equipment prior to assignment to activities requiring respiratory protection.
- (f) ICF KE shall provide, repair, or replace respiratory protective equipment as may be required due to wear and deterioration.
- (g) Means of cleaning all respiratory protective equipment shall be provided.
- (h) Only those employees who are trained in accordance with Procedure No. S&H-6 and medically qualified to wear respirators shall be assigned to work requiring use of respirators.

6. IMPLEMENTATION

- (a) Respiratory Selection
 - (1) When respirator use is required, only properly cleaned and maintained NIOSH/MSHA approved respirators shall be used. Single use respirators (dust masks) may only be used with specific approval by the ES&H Service Unit Manager.
 - (2) Employees shall be allowed to pick the most comfortable respirator from a selection including respirators of various sizes from different manufacturers.
 - (3) Selection of respirators shall be approved by the field safety and health staff in all cases, and shall be based on the following considerations:
 - (i) Nature of the hazard - The chemical and physical properties, toxicity, and concentration of hazardous material or mixture of materials.

- (ii) Oxygen-deficient atmospheres - Entry into oxygen-deficient atmospheres is **prohibited** without prior approval of the ES&H Service Unit Manager.
- (iii) Immediate Dangerous to Life and Death (IDLH) Atmospheres - Entry into any IDLH atmosphere is **prohibited** without prior approval of the ES&H Service Unit Manager.
- (iv) Irritant or Corrosive Atmospheres - Respirators selected must provide adequate face and eye protection. The contaminant or mixture of contaminants must have adequate warning properties (odor, irritation, or taste) to indicate respirator breakthrough if an air-purifying device is used.
- (4) **Regulated Materials** - In all cases where OSHA has required that a specific respirator is used (carcinogen standards, etc.), the specified respirator or one providing equal or better protection shall be used.
- (5) Air purifying respirators shall **NOT** be used for protection against the following materials. This is only a partial listing, contact the field safety and health staff for further information.

Acrolein	Methyl chloride
Aniline	Methylene chloride
Arsine	Nickel carbonyl
Bromine	Nitrobenzene
Carbon monoxide	Nitrogen oxides
Diisocyanates	Nitroglycerine
Dimethylaniline	Nitromethane
Dimethyl sulfate	Ozone
Hydrogen cyanide	Phosgene
Hydrogen fluoride	Phosphine
Hydrogen selenide	Phosphorus trichloride
Hydrogen sulfide	Stibine
Methanol	Sulfur chloride
Methyl bromide	
- (6) Full facepiece negative pressure air purifying respirators are not approved for protection against asbestos exposure due to the requirement for quantitative fit testing.

(b) Use of Corrective Lens Eyewear with Respirators

- (1) The wearing of contact lenses in work environments which entails exposure to chemical fumes, vapors, splashes, intense heat, molten metals, or highly particulate-contaminated atmospheres is prohibited.
- (2) Management shall assess which employees in their operations wear eye glasses routinely, determine what types (make and models) of respiratory protective masks are used, and assure that the appropriate frames or ophthalmic device hangers are obtained and provided at company expense.

(c) Employee Training and Instruction

- (1) The basic respiratory training program shall include, as a minimum, the following:
 - (i) Instruction in the need for, use, sanitary care, and limitations of each respirator type.
 - (ii) Opportunity for "hands-on" experience with respirators.
 - (iii) Proper fitting, including demonstrations and practice in wearing, adjusting, and determining the fit of the respirator. A selection of respirators shall be available to determine the most comfortable respirator and the best fit.
 - (iv) How to perform a positive and negative pressure test if the facepiece-to-face seal.
 - (v) A familiarization period of wear in normal air.
 - (vi) For negative pressure respirators, wearing the respirator in an irritant fume test atmosphere for qualitative fit testing. All qualitative fit testing shall be performed by a qualified person using the protocol found in Attachment C of this procedure or other protocol as designated by specific standards (e.g., asbestos, benzene). Powered air-purifying respirators (PAPRs) shall be worn in a test atmosphere with the power supply disconnected to evaluate fit in the negative pressure mode.
 - (vii) Qualitative fit testing shall be performed annually, or more frequently as required by law. Quantitative fit testing may be

required for some respirator or contaminants. The Field Safety and Health Staff will determine fit test requirements.

- (viii) Instruction in the nature of the respiratory hazards, whether acute, chronic, or both, and a description of potential health effects if the respirators are not used.
- (ix) Classroom and field training to recognize and cope with emergency situations (including respirator failure).
- (2) Subject training shall be repeated annually, and each employee receiving such training shall complete the Respiratory Training Completion Form (Attachment B).
- (3) Training provided as part of this procedure shall be performed in accordance with Procedure No. S&H-6.
- (d) **Respirator Inspection, Cleaning, Maintenance, and Storage**
 - (1) **General:** The field safety and health staff will define a program to area/facility management for maintenance and care of respirators which shall be adjusted to the type of facility, working conditions, and hazards involved, and shall include the following basic elements:
 - (i) Inspection for defects and/or deterioration.
 - (ii) Cleaning and disinfecting in accordance with manufacturers' instruction.
 - (iii) Repair as necessary.
 - (iv) Establishment and maintenance of a recordkeeping system to document respiratory inspection, repair, and maintenance.
 - (v) Proper storage.
 - (2) **Inspection, Maintenance, and Storage**
 - (i) All respirators shall be inspected routinely before, during, and after each use by the user. Any defects shall be reported to supervision. No defective respirator shall be issued or worn. Defective respirators shall be tagged and returned for repair.

- (ii) Respirators maintained for emergency use (such as SCBA) shall be inspected and sanitized after each use and inspected at least monthly. A record of the most recent inspection shall be maintained on the respirator or the storage container; and shall include the inspector's identification, the date, and a respirator identification number.
 - (iii) Routinely used respiratory equipment shall regularly cleaned, inspected, and sanitized by an individual qualified by experience or training to do the work.
 - (iv) Other types of respiratory equipment shall be maintained according to the manufacturer's instructions.
 - (v) Where respirators are assigned to individual employees, area management shall ensure compliance with cleaning and maintenance requirements by periodic inspection and field audits of respiratory equipment.
 - (vi) Respiratory equipment shall not be passed from one person to another until it has been cleaned and sanitized.
 - (vii) When not in use, respirators shall be stored to protect against dust, sunlight, extreme temperatures, excessive moisture, damaging chemicals, and physical damage.
- (e) Air Purifying Respirators (APR)
- (1) Fit testing shall be accomplished in accordance with Attachment A of this procedure.
 - (2) When APRs are worn, employees shall change the filter-cartridge elements daily, in the case of cartridges used for non-particulate contaminants, or sooner if "breakthrough" is perceived; and, for other filter cartridges whenever an increase in breathing resistance is detected.
- (f) Powered Air Purifying Respirators (PAPR)
- (1) When PAPRs are worn, employees shall change filter/cartridges elements daily, in the case of cartridges used for non-particulate contaminants, or sooner if "breakthrough" is perceived; and for other filter cartridges:
 - (i) Whenever an increase in breathing resistance is detected, or

- (ii) When airflow through filter elements decreases to an unacceptable level, as indicated by the manufacturer's test device.

(g) Compressed Air Systems

(1) Air Quality

- (i) Compressed air used for respiration shall be of high purity, and shall meet, as a minimum, the requirements for the specification for Grade D breathing air as described in Compressed Gas Association Specification G-7.1 (ANSI Z86.1-1973). The supplier shall certify compliance with these requirements for each lot of breathing air supplied.
- (ii) Breathing air shall be free from harmful dusts, fumes, mists, vapors, gases, or odors.
- (iii) Oxygen shall **NOT** be used at any time in open-circuit SCBAs or air-line respirators.
- (iv) Mixed or blended air shall not be used for breathing purposes.

(2) Compressed Air Cylinder Systems (Cascade)

- (i) Breathing air cylinders shall be legibly identified with the word AIR by means of stenciling, stamping, or labeling as near to the valve end as practical.
- (ii) Cascade systems shall be equipped with low pressure warning bells or similar warning devices to indicate air pressure in the manifold below 500 psi.
- (iii) When a cascade system is used to supply breathing air, one employee shall be assigned as safety standby within audible range of the low pressure alarm.
- (iv) When a cascade system is used to recharge SCBA air cylinders, it shall be equipped with a high-pressure supply hose and coupling rated at a capacity of at least 3000 psi.

- (v) Air-line couplings shall be incompatible with outlets for other gas systems to prevent inadvertently supplying air-line respirators with nonrespirable gases or oxygen.
 - (vi) The air pressure at the hose connection to positive-pressure respiratory equipment shall be within the range specified in the approval of the equipment by the manufacturer.
 - (vii) Cylinders shall be stored and handled to prevent damage to the cylinder or valve. Cylinders shall be stored upright with the protective valve cover in place and, in such a way (e.g., supported with substantial rope or chain in the upper one-third of the cylinder, or in racks designed for this purpose) as to prevent the cylinder from falling. Cylinders shall not be dropped, dragged, rolled, or allowed to strike each other or to be struck violently. Cylinders shall never be exposed to temperatures exceeding 125°F. Cylinders with visible external damage, evidence of corrosion damage, or exposure to fire shall not be accepted or used.
 - (viii) Only cylinders within current hydrostatic test periods shall be used.
- (3) Compressor Supplied Breathing Air
- (i) All compressors used for supplying breathing air shall be equipped with the following safety and standby devices:
 - (A) The compressor intake shall be located to assure that only respirable (uncontaminated) air is admitted. This requires attention to the location of the compressor intake with respect to compressor engine exhaust, chemical storage or use areas, and suitable intake screening or filtration.
 - (B) Alarms to indicate compressor failure (such as low-pressure air horns, etc.) shall be installed in the system.
 - (C) A receiver of sufficient capacity to enable the respirator wearer to exit from a contaminated atmosphere upon compressor failure shall be provided.

- (D) Oil lubricated compressors - if an oil-lubricated compressor is used to supply breathing air, it shall be equipped with **both** of the following devices:
 - (I) Continuous reading carbon monoxide monitoring system set to alarm should the carbon monoxide concentration exceed 10 ppm.
 - (II) High temperature alarm which will activate when the discharge air exceeds 110% of the normal operating temperature in degrees Fahrenheit.
- (E) A designated employee shall be assigned as safety standby who shall remain continuously within audible range of the alarms.
- (F) An inline purifying filter assembly to remove oil, condensed water, particulate, odors, and organic vapors shall be used in conjunction with the air compressor.
- (ii) Routine inspection and maintenance of the air compressor shall be performed in accordance with manufacturer's specifications.
- (h) Escape/Egress Units
 - (1) These respirators are intended for use in areas where escape with a short-term (5-10 minute) air supply is necessary. They may be used as adjuncts to airline pressure demand respirators as a backup air supply; or as independent emergency devices in areas where respiratory protection is not normally required.
 - (2) Appropriate training shall be accomplished and documented prior to assigning employees to tasks or locations subject to the use of these respirators.
 - (3) Escape/egress units shall never be used as primary standby respirators for confined space entry.

(i) **Medical Surveillance**

- (1) A medical questionnaire for respiratory users shall be completed by all potential candidates, prior to respiratory use. A more comprehensive medical evaluation may be required based on the results of the questionnaire.
- (2) No employee shall be assigned to a task that requires the use of a respirator unless it has been determined that he/she is physically able to perform the work while using the required respirator.
- (3) If an employee experienced difficulty in breathing during the fitting test or during use, he or she shall be re-examined by a physician to determine whether the employee can wear a respirator while performing the required duty.
- (4) Once a medical determination has been made to physical ability to wear a respirator, a review of the employee's health status shall be made at a minimum annually.

7. EXHIBITS/ATTACHMENTS

The following records are used for documenting activities associated with this procedure. Requirements for record distribution, retention, and maintenance is established within applicable project planning documents.

- (a) Qualitative Fit Test Protocol
- (b) Respirator Training Completion Form
- (c) Medical Questionnaire for Respirator Users

ATTACHMENT A

ICF KE MANDATORY QUALITATIVE RESPIRATOR FIT TEST PROTOCOL

NOTE: This protocol does not satisfy the fit test requirements for certain materials including asbestos and benzene. Contact the Field Safety and Health Staff for assistance.

A. Respirator Selection

Respirators shall be selected as described in this procedure. The respirator shall be equipped with HEPA filters.

B. Fit Test

1. The test conductor shall review this protocol with the test subject before testing.
2. The test subject shall perform the conventional positive and negative pressure fit checks.

Negative Pressure Test - Cover the cartridge/filter inlets with your palm and gently inhale. The facepiece should collapse against the face.

Positive Pressure Test - Cover the exhalation valve cover with your palm and gently exhale. The facepiece should expand away from the face.

If either test fails, loosen and readjust the respirator straps and check for obstructions to the sealing surface. Repeat both tests. If the test(s) fail again, select an alternate respirator.

3. A test atmosphere shall be generated with irritant smoke.
4. The test subject shall be advised that the smoke can be irritating to the eyes and instructed to keep the eyes closed while the test is being conducted (applies to half-mask respirators).
5. While wearing the selected respirator, the test subject shall enter the test atmosphere and perform the following exercises:
 - Breathe normally.
 - Breathe deeply. Be certain breaths are deep and regular.
 - Turn head all the way from one side to the other. Be certain movement is complete. Inhale on each side. Do not bump the respirator against the shoulders.
 - Nod head up and down. Be certain motions are complete and made every second. Inhale on each side. Do not bump the respirator against the shoulders.

- Nod head up and down. Be certain motions are complete and made every second. Inhale when head is in the full up position (looking toward ceiling). Do not bump the respirator against the chest.
 - Talking. Talk aloud and slowly in a fashion which will generate a wide range of facial movements.
 - Breathe normally.
6. The test subject shall indicate to the test conductor if the irritant smoke is detected. If smoke is detected, the test conductor shall stop the test. In this case, the tested respirator is rejected and another respirator shall be selected.
 7. Each test subject passing the smoke test (i.e., without detecting the smoke) shall be given a sensitivity check of smoke from the same tube to determine if the test subject reacts to the smoke. This may be performed by cracking the mask and gently inhaling while inside the test atmosphere. Failure to evoke a response shall void the fit test.
 8. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface.
 9. If hair growth or apparel interfere with a satisfactory fit, then they shall be altered or removed so as to eliminate interference and allow a satisfactory fit. If a satisfactory fit is still not attained, the test subject must use a positive-pressure respirator, such as powered air-purifying respirators, supplied air respirator, or self-contained breathing apparatus.
 10. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician trained in respiratory diseases or pulmonary medicine to determine whether the test subject can wear a respirator while performing her or his duties.
 11. Qualitative fit testing shall be repeated at least every year, or more often as required by law.
 12. In addition, because the sealing of the respirator may be affected, qualitative fit testing shall be repeated immediately when the test subject has experienced:
 - Weight change of 20 pounds or more.
 - Significant facial scarring in the area of the facepiece seal.
 - Significant dental changes, i.e., multiple extractions without prosthesis, or acquisition of dentures.
 - Reconstructive or cosmetic surgery.
 - Any other conditions that may interfere with facepiece sealing.

C. Recordkeeping

The following fit test forms shall be maintained in each office for 3 years. Permanent records shall be maintained by the Safety and Health Services Unit. The summary shall include:

- Name of test subject.
- Date of testing.
- Name of test conductor.
- Respirators selected (indicate manufacturer, model, size, and approval number).
- Testing agent.

RESPIRATOR TRAINING COMPLETION FORM

FIT TEST PROTOCOL USED:

___ Standard

___ Other (Specify)

BUSINESS UNIT

___ LOCATION

FIT TEST CONDUCTED BY: DATE

Initial only the appropriate blocks

NAME (print please)	SCBA Model: Size: S M L	AIRLINE PRESSURE DEMAND Size: S M L Brand:	PAPR Model: Size: S M L	AIR PURIFYING FULL FACE Size: S M L Brand:	AIR PURIFYING HALF MASK Size: S M L Brand:	OTHER
SIG.						
SS#						
1. I understand why respiratory protection is needed and where and when it should be used.						
2. I know how to use this respirator properly.						
3. I know how to clean and inspect this respirator.						
4. I understand the limitations and restrictions of the respirators I will be using.						
5. I wore this respiratory equipment in normal air and checked the facepiece fit.						
6. I wore this respiratory equipment in a test atmosphere generated by smoke or other means.						
7. I understand that a good gas-tight face seal cannot be achieved with obstruction such as facial hair or glasses (with fullface mask).						

MEDICAL QUESTIONNAIRE FOR RESPIRATOR USE

Name	Employee No.
Soc. Sec. No.	Business Unit
Date	Location

1. Have you ever worn a respirator before? ☐ Yes ☐ No

2. If yes, what type of respirator did you use?

3. Did you have any problems using the respirator?

Do you have now, or have you ever had any of the following:

A. Asthma	☐ Yes	☐ No
B. Emphysema	☐ Yes	☐ No
C. Chronic Bronchitis	☐ Yes	☐ No
D. High Blood Pressure	☐ Yes	☐ No
E. Heart Trouble	☐ Yes	☐ No
F. Persistent Cough	☐ Yes	☐ No
G. Shortness of Breath on Minor Exertion	☐ Yes	☐ No
H. Other Lung Disease	☐ Yes	☐ No
I. Fear of Enclosed Spaces	☐ Yes	☐ No
J. Other Medical Conditions that Might Interfere with Respirator Use	☐ Yes	☐ No

Please explain any YES answers:

PHYSICIAN: Based on the above information, your examination, and results of tests performed, please indicate your opinion regarding the ability of this person to use respiratory protection.

Approved to Use Respiratory Protection (Sign & Date):
NOT Approved to Use Respiratory Protection (Sign & Date):
Comments:

TITLE: BLOODBORNE PATHOGENS

1. PURPOSE

To establish the minimum requirements for ICF Kaiser Engineers (ICF KE) to protect workers potentially exposed to bloodborne pathogens.

2. SCOPE

This procedure applies in its entirety to all ICF KE operations unless a variance from its requirements is granted by the ES&H Service Unit Manager.

3. DEFINITIONS

- (a) **Blood:** Human blood, human blood components, and products made from human blood.
- (b) **Bloodborne Pathogens:** Pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV), and human immunodeficiency virus (HIV).
- (c) **Exposure Incident:** A specific eye, mouth, other mucous membrane, non-intact skin (skin that is cut, abraded, etc.), or parenteral contact with blood or other potentially infectious materials that results from the performance of the employee's duties.
- (d) **Other Potentially Infectious Material:** (1) The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between bodily fluids; (2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and (3) HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.
- (e) **Parenteral:** Piercing mucous membranes or the skin barrier through such events as needlesticks, human bites, cuts, and abrasions.
- (f) **Source Individual:** Any individual, living or dead, whose blood or other potentially infectious materials may be a source of occupational exposure to an employee.

4. RESPONSIBILITIES

- (a) The project manager has overall responsibility for establishing and ensuring compliance with this procedure.
- (b) The field safety and health staff is responsible for implementing and/or monitoring activities associated with this procedure.
- (c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

5. GENERAL REQUIREMENTS

- (a) Employees of ICF Kaiser Engineers are generally not required to render first aid to injured co-workers as part of their normal duties and responsibilities. Under this general case, the requirements set forth in Section 6 of this procedure apply. Note that training in first aid alone does not carry the requirement of actually providing emergency aid to an injured person.
- (b) Where employees of ICF Kaiser are required to render first aid as part of their job duties, either due to contract requirements, or any other reason, a comprehensive Bloodborne Pathogens Exposure Control plan, employee training, and other controls as defined in 29 CFR 1910.1030, must be implemented.
- (c) Blood, and other potentially infectious materials, may be encountered at waste sites during investigative or remedial activities. Materials encountered at waste sites that are suspected of being potentially infectious ("red bags," sharps containers, syringes, bandages) shall be presumed pathogenic until proven otherwise. In this case, the site specific health and safety plan shall include necessary exposure controls, and employee training in accord with 29 CFR 1910.1030 (see Procedure No. S&H-6).

6. IMPLEMENTATION

- (a) Employees who receive first aid training shall receive basic training on the hazards of bloodborne pathogens, and on ways to prevent exposure. If this information is not included in the first aid course curriculum, it shall be provided by the field safety and health staff.
- (b) First aid kits shall be equipped with disposable gloves, a CPR isolation/barrier device, and soap or other antiseptic cleanser (alcohol towelette, Betadine, etc.).

- (c) If an exposure incident as defined above occurs, the project manager, site manager, or field safety and health staff shall initiate the following actions.
- (1) As soon as possible after the incident, but not later than the end of the same work shift, the ES&H Service Unit Manager shall be notified of the exposure incident. The form in Attachment A (Infectious Materials Exposure Report) of this procedure may be used for this purpose, or the information requested in the form shall be provided.

Due to the importance of prompt medical evaluation, if the ES&H Service Unit Manager cannot be contacted, the information required in (1) shall be collected, and the following steps initiated without waiting for further instruction.
 - (2) The exposed employee(s) shall be notified of the availability of confidential medical evaluation and follow-up. Medical evaluation can be arranged through ICF KE's medical consultant, or locally through a hospital or physician, whichever results in the least delay.
 - (3) When feasible, the identity of the source individual shall be obtained if it is not known. If the source individual cannot be identified, either by lack of knowledge (e.g., exposure at a waste site), or due to state or local privacy laws, that fact shall be documented.
 - (4) Consent to test the source individual's blood for HBV and HIV infectivity shall be sought. If consent is withheld, that fact shall be documented. If consent is granted, or not required by law, the blood tests shall be conducted as soon as feasible, and the results documented. The results of the source individual's testing shall be made available to the exposed employee(s) in compliance with applicable privacy laws. The testing results shall be conveyed to the exposed employee(s) by the evaluating physician. Consent to sample and test the source individual's blood shall be coordinated through the evaluating physician.
 - (5) A sample of the exposed employee(s) blood shall be collected as soon as feasible, and consent to test the blood shall be sought. If consent is granted, the blood shall be tested for HBV and HIV status. If consent is not granted, the blood sample shall be stored for 90 days under the care of the evaluating physician. If during the 90 day period, the exposed employee(s) grants consent for testing, the testing shall be done as soon as feasible. Collection and testing (if consented to) of the exposed employee(s) blood shall be coordinated through the evaluating physician.

- (6) Additional medically indicated post exposure follow-up and treatment shall be provided to the exposed employee(s), by or under the direction of the evaluating physician.
- (d) For each employee involved in an exposure incident, the evaluating physician shall prepare a written opinion within 15 days of completing the evaluation. A copy of the written opinion shall be provided to the exposed employee(s). The content of this written opinion is limited to:
 - (1) Indication (positive or negative) for hepatitis B vaccination, and whether the employee has received the vaccination;
 - (2) That the exposed employee(s) has been informed of the results of the evaluation; and
 - (3) That the exposed employee(s) has been told of any medical condition resulting from the exposure incident.
- (e) If the exposed employee(s) declines hepatitis B vaccine under the medical evaluation and written opinion, the declination form (Attachment B) shall be completed and retained. If the exposed employee(s) later requests hepatitis B vaccine, the vaccination shall be provided, according to the recommendation of the evaluating physician.

7. EXHIBITS/ATTACHMENTS

All records relating to an exposure incident, and post-exposure evaluation, with the exception of the initial report, and information necessary to comply with occupational injury and illness recordkeeping requirements, shall be treated as confidential medical records.

ATTACHMENT A**INFECTIOUS MATERIALS EXPOSURE REPORT**

THIS COMPLETED FORM, OR THE INFORMATION REQUESTED ON IT, MUST BE FORWARDED TO THE ES&H SERVICE UNIT IN PITTSBURGH, OR OAKLAND, BEFORE THE END OF THE SHIFT DURING WHICH THE INCIDENT OCCURRED.

Date of Incident _____ Time of Incident _____

Name of Injured _____

Location of Incident _____

Type and Extent of Injury _____

Name(s) of First Aid Provider(s) _____

DID AN 'EXPOSURE INCIDENT' (as defined below) OCCUR DURING THIS EVENT? (CIRCLE ONE) **YES NO**

WAS BLOOD, OR 'OTHER POTENTIALLY INFECTIOUS MATERIAL' PRESENT IN THIS INCIDENT? (CIRCLE ONE) **YES NO**

DEFINITIONS:**"Exposure Incident"**

means a specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that results from the provision of first aid.

"Other Potentially Infectious Material"

means (1) The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between bodily fluids;

(2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and

(3) HIV¹-containing cell or tissue cultures, organ cultures, and HIV- or HBV²-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

¹ HIV means human immunodeficiency virus.

² HBV means hepatitis B virus.



ATTACHMENT B

HEPATITIS B VACCINE DECLINATION

I UNDERSTAND THAT DUE TO MY OCCUPATIONAL EXPOSURE TO BLOOD OR OTHER POTENTIALLY INFECTIOUS MATERIALS I MAY BE AT RISK OF ACQUIRING HEPATITIS B (HBV) INFECTION. I HAVE BEEN GIVEN THE OPPORTUNITY TO BE VACCINATED WITH HEPATITIS B VACCINE, AT NO CHARGE TO MYSELF. HOWEVER, I DECLINE HEPATITIS B VACCINATION AT THIS TIME. I UNDERSTAND THAT BY DECLINING THIS VACCINE, I CONTINUE TO BE AT RISK OF ACQUIRING HEPATITIS B, A SERIOUS DISEASE. IF IN THE FUTURE I CONTINUE TO HAVE OCCUPATIONAL EXPOSURE TO BLOOD OR OTHER POTENTIALLY INFECTIOUS MATERIALS AND I WANT TO BE VACCINATED WITH HEPATITIS B VACCINE, I CAN RECEIVE THE VACCINATION SERIES AT NO CHARGE TO ME.

(EMPLOYEE'S SIGNATURE)

(DATE)

(RECEIVED BY)

TITLE: COLD ENVIRONMENTS

1. PURPOSE

To establish the minimum requirements for ICF Kaiser Engineers (ICF KE) to protect workers exposed to cold environments.

2. SCOPE

This procedure applies in its entirety to all ICF KE projects unless a variance from its requirements is granted by the ES&H Service Unit Manager.

3. DEFINITIONS

Not applicable.

4. RESPONSIBILITIES

- a. The project manager has overall responsibility for establishing and ensuring compliance with this procedure.
- b. The field safety and health staff is responsible for implementing and/or monitoring activities associated with this procedure.
- c. It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

5. GENERAL REQUIREMENTS

- a. Most cold-related worker fatalities have resulted from failure to escape low environmental air temperatures, or from immersion in low temperature water. The single most important aspect of life-threatening hypothermia is a fall in the deep core temperature of the body.
- b. Hypothermia occurs when a person's body loses heat faster than it can be produced. The body's "normal" deep body temperature is 99.6° Fahrenheit. If body temperature drops to 95° Fahrenheit, uncontrollable shivers occurs. If cooling continues, these other symptoms may occur.
 - Vague, slow, slurred speech
 - Forgetfulness, memory lapses
 - Inability to use hands
 - Frequent stumbling
 - Drowsiness

-
- Exhaustion, collapse
 - Unconsciousness
 - Death
- c. Hypothermia can occur at temperatures above freezing. Cold, wet, windy conditions make prime hypothermia weather.
- d. Hypothermia impairs your judgement. You may not be able to make good decisions about your situation.
- e. Frostbite is the freezing of some part of the body. Fingers, toes, and even whole arms and legs can be lost as a result of frostbite.
- f. Pain in the hands and feet is felt only when temperature of the tissue is changing very rapidly. There may be no pain with gradual freezing.
- g. Loss of the sensations of touch, pressure, and pain may occur without awareness of any numbness or other sensation. Therefore, it is important to test these sensations often and to wear clothing that is loose and does not restrict the flow of the blood to the limbs.
- h. Exposed parts of the body should be inspected routinely. This is done best by a partner. Just before freezing, the skin - especially the face with its many blood vessels - becomes bright red. Then small patches of white appear, as freezing actually occurs.
- i. The skin also becomes less elastic. This is best noted in the finger pads, which remain pitted when touched or squeezed. Any further cooling will surely result in frostbite.
- j. Serious freezing is most common in the feet because of less awareness of them, poor circulation and sensation, and inadequate foot gear. Hands are next in order of serious injury. Exposed head parts are less likely to become frostbitten than feet because they are conditioned to exposure and have a better blood supply.
- k. Next to the extent of freezing, inadequate or improper treatment of a frozen part is the most common cause of serious loss of tissue. If you suspect you or a co-worker has experienced frostbite, seek medical attention immediately.

6. IMPLEMENTATION

- a. Workers shall wear warm clothing, such as mittens, heavy socks, etc., when the air temperature is below 40-45° Fahrenheit (F). Chemical protective clothing, if required by the project, may be used to partially protect the employee from the cold.
- b. When the air temperature is below 30-40°F (depending upon employee comfort), clothing for warmth, in addition to chemical protective clothing where necessary, shall be provided. This will include insulated suits, such as whole-body thermal underwear; wool socks or polypropylene socks to keep moisture off the feet if there is a potential of work activity which would cause sweating; insulated gloves (when air temperatures are extremely low less than 5-10°F, gloves with reflective surfaces, which reflect body heat back to the hand, should be used); boots; and insulated head cover, such as knit caps (ski caps).
- c. At air temperature below 35°F, the following work practices must be followed:
 - i. If the clothing of an employee might become wet on a job site, the outer layer of the clothing must be impermeable to water.
 - ii. If an employee's underclothing (socks, mittens, etc.) becomes wet in any way, the employee must change into dry clothing immediately. If the clothing becomes wet from sweating, the employee may finish the task which is causing the sweating before changing into dry clothing.
 - iii. Employees must be provided a warm area (65°F or above) to change from work clothing into street clothing.
 - iv. Employees must be provided a warm break area (65°F or above).
 - v. If appropriate, space heaters may be provided in the work area to warm the hands, feet, etc. Necessary fire and electrical safety practices shall be observed when using space heaters. Space heaters shall be shut off when the site is not occupied.
 - vi. Hot liquids, such as soups, warm, sweet drinks, etc. shall be provided in the break area. The intake of caffeinated beverages shall be limited because of the attendant diuretic and circulatory effects.
 - vii. The buddy system shall be practiced at all times. Any employee observed with severe shivering shall leave the cold area immediately.

-
- viii. Employees should layer their clothing, i.e., wear thinner, lighter clothing next to the body with heavier clothing layered outside the inner clothing.
 - ix. Avoid overdressing when going into warm areas or when performing activities which are strenuous. This could lead to a heat stress problem.
 - x. Auxiliary heated versions of handwear, footwear, etc., can be used in lieu of mittens, insulated socks, etc. if extremely cold conditions exist, and if compatible with hazards in the work area.
 - xi. Employees handling volatile liquids (gasoline, hexane, alcohol, etc.) shall take special precautions to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling.
 - xii. Work shall be arranged in such a way that sitting still or standing for long periods is minimized.
- d. All employees who may work in cold areas shall be trained in the following subjects in accordance with procedure S&H-6.
- Proper first aid treatment
 - Proper clothing practices
 - Proper eating and drinking habits
 - Recognition of impending adverse health effects
 - Safe work practices
- e. Clothing for warmth, which is worn under chemical protective clothing in contaminated areas, can be laundered in normal fashion, without the wash water being collected as contaminated water so long as the chemical protective clothing is worn properly, and remains intact.
- f. If there is a rip or tear in the chemical protective clothing in a contaminated area, the clothing for warmth must be handled as potentially contaminated, and the water in which it was washed must be collected as potentially contaminated water. More rigorous steps may be required if materials handled are extremely toxic (dioxin, etc.).

7. EXHIBITS/ATTACHMENTS

Not applicable.

TITLE: HOT ENVIRONMENTS

1. PURPOSE

To establish the minimum requirements for ICF Kaiser Engineers (ICF KE) to protect workers exposed to hot environments.

2. SCOPE

This procedure applies in its entirety to all ICF KE projects unless a variance from its requirements is granted by the ES&H Service Unit Manager.

3. DEFINITIONS

- (a) **Acclimatized.** Workers who have developed physiological adaptation to hot environments characterized by increased sweating efficiency, circulation stability, and tolerance of high temperatures without stress. Acclimatization occurs after 7 to 10 consecutive days of exposure to heat; and much of its benefit may be lost if exposure to hot environments is discontinued for a week.
- (b) **Chemical protective clothing** is defined as, but not limited to clothing which is constructed of relatively impermeable materials with the intent to act as a barrier to physical contact of the worker with potentially hazardous materials in the workplace. Such materials include: Tyvek™ coveralls (all types), CPF™ Series coveralls, and polyvinylchloride (PVC) coveralls and rain suits.
- (c) **Unacclimatized.** Workers who have not been exposed to hot work conditions for one week or more, or who have become heat-intolerant due to illness, or other reason.

4. RESPONSIBILITIES

- (a) The project manager has overall responsibility for establishing and ensuring compliance with this procedure.
- (b) The field safety and health staff is responsible for implementing and/or monitoring activities associated with this procedure.
- (c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

5. GENERAL REQUIREMENTS

- (a) Heat stress (hyperthermia) is a common hazard to employees working on projects involving exposure to hazardous substances, most particularly when impermeable protective clothing is used. This problem can occur at ambient temperatures below what is normally considered "hot weather." The body normally sheds excess heat primarily through radiation (capillaries in the skin dilate, transferring heat from the body core to the surface), and evaporation of sweat. Thermodynamically, evaporation is much more effective than radiation. Heat stress results when the body's regulating mechanisms are inadequate to dispose of internally generated, and externally supplied heat.

Heat is normally generated internally through metabolic processes, and the quantity of heat generated corresponds to the level of muscle activity. External heat sources include radiant bodies (the Sun, furnaces, fires, etc.), and convection (temperature difference between the skin and ambient air). External heat gain can occur through conduction from hot surfaces, but this is normally not significant since such contact will be avoided (it could be a very important factor if immersed in water, however).

The overall heat balance of a human can be written as an equation:

$$H = M \pm R \pm C - E$$

where:

- H = body heat burden
- M = metabolic heat gain
- R = radiant or infrared heat load
- C = convective heat load
- E = evaporative heat loss.

The "normal" person maintains a core body temperature of $37^{\circ}\text{C} \pm 1^{\circ}\text{C}$, ($98.5^{\circ}\text{F} \pm 1.8^{\circ}\text{F}$). Core body temperatures should not exceed 38°C (100.4°F) as a result of the total heat burden. Heat stroke occurs when the core temperature is greater than 40°C , and death is probable at core temperatures $\geq 42^{\circ}\text{C}$.

Working outdoors in hot, sunny weather places the worker under increased heat load from M, R, and C. If the heat loss from E, is less than the sum of M, R, and C, the total body heat balance will increase. Unfortunately, the use of impermeable protective clothing can reduce the heat loss from E to near zero.

6. IMPLEMENTATION

(a) Recommended Controls

- (1) Note that the guidelines discussed in this section are only intended to be used as a means for initial establishment of a work-rest regimen. It will be the responsibility of the field safety and health staff to evaluate the conditions at a specific operation and make final determinations of the work-rest regimen.
- (2) Heat stress is difficult to control in environmental work. Most work takes place outdoors, and, in much of the country, during the spring and summer months. There are three factors that impact on control of heat stress: worker acclimatization, replacement of fluid lost through sweating, and reducing work schedules.
 - (i) Acclimatization is the process by which the body adapts to higher environmental temperatures, and is very significant in preventing heat related illnesses. Acclimatization is a gradual adaptation requiring seven to ten days to complete. In an acclimatized worker, the heart rate is lower, the resting body temperature is lower, sweating begins more rapidly, and the sweat is more dilute (less salt loss). Acclimatization is temporary, and much of the benefit can be lost if the worker is not exposed to heat stress for a week or so. Lack of acclimatization is the reason heat-related illnesses are more common, and more severe in the early summer.
 - (ii) Replacement of lost fluids is critical for all workers weather acclimated or not. Intake of fluid must be increased beyond that which satisfies thirst, and it is important to avoid "fluid debt," which will not be made up as long as the individual is sweating. Two 8 oz. glasses of water should be taken prior to beginning work, then up to 32 oz per hour during the work shift; fluid replacement at frequent intervals is more effective. The best fluid to drink is water; liquids like coffee or soda do not provide efficient hydration, and may increase loss of water. If commercial electrolyte drinks (Gatorade, Squincher, etc.) are used, the drink should be diluted $\frac{1}{3}$ to $\frac{1}{2}$ with water, or 8 oz of water should be taken with each 8 oz of electrolyte. Additional salt is usually not needed; and salt tablets should never be taken. Replacement fluids should be cool, but not cold.

- (iii) A reduced work schedule lowers the contribution of the metabolic heat gain by periodically reducing the level of activity. Breaks should be taken in a cool, shaded location, and any impermeable clothing should be removed. Dry clothing or towels should be available to minimize chills when taking breaks. No manual labor may be performed during breaks, but paperwork, and other similar light tasks may be performed.
- (iv) Other controls include working at night or during the cooler parts of the day (6am - 10am, 3pm - 7pm), erecting a shade over the work area, and use of cooling garments. The last option is expensive and logistically difficult to implement.

(3) Work Schedules

- (i) Work schedules providing periodic rest periods must be implemented when employees are exposed to heat stress. Schedules may be developed based on instrumental measurements of the environment (temperature, radiant heat, humidity, and wind speed) with the resulting measurement compared to published guidelines (NIOSH REL, ACGIH TLV, for Heat Stress). When using this method, allowance must be made for the use of impermeable protective clothing.
- (ii) Alternate methods of establishing a work schedule are based on measuring physiological indices (heart rate, or oral temperature), which correlate to the core body temperature. Oral temperature does not correlate well to increasing core temperature (during heat exhaustion, it may be normal or even depressed due to extreme peripheral vasodilation), and is subject to effects from drinking replacement fluids.
- (iii) Measures of heart rate (pulse) appear to correlate well with heat-related stress, and can be used to estimate the impact of heat stress on individuals with differing levels of fitness (i.e. individuals with a pulse of 150/minute are experiencing about the same level of stress, even though the work output required to reach this rate will be quite higher for a fit person). The heart rate also incorporates the combined effects of environmental heat, muscle activity, and elevated body temperature, making it a useful, and easily measured variable.

The procedure for controlling heat stress via establishment of work schedules based on the measurement of heart rate is presented below.

- (4) The Site Safety Officer and Site Manager shall determine the potential for heat stress based on planned activities, and weather forecasts.

If the potential for heat stress exists:

- (i) All site workers shall be informed of the potential for heat stress during the daily safety meeting.
- (ii) The site safety officer and site manager shall determine if any hot zone workers are at particular risk for heat stress due to illness, etc.
- (iii) The site safety officer and site manager shall assure that sufficient quantities of potable water, and electrolyte drinks are available in the decon area; and that a shaded rest area is available at, or immediately outside the decon area.
- (iv) All hot zone workers and relief workers shall drink 16 oz. of water prior to beginning work; and at least 16 oz. during each rest period.
- (v) The initial work period and monitoring frequency, is set according to the table in Attachment A.
- (vi) Within the first minute of each rest period, each worker's heart rate (pulse) shall be measured, and compared to the following:

Initial heart rate: ≤ 110 beats/minute (28 beats/15 sec).
- (vii) Each worker's heart rate will be measured again three minutes later, and compared to the following:

Recovery heart rate: ≤ 80 beats/minute (20 beats/15 sec).
- (viii) If both heart rate criteria are met, the subsequent work period may be increased by one third, provided the temperature remains constant.

- (ix) If the initial heart rate is > than 110 beats per minute, or the recovery rate is not less than 80 beats per minute, the subsequent work shift is decreased by one third.

(5) Additional Means of Prevention

- (i) Cooling devices such as vortex tubes or cooling vests can be worn beneath protective garments. If cooling devices are worn, only physiological monitoring will be used to determine work activity.
- (ii) All breaks are to be taken in a cool, shaded rest area.
- (iii) Employees shall open or remove chemical protective garments during rest periods.
- (iv) Employees shall not be assigned other tasks, except paperwork during rest periods.
- (v) All employees shall be informed of the importance of adequate rest and proper diet in the prevention of heat stress.
- (vi) Employees shall be informed of the harmful effects of excessive alcohol consumption in the prevention of heat stress.

- (b) **Training:** Those personnel potentially exposed to heat stress shall receive the following training. Training provided as a part of this procedure shall be documented in accordance with Procedure No. S&H-6.

(1) Employees shall be trained on:

- (i) Sources of heat stress, influence of protective clothing, and importance of acclimatization.
- (ii) How the body handles heat.
- (iii) Heat related illnesses.
- (iv) Preventative/Corrective measures.
- (v) First Aid procedures for heat stress.

- (2) ICF KE Supervisors shall be trained on measurement methods and calculations of heat stress indices, and establishing work schedules.

7. EXHIBITS/ATTACHMENTS

The following Employee Physiological Monitoring Record as shown in Attachment B of this manual is used for documenting activities associated with this procedure.

ATTACHMENT A

FREQUENCY OF MEASUREMENT		
AMBIENT TEMPERATURE (°F)	NORMAL WORK CLOTHING ¹	IMPERMEABLE WORK CLOTHING
70° - 80°	N/A	90 MIN
80° - 85°	120 MIN	60 MIN
85° - 90	90 MIN	30 MIN
> 90°	60 MIN	15 MIN

¹Normal work clothing is cotton coveralls, or other cotton clothing with long sleeves and pants.

Note: Individuals with pre-existing medical conditions or restrictions contraindicating exposure to elevated environmental heat are precluded from assignments that involve exposure to high temperatures.

Note: Healthy individuals will vary significantly in their tolerance to heat, and heat tolerance can be affected by minor illnesses (cold, flu) and by prescription, and over-the-counter medications.

Note: The heart rate measure is only a part of the overall situation to be considered; other objective, and subjective symptoms of heat stress, such as: extreme fatigue, nausea, disorientation, lightheadedness, and breathlessness must be fully considered when evaluating the adequacy of control measures.

Note: The heart rate measure will provide guidance that can be significantly different for each member of a field team based on their acclimatization, physical fitness, and heat-tolerance. If it is critical that all team members use the same work/break schedule, the schedule that accommodates the least heat-tolerant team member will be observed.

ATTACHMENT B

EMPLOYEE PHYSIOLOGICAL MONITORING RECORD FOR HEAT STRESS

Employee Name		Date	
Employee SS#		Business Unit	
Project Location		Project No.	
Completed By			
Pre-Work Baseline		After 5th Work Period	
Ambient Air Temperature		Ambient Air Temperature	
Heart Rate		Initial Heart Rate	
		Recovery Heart Rate	
After 1st Work Period		After 6th Work Period	
Ambient Air Temperature		Ambient Air Temperature	
Initial Heart Rate		Initial Heart Rate	
Recovery Heart Rate		Recovery Heart Rate	
After 2nd Work Period		After 7th Work Period	
Ambient Air Temperature		Ambient Air Temperature	
Initial Heart Rate		Initial Heart Rate	
Recovery Heart Rate		Recovery Heart Rate	
After 3rd Work Period		After 8th Work Period	
Ambient Air Temperature		Ambient Air Temperature	
Initial Heart Rate		Initial Heart Rate	
Recovery Heart Rate		Recovery Heart Rate	
After 4th Work Period		After 9th Work Period	
Ambient Air Temperature		Ambient Air Temperature	
Initial Heart Rate		Initial Heart Rate	
Recovery Heart Rate		Recovery Heart Rate	

ATTACHMENT B

SUPERVISOR'S INJURY/INCIDENT REPORT

SUPERVISOR'S INJURY/INCIDENT REPORT

This is an official document to be initiated by the employee's supervisor. Please answer all questions completely. This report must be forwarded to the Corporate Health and Safety office within 24 hours of the injury or incident.

Injured's Name _____ Sex _____ S.S. No. _____ Birthdate _____
 Home Address _____ City _____ State _____ Zip _____ Phone _____
 Job Title _____ Employee's B.U. _____ Hire Date _____ Hourly Wage _____

SUPERVISOR

Date of incident _____ Time _____ Time reported _____ To Whom? _____
 Client name _____ Client address _____ Time shift began _____
 Exact location of incident _____ Did employee leave work? ____ No ____ Yes When _____
 Has employee returned to work? ____ No ____ Yes When _____
 Did employee miss a regularly scheduled shift after the day of the incident? ____ No ____ Yes
 Nature of injury _____ Exact body part _____
 Medical Attention: ____ None ____ First aid on site ____ Doctor's office ____ Hospital ER ____ Hospitalized
 Job assignment at time of incident _____ Project _____ Task _____ Subtask _____
 Describe incident _____

What unsafe physical condition or unsafe act caused the incident? _____

What corrective action has been taken to prevent recurrence? _____

Supervisor _____
 (Print) _____ Signature _____ Date _____

MANAGER

Comments on incident and corrective action _____

Manager's name _____
 (Print) _____ Signature _____ Date _____

HEALTH AND SAFETY

Concur with action taken? ____ No ____ Yes Remarks _____

OSHA Classification:

____ Incident only ____ First aid ____ No lost workdays ____ Lost workdays ____ Restricted activity ____ Fatality

Days away from work _____ Days restricted work _____ Total days charged _____

Coding: A. Injury type or illness ____ B. Injured body parts ____ C. Activity at time of accident ____ D. Injury cause code ____

E. Agent code ____ F. Safety rule violated code ____ G. Accident prevention code ____

Name _____
 (Print) _____ Signature _____ Date _____

White: Corporate Health and Safety

Yellow: Corporate Insurance

Pink: Business Unit Manager

APPENDIX C

COMMUNITY AIR MONITORING PLAN

**NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066
CHEEKTOWAGA, NEW YORK**

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Attachment B	Air Monitoring Data Record
Attachment C	Monitoring Equipment Standard Operating Procedures
Attachment D	Monitoring Equipment Calibration Record

LIST OF ACRONYMS AND ABBREVIATIONS

CAMP _____	Community Air Monitoring Plan
HASP _____	Health and Safety Plan
ICF Kaiser _____	ICF Kaiser Engineers Corporation
NIOSH _____	National Institute of Occupational Safety and Health
NYSDEC _____	New York State Department of Environmental Conservation
OSHA _____	Occupational Safety and Health Administration
PID _____	photoionization detector
ppm _____	parts per million
Site _____	NYSDEC Inactive Hazardous Waste Site No. 9-15-066
USEPA _____	United States Environmental Protection Agency
VOCs _____	Volatile Organic Compounds

1.0 INTRODUCTION

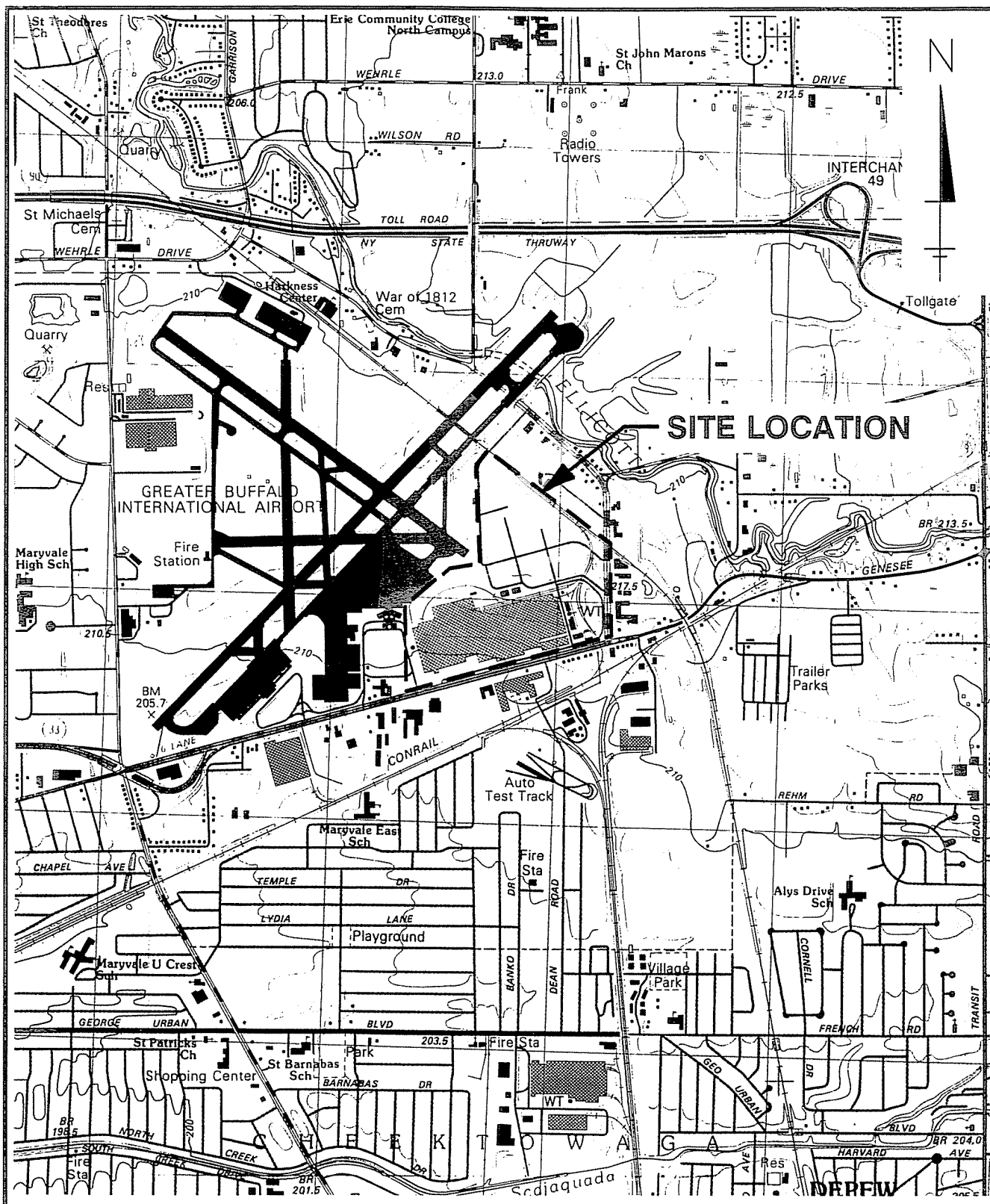
This Community Air Monitoring Plan (CAMP) has been prepared by ICF Kaiser Engineers Corporation (ICF Kaiser) in support of pre-design evaluation and remedial action activities at New York State Department of Environmental Conservation (NYSDEC) Inactive Hazardous Waste Site No. 9-15-066 in Cheektowaga, New York (Site) (Figure 1-1). The CAMP is intended to outline air monitoring procedures and equipment to be used during intrusive activities at the Site. Included in the CAMP are personnel, perimeter, and media treatment air monitoring. The CAMP was prepared according to the applicable federal and state regulations and guidance documents, including the latest *New York State Inactive Hazardous Waste Site Citizen Participation Plan* (August 30, 1988) and *Technical Administrative Guidance Memorandum 4031 - Fugitive Dust Suppression and Particulate Monitoring at Inactive Hazardous Waste Sites*.

A plan of the Site is presented in Figure 1-2¹ which depicts the following areas requiring remedial action:

- Soil excavation Area I (Oil Storage Building),
- Soil excavation Area J (Solvent Tank Storage Area),
- Soil excavation Area K (Hazardous Waste Storage Area),
- Soil excavation Area M (Underground Mixing Room),
- Soil excavation Area P (Flying Tigers),
- Soil excavation Area Q (South Abandoned Railroad Area),
- U-Crest Ditch sediment excavation area, and
- The abandoned manufacturing building (existing storm sewer system augmentation).

In general dust suppression techniques (i.e., wetting or covering of exposed soils or sediments) will be employed during any intrusive pre-design activity or remedial action activity that are conducted on windy days.

¹ The excavation areas shown on Figure 1-2 are approximate only. Refer to Section 3.4 and Figures 3 through 9 of the July 1996 "Pre-Design Investigation Summary Report" by Blasland, Bouck & Lee, Inc., for explicit excavation area limits.



0 500m 1000m

APPROX. SCALE: 1cm = 250m

MAP LOCATION

REFERENCE: LANCASTER, N.Y. USGS QUAD. 1982

FIGURE 1-1

ICF KAISER ENGINEERS

NYSDEC INACTIVE HAZARDOUS WASTE
SITE 9-15-066 - CHEEKTOWAGA, N.Y.

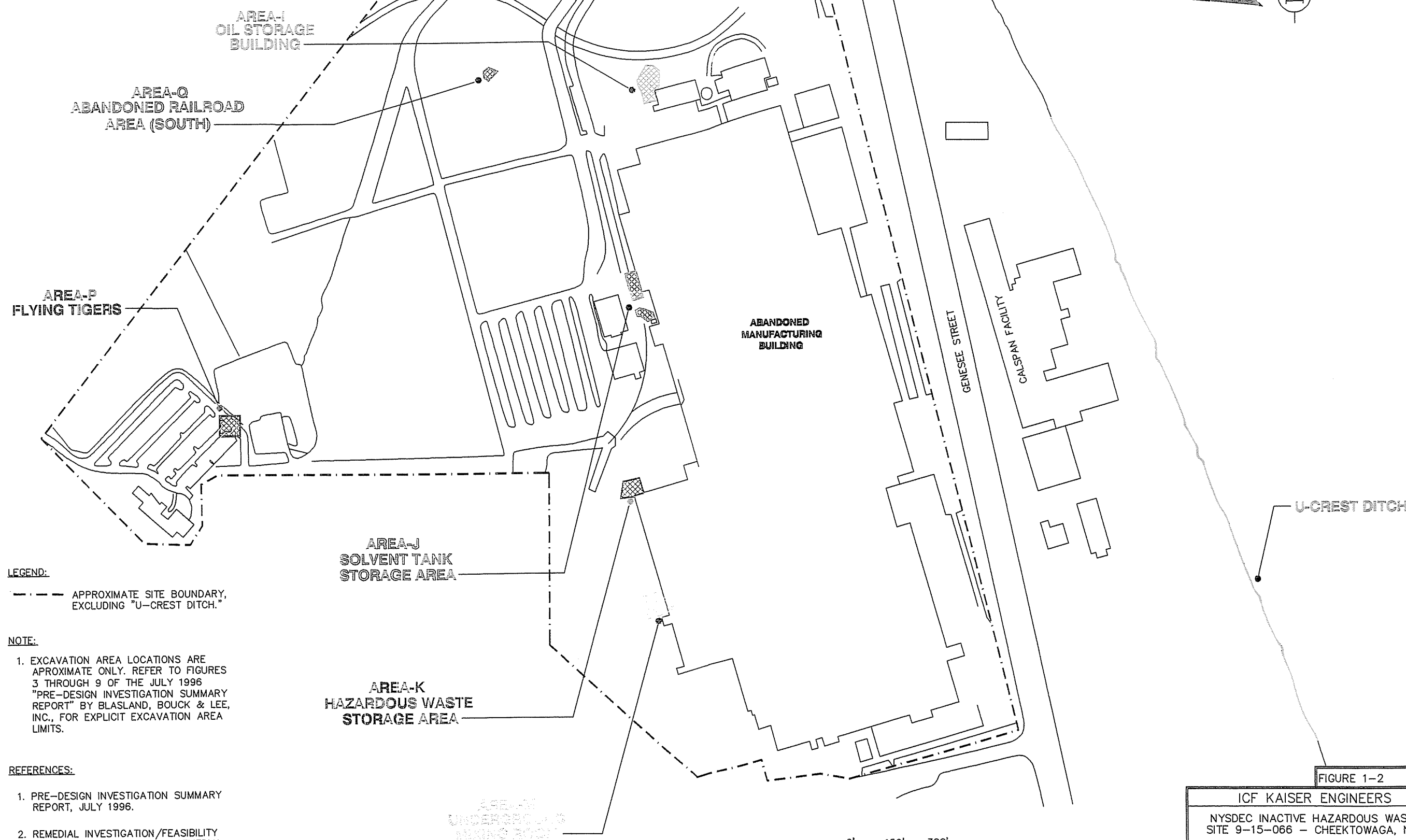
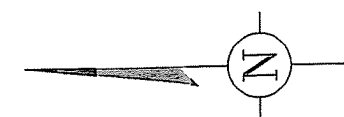
SITE LOCATION MAP

DATE: 10/17/97

DR.: D. EVANS

SCALE: AS SHOWN

FILE NAME: 90151002



LEGEND:

--- APPROXIMATE SITE BOUNDARY, EXCLUDING "U-CREST DITCH."

NOTE:

1. EXCAVATION AREA LOCATIONS ARE APPROXIMATE ONLY. REFER TO FIGURES 3 THROUGH 9 OF THE JULY 1996 "PRE-DESIGN INVESTIGATION SUMMARY REPORT" BY BLASLAND, BOUCK & LEE, INC., FOR EXPLICIT EXCAVATION AREA LIMITS.

REFERENCES:

1. PRE-DESIGN INVESTIGATION SUMMARY REPORT, JULY 1996.
2. REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT, VOLUME 1: REMEDIAL INVESTIGATION REPORT (TEXT) SEPTEMBER, 1994 (DUNN ENGINEERING COMPANY).

0' 150' 300'
SCALE: 1" = 150'

FIGURE 1-2

ICF KAISER ENGINEERS	
NYSDEC INACTIVE HAZARDOUS WASTE SITE 9-15-066 - CHEEKTOWAGA, N.Y.	
SITE LAYOUT PLAN	
DATE: 10/17/97	DR.: B. SNYDER
SCALE: AS SHOWN	FILE NAME: 20153003

2.0 AIR MONITORING ACTIVITIES

One objective of remedial action is to efficiently perform Site activities while protecting of both on-Site personnel and the surrounding community. One component in achieving this objective is the collection and analysis of air monitoring data. Three categories of air monitoring activities may be implemented during pre-design evaluations and/or remedial action:

- **Treatment Unit Air Monitoring** - Air emissions monitoring will be performed during on-Site operation of the mobile, low-temperature thermal desorption soil treatment unit. Treatment unit air monitoring activities will be conducted in accordance with the unit's operating permit and will be coordinated with personnel air monitoring activities and real-time perimeter air monitoring activities (if required). The operating permit for the treatment unit is provided as Attachment A.
- **Personnel Monitoring** - On-Site personnel performing pre-design evaluations or remedial actions will be monitored in accordance with the procedures specified in the Health and Safety Plan (HASP).
- **Perimeter Monitoring** - Perimeter air monitoring at the Site boundary² will be performed only during intrusive remedial action activities or during low-temperature desorption of soils any only if the trigger criteria (action level) specified in Section 5.4.2 of the HASP are exceeded. Should the HASP - specified trigger criteria for volatile organic compounds (VOCs) be exceeded, perimeter monitoring with a photoionization detector (PID) will be initiated. Should the HASP - specified trigger criteria for particulate be exceeded, perimeter monitoring with a DataRAM™ will be initiated..

² As appropriate, perimeter monitoring will also include monitoring down-wind of U-Crest Ditch remedial action activities.

3.0 PERIMETER AIR MONITORING

Perimeter monitoring will be used to characterize emissions during intrusive remedial action activities or during low-temperature desorption of soils when HASP-specified trigger criteria (Action Levels) are exceeded. During these operations, air monitoring stations will be set-up at two downwind and one upwind location along the Site boundary. The following instrumentation will be used at the perimeter air monitoring stations.

Photoionization Detector: A photoionization detector (PID) with data-logging capabilities will be used to monitor VOCs with an ionization potential of less than 11.7 eV. The real-time monitoring instrument will be mounted along the property boundary, in the continuous survey mode while trenching activities are conducted when local personnel monitoring indicates the need for perimeter monitoring. Periodically, upwind vapor concentrations will be collected and documented for comparison. This data will be compared with breathing zone readings within the work area.

DataRAM™: A DataRAM™ with direct readout will be used to monitor PM-10 particulate concentrations. The real-time monitoring instrument will be mounted along the property boundary in the continuous survey mode while trenching activities are conducted when local personnel monitoring indicates the need for perimeter monitoring. Periodically, upwind particulate concentrations will be collected and documented for comparison. These data will be compared with breathing zone readings within the work area.

Real-time perimeter air monitoring data will be tabulated daily with analytical data tabulated upon receipt. Attachment B contains the forms that will be used to record daily air monitoring information. Procedures for the use of anticipated perimeter air monitoring equipment is provided in Attachment C. Attachment D contains the forms for recording daily calibration of these instruments.

Perimeter monitoring trigger criteria (Action Levels) will be consistent with those in Section 5.4.2 of the Health and Safety Plan (ICF Kaiser, 1998).

4.0 REFERENCES

ICF Kaiser, (1998). Health and Safety Plan, NYSDEC Inactive Hazardous Waste Site No. 9-15-006, Cheektowaga, New York, ICF Kaiser Engineers Corporation, April 3, 1998.

New York State Department of Environmental Conservation, New York State Inactive Hazardous Waste Site Citizen Participation Plan (August 30, 1988)

New York State Department of Conservation, Technical Administrative Guidance Memorandum 4031 - Fugitive Dust Suppression and Particulate Monitoring at Inactive Hazardous Waste Sites.

ATTACHMENT A

TREATMENT UNIT OPERATING PERMIT

**This Appendix reserved for the pending NYSDEC permit for the specific,
mobile low-temperature thermal desorption unit to be used at the Site.**

ATTACHMENT B

AIR MONITORING LOG FORM

REAL-TIME AIR MONITORING DAILY LOG

NYSDEC INACTIVE HAZARDOUS

WASTE SITE NO: 9-15-066

Date: _____

Area : _____

Conducted By: _____

Activity: _____

Time (Hrs)	Monitoring Location	HNu/OVA (ppm)		Particulates (mg/m ³)
		Surface	Breathing Zone	

ATTACHMENT C

MONITORING EQUIPMENT STANDARD OPERATING PROCEDURES

PHOTOIONIZER ANALYZER MODEL PI-101
HNU SYSTEMS INC.
"HNU"

CAPABILITIES:

Detects total concentration of many organic and some inorganic gases and vapors. Easy to use and has a rapid response (90% of actual concentration in three seconds for benzene). It has a useful range of 0 - 2,000 ppm and a lower limit of detection of 0.1 parts per million (ppm) (benzene).

THEORY:

Ambient air is drawn into the probe which contains an ultraviolet (UV) source. Since every molecule has a characteristic ionization potential, those molecules that are present with an ionization potential less than the probe energy are ionized. The ion pairs formed cause a current to flow between two electrodes. A readout of this current, which is proportional to the concentration of the ion pairs, is displayed on a meter. Probes of 9.5, 10.2 and 11.7 eV are available, but the 10.2 eV probe is the most useful. Although the 11.7 eV probe can detect more compounds than the other two probes, it has a useful life of only 700-1000 hours, making it cost-prohibitive to use on a regular basis. Obviously, if the presence of compounds that can be detected only by the 11.7 eV probe is suspected, it will be used instead of the 10.2 eV probe.

LIMITATIONS:

Materials with an ionization potential greater than the probe energy will not be measured. For instance, with a 11.7 eV probe, the following substances are among those which will not be detected:

Methane (12.98 eV)
Hydrogen Cyanide (13.91 eV)
Carbon Dioxide (13.79 eV)

For information on additional compounds, consult the HNu Systems Operator's Manual or other chemical reference books.

The repeatability of the meter reading is $\pm 1\%$ of the full scale deflection (e.g., on the 0 - 20 ppm scale, the uncertainty is ± 0.2 ppm). Therefore, at low concentrations near the detection limit, the error could be quite large.

PRE-FIELD PREPARATION:

Make sure the batteries are fully charged and run through the calibration procedure to check instrument operation.

CALIBRATION:

1. Turn the unit on and leave the instrument in the standby position.

2. Allow five minutes for the instrument to warm up.
3. Zero the meter while still in the standby mode.
4. Set the switch to the appropriate range (0 - 200 ppm) for the calibration gas, and set the span as required (normally the span is set at 5.0 for the 11.7 eV probe).
5. Attach the regulator to the calibration gas cylinder, and probe extension to the probe. Connect the probe extension to the calibration gas cylinder with plastic tubing, turn on the calibration gas regulator and wait about a minute for the calibration gas to flow into the probe. Then read the meter on the 0 - 200 ppm scale, and enter the meter reading and the actual concentration (read off the calibration gas cylinder) into the Daily Equipment Calibration Record (Attachment D). The meter reading should be within 10% of the concentration given on the calibration gas cylinder. If the reading is off by more than 10%, a trained operator should clean the lamp window. (Refer to the Operation Manual).
6. It should be noted that this calibration gas cannot be carried on board passenger aircraft; therefore, unless the team drives to the Site, the calibration gas has to be shipped in advance as dangerous goods via Federal Express.

FIELD USE:

After calibration is performed, detach the calibration gas cylinder and allow the instrument to purge for a few minutes. Then obtain a background reading on the 0 - 20 ppm scale in a clean area away from vehicles. Record this background in the Health and Safety logbook and then proceed with the survey of the anticipated work areas. It must be noted that the concentration readout is for benzene only, since the calibration gas is benzene or an equivalent. The instrument response to different compounds is relative to the calibration setting. The actual concentration of total contaminants can be higher or lower than the instrument readings. In addition, the response is not linear over the detection range (e.g., if the concentration increases by 10%, the meter will not necessarily rise by 10%).

TIPS:

The batteries are gel cells and it is not possible to overcharge them. Since the instrument has to be recalibrated every time it's turned off, it should be left in the standby mode after calibration, when not being used to take readings. The batteries should be recharged overnight by first plugging the miniphone jack from the charger into the instrument and then plugging the charger into the 120V mains. After charging is complete, the charge should be removed from the 120V line before being unplugged from the instrument.

TROUBLESHOOTING:

If the reading is zero or negative, there is condensation present on the lamp. Move the instrument to a drier area so that the air drawn into the probe will remove the condensation by evaporation.

MIE MODEL DATARAM REAL-TIME AEROSOL MONITOR

The MIE Model DataRAM Real-time Aerosol Monitor will be used for monitoring particulate concentrations in air that exceeds PM-10 in size. A direct read-out in milligrams per cubic meter (mg/m^3) is obtained to indicate airborne concentrations of particulate.

Summary of Method

The DataRAM is pointed in the direction of the breathing zone to obtain a direct reading in mg/m^3 of particulate matter. Optional sampling accessories can be used to collect PM-10 data.

Equipment

- DataRam with charger and/or batteries.
- Omnidirectional air sampling inlet with PM-10 head

Operational Characteristics and Procedures

1. Operating Modes

With exception of the Span Check, all operations and commands are performed by means of the front panel touch keys.

There are five different modes of operation:

- a) Standby mode (before a run has been initiated or after it has been terminated).
- b) Run mode (during which sampling/monitoring proceeds with or without data logging).
- c) Purging mode (during which DataRAM purges itself with internal filtered air).
- d) Zeroing mode (during which the DataRAM purges itself and registers its own background level).
- e) Span Check mode (during which the DataRAM purges itself, and the user inserts and then retracts the internal reference calibrator).

STANDBY MODE

In this mode all normal functions are activated (i.e. pump running) except the measurement and/or logging function. Only in this mode can any operational parameters be selected/changed. During the run mode none of these parameters can be changed (e.g. display update time, alarm activation/level, data logging enabling/parameters, etc.).

RUN MODE

During the run mode the DataRAM performs concentration measurements which can be displayed and logged in that mode. If automatic zeroing has been enabled (as selected in the standby mode) the instrument interrupts the normal sampling operation on a timed basis (e.g. every 2 hours) for approximately 30 seconds during which the DataRAM purges itself and registers its optical background which is then automatically subtracted from the sensed signal.

The DataRAM will remain in the run mode until the run is terminated (by manual command), or automatically, if the battery charge falls below an acceptable level.

The MENU key responds only when the DataRAM is in the run mode.

ZEROING MODE

This mode can be activated either manually, or automatically (at preprogrammed time intervals). No concentration readings are provided during the zeroing mode. The DataRAM remains in this mode for a period of about 20 to 30 seconds after which it returns to whatever mode it had been in initially (standby or run).

PURGING MODE

This mode can only be activated manually. Concentration readings for clean air are indicated. Manual command is required to cancel this mode. This mode is provided principally for instrument check out and testing purposes, including span check.

SPAN CHECK MODE

This mode requires manual insertion of the reference calibrator (reference scattering element) into the sensing chamber, by rotating a knob on the back panel of the DataRAM. Once the span reading has been completed (as indicated on the LCD screen), the user retracts the calibrator to its normal position. During span check the DataRAM operates in the purging mode.

Calibration

Field calibration of the DataRAM will not be conducted. The instrument shall be maintained as described in the manufactures specifications.

ATTACHMENT D

MONITORING EQUIPMENT CALIBRATION RECORD

Instrument No. _____

[illegible]

NYSDEC Inactive
Hazardous Waste Site No. 9-15-066
70717-04-B

Community Air Monitoring Plan
April 3, 1998



Worldwide Excellence in Meeting Client Needs

APPENDIX D

QUALITY ASSURANCE PROJECT PLAN

**NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066
CHEEKTOWAGA, NEW YORK**

QUALITY ASSURANCE PROJECT PLAN

NYSDEC INACTIVE HAZARDOUS WASTE SITE No. 9-15-066
CHEEKTOWAGA, NEW YORK

April 3, 1998

Prepared for
Respondents for NYSDEC Order on Consent and Settlement Agreement
Index No. 89-0381-91-08

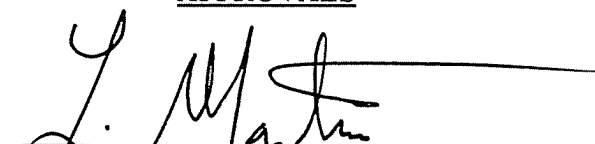
Prepared by
ICF Kaiser Engineers Corporation
Pittsburgh, Pennsylvania

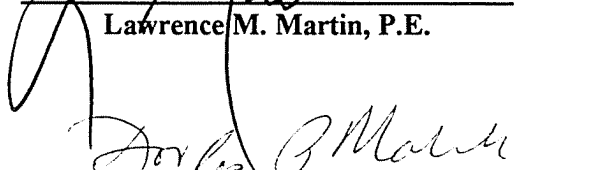
NOTICE

This Quality Assurance Project Plan (QAPP) was prepared for use by ICF Kaiser Engineers Corporation (ICF Kaiser) employees and subcontractors during performance of Pre-Design evaluations, remedial design, and remedial action activities associated with New York State Department of Environmental Conservation (NYSDEC) Inactive Hazardous Waste Site No. 9-15-066.

This QAPP has been prepared using the NYSDEC Resource Conservation and Recovery Act (RCRA) Quality Assurance Project Plan guidance (NYSDEC, 1991) and the NYSDEC Technical Administrative Guidance Memorandum (TAGM) regarding development and review of site analytical plans (TAGM: DSHM-96-03, January 1997). Because those two documents provide guidance for developing both sampling and analysis plans and QAPPs, as appropriate, this QAPP incorporates information from those documents. The Site is not a RCRA permitted unit, nor is it a solid waste management facility subject to the requirements of 6 New York Official Compilation of Rules and Regulations (NYCRR) Part 360 regulations.

APPROVALS



Lawrence M. Martin, P.E.


Douglas P. Malik, P.E.

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Attachments

Attachment A ICF Kaiser Procedures

LIST OF ACRONYMS AND ABBREVIATIONS

AA	Atomic Adsorption
ASTM	American Society for Testing and Materials
COC	Chain of Custody
CQAP	Construction Quality Assurance Plan
CLP	Contract Laboratory Protocol
BACA	Buffalo Airport Center Associates
DQOs	Data Quality Objectives
ECIDA	Eric County Industrial Development Agency
ELAP	Environmental Laboratory Approval Program
HASP	Health and Safety Plan
ICF Kaiser	ICF Kaiser Engineers Corporation
ICP	Inductively Coupled Argon Plasma
NFTA	Niagara Frontier Transportation Authority
NYCRR	6 New York Official Compilation of Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
OU	Operable Unit
PCBs	Polychlorinated biphenyls
PDWP	Pre-Design Work Plan
POTW	Publicly Owned Treatment Works
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RA	Remedial Action
RCRA	Resource Environmental Conservation and Recovery Act
Respondents	Respondents for NYSDEC Order on Consent and Settlement Agreement
RD	Remedial Design
ROD	Record of Decision
SOPs	Standard Operating Procedures
SDG	sample delivery group
SVOCs	Semi-Volatile Organic Compounds
TAGM	Technical Administrative Guidance Memorandum
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VOCs	Volatile Organic Compounds
Westinghouse	Westinghouse Electric Corporation

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP)¹ has been prepared by ICF Kaiser Engineers Corporation (ICF Kaiser) on behalf of the Respondents for New York State Department of Environmental Conservation (NYSDEC) Order on Consent and Settlement Agreement, Index No. 89-0381-91-08, (Respondents) for remedial activities at NYSDEC Inactive Hazardous Waste Site No. 9-15-066 in Cheektowaga, New York (Site, Figure 1-1).

This QAPP, which applies to remedial efforts for both Operable Unit 1 (OU1) and Operable Unit 2 (OU2) at the Site, establishes:

- Technical standards and quality goals,
- Specific protocols to achieve the desired results, and
- Acceptance criteria by which the results will be evaluated.

This QAPP has been prepared using the NYSDEC Resource Conservation and Recovery Act (RCRA) Quality Assurance Project Plan guidance (NYSDEC, 1991) and the NYSDEC Technical Administrative Guidance Memorandum (TAGM) regarding development and review of site analytical plans (TAGM: DSHM-96-03, January 1997). Because those two documents provide guidance for developing both sampling and analysis plans and QAPPs, as appropriate, this QAPP incorporates information from those documents. The Site is not a RCRA permitted unit, nor is it a solid waste management facility subject to the requirements of 6 New York Official Compilation of Rules and Regulations (NYCRR) Part 360 regulations.

1.1 PROJECT DESCRIPTION

Combining the requirements of both the March 1995 Record of Decision (ROD1) and the December 1995 Record of Decision (ROD2), remedial activities were separated into three phases:

- Pre-design evaluations,
- Remedial design, and
- Remedial action.

This QAPP applies to all phases of remedial activities.

¹ Abbreviated as "QAPP" in NYSDEC guidance documents.

1.1.1 Pre-Design Evaluations

Pre-design evaluations will supplement the information provided in existing Site documents, to provide the data necessary to complete remedial design activities. Pre-design activities are fully defined in the *Pre-Design Evaluation Work Plan* (PDWP) (ICF Kaiser, 1998a). In summary, they will include:

- A storm sewer evaluation to assess the modifications necessary for its use as a shallow groundwater collection system,
- A storm sewer discharge quality evaluation to assess groundwater treatment system requirements,
- A sample collection and analysis program to confirm the limits of U-Crest Ditch sediment removal and characterize materials for treatment and/or disposal,
- A test boring program to develop the geotechnical data needed to predict the stability of soil excavation sidewalls, and
- An evaluation to identify remedial action permit requirements and compliance issues.

1.1.2 Remedial Design

As pre-design evaluation data is generated, remedial design (RD) activities will begin. The following plans will be prepared and finalized during RD to establish final requirements for remedial action (RA):

- Sediment Removal, Stabilization and Disposal Plan,
- Soil Removal, Treatment and Backfilling Plan,
- Storm Sewer Closure and Augmentation Plan,
- Permanent Groundwater Treatment Plant Plans and Specifications (if needed),
- Permanent Groundwater Treatment Plant Start-Up Plan (if needed),
- Construction Quality Assurance Plan (CQAP),
- Erosion and Sedimentation Control Plan,
- Release Contingency Plan,
- Citizen Participation Plan,
- Groundwater Monitoring Plan,
- Health and Safety Plan (HASP) (updated, as required following completion of pre-design evaluations), and
- Tentative Remedial Action Schedule.

In addition, technical specifications and design drawings will be prepared and finalized during RD for the construction of a groundwater collection system² and a permanent groundwater treatment plant (as needed).

² The pumps, piping, and appurtenances associated with routing collected groundwater from the augmented storm sewer system to a publicly owned treatment works or other permitted discharge point (with or without on-Site treatment in a permanent groundwater treatment plant).

1.1.3 Remedial Action

Consistent with the requirements with ROD1 and ROD2, remedial action activities include:

- Excavation of soils within Site Areas I, J, K, M, P, and Q so that the remaining soils achieve ROD-specified Remedial Objectives (Figure 1-2³),
- Excavation of sediments within the U-Crest Ditch so that the remaining sediments achieve ROD-specified Remedial Objectives,
- Excavation of previously closed underground storage tanks (USTs) within Site Areas J and K, including their associated piping,
- On-Site low-temperature thermal desorption and on-Site disposal of excavated soils to achieve ROD-specified Remedial Objectives,
- Stabilization (moisture control) and off-Site disposal of excavated sediments or on-Site low-temperature thermal desorption of excavated sediments to achieve ROD-specified Remedial Objectives,
- On-site disposal or recycling of UST carcasses and piping,
- Backfilling and grading of soil excavation areas with Site soils which have been treated on-Site via low-temperature thermal desorption,
- Augmentation of the existing storm sewer system beneath the abandoned manufacturing building for hydraulic gradient control and collection of Site-impacted groundwater,
- Sealing of storm sewer inlets and drains within the abandoned manufacturing building to eliminate surface water contributions to the groundwater collection system,
- Evacuation and treatment of standing water and within the Fan Room Tunnel and the Underground Mixing Room Tunnel, with subsequent discharge of such water to the U-Crest Ditch or the Publicly Owned Treatment Works (POTW),
- On-Site treatment of groundwater collected from the augmented storm sewer system beneath the abandoned manufacturing building followed by discharge to the U-Crest Ditch or the POTW, or direct discharge of groundwater collected from the augmented storm sewer system beneath the abandoned manufacturing building to the POTW,
- Site restoration, including removal of all remedial equipment and temporary facilities, surface water controls as appropriate, pavement repair as appropriate, vegetation restoration as appropriate, and U-Crest Ditch restoration as appropriate, and
- Initiation of a groundwater monitoring program.

1.2 SITE DESCRIPTION SUMMARY

Inactive Hazardous Waste Site No. 9-15-066 is located at 4454 Genesee Street in Cheektowaga, New York (Figure 1-1). The Site is bordered to the north and west by the Greater Buffalo International Airport, to the south by Genesee Street, and to the east by Holtz Drive. A non-contiguous, surface water channel (U-Crest Ditch) receives storm water from the Site via two outfall discharges. Both the Site and the U-Crest

³ The excavation areas shown on Figure 1-2 are approximate only. Refer to Section 3.5 and Figures 3 through 9 of the July 1996 "Pre-Design Investigation Summary Report" by Blasland, Bouck & Lee, Inc., for explicit excavation area limits.

Ditch, which is located on the opposite side of Genesee Street, are located in a mixed setting of commercial and industrial properties.

The 143-acre Site includes an abandoned 2.5 million square-foot manufacturing building, several smaller buildings, large areas of paved ground surface, and the Flying Tigers Restaurant (located in the northern extreme of the Site). With the exception of the restaurant, the Site is inactive and surrounded by chain-link fencing.

1.3 SITE HISTORY SUMMARY

The Site was developed in the early 1940s by the United States Government for the manufacture of military aircraft, and a large plant building⁴, approximately 2.5 million square feet, and various ancillary structures were constructed for this purpose. Curtiss-Wright Corporation operated this plant until 1945. In 1946, Westinghouse Electric Corporation (Westinghouse) purchased the Site from the United States Government and converted the plant for the manufacture of electric motors and related electrical components.

In 1964 and 1984, Westinghouse sold two parcels at the northern tip of the Site, to what is known today as the Niagara Frontier Transportation Authority (NFTA). In 1984, Westinghouse sold the remainder of the Site to an individual who, in 1985, assigned his rights to this property to the Erie County Industrial Development Agency (ECIDA). ECIDA subsequently entered into a lease-purchase agreement for the property with Buffalo Airport Center Associates (BACA).

After selling the Site, Westinghouse continued to lease a small portion of the plant; other plant areas were leased by BACA to third parties for various manufacturing and warehousing operations. The Site was vacated in 1991, and, except for some removal actions undertaken by BACA and NYSDEC remedial investigations, the Site has been unoccupied since that time.

NFTA is currently expanding the Buffalo International Airport. These airport expansion plans call for acquisition of the Site, demolition of Site buildings, and use of Site land for taxi-ways and runway clear zones.

In 1985 and 1986, a NYSDEC Phase I Investigation was conducted at the Site. That investigation triggered a series of assessments and evaluations that led to the RD and RA process. Abandoned Site structures are scheduled for demolition, beginning in 1998. RA activities, planned for both the Site and the U-Crest Ditch, will follow structure demolition activities.

1.4 ORGANIZATION OF THE QUALITY ASSURANCE PROJECT PLAN

Following this introduction, the QAPP is organized as follows:

- Project Organization and Responsibilities -- Section 2.0 describes the organization of the RD/RA project team and defines the responsibilities of RD and RA personnel.
- Quality Assurance Objectives for Remedial Design and Data Management -- Section 3.0 establishes RD standards for technical specifications and plans. Data quality objectives (DQOs) for sample collection and analysis, including specific goals for accuracy, precision, representativeness, completeness, and comparability are also established.

⁴ Now referred to as the "abandoned manufacturing building."

- Field Sampling PlanQuality Objectives (DQOs)Objectives (DQOs)(DQOs)(DQOs) -- Section 4.0 references QAPP companion documents that establish RD and RA protocols for sample collection, on-site handling, documentation, and sample analysis methods. It also specifies sample collection container types, sample preservation protocols, and acceptable sample holding times.
- Analytical Methods -- Section 5.0 specifies laboratory methodologies and instrument calibration protocols.
- Data Reduction, Validation, and Reporting -- Section 6.0 defines procedures for data reduction, validation, and reporting.
- Internal Quality Control Checks -- Section 7.0 discusses RD quality control checks and the Quality Assurance (QA) audit program for RA.
- Corrective Action -- Section 8.0 describes conditions that require corrective action, assigns responsibilities, and specifies corrective action protocols. This section also establishes stop-work protocols.
- Quality Assurance Reports to Management --Section 9.0 describes quality control reporting requirements for remedial activities.
- References --Section 10.0 lists QAPP references.

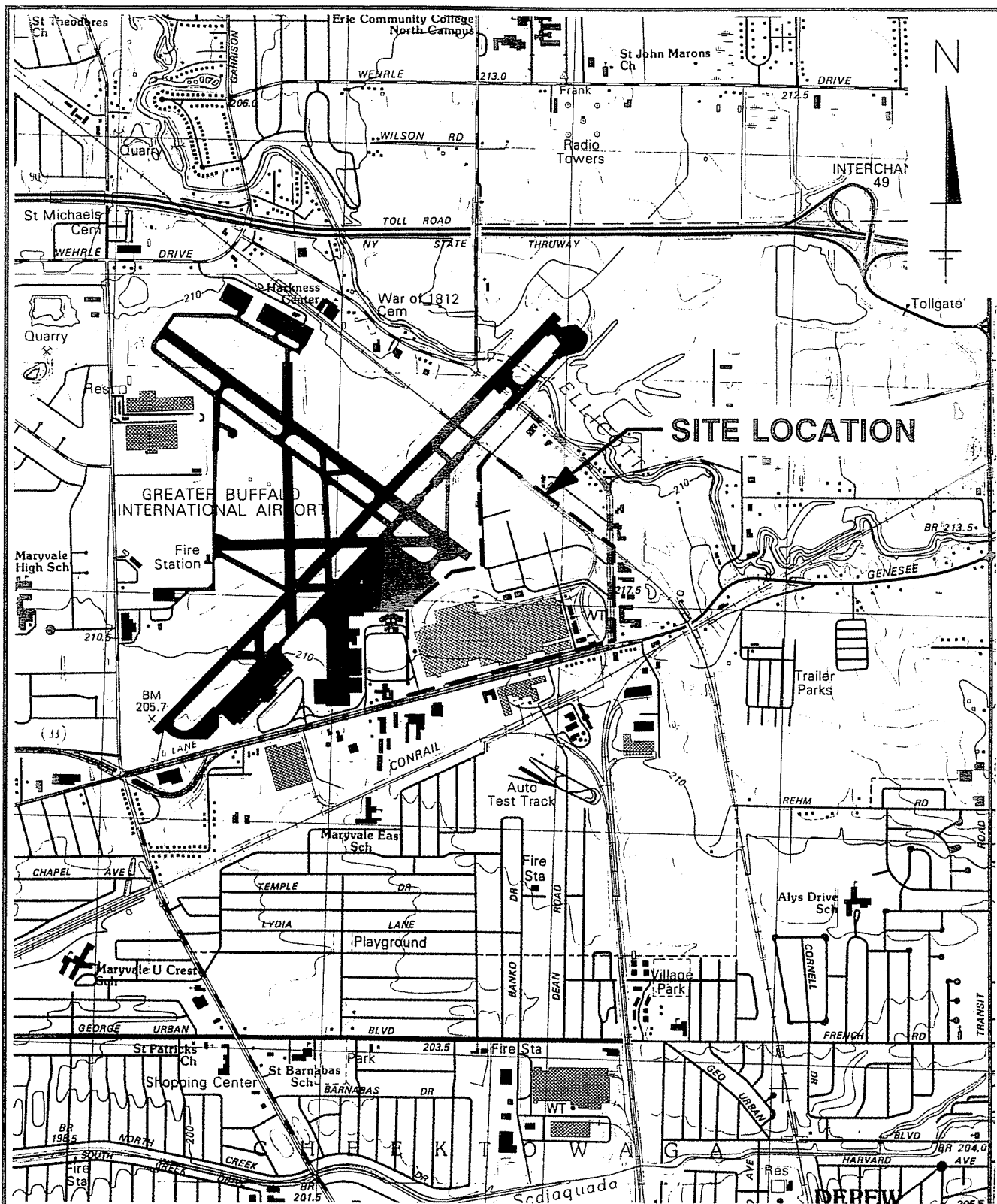


FIGURE 1-1

ICF KAISER ENGINEERS

NYSDEC INACTIVE HAZARDOUS WASTE
SITE 9-15-066 - CHEEKTOWAGA, N.Y.

SITE LOCATION MAP

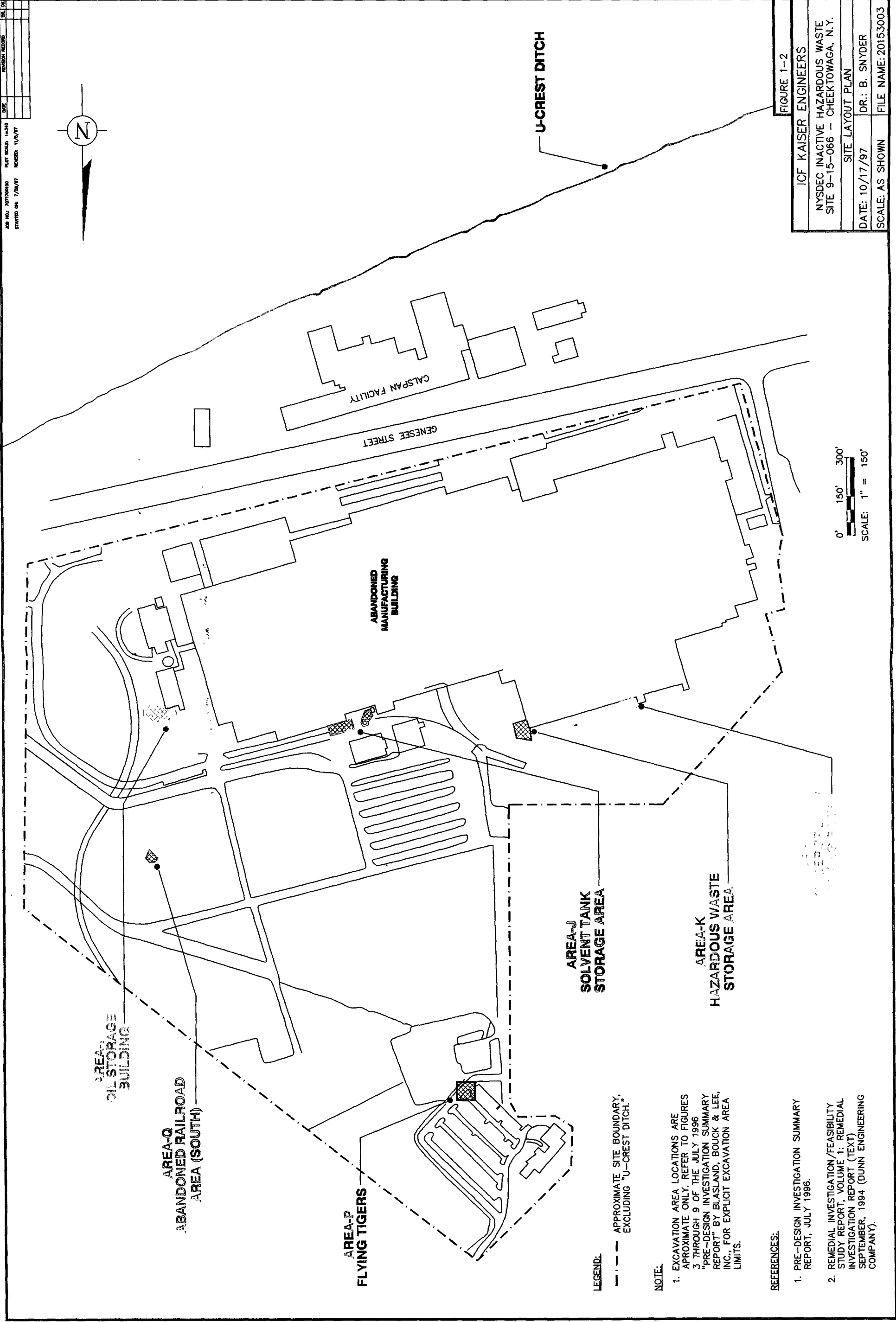
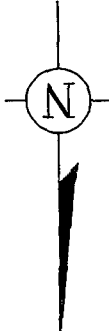
DATE: 10/17/97

DR.: D. EVANS

SCALE: AS SHOWN

FILE NAME: 90151002

REFERENCE: LANCASTER, N.Y. USGS QUAD. 1982



LEGEND:

--- APPROXIMATE SITE BOUNDARY, EXCLUDING "U-CREST DITCH."

NOTE:

1. EXCAVATION AREA LOCATIONS ARE APPROXIMATE ONLY. REFER TO FIGURES 3 THROUGH 9 OF THE JULY 1996 "PRE-DESIGN INVESTIGATION SUMMARY REPORT" BY BLASLAND, BOUCK & LEE, INC., FOR EXPLICIT EXCAVATION AREA LIMITS.

REFERENCES:

1. PRE-DESIGN INVESTIGATION SUMMARY REPORT, JULY 1996.
2. REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT, VOLUME 1: REMEDIAL INVESTIGATION REPORT (TEXT) SEPTEMBER, 1994 (DUNN ENGINEERING COMPANY).

FIGURE 1-2

ICF KAISER ENGINEERS	
NYSDEC INACTIVE HAZARDOUS WASTE SITE 9-15-066 - CHEEKTOWAGA, N.Y.	
SITE LAYOUT PLAN	
DATE: 10/17/97	DR.: B. SNYDER
SCALE: AS SHOWN	FILE NAME: 20153003

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

In order for this project to proceed smoothly and yield valid and usable data, it is essential that all organizations and individuals that are part of the program be clearly informed of their responsibilities and authority. The role of each organization and key personnel associated with this project are defined in this section.

2.1 PROJECT ORGANIZATION

Figure 2-1 presents the responsibility, hierarchy, and the principal members of the RD/RA project team. The text below details the titles and quality related responsibilities of ICF Kaiser personnel who are directly responsible for RD/RA project quality.

Implementation of the QAPP requires that all project personnel maintain an awareness of contractual requirements and project objectives. In addition, project personnel will be familiar with the protocols, formats, and schedules specified in project documents.

2.2 RESPONSIBILITIES AND AUTHORITIES

Although all project team members are responsible for project quality, the following positions include primary, quality-oriented responsibilities:

- Project Manager,
- Quality Assurance Officer,
- Site Superintendent,
- Field Engineer,
- Lead Design and Geotechnical Engineer,
- Construction Quality Assurance Officer

The Project Manager reports to the Respondents' Project Coordinator. He is responsible for activity planning, overall project team performance, project schedule and budget, project resource allocation, subcontractor and vendor administration, communications, and project quality. The Project Manager has authority to stop any and all project activities that are not being conducted in accordance with the quality standards established by or referenced within this QAPP.

The Quality Assurance Officer (QA Officer) functions independently of the Project Manager. The QA Officer is also independent from the data generation activities. This individual shall have broad authority to approve or disapprove project plans, specific analyses, and final reports. The QA Officer is responsible for confirming that all RD and RA activities are conducted in accordance with the quality standards established by or referenced within this QAPP or the CQAP. Using QAPP-specified inspections and audits, the QA Officer identifies and documents non-compliant conditions (if any). In addition, the QA Officer confirms and documents that non-compliant conditions have been evaluated and that appropriate corrective actions have been implemented. Like the Project Manager, the QA Officer has the authority to stop any and all project activities that are not being conducted in accordance with the quality standards established by or referenced within this QAPP or the CQAP. The QA Officer verifies that RD activities conform to applicable procedures and requirements, verifies that field samples and data are collected and

documented as specified, verifies that data validation is performed as specified, verifies that project analytical and geotechnical laboratories have and maintain adequate QA programs, and provides the Project Manager with monthly status reports concerning QA activities.

The Lead Design and Geotechnical Engineer will work with the Project Manager and project design staff to develop accurate and concise technical specifications, design drawings, and support that comply with applicable technical standards and regulatory guidance. These documents will establish RA means and methods that are feasible from a constructability perspective, and will result in the achievement ROD-specified objectives when properly implemented.

The Construction Quality Assurance Officer (CQA Officer) reports to the QA Officer. The CQA Officer is responsible for the development and implementation of the CQAP. Using CQAP-established protocols, the CQA Officer documents CQAP activities, evaluations, tests, and results. Using CQA inspections and audits, the CQA Officer identifies and documents non-compliant RA conditions (if any). The CQA officer then confirms and documents that such non-compliant conditions have been evaluated and that appropriate corrective measures have been implemented. The CQA Officer has the authority to stop RA activities that are not being conducted in accordance with the quality standards established by or referenced within the CQAP.

The Site Superintendent reports to the Project Manager and directs all on-Site RA activities, including management of equipment operators, field technicians, and Site subcontractors. By conducting on-Site RA activities in accordance with the technical specifications, design drawings, and support plans, the Site Superintendent has primary responsibility for on-Site RA quality control (QC).

The Field Engineer reports to the Project Manager, but is under the daily direction of the Site Superintendent. The Field Engineer works with the Site Superintendent to lay out, and conduct on-site RA activities in accordance with the technical specifications, design drawings, and support plans. Their primary function is to confirm for the Site Superintendent that QC measures are implemented and maintained. In this role, the Field Engineer will self-perform many on-Site QC measures. The Field Engineer also helps the Site Superintendent to identify field conditions that are different from those that were anticipated. If such conditions are identified, the Field Engineer then works closely with the Project Manager, the QA Officer and the Lead Design and Geotechnical Engineer to assess and document necessary design modifications (if any).

2.3 SUBCONTRACTED LABORATORIES

Analytical and geotechnical laboratories have not yet been selected to support RD and RA work. Once these laboratories have been selected and approved by the Project Coordinator, the Project Manager, and the QA Officer, copies of their individual QA/QC Plans and relevant standard operating procedures (SOPs) will be provided as appendices to this QAPP.

The laboratory will provide verification of current certification by the New York State Department of Health, Environmental Laboratory Accreditation Program (ELAP). All analytical data will be generated in accordance with the NYSDEC Analytical Services Protocol (Rev. 10-95).

ICF Kaiser is ultimately responsible for achieving QAPP-specified requirements and assumes oversight responsibilities of subcontracted laboratories. ICF Kaiser will, however, delegate to the analytical and geotechnical laboratories the responsibility to complete all sample analyses as specified within this QAPP.

ICF Kaiser oversight activities will include:

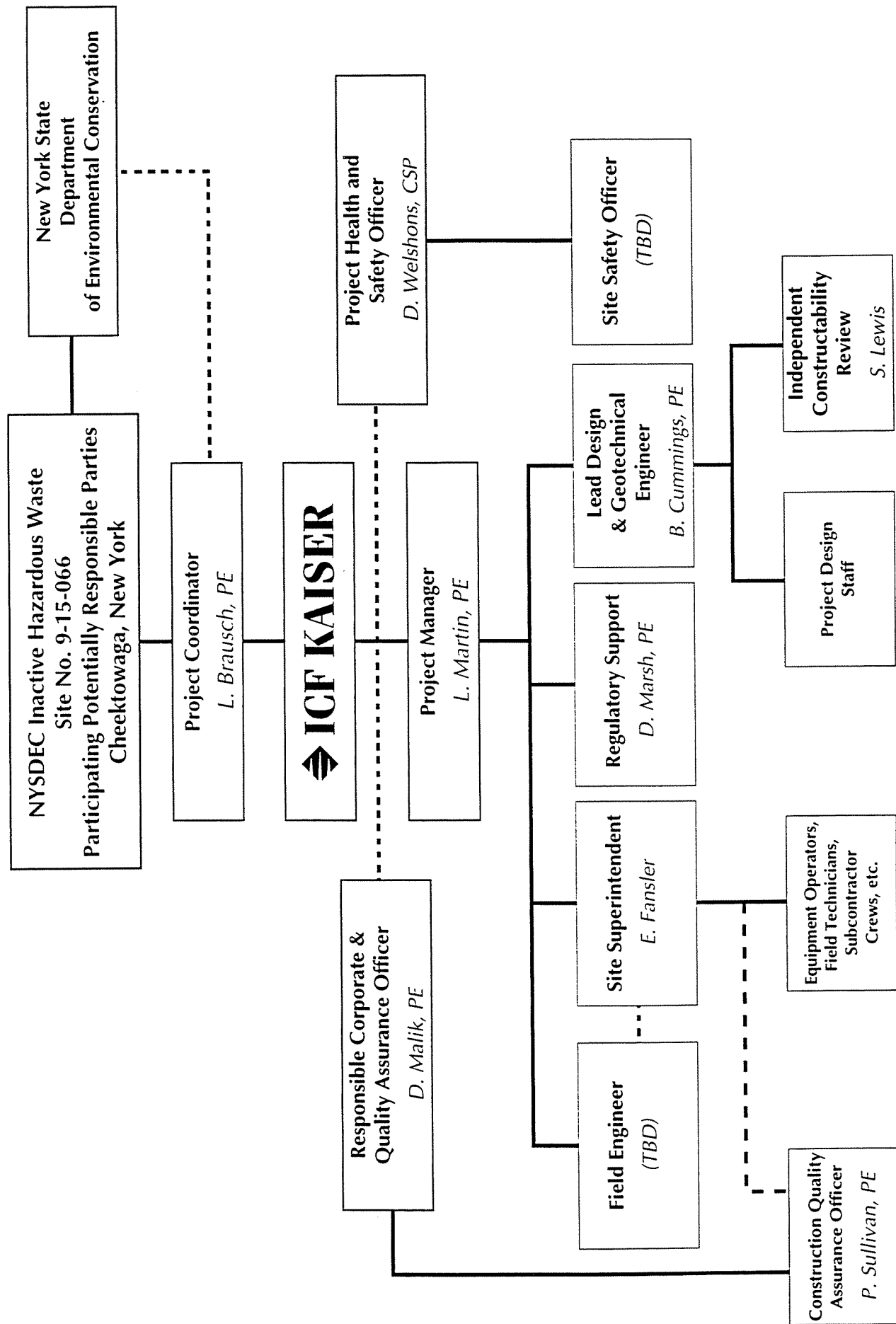
- Evaluating laboratory protocols to confirm that their practices conform with this QAPP,
- Confirming that laboratory records, logs, SOPs, and analytical results are maintained in a retrievable manner,
- Elucidating non-compliant conditions (if any), and
- Confirming and documenting that appropriate corrective measures are implemented and maintained as appropriate.

2.4 PERSONNEL QUALIFICATION AND TRAINING

The ICF Kaiser Project Manager will confirm that the RD and RA project personnel possess appropriate qualifications by:

- Identifying project-specific functions requiring special skills, licenses, certifications, and registrations,
- Confirming that project staff demonstrate and maintain the required skills to perform their assigned work,
- Confirming the qualifications of the selected analytical and geotechnical laboratories,
- Advising RD and RA personnel, vendors, and subcontractors of their roles and responsibilities in achieving project quality objectives; and
- Confirming that RD and RA personnel are cognizant of and compliant with applicable contractual and regulatory requirements.

Figure 2-1
Project Organization



3.0 QUALITY ASSURANCE OBJECTIVES FOR REMEDIAL DESIGN AND DATA MANAGEMENT

This section establishes RD standards for technical specifications and plans. DQOs for sample collection and analysis, including specific goals for accuracy, precision, representativeness, completeness, and comparability are also established. A brief description of these specific goals follows:

- Accuracy – a measure of the bias that exists in a measurement system;
- Precision – a measure of the reproducibility of analyses under a given set of conditions;
- Representativeness – the degree to which sampling data accurately and precisely represents selected characteristics;
- Completeness – the measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under “normal” conditions; and
- Comparability – the degree of confidence with which one data set can be compared to another.

All of these parameters are interrelated in terms of overall data quality. Ideally, the end use of the measurement data should define the necessary parameters

3.1 REMEDIAL DESIGN

RD plans will be developed in accordance with applicable NYSDEC regulations and guidance.

Design criteria will be documented and approved by the ICF Kaiser Project Manager prior to initiating design activities. Design criteria will include the following information:

- Brief description of facilities;
- Tabulation of applicable codes and standards which govern the design;
- Project location and site conditions (e.g., temperature range, rainfall, wind range and prevailing wind direction, geology, and seismic zone) that affect protective enclosure and equipment design;
- Environmental, safety and health requirements;
- Soils investigation data for determining soil load bearing capacity, including reference to exploratory and laboratory work and recommended design loads; and
- Discipline-specific design criteria (e.g., material of construction, permissible foundation loads, control scheme).

The following sections define the design requirements for calculations, equipment specifications, drawings, and computer systems.

3.1.1 Calculations

Engineering and equipment sizing calculations shall be prepared by ICF Kaiser as required. Calculations will consist of the following information:

- **Objective:** The reason for making the calculation, the end results sought, and alternatives examined;
- **Design Basis:** The design approach and concept for calculations, including applicable codes and standards; and
- **Calculations and Conclusions:** Calculations will be prepared on calculation sheets in a neat and logical manner with sufficient notes to make the calculations easily understandable and traceable so that the calculation can be replicated. The conclusions will be shown on the calculation sheets.

Calculations will be reviewed for accuracy and appropriateness as defined in Section 7 of this QAPP and in accordance with ICF Kaiser Procedure E-7, *Calculations*, of the ICF Kaiser Engineering Procedures Manual (Attachment A).

3.1.2 Technical Specifications

As applicable, technical specifications will be developed for augmentation of the existing storm sewer system and the permanent groundwater treatment plant. Technical specifications will include the following information:

- Scope of Work,
- Equipment and Material Descriptions,
- Applicable operating conditions and performance requirements,
- Applicable design requirements,
- Special requirements (if any),
- Applicable testing and acceptance criteria,
- Identification of applicable codes and standards, and
- Construction procedures.

As applicable, technical specifications will be prepared in accordance with ICF Kaiser Procedure E-8, *Preparation of Specifications*, of the ICF Kaiser Engineering Procedures Manual (Attachment A).

3.1.3 Design Drawings

As applicable, design drawings will be prepared in accordance with ICF Kaiser Procedure E-9, *Drafting Standards* of the ICF Kaiser Engineering Procedures Manual (Attachment A).

3.2 DOCUMENTATION

Documentation and records providing evidence that RD and RA documents were prepared in accordance with QAPP-specified protocols may include, but are not limited to, the following:

- Design origin references, input documents, and changes thereof,
- Design calculations and analyses, including computer code input/output,
- Design verification records,
- Origin of data used, and

- Design output documents (e.g., design drawings and technical specifications).

3.3 DESIGN MODIFICATIONS

Changes or modifications to finalized (i.e., NYSDEC-approved) design documents are subject to the same level of review as the original design. All such changes and modifications are to be identified, reviewed, and approved in accordance with applicable ICF Kaiser protocols and direction from the Project Coordinator.

3.4 CONSTRUCTABILITY

Prior to their submittal as 90 percent documents, RA plans, technical specifications, and design documents will be evaluated from a constructability perspective. Identified deficiencies will be appropriately corrected or addressed during completion of the 90 percent RD/RA documents.

3.5 REGULATORY COMPLIANCE

Prior to their submittal as 90 percent documents, RA plans, technical specifications, and design documents will be evaluated from a regulatory compliance perspective. Identified deficiencies will be appropriately corrected or addressed during completion of the 90 percent RD/RA documents.

3.6 DATA QUALITY OBJECTIVES

The United States Environmental Protection Agency (USEPA) developed the DQO process as a tool to be employed during project planning. Use of the DQO process will clarify the study objectives, define the appropriate quantity and quality of data to be collected, determine the conditions under which to collect the data, and specify acceptable error levels which will allow the data to support the final decisions to be made at the Site. This section gives a brief overview of the DQO process, and then describes how the process was used in planning the sampling needed during the NYSDEC Inactive Hazardous Waste Site No. 9-15-066 remedial action. It should be emphasized that the DQO process does not produce a separate deliverable; it is a tool that is used to aid and facilitate the project planning process.

3.6.1 DQO Process

The DQO process is a series of seven steps designed to ensure that the type, quantity, and quality of environmental data used in the decision making are appropriate for the intended application. The process described in this section is detailed in "Guidance for Planning for Data Collection in Support of Environmental Decision Making Using the Data Quality Objectives Process", EPA Q/G-4, September 1994 - Final. The NYSDEC RCRA Quality Assurance Project Plan guidance takes perhaps a more simplistic three-step approach, which is (1) identify decision types, (2) identify data uses/needs, and (3) design data collection program. The 1991 NYSDEC guidance three stage process is incorporated in the seven step process. Each step in the process produces an output which is used as input to succeeding steps. The seven steps are described below.

Step 1 - State the Issue. Clearly and concisely define the reason for the investigation plus the interested parties, thus focusing the objectives. The results of previous studies (if any) can be used to determine present conditions at the Site.

Step 2 - Identify the Decision. Reformulate the issue into a measurable question. The decision statement is a pronouncement of what question must be resolved or answered to address the issue identified in Step 1, and is basically putting the issue into a measurable form.

Step 3 - Identify Inputs. Determine what additional information is needed to resolve the decision, identifying data gaps within the existing data and information that must be collected to fill the data gaps. Specify the types of samples to be collected, and verify that analytical methods exist to provide the necessary data.

Step 4 - Define the Boundaries of the Study. Clearly identify the boundaries of the Site both spatially (the area to be studied) and temporally (when to collect data and over what time frame the study applies).

Step 5 - Develop a Decision Rule. Consolidate the decision statement, inputs, and boundary conditions into a single "if...then" statement that identifies the parameter(s) of interest, the action level(s), and the alternatives associated with the action levels.

Step 6 - Specify Acceptable Limits on Decision Errors. Define the types of errors associated with the data, the consequences of the errors, and the range of acceptable errors. Measurement data are only an estimate of the situation at the Site. It is important that acceptable data be defined in terms of both false positive and false negative errors. Definition of acceptable errors will lead to development of goals for precision, accuracy, Representativeness, completeness, and comparability.

Step 7 - Optimize the Design. Identify the most resource-effective sampling design that will generate data which satisfies steps 1-6 of the DQO process. There are many sets of sampling/analysis schemes that will generate the data needed to adequately address the issue stated in the DQOs. The objective is to design a cost-effective approach to sampling and analysis.

3.6.2 RD/RA Decision Process/Data Quality Objectives

Data Quality Objectives are qualitative and quantitative statements about the type of data needed to make decisions during the remediation. The development of DQOs is a systematic and iterative process, with the goal of:

- Promoting communication among all parties involved in RD and RA,
- Focusing planning for data collection,
- Providing structure and organization for complex issues,
- Confirming that sufficient data is collected to meet project objectives, and
- Establishing realistic expectations about data usability and the associated level of uncertainty.

The following describes the DQO process for the NYSDEC Inactive Hazardous Waste Site No. 9-15-066 remediation as applied to the field sampling, sample analysis, data evaluation, and data uses.

3.6.2.1 Problem to be Resolved

Through ICF Kaiser, the Respondents are implementing ROD1 and ROD2 for NYSDEC Inactive Hazardous Waste Site No. 9-15-066. ROD1 generally involves remediation of contaminated soil and sediment via thermal desorption or off-Site disposal. ROD2 generally involves collection and treatment (if necessary) of shallow groundwater. Limited pre-design evaluations are needed at the Site to define the

boundaries of the certain RA activities. In addition, confirmatory samples must be collected and analyzed to demonstrate that remedial objectives are achieved.

3.6.2.2 Decision to be Made

If necessary to comply with the conditions of a discharge permit, a permanent groundwater treatment plant will be constructed to treat collected shallow groundwater. To properly design the treatment plant, both its influent flow rate and chemical characteristics must be defined. The existing storm sewer system will be augmented to serve as the groundwater collection system. Therefore, the first decision can be stated as, "What are the chemical characteristics of the storm sewer system discharge?"

Sediments within the U-Crest Ditch that exceed remedial objectives will be excavated for treatment or off-Site disposal. However, the thickness of the sediments to be excavated as well as their chemical composition for disposal are not clearly defined. The second decision to be made is, "What is the depth(s) of the sediments in U-Crest Ditch that exceed ROD-specified remedial objectives and what are their chemical characteristics relative to off-Site disposal?"

On-site soils within previously defined areas will be excavated for on-Site treatment using low-temperature thermal desorption. To confirm assumed excavation side slope allowances, selected geotechnical properties of Site soils will be evaluated. The third question can be stated, "What are the geotechnical characteristics of excavation area soils relative to slope stability?"

Following soil excavation and prior to backfilling, it must be confirmed that remedial objectives for soils have been achieved. The fourth question can be stated, "Do excavation area side wall/bottom soils, thermally treated soils, and soils excavated to facilitate the removal of soils for thermal treatment meet remedial objectives?"

3.6.2.3 Inputs to the Decision

Existing data is insufficient to support the decisions given above. The storm sewer discharge has been sampled and analyzed, but not for water treatment parameters. Samples need to be collected and analyzed for treatment parameters.

Sediment samples will need to be collected within U-Crest Ditch and analyzed to for ROD-specified remedial objective parameters and disposal disposition parameters.

Geotechnical characteristics of excavation area soils have not been evaluated. Representative samples of the soils must be collected, with subsequent geotechnical analysis.

Excavated soils and soils that remain in-situ following excavation activities (i.e., excavation side wall and bottom soils) must be sampled to confirm achievement of remedial objectives prior to backfilling at an individual area.

USEPA-approved analytical methods [including both USEPA and American Society for Testing and Materials (ASTM) procedures] exist such that the required analyses can be performed.

3.6.2.4 Boundaries of the Study

The populations of interest are defined as the sediments within and the water that discharges from the existing storm sewer system, impacted sediments in U-Crest Ditch, and soils within previously identified Site evaluation areas.

Spatial boundaries of the decision statement are limited to the existing storm sewer system, sediments within a specific reach of U-Crest Ditch, excavated soils, and soils that remain in-situ following excavation activities.

Temporal boundaries of the decision statement reflect the constituent concentrations in storm sewer water and sediment, in U-Crest Ditch sediments, in excavated soils, and in soils that remain in-situ following excavation activities. In addition, geotechnical characteristics of excavation area soils reflect such temporal boundaries.

3.6.2.5 Decision Rules

A DQO decision rule is an "if/then statement" that defines the conditions that would cause the decision maker to choose among alternative actions. Decision rules are defined early so that appropriate evaluation techniques, analytical methods, and detection limits are selected. The decision rules to be applied during RD/RA activities are as follows:

- If storm sewer water quality analyses (when combined with estimated groundwater collection rates) indicate the need for on-Site treatment, a permanent groundwater treatment plant will be designed accordingly.
- If constituent concentrations within sediments (located within the previously defined reach of U-Crest Ditch requiring remedial action) are above ROD-specified remedial objectives, they will be removed and properly disposed.
- If geotechnical testing indicates limited soil stability, excavation area sidewall slopes will be adjusted accordingly.
- If soils that remain in-situ following excavation activities exceed ROD-specified remedial objectives, they will be removed and treated.
- If excavated soils exceed ROD-specified remedial objectives, they will not be used as on-Site backfill until they achieve ROD-specified remedial objectives.

3.6.2.6 Uncertainty Limits

Two types of error are present in any environmental study -- sampling design error and measurement error. The combination of sampling design error and measurement error is called total study error, which can lead to decision error. The objective of this step in the DQO process is to control the probability of decision errors.

Statistical methods and the USEPA DQO Guidance (September 1994) document indicate that a condition of the environment termed the null hypothesis be adopted. Decision errors occur when the null hypothesis is rejected when true (false positives) or accepted when false (false negatives). The null hypothesis is adopted as the scenario that has the most adverse consequences. The burden of proof will be with the data

collected to show that the null hypothesis is not true. An appropriate statement of the null hypothesis for the Site remediation is "The sediments present in the Ditch contain contaminant concentrations greater than the cleanup objectives, the storm sewer discharge contains constituent loadings beyond those expected, and soils at depth have limited stability."

Restated in terms of the null hypothesis, decision errors are as follows:

- False positive decision errors result from analytical data indicating concentrations below cleanup objectives when they are above the cleanup objectives.
- False negative decision errors result from analytical data indicating concentrations above cleanup objectives when they are below cleanup objectives.

To control the decision errors, the false positive error rate will be set at 5% and the false negative error rate will be set at 10%. Thus the probability of not committing a false positive error (termed confidence) is 95% and the probability of not committing a false negative error (termed power) is 90%.

In addition, total study error will be controlled through specifying the precision, accuracy, representativeness, comparability, and completeness of the sampling and analytical process.

PRECISION: Precision refers to the level of agreement among repeated measurements of the same parameter. It is usually stated in terms of standard deviation, relative standard deviation, relative percent difference, range, or relative range. The overall precision of a piece of data is a mixture of sampling and analytical factors. The analytical precision is much easier to control and quantify because the laboratory is a controlled, and therefore measurable, environment. Sampling precision is unique to each site, making it much harder to control and quantify.

Sampling precision will be checked by obtaining a duplicate sample for every 20 samples collected for each type of media. Precision will be evaluated by calculating the relative percent difference (RPD) as follows:

$$RPD = \frac{\text{difference between the two measured values}}{\text{average of the two measured values}}$$

The RPD will be calculated for each analytical parameter. It is expected that the field duplicates will have RPDs of $\leq 50\%$ and the commercial lab duplicates will have RPDs $\leq 35\%$. If these criteria are not met, a careful examination of the sampling techniques, sample media, and analytical procedure will be conducted to identify the cause of the high RPD and assess the usability of the data.

ACCURACY: Accuracy refers to the difference between a measured value for a parameter and the true value for the parameter. It is an indicator of the bias in the measurement system. Sources of error measured by this parameter include the sampling process, field contamination, preservation, handling, sample matrix, sample preparation, and analytical technique.

Commercial laboratory accuracy will be evaluated by the analysis of one spiked sample per sample batch. The spike acceptance criteria specified in SW846 are adopted for this project. If these criteria are not met, a careful evaluation of the data will be performed to determine the source of the error and the usability of the data.

Spike recoveries will be calculated as follows:

$$\text{Recovery} = \frac{\text{Spike Sample Result} - \text{Sample Result}}{\text{Spike Added}} \times 100$$

REPRESENTATIVENESS: Representativeness is a measure of the degree to which the measured results accurately reflect the medium being sampled. It is a qualitative parameter which is addressed through the proper design of the sampling program in terms of sample location, number of samples, and actual material collected as a sample of the whole.

Sampling protocols (discussed in the PDWP and certain RA plans) have been developed to assure that samples collected are representative of the media. Field handling protocols (e.g., storage, handling in the field, and shipping) have also been designed to preserve the integrity of the collected samples. Proper field documentation and audit results will be used to establish that protocols have been followed and that sample identification and integrity have been maintained.

COMPARABILITY: Comparability expresses the confidence with which one data set can be compared to another. When comparing data, it is important to compare data collected under the same set of conditions. Seasonal trends, depth of sample collection, analytical protocol, stream flow during sample collection, and any other sampling/analytical variables must be taken into account when comparing data sets. This will be accomplished by using established USEPA methods for collecting and analyzing the samples, and documenting the methods used.

COMPLETENESS: Completeness is a measure of the amount of information that must be collected to allow for successful achievement of the project objectives. The overall objective is to successfully complete the remediation as identified in ROD1 and ROD2. A certain amount and type of data must be collected for the remediation to be successful. Missing data may reduce the precision of estimates or introduce bias, thus lowering the confidence level of the conclusions. While completeness has historically been presented as a percentage of the data that is considered valid, this does not take into account critical sample locations or critical analytical parameters. The completeness goal for the remediation activities will be 90% for the laboratory analyses.

The amount and type of data that may be lost due to sampling or analytical error cannot be predicted or evaluated in advance. The importance of any lost or suspect data will be evaluated in terms of the sample location, analytical parameter, nature of the problem, decision to be made, and the consequence of an erroneous decision. Critical locations or parameters for which data is determined to be inadequate may be re-sampled.

Completeness will be calculated as follows:

$$\text{Completeness} = \frac{\text{Number of usable results}}{\text{Number of planned results}} \times 100$$

3.6.2.7 Sample Design

The sample design is been detailed in the PDWP and RA support documents.

4.0 FIELD SAMPLING PLAN

The collection and analysis of soil, sediment and storm sewer water samples obtained during pre-design evaluation activities will follow the protocols established in the PDWP.

The collection and analysis of soil and water samples obtained during RA activities will follow the protocols established in the RA support plans.

4.1 SAMPLE MANAGEMENT

Sample collection, preservation, handling, storage, packaging, and shipping will be performed in a manner that minimizes damage, loss, deterioration, and artifacts.

4.1.1 Analytical Sample Containers

Sample containers must meet the criteria described in ICF Kaiser SOP 3.4 *Sample Container and Preservation Requirements* (Attachment A). Pre-cleaned sample containers will be provided by the subcontracted analytical laboratory. The sample containers that are required for the collection of aqueous and soil samples are summarized in Table 4-1. Containers will be cleaned and controlled in accordance with USEPA protocols (USEPA 1986). The Certificates of Cleanliness will be maintained by the contract laboratory.

4.1.2 Sample Preservation

Chemical preservatives will be required for aqueous samples to retard the degradation or volatilization of constituents during transit and storage prior to laboratory analysis. Preservatives will be added to appropriate samples at the time of collection, as described in ICF Kaiser SOP 3.4 *Sample Container and Preservation Requirements*. The types of preservation required for samples collected during this project are summarized in Table 4-1. Samples will be transported to the laboratory in temperature controlled coolers. Blue ice or wet ice will be used to maintain the internal cooler temperatures required for preservation.

No preservatives will be used for samples collected for VOC analyses. VOC samples are limited to a seven day holding time.

Procedures for sample preservation are summarized below:

- Preservatives will be added to samples either using a pipette or directly to the sample if vials of preservatives are used.
- The sample bottle will be capped, and the bottle gently agitated in order to homogenize the preservative throughout the sample.
- The sample bottle cap will be reopened and a small amount of the sample will be transferred to a beaker, and the bottle will be closed.
- pH paper will be used to determine the pH of the sample aliquot. The pH paper will never come into direct contact with the sample in order to preserve the integrity of the sample.

6.0 DATA REDUCTION, VALIDATION, AND REPORTING

The collected data can be divided into field and technical data. Documentation on both types of data will enable characterization of the extent and magnitude of contaminants at the Site. Field data will consist of all real-time measurements. Technical data will include all field and laboratory analytical data, plus the results of field and laboratory QC samples.

6.1 DATA REDUCTION

Data reduction includes all automated and manual processes for reducing or organizing raw data generated by the laboratory. Data are initially collected, converted to standard reporting units, and recorded in standard formats by the laboratory chemist. The chemist may use a variety of data reduction methods, including standard algorithms for computer generated and reduced data, or calculations and integrations for manually produced data. For the published and referenced methods used during RD and RA activities, the lab will be required to adhere to the method calculation requirements. In addition, the calculations and data reduction will be checked at the department level to ensure that they have been properly performed. The lab QA manager or his designee will be responsible for reviewing a percentage of the data reductions. Details of the data reduction methods will be provided in the laboratory QA Plan.

6.2 DATA VALIDATION

Samples collected during the pre-design evaluation and during the remedial action will be analyzed using the USEPA approved methods detailed in this QAPP. All of the analytical data will be validated by the laboratory to determine compliance with method and project QC objectives. A Data Usability Summary Report (DUSR) may be used as an alternative to data validation.

The analytical laboratory QA Officer or designee, who shall be someone other than the analyst(s), is responsible for validating the data. The validation will be based on the criteria specified herein, which will include such criteria as the following:

- Holding times;
- Instrument tuning and performance;
- Calibration;
- Blanks;
- Surrogate recoveries; and
- Matrix spike and matrix spike duplicate recoveries.

The validator will assess the overall quality of the data and make a written statement upon completing the validation indicating whether or not he/she considers the data valid.

In addition to the preceding validation, ICF Kaiser will validate at five percent of the samples. The process consists of data editing, screening, checking, auditing, certification, reviewing, and interpretation. The independent data validation tasks requires that the validator conduct a detailed comparison of the reported data with the raw data submitted as part of the supporting documentation package. It is the responsibility of the validator to determine if the reported data can be substantiated by applying protocol-defined procedures for the identification and quantification of the individual analytes.

ICF Kaiser will independently validate five percent of the organic analytical data in accordance with the USEPA National Functional Guidelines for Organic Data Review (2/94), as applicable to SW-846-generated data. At a minimum, the following factors will be examined:

- Sample holding times (SW-846 criteria)
- Sample chain-of-custody
- GC/MS tuning criteria (method-specific criteria)
- Initial and continuing calibration (method-specific criteria)
- Detection limits (project-specific criteria)
- Laboratory blanks
- Surrogate spike recoveries (method-specific criteria)
- Matrix spike/duplicate analysis (method-specific criteria)
- Field duplicate analysis
- Field blank contamination
- Trip blank contamination
- Internal standard area
- PCB instrument performance (method-specific criteria)
- Compound identification criteria
- Raw data review (as specified for each individual QC parameter)

ICF Kaiser will independently validate five percent of the inorganic analytical data in accordance with the USEPA National Functional Guidelines for Inorganic Data Review (2/94), as applicable to SW-846-generated data. At a minimum, the following factors will be examined:

- Holding times
- Calibration (method-specific criteria)
- Laboratory blanks
- Duplicate sample analysis
- Spike sample analysis
- Inductively Coupled Argon Plasma (ICP) interference check
- Lab control sample (method-specific criteria)
- ICP serial dilution (method-specific criteria)
- Graphite furnace Atomic Adsorption (AA) QC information (method-specific criteria)
- Field duplicate analysis
- Field blank contamination
- Trip blank contamination
- Raw data review (as specified for each individual QC parameter)

The data will be validated by sample delivery group (SDG). An SDG will consist of a group of environmental samples as received from the laboratory, along with the associated field and method blanks. Once the validation for an SDG is completed, a validation report will be prepared that summarizes the results of the validation process, including:

- QC parameters reviewed (see above lists)
- Lab compliance with QC criteria (e.g. precision, accuracy, completeness, blank contamination, documentation)
- Data quality (and associated data flags) of analytes not meeting specific QC criteria. All data not meeting QC criteria will be flagged in accordance with the 2/94 National Functional Guidelines (NFG) requirements.

6.3 DATA REPORTING

The laboratory will report the analytical results in a "CLP-type" data package, which will include sample results, associated QC data, raw data for all field and QC samples, and all other information needed to recalculate the analytical results as well as perform a the data validation. The resume of the person who completes the data validation or prepares the DUSR will be submitted to NYSDEC for their prior approval.

All field real-time measurements and observations will be recorded in project field notebooks, field data records, or similar types of record-keeping books. Field measurements include pH, temperatures, specific conductance, alkalinity, water flow, etc. All data will be recorded directly and legibly in field notebooks. If entries must be changed, the change should not obscure the original entry. The reason for the change will be stated and the correction and explanation (if necessary) will be initialed and dated at the time the correction is made. Field data records will be organized into standard formats whenever possible and retained in the project files.

7.0 INTERNAL QUALITY CONTROL CHECKS

Internal quality control refers to all data compilation and contaminant measurements; QC checks are the mechanisms whereby the components of the QA objectives are monitored. This section describes the internal QC checks for the following:

- Document review;
- Document control;
- Document revision;
- Field QC samples;
- Laboratory QC; and
- Performance and systems audits.

7.1 DOCUMENT REVIEW

Documents anticipated during this project may include, but are not limited to, the following:

- Plans and reports;
- Engineering documents; and
- Vendor and subcontractor drawings and data.

7.1.1 Plans and Reports

RA plans and reports must be reviewed and approved by the Project Coordinator, the ICF Kaiser Project Manager, the ICF Kaiser QA Officer, and the NYSDEC prior to implementation. Each document must also undergo a technical review, as appropriate based on the content of the document, by personnel not involved in the generation of an individual document.

The review process is as follows:

- Prior to the implementation of project plans, they must be reviewed by the ICF Kaiser Project Manager and the QA Officer;
- Comments will be addressed and resolved by the author of the plan;
- Problematic areas identified in the project plans will be re-reviewed by the appropriate person; and
- Upon acceptance of project documents by ICF Kaiser's Project Manager and QA Officer, a Technical Review Record Form, as provided in Figure 7-1, will be signed and maintained in ICF Kaiser's project files.

Changes to project documents are subject to the same review process. Changes must be recorded and include the name of the plan addressed, subject that changed, author of the change, approval signatures, date implemented, and a brief discussion why the change was necessary. This information will be stored in ICF Kaiser's project files.

7.1.2 Engineering Documents

Calculations, design drawings, technical specifications, and related documents prepared by ICF Kaiser shall be checked by a qualified engineer.

Checking shall confirm the following:

- The drawing or document is complete, accurate and suitable for the intended use;
- The sources of information and the interfaces with related documents are clearly identified;
- The document is in conformity with ICF Kaiser's procedures, the project and design criteria, the budget, and the applicable codes and standards;
- The design is constructable, operable, maintainable, and does not depict installations that contain interferences, either in themselves or with the installation designed by other disciplines, vendors or subcontractors;
- The drawing or document is thoroughly checked and is without errors or omissions;
- The drawing or document conforms to the technical specifications; and
- The supporting calculations are documented properly.

Design Drawing and Technical Specification Review. Checked design drawings and technical specifications shall be returned to the ICF Kaiser Lead Design Engineer or his designee for review. The Lead Design Engineer or his designee shall inspect the design drawing or technical specification and consult with the original design engineer and the checker to resolve conflicts. The checked design drawing or technical specification shall then be returned to the original drafter or designer for corrections. Revised drawings and specifications will require the same level of checking as the originals. Throughout the review process, the Lead Design Engineer will be responsible for confirming that other design documents affected by a change to one document are revised accordingly and checked. Marked copies of checked material shall be retained in the project file. Figure 7-2 is the Design Drawing Check Sheet and Figure 7-3 is the Technical Specification Approval Sheet.

Calculation Review. After completing a calculation, the designer will sign the Design Calculation Index as described in ICF Kaiser Procedure E-7. Calculations will be checked by verifying each step of the calculations. The checker shall resolve any discrepancies with the engineer or designer who prepared the original calculations. After the Design Calculation Index has been signed by the checker, the ICF Kaiser Lead Design Engineer or his designee will review the calculation to determine that it has been organized and checked properly and the results are acceptable in accordance with the project criteria and scope. The Lead Design Engineer will indicate approval by signing the Design Calculation Index. Revised calculations will require the same level of checking as the original.

7.1.3 Vendor and Subcontractor Drawings and Data

Technical documents submitted by vendors or subcontractors shall be reviewed by ICF Kaiser as appropriate. The material submitted may include design and equipment drawings, performance data, calculations, operating and maintenance manuals, test reports, installation instructions, diagrams, fabrication details, or other data covering items being supplied and/or fabricated from ICF Kaiser's design drawings or technical specifications.

The data will be validated by sample delivery group (SDG). An SDG will consist of a group of environmental samples as received from the laboratory, along with the associated field and method blanks. Once the validation for an SDG is completed, a validation report will be prepared that summarizes the results of the validation process, including:

- QC parameters reviewed (see above lists)
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The laboratory will report the analytical results in a "CLP-type" data package, which will include sample results, associated QC data, raw data for all field and QC samples, and all other information needed to recalculate the analytical results as well as perform a the data validation. The resume of the person who completes the data validation or prepares the DUSR will be submitted to NYSDEC for their prior approval.

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- Prior to the implementation of project plans, they must be reviewed by the ICF Kaiser Project Manager and the QA Officer;
- Comments will be addressed and resolved by the author of the plan;
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Calculations, design drawings, technical specifications, and related documents prepared by ICF Kaiser shall be checked by a qualified engineer.

Checking shall confirm the following:

- The drawing or document is complete, accurate and suitable for the intended use;
- The sources of information and the interfaces with related documents are clearly identified;
- The document is in conformity with ICF Kaiser's procedures, the project and design criteria, the budget, and the applicable codes and standards;
- The design is constructable, operable, maintainable, and does not depict installations that contain interferences, either in themselves or with the installation designed by other disciplines, vendors or subcontractors;
- The drawing or document is thoroughly checked and is without errors or omissions;
- The drawing or document conforms to the technical specifications; and
- The supporting calculations are documented properly.

Design Drawing and Technical Specification Review. Checked design drawings and technical specifications shall be returned to the ICF Kaiser Lead Design Engineer or his designee for review. The Lead Design Engineer or his designee shall inspect the design drawing or technical specification and consult with the original design engineer and the checker to resolve conflicts. The checked design drawing or technical specification shall then be returned to the original drafter or designer for corrections. Revised drawings and specifications will require the same level of checking as the originals. Throughout the review process, the Lead Design Engineer will be responsible for confirming that other design documents affected by a change to one document are revised accordingly and checked. Marked copies of checked material shall be retained in the project file. Figure 7-2 is the Design Drawing Check Sheet and Figure 7-3 is the Technical Specification Approval Sheet.

Calculation Review. After completing a calculation, the designer will sign the Design Calculation Index as described in ICF Kaiser Procedure E-7. Calculations will be checked by verifying each step of the calculations. The checker shall resolve any discrepancies with the engineer or designer who prepared the original calculations. After the Design Calculation Index has been signed by the checker, the ICF Kaiser Lead Design Engineer or his designee will review the calculation to determine that it has been organized and checked properly and the results are acceptable in accordance with the project criteria and scope. The Lead Design Engineer will indicate approval by signing the Design Calculation Index. Revised calculations will require the same level of checking as the original.

7.1.3 Vendor and Subcontractor Drawings and Data

Technical documents submitted by vendors or subcontractors shall be reviewed by ICF Kaiser as appropriate. The material submitted may include design and equipment drawings, performance data, calculations, operating and maintenance manuals, test reports, installation instructions, diagrams, fabrication details, or other data covering items being supplied and/or fabricated from ICF Kaiser's design drawings or technical specifications.

The review of technical documents will comply with the objectives shown below. The review will not, under any circumstance, relieve the vendor from responsibilities assumed in the contract.

- Compliance with specified scope of work and project specifications and/or purchase order or contract;
- Compliance with applicable codes and standards;
- Compliance with performance requirements and characteristics; and
- Agreement with ICF Kaiser's design drawings and specifications regarding the following:
 - Proper identification;
 - Correctness in size and capacity;
 - Utility requirements;
 - Access requirements;
 - Interferences with buildings and/or other equipment;
 - Location;
 - Proper matching with structural and/or foundation structures; and
 - Interferences with other work.

7.2 DOCUMENT CONTROL

Document controls will be implemented so that project personnel are using the most updated documents, and that project documents issued or generated will be accounted for upon completion of the project in such a manner that they are retrievable. The program includes a numerical document control system, document inventory procedure, and a central filing. During the course of the project, document control files will be maintained at ICF Kaiser.

ICF Kaiser's Project Manager will be responsible for inventorying the project documentation and protecting the document control files against damage, deterioration, loss, or unauthorized use by limiting access to files.

Documents used or generated during the course of the project are accounted for and become a part of the project files upon completion of the task. These may include but are not limited to the following:

- Sample identification documents and field logbooks;
- Chain of custody records;
- Project Deliverables (i.e., design drawings, technical specifications, RA support plans, etc.);
- Laboratory data, calculations, graphs, control charts, field notebooks;
- Reports and correspondence material; and
- Photographs.

When an error is made on an accountable document, corrections are made by drawing a single line through the error and entering the correct information. The correction must also be initialed and dated by the person making the correction. A brief explanation must be provided explaining the reason the correction was made, if necessary.

The review of technical documents will comply with the objectives shown below. The review will not, under any circumstance, relieve the vendor from responsibilities assumed in the contract.

- Compliance with specified scope of work and project specifications and/or purchase order or contract;
- Compliance with applicable codes and standards;
- Compliance with performance requirements and characteristics; and
- Agreement with ICF Kaiser's design drawings and specifications regarding the following:
 - Proper identification;
 - Correctness in size and capacity;
 - Utility requirements;
 - Access requirements;
 - Interferences with buildings and/or other equipment;
 - Location;
 - Proper matching with structural and/or foundation structures; and
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- Laboratory data, calculations, graphs, control charts, field notebooks;
- Reports and correspondence material; and
- Photographs.

When an error is made on an accountable document, corrections are made by drawing a single line through the error and entering the correct information. The correction must also be initialed and dated by the person making the correction. A brief explanation must be provided explaining the reason the correction was made, if necessary.

The marked copies of checked material shall be retained for future reference. Notes, calculations, and other information marked on documents assist in follow-up design and aid in re-checking portions of documents.

Controlled documents which are sensitive to timing or acceptance will be identified by the ICF Kaiser Project Manager. In order to identify controlled documents, ICF Kaiser will use a document control program for RA plans and reports that utilizes the following information in document footers:

- Document Title,
- Document Control Number,
- Revision number,
- Revision Date, and
- Page Number.

A distribution list of controlled documents (to include deliverables generated for this project) will be maintained by the ICF Kaiser Project Manager who will confirm that revisions are distributed to the addressees. Receipt of controlled documents will be verified using a Receipt and Acknowledgment Form as presented in Figure 7-4. Completed Receipt and Acknowledgment forms will be returned to the Project Manager for placement in the project files. Every controlled document will be identified by a Document Control Number.

7.3 DOCUMENT REVISION

Revisions to approved project plans, calculations, designs, and equipment specifications (including specifications of computer systems) must undergo the same review process as the original document. In cases of major changes, the Westinghouse Project Manager will be notified. Minor changes will be approved by the ICF Kaiser Project Manager.

Field changes will be documented in the field logbook and on a Document Revision Form. Field changes must be approved by the Field Operations Manager, Project Manager, and the QA Officer prior to implementation. Figure 7-5 is an example of the Document Revision Form. Completed Document Revision Forms will be maintained in the project files.

Revised documents will be provided to each person on the distribution list. Use of the most recent copies of project plans will be checked during the readiness reviews. It will be the responsibility of the recipient to destroy or dispose of superseded documents. The recipient will be notified of their responsibility by internal memorandum. Copies of superseded documents in the project files will be identified as such by writing "obsolete" on the cover.

7.4 FIELD QUALITY CONTROL SAMPLES

Quality Control samples to be collected during field operations are detailed in the PDWP and the RA support plans.

7.5 LABORATORY QUALITY CONTROL

The analytical laboratory will follow all of the quality control provisions detailed in the analytical methods for matrix spikes, blanks, duplicates, lab control samples, surrogate spikes, clean-ups, calibration, tuning, detection limits, and all other method-specific QC requirements.

7.6 PERFORMANCE AND SYSTEMS AUDITS

Performance audits assess the accuracy of the total measurement system or its component parts. Performance audits are quantitative evaluations of the measurement system(s). Systems audits consist of the qualitative evaluation of the components of the measurement systems to determine their proper selection and use.

7.6.1 Performance Audits

The ICF Kaiser QA Officer will review the results of the contract laboratory's USEPA Water Supply and Water Pollution performance evaluation samples for the past two years to evaluate the laboratory's ability to produce accurate analytical results. At the discretion of the QA Officer, the laboratory may provide results from another, equivalent, performance evaluation program.

7.6.2 Systems Audits

At least one field audit will be conducted to confirm that the field team is following protocols delineated in the PDWP. Audits will be performed by the ICF Kaiser QA Officer or an appropriate designee. The field audits will occur in conjunction with field sampling events. During any field systems audit, the auditor will compare current field practices with standard procedures. The following elements will be evaluated:

- Overall level of organization and professionalism;
- All activities conducted in accordance with project documents;
- All procedures and analyses conducted according to the procedures outlined in either the QAPP or RA support plans;
- Level of activity and sample documentation;
- Working order of instruments and equipment;
- Level of QA conducted per each field team;
- Contingency Plan in case of equipment failure or other event preventing the planned activity from proceeding;
- Decontamination procedures;
- Level of efficiency with which each team conducts planned activities and proceeds to the next activity; and
- Sample packaging and shipment.

Upon completion of the audit, a report of the findings will be given to the Project Manager within 15 days of the audit. Results of the audit will be retained as part of the QA documentation for this project.

A laboratory audit may be performed to verify analytical capability and compliance with the PDWP and this QAPP. The laboratory audit, if required, will be performed during the period the laboratory is analyzing samples for this project. The audit will be conducted by the ICF Kaiser QA Officer or an appropriate designee. If the ICF Kaiser QA Officer elects to perform an on-Site laboratory audit, it will include the following:

- Following the sample chain of custody from the time of sample receipt, through all analysis steps, to data reduction, validation, and report generation;
- Examining maintenance and calibration log books to ensure that those activities are performed on a scheduled basis;
- Examining procedures and records for data calculation, transfer, and validation;
- Spot-checking calibration, QC, and sample data from selected instruments for selected days to ensure acceptable precision, accuracy, and completeness;
- Inspecting storage areas, glassware preparation areas, and distilled/de-ionized water system records and procedures; and
- Examining QA procedures and records (standard and spike solution log books and storage areas, control charts, QA manuals).

A formal audit will be provided to the Project Manager within 15 days of the audit. Results of the audit will be retained as part of the QA documentation for this project.

Figure 7-1
Technical Review Record for Project Documents

TO BE COMPLETED BY THE DOCUMENT AUTHOR		
PROJECT NAME:	PROJECT NO.:	CLIENT:
DOCUMENT NAME/DATE: _____		
DRAFT _____ FINAL _____ REVISION NO.		
AUTHOR:		
TECHNICAL REVIEWER:		
MANAGEMENT REVIEWER:		
HEALTH & SAFETY REVIEWER:		
ENGINEERING REVIEWER:		
OTHER REVIEWER:		
RETURN REVIEW COPIES TO AUTHOR BY:		
DUE DATE/TIME:		DATE IN/TIME:
NUMBER OF COPIES/DISTRIBUTION: _____ _____		

THE APPROPRIATE SIGNATURE(S) MUST BE COMPLETED AND DATED BEFORE RELEASE OF THE PROJECT DOCUMENT		
REVIEWER SIGNATURE	DATE	INITIAL IF N/A
TECHNICAL OK:		
MANAGEMENT OK:		
ENGINEERING OK:		
HEALTH & SAFETY OK:		
OTHER SPECIALIST*:		
OTHER SPECIALIST*:		

* SPECIALIST TO BE WRITTEN IN AS REQUIRED

Figure 7-2 Design Drawing Check Sheet

	DOCUMENT NO.	REV.
	TITLE	
1.	Agreement with Design Criteria and Cost Estimate	
2.	Agreement with Specification/Purchase Order	
3.	Vendor Drawings	
	<u>Document Control No.</u>	<u>Rev. No.</u>
	<u>Manufacturer</u>	<u>Title</u>
4.	Discipline Drawings	
	<u>Discipline</u>	<u>Drawing No.</u>
	<u>Rev.</u>	<u>Issued</u>
	<u>Job Engineer</u>	<u>Date</u>
	Structural	
	Architectural	
	Mechanical	
	Civil	
	Piping	
	HVAC	
	Electrical	
	Instrumentation	
5.	Calculations	
	Notes	
	Checker_____	Date_____
	Job Engineer_____	Date_____
	Lead Design Engineer_____	Date_____

Figure 7-3 **Technical Specification Approval Sheet**

TITLE _____	JOB NO. _____
SPECIFICATION NO. _____	ADDENDUM NO. _____
PREPARED BY _____	_____ DATE
CHECKED BY **	
_____	_____ DATE
_____	_____ DATE
_____	_____ DATE
_____	_____ DATE
_____	_____ DATE
_____	_____ DATE
REVIEWED/CHECKED	
PROJECT ENGINEER	_____ DATE
APPROVED BY	
Lead Design Engineer	_____ DATE

** Indicate appropriate discipline (i.e., structural, mechanical, process, etc.) below signature.

Figure 7-4
Receipt and Acknowledgement Form

RECEIPT AND ACKNOWLEDGEMENT FORM

PROJECT PLAN: _____

DATE/REVISION NO.: _____

The Receipt and Acknowledgement Form provides: (1) a certification, as described below, by signature of each person on site; and (2) a record of personnel present during an operational period. Additions may be made to the form as personnel begin working on the project. Completed forms representing the current complement of site personnel must be maintained in the project files.

Prior to the initiation of project activities, I have been given an opportunity to read and question the contents of the _____ (ABOVE PROJECT PLAN). By my signature, I certify that I have read, understood, and agree to comply with the information and requirements set forth in this Plan.

Printed Name

Signature

Date

Figure 7-5
Document Revision Form

REQUESTOR:		DATE:	
PROJECT NAME:		PROJECT NO.:	
CLIENT:			
ITEM REQUIRING REVISION			
DOCUMENT:			
SECTION:	PAGE:	PARAGRAPH:	
EXISTING TEXT OR DESCRIPTION:			
REQUIRED REVISION AND RATIONALE:			
CLIENT CONTACTED:			
YES NO DATE:			
APPROVALS:			
Project Manager (Signature):_____Date:_____			
QA Officer (Signature):_____Date:_____			

8.0 CORRECTIVE ACTION

Corrective actions are those measures taken to rectify a laboratory or field measurement system that is not functioning as intended. Corrective action may be initiated by any person performing such work in support of the project at any time.

8.1 LABORATORY

At the laboratory level, re-analysis and other corrective measures are contractually required if specific control limits established in the standard methods are exceeded. The bench chemist directly responsible for the test knows the current operating and acceptance limits, and will take corrective actions required, including sample re-analysis. Bench results are also reviewed by a second chemist to ensure that all method-specified QA requirements have been met. The report is then prepared and submitted to the Contract Compliance Screening Section for final QC check. Each person in the review process has the authority to require re-extraction and re-analysis of a sample if QC problems are identified.

If ICF Kaiser data validation or QC audits result in detection of unacceptable conditions of data, the Project Manager will be responsible for developing and initiating corrective action. The QA Officer will be notified of the non-conformance and will oversee any corrective action to verify problem resolution. Corrective action may include:

- Re-analyzing samples if holding time criteria permit,
- Re-sampling and analyzing,
- Evaluating and amending sampling and analytical procedures, or
- Accepting data acknowledging level of uncertainty.

Data inadequacies attributable to site-specific interferences or conditions may require that sampling procedures or analytical methods be modified.

8.2 FIELD

The initial responsibility for reporting and documenting a non-compliant event lies with the field personnel. The field engineer is responsible for investigating a problem and implementing any corrective action, or for assigning other personnel to perform these tasks. The field engineer must also verify that any particular corrective action has eliminated the problem in question. The field engineer is responsible for documenting and reporting non-compliant events to the project manager and the QA Officer. All ICF Kaiser field personnel have the authority to stop work when a non-compliant event has occurred that could impact the quality of the data. Corrective actions will be decided upon by the field engineer in consultation with any more experienced personnel as the field engineer deems necessary.

Corrective actions in the field are likely to be immediate in nature and can be implemented by field personnel or the field engineer; the corrective action will usually involve recalculation, re-analyses, repeating the instrument calibration or re-sampling a particular locations. Once a non-compliant event has occurred and the field engineer has been notified, the following steps will be taken to reestablish control: (1) the field engineer will investigate and determine the probable cause of event; (2) the field engineer will consult with senior staff if the problem warrants such consultation; (3) the field engineer will decide on an appropriate corrective action; and (4) the field engineer will implement or direct others to implement the corrective action and verify its effectiveness.

Field personnel will document non-compliant events by recording the problem and its resolution in the field logbook. Possible causes of the problem , corrective action planned, and date corrective action taken will also be recorded. The field engineer will check to be sure that corrective action has been taken, the corrective action appears effective, and the problem has been fully solved. The Project Manager will receive a copy of the field notebooks and will file them in the project QA file.

8.3 PREVENTIVE MAINTENANCE

The Project Manager and the QA Officer are responsible for enforcing project document-specified protocols. By incorporating and enforcing such protocols, specifically those in the QAPP and CQAP, the need for corrective actions will be minimized.

9.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

An important aspect of the QA/QC program is the communication between the QA Officer and the Project Manager. Regular appraisal of the quality aspects related to the ongoing data gathering efforts provides the mechanism whereby the established objectives may be met.

9.1 MONTHLY QA REPORTS

The ICF Kaiser QA Officer will prepare monthly QA reports describing all project related QA/QC activities that have taken place during the preceding month. The reports may include, but are not limited to the following items:

- Summary of all project related QA/QC activities, including an assessment of measurement data accuracy, precision and completeness;
- Results of QA performance or system audits;
- Milestone reviews;
- Any deficiencies identified; and
- Corrective actions taken.

The reports will be provided to the ICF Kaiser Project Manager and will be maintained in the project files.

10.0 REFERENCES

Blasland, Bouck & Lee, Inc., Pre-Design Investigation Summary Report, Westinghouse Site Participating Parties, Cheektowaga, New York, July 1996.

ICF Kaiser, 1998a. Pre-Design Evaluation Work Plan, NYSDEC Inactive Hazardous Waste Site No. 9-15-006, Cheektowaga, New York, ICF Kaiser Engineers Corporation, April 3, 1998.

New York State Department of Environmental Conservation (NYSDEC). 1991. Resource Conservation and Recovery Act Quality Assurance Project Plan Guidance. Division of Hazardous Substances Regulation. March 29, 1991.

New York State Department of Environmental Conservation, Division of Hazardous Waste Remediation, (ROD1). Record of Decision, Westinghouse Electric Corporation Site, Town of Cheektowaga, Erie County, Site No. 9-15-066, March 1995.

New York State Department of Environmental Conservation, Division of Hazardous Waste Remediation, (ROD2). Record of Decision, Westinghouse Electric Corporation Site, Town of Cheektowaga, Erie County, Site No. 9-15-066, December 1995.

NYSDEC 1997. New York State Department of Environmental Conservation, Technical Administrative Guidance Memorandum regarding development and review of site analytical plans. Division of Solid and Hazardous Materials - 96-03, January 1997.

United States Environmental Protection Agency (USEPA). 1986. Test Methods for Evaluation of Solid Waste (SW-846), 3rd Edition. Office of Solid Waste and Emergency Response, Washington, DC. November 1986.

United States Environmental Protection Agency (USEPA). 1988. Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA. Office of Emergency and Remedial Response. October 1988.

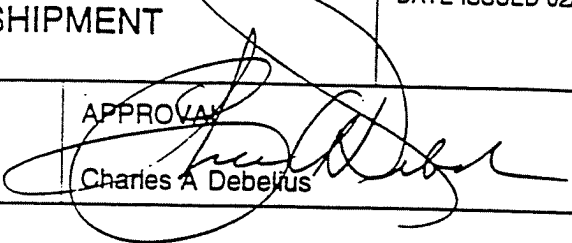
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United States Environmental Protection Agency (USEPA). 1994. USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, Office of Emergency and Remedial Response. Document No. EPA540/R-94/012. February 1994.

United States Environmental Protection Agency (USEPA). 1994. USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, Office of Solid Waste and Emergency Response. Document No. EPA-540/R-94-013, February 1994.

United States Environmental Protection Agency (USEPA). 1994. Guidance for Planning for Data Collection in Support of Environmental Decision Making Using the Data Quality Objectives Process, Document No. EPA Q/G-4, September 1994 - Final.

ATTACHMENT A
ICF KAISER PROCEDURES

ICF KAISER ENGINEERS Environment & Energy Group	STANDARD OPERATING PROCEDURES	
	SAMPLE PACKAGING AND SHIPMENT	SOP NO. 3.3 REV. 1 PAGE 1 of 8 DATE ISSUED 02/22/95
	APPROVAL  Charles A. Debelius	

3.3.0 PURPOSE

This SOP provides instructions that are to be followed in the packaging, labeling, and shipment of samples collected during field operations. This SOP is intended to be used in conjunction with SOP No. 3.1, Soil/Sediment Sampling, and SOP No. 3.2, Groundwater/Surface Water Sampling.

3.3.1 INTRODUCTION

As with all field work, the ease and efficiency with which sample handling is conducted is proportional to the amount of preparation before entering the field. Organization and a thorough understanding of the sampling plan are essential for the person designated to complete paperwork and ship samples. Sufficient amounts of packaging materials must be assembled, shipping requirements determined, and shipping offices located before the trip.

While the completion of some of the paperwork in the office is advisable, this practice must be tempered by judgement. The completion of too much paperwork can be a problem if sampling plans or circumstances change in the field. Each person must determine the balance between too much and too little pre-field paperwork and preparation through experience.

Sample packaging, labeling, and shipment procedures are designed (1) to preserve sample quality so that analyses will yield results representative of site conditions, (2) to protect and inform sample handlers including shippers and laboratory personnel, and (3) to provide a papertrail to allow cross referencing of sample collection locations with analytical results. For the purpose of sample packaging and shipment, samples are categorized as "hazardous" samples unless it can be reasonably assumed that dioxins are not present and all other contaminants are at concentrations below 10 ppm. If both these conditions are met, the sample can be packaged and shipped as an "environmental" sample. Procedures for handling these two types of samples follow.

3.3.2 PREPARATION FOR FIELD WORK

- Determine sample locations.
- Determine number of samples (including QA/QC and duplicates).
- Determine analysis required.
- Number stations unambiguously.
- Determine probable concentrations of samples.
- Determine number and type of sample bottles required.

- Determine packaging materials required (e.g., strapping tape, ice chests, vermiculite, bubble wrap, paint cans, warning labels, etc.).
- Have authorized person contact SMO for Case and/or SAS Number(s), blank paperwork, and laboratory space.
- Contact all interested parties (i.e., EPA representatives, state agencies, site owners, site operators, etc.).
- Assemble sample bottles and packaging materials.
- Check applicable United States Department of Transportation (USDOT) shipping regulations.
- Make plans for sample shipments (e.g., locate Fed-Ex, obtain laboratory address, etc.).
- To avoid confusion, prior to sampling, bottles can be temporarily numbered with station numbers.
- Plan for likely site conditions (e.g., hazards on the site, weather, accessibility of the site, etc.).

3.3.3 SAMPLE HANDLING

Once samples have been sealed in the ice chests, they are to be expeditiously transported to the analytical laboratory. If the laboratory is located near the sampling site (e.g., if a non-CLP laboratory has been reserved) the sampling team may drive the samples to the laboratory. Otherwise, samples are to be routinely shipped by the overnight service.

There are two types of airbills, the nonrestricted materials airbill, for the shipment of environmental samples and the restricted articles airbill, for the shipment of hazardous materials. Environmental samples are generally those collected from sources not expected to show significant contamination, for example, ponds, streams, and off-site soils. Samples from obviously contaminated sources such as on-site soils and groundwater, drums, leachate, and tanks must be considered as hazardous materials and shipped according to USDOT regulation. If enough information is known about a site, samples from these sources may be shipped as low level environmental samples. Only low concentration samples are considered environmental while medium and high concentration samples are considered hazardous.

3.3.3.1 Packaging

Samples suspected of containing dioxins at any concentration, or suspected of containing other hazardous contaminants at concentrations over 10 ppm are to be overpacked and shipped according to USDOT regulations (see Exhibit 3.3-1). The following procedure is to be used for low level environmental sample packaging.

- Decontaminate outside of sample containers.
- Affix sample labels to corresponding sample containers.
- Add preservatives to water samples as required.
- For Region X, attach sample tags and matching sample labels to sample containers.
- Affix custody seals to the neck of the container, over the cap.

- Use bubble wrap bags to protect glass sample bottles.
- Enclose all samples containers and bottles in sealed ziplock bags.
- Place sample containers in an ice chest lined with a plastic trash bag, checking against chain-of-custody record to ensure all samples are listed and are in the correct ice chest.
- Add styrofoam packing material to the trash bag to fill the empty space between samples.
- Fasten trash bag with twist-tie.
- Detach and retain the first two copies of the traffic report and chain-of-custody form.
- Seal remaining paperwork in a ziplock bag. Tape the bag to the inside of ice chest lid.
- Fill 1 to 3 ziplock bags with ice and include in the ice chest shipment if required by sampling and analysis plan. All ice should be double bagged in heavy duty ziplock bags.
- Affix airbill or airbill sticker to outside of the ice chest.
- Affix "This End Up" stickers to the ice chest.
- Seal the ice chest with three (3) custody seals (two in the front and one in the back).
- Tape the ice chest shut using strapping tape.
- Affix the laboratory address to all ice chests.
- Remove extraneous stickers from the ice chests.
- Ensure that ice chests have an ICF Technology return address on them.

Before relying on a shipping service, call that service to locate the drop off point nearest the site, then call that site to obtain the business hours and prepare them for your shipment. Occasionally, service operators are not aware that they can ship environmental or hazardous samples and it is inconvenient to have them attempt to learn the procedures just before the shipment deadline. Also the shipping deadline for laboratories on the East Coast may be several hours earlier than West Coast deadline. Calling in advance can identify these considerations.

3.3.3.2 Chain-of-Custody Seal

This form is used to show that no tampering has occurred between the time the sample left the field personnel to when it arrived at the laboratory. It is an adhesive form and should be placed over the container top and neck so that the lid cannot be removed without breaking the seal. Custody Seals are also used to seal the ice chests and paint cans shut before shipping.

(1)	Date	Sample date.
(2)	ID#	Project code number for the sampling event.
(3)	Signature	Signature of the person sealing the container.

3.3.3.3 Environmental Samples Airbill

Federal Express is used to ship the vast majority of samples to analytical laboratories. This section describes the procedures used when shipping samples via Federal Express. However, this does not prevent samplers from utilizing other carriers.

Federal Express requires a completed "Nonrestricted Materials Airbill" for the shipment of environmental samples. A separate airbill is required for each destination but multiple ice chests can be shipped under one airbill if they are being sent to the same laboratory. The Federal Express Nonrestricted Materials Airbill is completed as follows. An example of a Federal Express airbill is shown in Exhibit 3.3-2.

(1)	Date	The date the sample is shipped.
	Sender's Federal Express Account Number	ICF Fed-Ex account should be typed or printed in here, it is 1105-2301-7
	From	Team leader's name.
	Phone	Phone number of office. (If the team expects to be in the field for an extensive period the hotel phone number may be more helpful.)
	Company	Self explanatory.
(2)	Recipient's Name	Name of laboratory contact, laboratory phone number, and laboratory address from the Field Operations Notebook.
(3)	Billing Reference Payment	ICF project code. Check "Bill Sender."
(4)	Services Delivery	Check box # 1, "Priority 1" Check box # 1, 2 or 3 as required.
H.	Fill out if necessary.	
(5)	Leave Blank, <u>do not sign</u> .	

Examples of airbills from other carriers are shown in Exhibit 3.3-3 and 3.3-4.

3.3.3.4 Hazardous Materials Airbills

Unlike the regular airbill the Dangerous Goods or Restricted Articles airbill has two parts. In addition to the upper portion which is identical to the typical airbill, the Restricted Articles airbill has a lower portion entitled "Shipper's Certification for Dangerous Goods." Every effort must be made to fill out this portion correctly, as shippers may be subject to fines for the improper transport of restricted articles.

- (1-5) These sections are filled out in the same way as the normal airbill.
- (6) Check the box labeled "49 CFR."
- (7) No. of Packages Write in the number of ice chests being shipped on that airbill.
 Packages

(8)	Proper Shipping Name	One of the following will usually apply; "Flammable Liquid, NOS," "Flammable Solid, NOS," "Compressed Gas, NOS" "Corrosive" or "Hydrogen." Regulations require that the hazardous constituents must be entered along with the NOS designation (i.e., "Compressed Gas NOS [0.1% hexane in air]).
(9)	Class or Division	One of the following will usually apply; "Nonflammable Gas," "Flammable Liquid," "Flammable Solid," or "Flammable Gas."
(10)	UN or NA Number	Consult USDOT Tables (Appendices A and B) for proper UN or NA number. (UN numbers should be written "UN1992" not "1992").
(11)	Subsidiary Risk	This column is filled out when the substance has more than one hazard as listed in USDOT Tables.
(12)	Total Net Quantity	Write the total quantity of hazardous materials in the shipment in appropriate units.
(13)	Radioactive Materials	
(14)	Transport Details	Shipping limitations as follows: a. Flammable Liquids - Less than 32 oz--Passenger aircraft - 32 oz to 10 gal--Cargo aircraft b. Flammable Solids - Less than 25 lbs--Passenger or cargo aircraft. - 25 lbs--1000 lbs cargo aircraft - Greater than 1000 lbs requires more extensive procedures. (25 lbs being the total weight of the ice chest). (An empty ice chest weighs approximately 18 lbs).
(15)	Print shipper's name and title.	
(16)	Write in the name of the city the shipment is being made from.	
(17)	Telephone number of INFOTRAC Inc (1-800-535-5305).	ICF has contracted with INFOTRAC to provide a 24 hour emergency response telephone number.
(18)	Shipper's signature.	

3.3.3.5 Carrier Sticker

The carrier sticker is attached by carrier employees to the additional ice chests when more than one is going to the same laboratory. These are bar code stickers which are adhesive backed and are easily attached to the outside of the ice chest.

3.3.3.6 Warning Labels

USDOT regulations require warning labels for hazardous materials. USDOT regulations must be consulted and adhered to for all shipments.

3.3.4 SAMPLE SHIPMENT

When shipping hazardous materials (which may include sample or equipment), personnel must be aware that specific regulations govern the packaging, labeling, and transport of these items. Hazardous materials are defined by the Hazardous Materials Regulation Board and set forth in 49 CFR Parts 171-178, and must be shipped in strict accordance with USDOT procedures. ICF staff members should be aware that regulatory agencies have the authority to levy substantial financial penalties on violators. These regulations apply to shipment by non-commercial (i.e., personal, rented or company vehicles) as well as by commercial carrier. Persons making shipments should remember that only designated air carrier offices will accept hazardous materials.

3.3.4.1 Environmental Samples

Samples which are not expected to contain significant levels of contamination, such as those taken from streams, ponds, and off-site soils are considered environmental samples. That is, all low concentration samples are shipped as "Environmental Samples." These samples have no packaging, labeling, or shipping requirements beyond the usual procedures. (Most air carriers require an address of the sender and of the receiver to be on the ice chest.) The primary concern in the case of "Environmental Samples" is that the samples reach their destination in a timely and undamaged state.

3.3.4.2 Hazardous Materials Samples

Samples taken from such potentially contaminated sources as on-site soils, drums, storage tanks, ponds, impoundments, lagoons, or leachates or from obviously contaminated locations must be treated as hazardous material samples and be shipped accordingly. If there is any doubt, a sample should be shipped as a hazardous material. Both medium and high concentration samples are shipped as hazard materials.

Hazardous materials must be packaged differently than the more common environmental samples. The sample is bubble wrapped, sealed in a plastic bag, then placed in a metal paint can, one sample per can. The dead air space is filled with vermiculite and the can is sealed with metal clips. The paint cans are labeled with the following: Sample Tag #, SAS #, Case #, the date, and any applicable warning labels. The cans are then shipped in an appropriately labeled ice chest.

3.3.4.3 Known Materials

Hazardous materials are further divided into known materials and unknown materials depending on the situation at the site. If all the hazardous substances in the sample are known or can be accurately identified, the sample is packaged, labeled, and shipped according to the instructions for that material, as detailed in the USDOT Hazardous Materials Table. 49 CFR 172.101 and the HM181 Rule - new package requirements. These change too frequently to include here.

3.3.4.4 Unknown Materials

When one or more substances in the sample cannot be identified, the sample must be shipped as an "unknown material." The appropriate transportation procedures are determined by classifying the sample through a process of elimination using the USDOT Hazardous Materials Table.

Radioactive Materials. If radiation survey instruments indicate, or there is a reasonable suspicion the samples contain radioactive materials, they must be shipped as radioactive materials. Regulations governing transport of radioactive materials are given in 49 CFR parts 173.389 to 173.398.

Poison A. USDOT defines Poison A as extremely dangerous non-radioactive poisonous gas or liquid of such a nature that a very small amount of gas or vapor of the liquid will be dangerous to life. Most Poison A materials are gases and would not be commonly found in field activities. All samples found in closed containers do not have to be shipped as Poison A. Judgement based on available information must be used to decide if a sample is a Poison A. Special efforts to personally be familiar with all regulations governing transport of Poison A samples should be made by all team leaders expecting to ship such samples. Begin with 49 CFR 173.2.

Flammable Liquids. The next two categories in the USDOT classification are flammable gas and nonflammable gas. In usual circumstances sampling does not include gases, nor are sampling containers expected to contain a significant amount of gas in their airspace. For samples containing unknown materials, other classifications listed below flammable liquid are not usually considered. In order to classify a substance as nonflammable a flash point test is required. Such tests would be impractical or even dangerous in the field. Thus unknown hazardous samples are usually shipped as flammable liquids. The phrase "flammable liquid" does not necessarily mean the sample is either flammable or a liquid; it merely refers to a shipping classification in accordance with USDOT regulations. If the sample is a solid or a sludge it may be shipped as a "flammable solid." Any unknown material that is not classified as Poison A, flammable gas, or nonflammable gas should be shipped as a flammable liquid or a flammable solid.

"Flammable liquid" and "flammable solid" samples must be packed in paint cans as "high" or "medium" concentration samples for shipment. (Conversely, unknown sample of high or medium concentration must be packed and shipped as "flammable liquids" or "flammable solids.") The following information must be placed on each paint can:

- Laboratory name and address.
- "FLAMMABLE LIQUID, NOS UN1993" or "FLAMMABLE SOLID, NOS UN1325" (NOS means Not Otherwise Specified or Not Otherwise Stated)
- "DANGEROUS WHEN WET" if applicable
- Sample Tag #
- SAS #
- Case #
- The date

The ice chest in which the paint cans are packed should have the following labels;

- Laboratory name and address
- "FLAMMABLE LIQUID, NOS UN1993" or "FLAMMABLE SOLID, NOT UN1325"
- "DANGEROUS WHEN WET" if applicable
- "CARGO AIRCRAFT ONLY"
- "LABORATORY SAMPLES"
- "INSIDE PACKAGES COMPLY WITH PRESCRIBED SPECIFICATIONS"
- "THIS END UP"

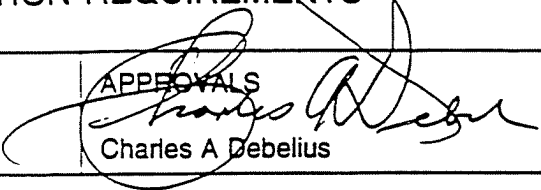
Unknown hazardous materials can be transported by truck, rail, or overnight carriers, but must not be transported by passenger carrying aircraft.

3.3.5 SHIPMENT COORDINATION

Once samples have been shipped to the analytical laboratory, the sample team leader must notify the appropriate client and/or laboratory contact. For EPA projects, the appropriate contact is the Regional

Sample Control Center (RSCC). Notification must be on the day of shipment and if after hours, the team leader may need to leave a detailed message. The following information is to be provided to the RSCC.

- Team leader name.
- Telephone number (office or hotel) for following-day contact.
- Site name or code.
- Batch numbers (for dioxin analyses).
- Exact number of samples shipped by matrix and environmental or hazardous concentrations.
- Laboratories that samples were shipped to.
- Shipping company and airbill numbers.
- Method of shipment (overnight).
- Date of shipment.
- Analyses requested by laboratory and matrix.
- Any irregularities or problem with samples including special handling instructions.
- Status of sampling mission (e.g. final shipment or future sampling schedule).

ICF KAISER ENGINEERS	STANDARD OPERATING PROCEDURES	
Environment & Energy Group	SAMPLE CONTAINER AND PRESERVATION REQUIREMENTS	SOP NO. 3.4 REV. 1 PAGE 1 OF 7 DATE ISSUED 05/14/93
	 APPROVALS Charles A Debelius	

3.4.0 PURPOSE

This SOP provides instructions for the selection of containers and preservatives for sample collection. Container requirements and sample preservation vary according to sample type, sample hazard level, and analyses to be performed. This SOP describes container and preservation requirements and the storage criteria for low-, medium-, and high-hazard level sample designations as defined for the CLP Program.

3.4.1 SAMPLE CONTAINER AND PRESERVATION REQUIREMENTS

Table 3.4-1 presents sample container requirements for CLP Routine Analytical Services (RAS) samples. For non-CLP sampling, container supply is to be requested during laboratory procurement. Detailed preservation requirements are presented in Table 3.4-2, which should be consulted for specific requirements when planning and conducting field sampling activities.

3.4.2 LOW- AND MEDIUM-HAZARD LEVEL SAMPLES

Low-hazard level samples contain up to 20 parts per million (ppm) of each hazardous substance present. Medium-hazard level samples contain between 20 and 200 ppm of at least one hazardous substance and require special packing. Paint cans must be used for shipping all medium- and high-level samples. Specific packing and shipping instructions for medium- and high-level samples are presented in SOP 3.6, Sample Packaging and Shipment.

3.4.2.1 Low-Hazard Water Samples

Low-hazard water samples taken for organic extractable analysis are to be collected in four 1-liter amber glass bottles. Volatile organic compound (VOC) samples shall be taken in two 40-ml vials with teflon-lined septa in the lids. Two full vials are required for RAS VOC samples. Low detection limit samples for RAS and Special Analytical Services (SAS) VOC samples require three or four 40-ml vials.

Low-hazard level inorganic water samples for metals analysis are to be collected in a 1-liter polyethylene bottle and the contents preserved to a pH of less than 2 with a metals-grade (Ultrex or equivalent) nitric acid (HNO_3). Usually, 10-ml HNO_3 is sufficient. Cyanide analysis also requires a 1-liter polyethylene bottle and shall be preserved to a pH of greater than 12 with sodium hydroxide solution (NaOH). Sodium hydroxide solutions of varying concentrations can be purchased from several vendors. Check the pH by pouring sample into the container cap, checking with the pH indicator strip and discarding the waste sample in to an appropriate container for proper disposal. Replace cap on sample.

TABLE 3.4-1
CLP SAMPLE CONTAINER REQUIREMENTS

SAMPLE MEDIUM	HAZARD LEVEL	ORGANIC ANALYSIS		INORGANIC ANALYSIS	
		HAS VOLATILES EXTRACTABLES	HAS DIOXIN	HAS METALS	HAS CYANIDE
Water	Low	4 x 1L amber glass bottles	2 x 40ml glass vials w/teflon lined septa lids	2 x 1L amber glass bottles	1 x 1L polyethylene bottle
	Medium	4 x 32oz wide-mouth glass jars	2 x 40ml glass vials w/teflon- lined septa lids	2 x L amber glass bottles	1 x 16oz wide-mouth glass jar
Soil	Low & Medium	1 x 8oz wide-mouth glass jar	2 x 120ml wide-mouth glass jars	1 x 4oz wide-mouth glass jar	1 x 8oz wide-mouth glass jar
	High	1 x 8oz wide-mouth glass jar	1 x 8oz wide-mouth glass jar	1 x 8oz wide-mouth glass jar	1 x 8oz wide-mouth glass jar

TABLE 3.4-2

RECOMMENDATION FOR SAMPLING AND PRESERVATION
OF SAMPLES ACCORDING TO MEASUREMENT⁽¹⁾

MEASUREMENT	VOLUME REQUIRED (ml)	CONTAINER ⁽²⁾	PRESERVATIVE ⁽³⁾	HOODING TIME ⁽⁴⁾
Physical Properties				
Color	50	P,G	Cool, 4°C	48 hours
Conductance	100	P,G	Cool, 4°C	28 days
Hardness	100	P,G	HNO ₃ to pH <2	6 months
Odor	200	G only	Cool, 4°C	24 hours
pH	25	P,G	None Required	Analyze Immediately
Residue Filterable	100	P,G	Cool, 4°C	7 days
Non-Filterable	100	P,G	Cool, 4°C	7 days
Total	100	P,G	Cool, 4°C	7 days
Volatile	100	P,G	Cool, 4°C	7 days
Settleable Matter	1000	P,G	Cool, 4°C	48 hours
Temperature	1000	P,G	None Required	Analyze Immediately
Turbidity	100	P,G	Cool, 4°C	48 hours
Metals				
Dissolved	200	P only	Filter on site HNO ₃ to pH <2	6 months
Suspended	200	P only	Filter on site	6 months
Total	100	P,G	HNO ₃ to pH <2	6 months
Chromium VI	200	P,G	Cool, 4°C	24 hours
Mercury Dissolved	100	P,G	Filter on site HNO ₃ to pH <2	28 days
Total	100	P,G	HNO ₃ to pH <2	28 days
Inorganics, Non-Metallics				
Acidity	100	P,G	Cool, 4°C	14 days
Alkalinity	100	P,G	Cool, 4°C	14 days
Bromide	100	P,G	None Required	28 days
Chloride	50	P,G	None Required	28 days

TABLE 3.4-2

**RECOMMENDATION FOR SAMPLING AND PRESERVATION
OF SAMPLES ACCORDING TO MEASUREMENT⁽¹⁾**

MEASUREMENT	VOLUME REQUIRED (ml)	CONTAINER ⁽²⁾	PRESERVATIVE ⁽³⁾	HOLDING TIME ⁽⁴⁾
Chlorine	200	P,G	None Required	Analyze Immediately
Inorganics, Non-Metallics (continued)				
Cyanides	500	P,G	Cool, 4°C NaOH to pH >12 0.6g ascorbic acid ⁽⁷⁾	14 days ⁽⁶⁾
Fluoride	300	P,G	None Required	28 days
Iodide	100	P,G	Cool, 4°C	24 hours
Nitrogen Ammonia	400	P,G	Cool, 4°C H ₂ SO ₄ to pH <2	28 days
Kjeldahl, Total	500	P,G	Cool, 4°C H ₂ SO ₄ to pH <2	28 days
Nitrate plus Nitrite	100	P,G	Cool, 4°C H ₂ SO ₄ to pH <2	28 days
Nitrate ⁽⁸⁾	100	P,G	Cool, 4°C	48 hours
Nitrite	50	P,G	Cool, 4°C	48 hours
Dissolved Oxygen Probe	300	G bottle and top	None Required	Analyze Immediately
Winkler	300	G bottle and top	Fix on site and store in dark	8 hours
Phosphorus Orthophosphate, Dissolved	50	P,G	Filter on site Cool, 4°C	48 hours
Hydrolyzable	50	P,G	Cool, 4°C H ₂ SO ₄ to pH <2	28 days
Total	50	P,G	Cool, 4°C H ₂ SO ₄ to pH <2	28 days
Total, Dissolved	50	P,G	Filter on site Cool, 4°C H ₂ SO ₄ to pH <2	24 hours
Silica	50	P only	Cool, 4°C	28 days
Sulfate	50	P,G	Cool, 4°C	28 days

TABLE 3.4-2 - FOOTNOTES

- (1) A general discussion on sampling water and industrial wastewater may be found in ASTM, Part 31, p. 72-82 (1976) Method D-3370.
- (2) Plastic (P) or Glass (G). For metals, polyethylene with a polypropylene cap (no liner) is preferred.
- (3) Sample preservation should be performed immediately upon sample collection. For composite samples each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, samples may be preserved by maintaining at 4°C until compositing and sample splitting is completed.
- (4) When any sample is to be shipped by common carrier or sent through the United State Mails, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR Part 172). The person offering such material for transportation is responsible for ensuring such compliance. For the preservation requirements of Table 3.4-2, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: hydrochloric acid (HCL) in water solution at concentrations of 0.04% by weight or less (pH about 1.96 or greater); nitric acid (HNO₃) in water solutions at concentrations of 0.15% by weight or less (pH about 1.62 or greater); sulfuric acid (H₂SO₄) in water solutions at concentrations of 0.35% by weight or less (pH about 1.15 or greater); sodium hydroxide (NaOH) in water solutions at concentrations of 0.080% by weight or less (pH about 12.30 or less).
- (5) Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid. Samples may be held for longer periods only if the permittee or monitoring laboratory has data on file to show that the specific types of sample under study are stable for the longer time and has received a variance from the Regional Administrator. Some samples may not be stable for the maximum time period in the table. A permittee or monitoring laboratory is obligated to hold the sample for a shorter time if knowledge exists to show this is necessary to maintain sample stability.
- (6) Maximum holding times is 24 hours when sulfide is present. Optionally, all samples may be tested with lead acetate paper before the pH adjustment in order to determine if sulfide is present. If sulfide is present, it can be removed by the addition of cadmium nitrate powder until a negative spot test is obtained. The sample is filtered and then NaOH is added to pH 12.
- (7) Should only be used in the presence of residual chlorine.
- (8) For samples from non-chlorinated drinking water supplies concentrated H₂SO₄ should be added to lower sample pH to less than 2. The sample should be analyzed before 14 days.
- (9) For volatile organics analysis, acidify all low concentration groundwater and other drinking water samples. Test an aliquot of the water to see how much acid is required to bring the pH to less than 2 prior to collecting the actual sample. Do not acidify surface water, wastewater or any medium/high concentration samples. If acidification causes bubbling, do not acidify and notify the Quality Assurance Officer.
- (10) Surface soil samples. Soil boring samples are collected in brass or stainless steel rings.

3.4.2.2 Medium-Hazard Water Samples

Organic extractable analysis for medium-hazard level water samples requires four 32-ounce wide-mouth glass jars. VOC samples are to be taken in two 40-ml vials with teflon-lined septa in the lids. Inorganic analysis for metals and cyanide in medium-hazard level samples are to be taken in two separate 16-ounce jars and require no preservatives.

3.4.2.3 Low- and Medium-Hazard Soil Samples

The following container requirements apply to low- and medium-hazard level soil samples. Organic-extractable soil samples are to be collected in one 8-ounce wide-mouth glass jar. VOC samples require two 120-ml wide-mouth glass jars. Inorganic soil samples shall be collected in one 8-ounce wide-mouth glass jar and will be analyzed for both metals and cyanide. Soil samples do not require chemical preservation.

3.4.3 HIGH-HAZARD SAMPLES

High-hazard samples have concentrations over 200 ppm of the hazardous substances. Liquids, sludges, and solids require one 8-ounce wide-mouth glass jar 3/4-full for both organic and inorganic analyses. This volume is considered adequate for complete routine analysis.

3.4.4 SPECIAL REQUESTS

All CLP analysis not otherwise routine (i.e., target compound list, volatile organic analysis, semi-target analyte list metals) are considered SAS if requested for CLP analysis. Two examples are dioxins and furans. Others may be Standard Methods, drinking water methods, ASTM methods, modified EPA methods, or more complicated analyses like the Toxicity Characteristic Leaching Procedure. Quick turnaround requests of a RAS analysis become a RAS+SAS, if done under CLP analysis.

The container requirements will vary for the type of constituent(s) sampled, and the appropriate methods need to be referenced for each parameter under investigation to ensure proper collection volumes, preservation, containers, and holding times are met.

Analyses for dioxins and furans are SAS techniques. The persons responsible for obtaining sample containers must be consulted 6 to 8 weeks prior to sampling. CLP laboratory space should be procured at least 3 weeks prior to sample collection. Soil analyses require one 4-ounce wide-mouth glass jar. Water analyses require two 1-liter amber bottles. No extra volume should be taken as the laboratory must dispose of the sample remnants.

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Vice President & Chief Engineer**1. POLICY**

This procedure shall apply to all calculations prepared for studies, analysis, detail design, the selection of equipment and components or other related investigations.

2. PURPOSE

This procedure defines the method for documentation required for preparation and handling of calculations.

The objectives of this procedure are:

- To ensure that calculations are prepared in a complete and uniform manner.
- To provide a convenient and uniform filing method for ready identification and retrieval of any calculation.

3. DEFINITIONS

- 3.1 A Chief Discipline Engineer/Architect is the lead engineer or architect for that discipline in any ICF KE office.
- 3.2 A Discipline Job Engineer/Architect is the lead engineer or architect for that discipline assigned to a particular job.
- 3.3 For this procedure a Design Engineer/Architect is any architect, engineer, or designer assigned to prepare calculations.
- 3.4 The Checker is an engineer or architect assigned to check the calculation of the Design Engineer/Architect. The Checker should have the capability of preparing the calculation.

4. RESPONSIBILITIES**4.1 Design Engineer/Architect**

The Design Engineer/Architect shall be responsible for:

- 4.1.1 Preparation of calculations in accordance with the design basis to fulfill stated objectives.
- 4.1.2 Entering information on the Design Calculation Index sheet.

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4.1.3 Checking conformance of calculations with approved specifications, vendor drawings, or contractor substitutions.

4.1.4 Making revisions, if necessary.

4.2 Checker

The Checker shall be responsible for checking calculations for accuracy, completeness, conformance with the design basis, and suitability for stated objectives.

4.3 Discipline Job Engineer/Architect

The Discipline Job Engineer/Architect shall be responsible for:

4.3.1 Assigning Design Engineers/Architects and Checkers.

4.3.2 Establishing the design basis.

4.3.3 Approving use of a computer.

4.3.4 Approving calculations.

4.3.5 Numbering of calculations and maintaining the summary index during the course of the job.

4.3.6 Filing a copy of calculations in the job file and transmitting originals to the Chief Discipline Engineer/Architect.

4.3.7 Preparing Client's copies.

4.4 Chief Discipline Engineer/Architect

The Chief Discipline Engineer/Architect shall be responsible for maintaining a central file for original calculations.

5. IMPLEMENTATION

5.1 Assigning Design Engineers/Architects

Engineers/Architects or Designers shall be assigned to prepare calculations by the appropriate Chief Discipline Engineer/Architect or Discipline Job Engineer/Architect.

5.2 Preparation of Calculations

5.2.1 Design Calculation Index Sheet

Calculations shall begin with a Design Calculation Index sheet (Exhibit 7-1) on which the Design Engineer/Architect shall enter the following:

- 5.2.1.1 Job number and title (if not pre-printed).
- 5.2.1.2 Area, building, or facility.
- 5.2.1.3 Calculation number - formed by the discipline initial plus the area number and a serial number (e.g., "P-6-1").
- 5.2.1.4 Calculation description.
- 5.2.1.5 Discipline.
- 5.2.1.6 Applicable drawing numbers.
- 5.2.1.7 Calculation status.

The space for sheet number is left blank until final assembly of the complete set of job discipline calculations, as described in Item 5.2.9, Retention.

The Design Engineer/Architect shall fill out the index part of the sheet after completing the calculations (see Exhibit 7-1).

5.2.2 Calculation Sheets

The first calculation sheet, Form E-6 (Exhibit 7-2), shall begin with an Introduction that describes and defines the following:

5.2.2.1 Objective

This section shall state the reason for making the calculation, the end result sought, and alternatives examined.

Example:

Sizing the Sump underneath the Acid Storage Tank.

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This calculation determines:

The amount of rainfall that falls on the treatment unit pad in a 25 year, 24 hour storm for use in sizing the acid sump.

5.2.2.2 Design Basis

The Chief Discipline Engineer/Architect or Discipline Job Engineer/Architect shall review the following with the Design Engineer/Architect to establish agreement on design approach and concept for calculations:

- 1) Criteria and source. The Project Management Plan will be referenced.
- 2) Given or known data and source.
- 3) Assumptions made.
- 4) Methods to be used. Include special data, formulas and, if a computer is to be used, the name of the computer program.
- 5) References used.

After agreement on design approach and concept is reached, the above items will be stated under "Design Basis."

5.2.2.3 Calculations and Conclusions

Calculations shall be prepared on calculation sheets (Exhibit 7-3), in a neat and logical manner with sufficient notes to make the calculations easily understandable.

The conclusions will also be shown on the calculation sheets.

After completing the calculation, the Design Engineer/Architect will sign the Design Calculation Index sheet (Exhibit 7-1).

5.2.3 Computer Calculations

To assure that the use of a computer is appropriate, the Chief Discipline Engineer/Architect or Discipline Job Engineer/Architect shall review the planned computer usage with the Design Engineer/Architect.

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5.2.3.1 Only approved computer programs shall be used for design calculations.

5.2.3.2 Computer calculations will be made up of computer input and output sheets together with a Design Calculation Index sheet.

5.2.4 Checking

Calculations shall be checked in accordance with Engineering Procedure E-11, "Checking Documents." After completing checking, the checker will sign the Design Calculation Index sheet.

5.2.5 Approvals

5.2.5.1 Initial Approvals

After the calculation index sheet has been signed by the Checker, the Chief Discipline Engineer/Architect or Discipline Job Engineer/Architect shall review the calculation to ensure that it has been organized and checked properly and that the results obtained by the Design Engineer/Architect and Checker are consistent with the type of calculation performed. The Chief Discipline Engineer/Architect or Discipline Job Engineer/Architect shall approve the calculation by signing the Design Calculation Index sheet.

5.2.5.2 Subsequent Approvals

Upon receiving approved specifications, vendor drawings, or contractor substitutions, the Chief Discipline Engineer/Architect or Discipline Job Engineer/Architect will ask the Design Engineer/Architect to review the calculation for agreement with the above documents and if necessary, revise them to agree with the above documents. After assuring that the calculation agrees with the approved specifications, vendor drawings or contractor substitutions, the Design Engineer/Architect shall sign the appropriate line on the Design Calculation Index sheet.

Any revisions to calculations shall be made in accordance with Item 5.2.6, Revisions.

5.2.6 Revisions

Minor changes to approved calculations will be incorporated as revisions.

Revisions will be done neatly by the Design Engineer/Architect on the original calculation sheets in such a manner that the revised part of the

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calculation will be distinct from the original. A triangle with a revision number will be added to identify the revised portion.

After completing the revisions, the Design Engineer/Architect shall enter the number and a brief description of the revision on the Design Calculation Index sheet. The Design Engineer/Architect and Checker will sign and date the index sheet. Revisions will be checked and approved by the same procedure as the original calculation.

Major changes which cannot be incorporated as revisions will require a new calculation, which will supersede the original calculation. The Design Engineer/Architect responsible for new calculations shall void the original calculations in accordance with Item 5.2.7, Voiding Calculations.

5.2.7 Voiding Calculations

If a calculation is superseded by a new calculation, the status of the superseded calculation shall be marked "void" on the Design Calculation Index sheet and the following information added:

5.2.7.1 The number and date of the calculation that superseded it.

5.2.7.2 The reason for voiding the calculation.

5.2.8 Summary Index

A summary index of all design calculations will be maintained on Design Calculation Index sheets (see Exhibit 7-4). The Discipline Job Engineer/Architect will record each calculation after approving it.

5.2.9 Retention

The original copy of the calculation shall be retained by the Discipline Job Engineer/Architect in loose-leaf binders organized by area and subject and then sequentially by calculation number. If the calculation to be filed supersedes another calculation, the superseded calculation is marked void and is placed immediately to the rear of the new calculation. The calculations shall be retained by the Discipline Job Engineer/Architect until the work is completed. The calculations shall then be prepared for permanent filing and for Client's copies.

5.2.9.1 Permanent Filing

Every sheet of each discipline's calculations, including the Design Calculation Index sheets, shall be assigned a number. The number will consist of two parts separated by a dash. The first part will be the area number and the second part the

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consecutive sheet number (e.g., Sheet No. 3-17 is the 17th consecutive sheet in the calculations for Area 3).

The calculations shall then be assembled by area groups and by discipline.

The summary index of each discipline shall be marked with the final sheet numbers and shall then be placed at the front of the discipline calculations. The Discipline Job Engineer/Architect shall place a copy of the calculations in the job file and transmit the originals to the Chief Discipline Engineer/Architect.

The Chief Discipline Engineer/Architect shall see that this responsibility is carried out prior to the reassignment of a Discipline Job Engineer/Architect. The Chief Discipline Engineer/Architect will be responsible for maintaining in a central file the calculations prepared for completed projects. (See Procedure E-28, Retention of Documents).

5.2.9.2 Client's Copies

The Client's copies of calculations shall be assembled and bound in accordance with Client's requirements.

5.3 Registration Requirements - See Procedure E-3, Professional Seals, Permits, Codes, and Standards.

6. EXHIBITS

- 7-1 Sample Design Calculation Index**
- 7-2 Sample Form E-6**
- 7-3 Sample Calculation Sheet**
- 7-4 Sample Summary Index**

EXHIBIT 7-2

SAMPLE FORM E-6

ICF KAISER ENGINEERS	Job No. <u>92-24-300</u> Sheet 1 of 5
ANP - BUE LAKE-18A COMP STN FOUNDATION FOR DRY AIR RECEIVER EQUIP NO V-310-6	DESIGNED BY <u>K. W. A</u> DATE <u>5/12/92</u> CHECKED BY <u>[Signature]</u> DATE <u>5/12/92</u>

DESIGN CRITERIA

DN FOR 1402.3 VESSEL 120" O.D. x 35'-0" S/S

1. DEAD LOAD 2. LIVE LOAD (WET LOAD)	}	FROM VENDOR DWG STEELTEX DWG. NO. 92S-149-A

3. WIND LOAD : BOCA 1987, 90 mph. Exp C

4. SEISMIC LOAD : BOCA 1987, ZONE 1

5. THERMAL LOAD : NOT A LOADING CONDITION
 SINCE OPERATING TEMP
 WILL NOT VARY FROM
 INSTALLATION TEMP.

REFERENCES USED

1. BUILDING OFFICIALS & NATIONAL CODE ADMINISTRATORS
 CODE, 1987.
2. ACI-318-89
3. REPORT ON GEOTECHNICAL INVESTIGATION
 FOR BUE LAKE-18A COMPRESSOR STATION
 BY NTH, OCT. 91
4. IN-HOUSE SPREAD SHEET FOR DESIGN
 OF SPREAD FOOTING. FILE: SPREAD.WK3

CALCULATIONS SEE FORM No. E-6 Rev. 12-88

EXHIBIT 7-3

SAMPLE CALCULATION SHEET

ICF KAISER ENGINEERS	JOB NO. 2024-300 SHEET 2 OF 5
AIR BLUE LINE FOR PLANT AIR RECEIVER	DESIGNED BY K CHON DATE 5/6/1 CHECKED BY H. ALAN DATE 5-1

LOADING:

1 DRY WEIGHT $W_1 = 44.4 \text{ K}$
 WT. LOAD $W_2 = 215.8 \text{ K}$

2 WIND LOAD

$$P_0 = P_z I C_p$$

$$= 25 \times 1.0 \times 0.8 = 20 \text{ PSF}$$

$V_N = 36 \times 10 \times 20 = 7.2 \text{ K}$
 GOVERNS FOR TRANSV. DIRECTION

3 EISMIC LOAD

$$V_0 = 22 \text{ KCSN}$$

$$= 0.055 W$$

$$= 0.055 \times 44.4$$

$$= 2.5 \text{ K}$$

WHERE $\tau = 3/16$ CONT.
 $I = 1$
 $K_C = 0.29$

GOVERNS FOR LONGITUDINAL DIRECTION

VERTICAL LOAD DUE TO CALSMIC

$$P = 2.5 \times 6/20 = 0.65 \text{ K}$$

UPLIFT FORCE

ANCHOR BOLTS DESIGN

FROM INSPECTION. NO UPLIFT

$$V_{\text{UP}} = 7.2/4 = 1.8 \text{ KIP}$$

FOR 3/4" BOLT

$$V = 1.8 / (\pi \times 0.75^2) = 4.1 \text{ KSI} < 14 \text{ KSI OK}$$

NATIONAL ME Form No. E-9 Rev. 12-69

EXHIBIT 7-4

SAMPLE SUMMARY INDEX

ICF KAISER
ENGINEERS

7/27/84
ENGINEERS

ICF KAISER ENGINEERS DESIGN CALCULATION INDEX SC-01

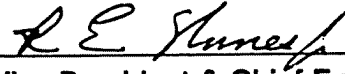
[illegible]

E-8: PREPARATION OF SPECIFICATIONS

Revision No. 3

Effective Date: Nov-30-92

Authorized by:


Vice President & Chief Engineer**1. POLICY**

This procedure applies to the specifications prepared and issued by ICF Kaiser Engineers (ICF KE). Exceptions to this procedure relative to format may be taken only by direction of the client and with the approval of the Specifications Manager.

Specifications shall be free of errors, accurate in definition of scope, and complete with updated references. Specifications shall be written with the latest proper terminology and include all pertinent technical data.

2. PURPOSE

This procedure defines the requirements to be followed in the preparation, review, approval, issuance, and revision of specifications.

3. REFERENCES

This procedure incorporates the requirements of the Construction Specifications Institute (CSI) standard format.

4. RESPONSIBILITY

The requirement of a specification is the responsibility of the Project Engineer/Engineers assigned to a project. The development of the same is the responsibility of the Specification Engineer and the Principal Discipline Job Engineer for the project.

5. IMPLEMENTATION**5.1 General**

- 5.1.1 The Specification Group will operate from a centralized office using a master file system as a basis for all specifications. Word processing equipment will be utilized to develop job specifications.

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Revision No. 3
Effective Date: Nov-30-92

5.2 Preparation

- 5.2.1 The Specification Engineer assigned to a project shall develop a specification list in association with the Project Engineers, the Discipline Job Engineers and the Design Manager. The specification list shall be developed from the equipment list, past experience, project scope of contract, and other available information.
- 5.2.2 A specification completion schedule shall then be developed for the specifications required. This schedule is important for planning the project. It will take into consideration the proper time frame for procuring equipment to be delivered on time and in the proper sequence, the lead times needed for manufacturing, and when vendors should submit drawings so that the design effort will progress efficiently and on schedule.
- 5.2.3 While each specification will be unique to a particular project, it can be updated and changed from a specification used in a previous job or a master file specification. If a similar specification is not found in the master file, a new draft will be generated.
- 5.2.4 The draft from the master file is to be modified by the Specification Engineer to incorporate all the items unique to the particular project for which the specification is being written. The modified draft is submitted to the word processor and then distributed for review and checking. After appropriate reviews and checking, the final copy is generated. (See Exhibit 26-1.)
- 5.2.5 When drawings are to be included as part of a specification, a drawing list shall be developed by the appropriate Discipline Job Engineers assigned to the project. The Discipline Job Engineers are responsible for identifying the proper drawings according to the list.
- 5.2.6 Attachments to specifications shall be the responsibility of the Discipline Job Engineers (e.g., pipe material specifications, data sheets, drawings, sketches, etc.).
- In all cases, the Discipline Job Engineers shall be responsible for the preparation, typing, checking, proofreading, and forwarding of camera-ready copies of the attachments to the assigned Specification Engineer for inclusion in the specification package. The Specification Engineer will continue to process Form KE-G10, "Bidder and Seller Information Requirements."
- 5.2.7 The format for equipment and construction specifications shall be in accordance with the specification format documents attached hereto (Exhibit 26-2). The original specification files are to be set up and maintained by the Specifications Engineer. A working file (by specification number) will also be maintained by the

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Revision No. 3

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Specification Engineer. This file shall include all drafts, approved copies, and all other information that demonstrates that the specification, as issued, has been properly prepared and coordinated.

5.3 Review/Checking of Specifications

Review and checking of specifications shall be in accordance with Engineering Procedure E-11, "Checking Engineering Documents."

5.4 Issuance

After all required approvals have been obtained, specifications shall be issued and distributed as directed by the Project Manager. A copy of each issued specification shall be included in the master file.

5.5 Revisions

The specifications list will be updated (e.g., deletions, additions, status, schedule, etc.) as required. Updating of this list shall be the responsibility of the assigned Specification Engineer.

Specification changes after initial issue will be by addendum or by complete specification revision, as most suitable, based on extent of the change(s).

6. EXHIBITS

8-1 - Specifications Flow Chart

8-2 - Specification Format/Style

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EXHIBIT 8-1

SPECIFICATIONS FLOW CHART

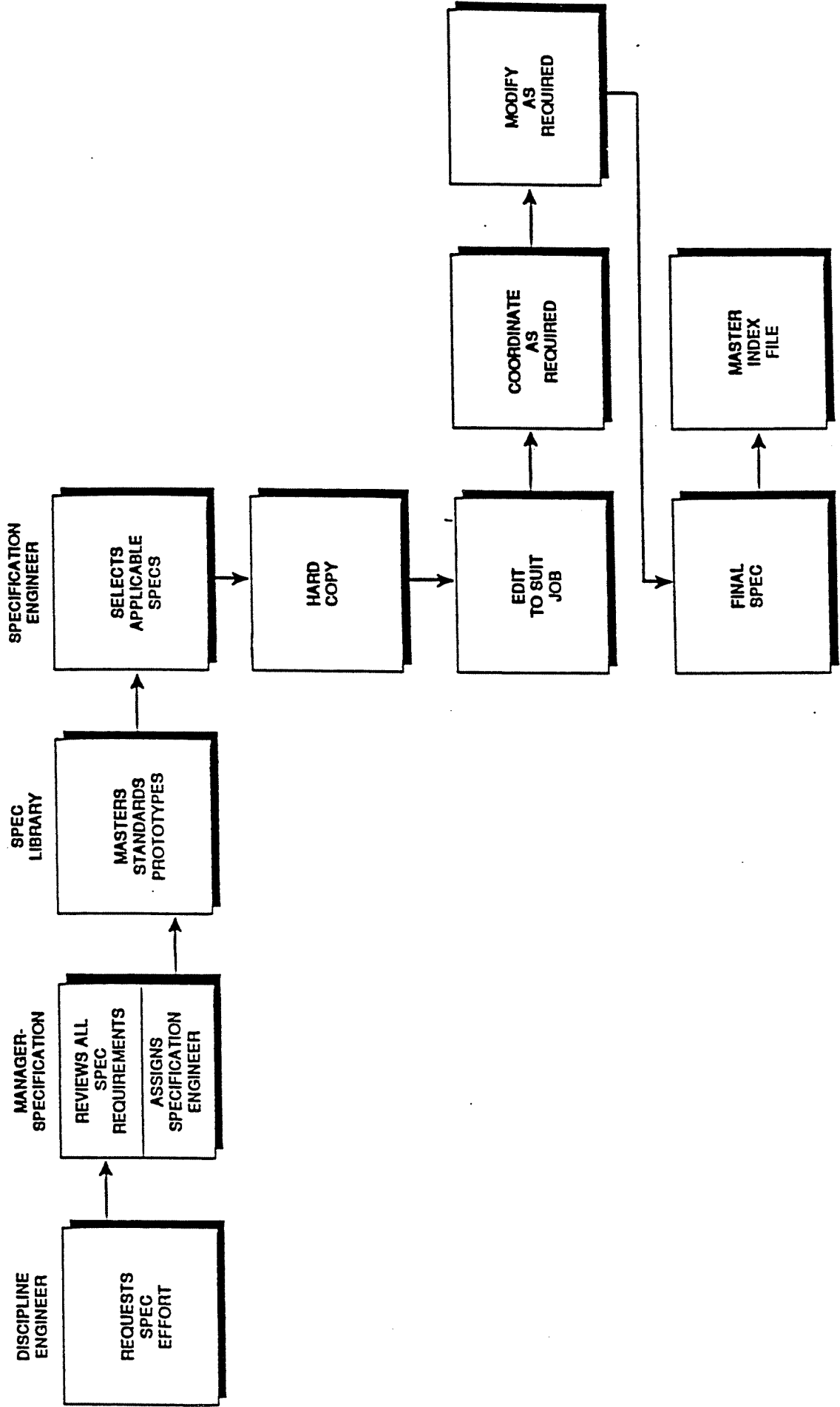


Exhibit 8-2

SPECIFICATION FORMAT/STYLE

1. PREPARATION OF SPECIFICATIONS

1.1 Cover Page

The specification cover page will show the specification number, title, the revision number, date and approval signatures. In addition, the cover page will also display the company name or entity as designated by the legal department, the client's name, and the job number.

1.2 Numbering System

The text should be organized in paragraphs that are numbered using a preferred maximum of three levels (e.g., 1.1.1).

2. EQUIPMENT SPECIFICATIONS

2.1 The body of the specification will include the following paragraphs and subparagraphs, as appropriate. The following numbering system is used in equipment specifications:

1.0 Scope

1.1 Work Included
Equipment Numbers
Description

1.2 Work Not Included

2.0 General Provisions

2.1 Cited References (list only)

2.2 Drawings (current), Specifications and Documents (list only)

3.0 Technical Provisions

3.1 Equipment Description

3.2 Operating Conditions and Performance Requirements

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Exhibit 8-2 (cont)

- 3.3 Design Requirements
- 3.4 Special Requirements (split bearing, high tension bolts, etc.)
- 4.0 Painting and Finishes (provide any special instructions)
- 5.0 Marking and Preparation for Shipment
- 6.0 Information Required from Seller
- 2.2 Additional Documents to be Enclosed with Issued Specifications
 - Data sheets
 - Drawings (actual design and standard drawings)
 - Standard Provisions for Procurement of Equipment and Materials (the current revision of the Project Standard Provisions)

3. CONSTRUCTION SPECIFICATIONS

3.1 General

The accepted standard for construction specifications is the format developed by the Construction Specifications Institute (CSI). This format has been adopted for preparing construction specifications.

3.2 Body

The body of the specification will be in the 16 Division/Section/3-Part CSI format. Summary of work for the total project shall be always be included as a section under Division 1. Part 1 - General, covers work in general terms without detailing scope. Part 2 - Products, defines quality of materials, equipment and products which are to be purchased for the intended project. Part 3 - Execution, describes the manner in which items in Part 2 are to be installed at the intended project. The Divisions will be as follows:

- DIVISION 1 - GENERAL REQUIREMENTS
- DIVISION 2 - SITEWORK
- DIVISION 3 - CONCRETE
- DIVISION 4 - MASONRY
- DIVISION 5 - METALS

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Exhibit 8-2 (cont)

DIVISION 6	-	WOOD AND PLASTICS
DIVISION 7	-	THERMAL AND MOISTURE PROTECTION
DIVISION 8	-	DOORS AND WINDOWS
DIVISION 9	-	FINISHES
DIVISION 10	-	SPECIALTIES
DIVISION 11	-	EQUIPMENT
DIVISION 12	-	FURNISHINGS
DIVISION 13	-	SPECIAL CONSTRUCTION
DIVISION 14	-	CONVEYING SYSTEMS
DIVISION 15	-	MECHANICAL
DIVISION 16	-	ELECTRICAL

4. SPECIFICATION STYLE

- 4.1 Text shall be in clear, simple language, free of vague terms or those subject to interpretation. Specifications shall be written in short, concise sentences in the simplest style possible, and the tense shall be the same throughout. Unfamiliar words, those having more than one meaning, and unusual trade and technical expressions shall be avoided. When extensive punctuation appears necessary for clarity, consideration shall be given to revising the sentence, since misplaced or omitted punctuation marks can sometimes change the meaning of the sentence completely. To avoid confusion, consideration shall be given to breaking up compound sentences. Tabulations and schedules are frequently advantageous.
- 4.2 Type style (font) shall be "Prestige Elite." Margins of text shall be 1¼ inches minimum from the top, bottom, right and left of the page.
- 4.3 Specifications shall indicate as definitively as possible the standards of performance, quality, and workmanship which the item must meet to be acceptable.

E-9: DRAFTING STANDARDS**Revision No. 4****Effective Date: Nov-30-92****Authorized by:**
Vice President & Chief Engineer**1. POLICY**

This procedure applies to those ICF Kaiser Engineers drawings that are generated manually. Drawings created by Computer Aided Engineering, the preferred method, shall follow the procedures outlined in the ICF KE CAE Drafting Guidelines. Deviation from these standards and procedures must be approved by the Chief Engineer.

2. PURPOSE

To set forth the standards and procedures for planning, drafting, and revising manually generated drawings.

3. DEFINITIONS

- 3.1 The Design Support Manager is the engineer in any ICF KE office who is assigned functions similar to those assigned to the Design Support Manager in Engineering Procedure E-2.
- 3.2 The Chief Discipline Engineer/Architect is the lead discipline engineer/architect in any ICF KE office.

4. RESPONSIBILITY

Overall responsibility for the administration of this procedure is assigned to the Design Support Manager and Chief Discipline Engineer/Architect.

5. IMPLEMENTATION**5.1 Drawing Planning and Layout**

Before starting work the drawing content should be roughly sketched free-hand on a calculation sheet or on the back of an old print.

In general, the drawing produced shall conform to the following:

- 5.1.1 Reserve the necessary space above the title block on the right hand for legend, notes, key plot plan and bills of material, if required.

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- 5.1.2 Arrange the main elements of the drawing to provide a 1-1/2" binding edge.
 - 5.1.3 Orient all drawings, notes and dimensions to read from the bottom of the sheet or from the right hand side. Use north arrows to orient plans. If possible, the plans should be designed so that the north arrow points to the top of the sheet, or as a second choice, to the left of the sheet. Plans created by different design disciplines for the same facility shall maintain the same orientation.
 - 5.1.4 Use a "Key Plan," as applicable, to locate the area of the drawing in relation to the plant or building layout. This plan is preferably placed in the lower right hand corner of the sheet, so that it is visible when the sheet is folded.
 - 5.1.5 Avoid mixing major plans with sections and details on the same drawings.
 - 5.1.6 Where part views are shown, the match lines with matching drawing numbers shall clearly indicate the limits of work on each sheet. Plant coordinate numbers shall be assigned to plant yard match lines.
 - 5.1.7 The sheet composition should be simple. Crowding and overlapping of views and details are to be avoided. Details should be carefully organized so that related details read coherently in a grouped arrangement. Use simple orthographic projections to explain sections. Avoid cutting complex sections. In general, about 1" of clear space should separate details. Sections and elevations preferably should be separated by more than 1" of clear space.
 - 5.1.8 All drawings for a project must be drawn on standard preprinted paper, cloth or mylar tracing sheets approved for the specific project.
 - 5.1.9 Avoid repetition of information on different drawings or on the same drawing to avoid conflicts.
- 5.2 Rules for Microfilming

In most cases ICF KE drawings on microfilm are reduced at a ratio of 29:1. Therefore the following preparation rules shall be followed:

- 5.2.1 Lettering must be at least 1/8" high with an open letter style for manually generated drawings.

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- 5.2.2 There must be maximum contrast between line density and background.
- 5.2.3 Material typed on standard elite typewriters shall not be used. It will not reduce clearly at the ratio of 29:1.
- 5.2.4 A blackline print must be made from a reversed brownline drawn on vellum to make microfilming possible.
- 5.2.5 Colored paper and lettering shall not be used.

5.3 Line Weights

- 5.3.1 For width and character of lines commonly used on engineering drawings, see Exhibit 9-1.
- 5.3.2 All lines and strokes should be clear and black. A good drafting technique is required to make prints for construction, filing, and record drawings that are clear and legible. The ultimate user may never see the original tracing.
- 5.3.3 The quality and spacing of the pencil lines and strokes on the mylar tracing must be carefully controlled. A pencil which will leave a fairly dense deposit should be used and all lines and strokes should be drawn with uniform manual pressure, as though the drafting were in pen and ink.
- 5.3.4 To make lines of different widths, use a sharp pencil and a number of strokes to get the desired width of line. A sharp pencil gives a good sharp outline to a wide line. Never use a dull pencil or increased pressure as this will give you a fuzzy line. Exercise care to produce lines of even thickness and uniformity.
- 5.3.5 Parallel lines should never be so close together that they will merge into one broad line when a reduced print is made. The clear space between lines should always be of greater width than the lines.
- 5.3.6 Care should be taken to select grades of pencils which will produce the desired line weights without "engraving" or tearing the drawing tracing film. When drawing on mylar, use mylar drafting pencils. The selection of pencil grades shall be of personal preference so long as the drafting product is of acceptable quality, with sharp dense lines which produce a good, sharp, clear print. When drawing on vellum (paper), only graphite type pencils and leads are acceptable.

5.3.7 When making changes on a mylar tracing, use only a plastic eraser to erase existing work. Use of any other type of eraser will remove the drawing surface (tooth) from the mylar and make it very difficult to redraw in the erased area.

5.3.8 Erasing machines should be avoided, if possible. If an erasing machine is used, use only plastic erasers and use with extreme care. The drawings surface of the mylar comes off quite easily with an erasing machine.

When erasing on vellum (paper), any type eraser (hand or erasing machine) is acceptable, although care should be taken so that the paper is not torn, especially if erasing is required several times in one area.

5.3.9 A drawing will be handled many times in its lifetime. Keep it clean.

5.3.10 Hands and instruments must be kept clean and dry.

5.3.11 Avoid excessive use of powdered cleaners, since they reduce the clarity of the drawing by removing graphite. When used with care, they are a very helpful product for keeping the drawing clean.

5.3.12 Use screened mylar reproductions of previously prepared drawings where possible for drawing background. Drawings used for background reproductions should have no further changes, but might be at an intermediate stage of completion insofar as the originating discipline is concerned.

5.3.13 When existing drawings are used on a job expansion, use screened mylar tracings (reverse printing) and draft the additional facility layouts on the screened mylar. This will enable contractors to distinguish unequivocally between the existing portion of job and the new one.

5.4 Lettering

5.4.1 For manual lettering, see Exhibit 9-2.

5.4.2 Lettering and figures drawn free hand shall be neat, clean, even strokes in simple open, rounded style without shading or embellishment.

Wherever practical, extensive notes, schedules and lists should be handled utilizing typed decals.

5.4.3 Vertical lettering is the standard and shall be used in the titles and title block areas. All lettering shall be capital letters.

5.4.4 Lettering style shall be consistent throughout the drawing.

5.4.5 Sizes of lettering and figures are to be:

3/16" for titles of views of details

5/32" for general notes and subtitles

1/8" for all other lettering

5.4.6 Lettering should be compact, but without crowding. Text width should be approximately half the size of text height (i.e., 1/8" high lettering with 3/32" width). All lettering and figures must be neat and clear to be legible on reduced reproductions.

5.4.7 Fractions must be made with a horizontal line and with numerals sized so that the fraction is 1-2/3 times larger than the adjacent lettered numerals.

5.4.8 Underline titles of views with a single line.

5.5 Scales

5.5.1 Choice of scales shall be selected by the design group preparing the drawing. In general, the scale of a drawing should be large enough to meet the following requirements:

- Preserve separation of parallel lines.
- Allow for reasonable space between lines and lettering or figures.
- Preserve clarity when the drawing is reduced to half size.

5.5.2 Scales shall be called out under the title of each view or detail if more than one scale is used on the drawing sheet.

Thus: SCALE: 1/2" = 1'-0"

5.5.3 Plans, elevations, sections, and details must be to scale where accuracy is necessary to establish physical relationships.

5.5.4 Drafting to scale is not always necessary. Exaggeration of a detail may clarify the intent.

5.5.5 Graphic scales must be added above the title block on civil yard drawings.

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5.5.6 If a detail is not to scale, note it under the title: NOT TO SCALE or NTS.

5.6 Arrows and North Arrows

5.6.1 Arrows with straight shafts may be used only where they will not conflict with dimension and section lines and the lines of the drawing. These arrows should be drawn parallel to each other and notes should be grouped systematically.

5.6.2 Welding symbols shall be drawn with shafts in straight segments.

5.6.3 In general, the number of arrows from notations shall be kept to a minimum. Where possible, notes should be grouped together, with the arrows run from the end or from the beginning of the notation.

5.6.4 Where necessary to orient a plan view in space, place a north arrow on the drawing. The north arrow should be located in the upper right hand section of the drawing.

5.7 Dimensioning

5.7.1 Dimension lines shall be simple, straight, unbroken lines with arrowheads.

5.7.2 Dimensions shall be written above the line.

5.7.3 Arrowheads should accurately point to the line being dimensioned.

5.7.4 Witness lines which define the end of dimension lines must be in line with the surface being dimensioned.

5.7.5 Dimensions 1'-0" and larger shall be written in feet and inches. There are exceptions to this such as plate width and beam depths, duct work, certain equipment dimensions and other recognized standards. In some cases on civil yard plans, dimensions are shown only in feet (176.17 ft).

5.7.6 Use coordinate systems with feet and decimals for plot plans, maps and drawings showing outside services.

5.7.7 Show elevations within structures in feet and inches. All other elevation figures shall be in feet and decimals.

5.7.8 Avoid unnecessary duplication of dimensions. In general, horizontal dimensions should be shown on plans; vertical dimensions should be shown on sections and elevations.

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5.7.9 If elevations are shown on a structure, do not repeat the same information by giving height dimensions to the same points.

5.7.10 When a dimension is out of scale enough to be misleading, add the note "not to scale" or the abbreviation "NTS" adjacent to the dimension figure. Do not use a wavy line under the figure.

5.8 Section and Detail Designations

5.8.1 Designation of section cuts and details shall be with straight lines as illustrated by Exhibit 9-3.

5.8.2 Sections shall be designated by letters using the alphabet in sequence, omitting letters I, O and Q. After all letters have been utilized, use two letters, such as AA, AB, AC, etc.

5.8.3 Details are to be numbered in sequence.

5.8.4 When a section is referenced or plotted on a sheet other than the sheet from which it is taken, the letter or number designation shall be given adjacent to the title of the section or detail and underlined. The drawing number(s) of the sheet(s) on which the section is cut shall be shown below this underline. Conversely, the designation of the section or detail on the drawing(s) on which they are cut shall include the number of the sheet upon which the section or detail originated.

5.8.5 Omit the drawing reference if the section or detail is located on the same sheet as that on which the section or detail cut is taken.

5.8.6 Ensure that the section arrows are placed in the direction of the section.

5.9 Construction Detail Designations

5.9.1 All disciplines have construction detail libraries. If construction details are required, contact the appropriate Chief Discipline Engineer/Architect for a booklet showing all the details available for that discipline. After determining requirements fill out a Construction Detail Request Form (Exhibit 9-4).

5.9.2 Construction details on construction drawings should be referred to on other construction drawings as illustrated on Exhibit 9-3.

5.10 Notes

- 5.10.1 All notes and notations are to be concise.
- 5.10.2 Specific notations are to be carefully placed as they relate to that portion of the drawing or detail to which they apply.
- 5.10.3 Avoid placing notes through drawing lines.
- 5.10.4 Notes related to small plans and details should be placed to one side with enough separation to preserve legibility.
- 5.10.5 If possible, organize the notes and notations in groups.
- 5.10.6 Avoid repetitious notes.
- 5.10.7 General notes should cover applicable material specifications, bills of materials, design criteria, and special instructions to the fabricator and/or installer. Use the printed block at the bottom of the standard sheet for these or, if the notes are extensive, group them on the right hand side of the sheet.
- 5.10.8 The use of machine typing is recommended over hand lettering for extensive "General Notes". The typed notes may be on decal paper if that is satisfactory or preferably on individual sheets which should be arranged on a print from which a mylar could be obtained with the appropriate title block.

5.11 Indications of Materials

- 5.11.1 Where possible, omit hatching and other material indications on drawings. Simple notation may be adequate.
- 5.11.2 Hatching and other material indications should be used only where it is an advantage in clarifying a drawing. Partial cross hatching of a view is sufficient to show the intent.
- 5.11.3 Exhibit 9-5 illustrates manual engineering drawing material indication symbols. For the sake of clarity and legibility in reduced size prints, the lines and strokes used in these material indications must be exaggerated in scale as shown. Any other symbols should be drawn in a similar manner.

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- 5.11.4 Use printed appliques for area designation and material indication where such use is economical.

5.12 Drawing Sheets

- 5.12.1 All ICF KE design work shall be drafted on standard size sheets, with printed border and title block.
- 5.12.2 For manual drafting, sheets shall be mylar drafting film. (See Exhibit 9-6, Manual Drafting Drawing Sheet Specifications.)
- 5.12.3 Except for special work, the standard size sheet is 27" x 40".
- 5.12.4 Use the title block established as the standard for the particular project.
- 5.12.5 The information required on the title block is shown in Exhibit 9-7, a and b.
- 5.12.6 Because of the lettering size required and the limitations of space, drawing titles should be as brief as possible, preferably two lines. The title of the drawing is a means of identification only.
- 5.12.7 The standard drawing sheet has a box for reference drawings. List only those reference drawings required to do the work shown on the sheet.
- 5.12.8 If vendor's drawings must be referenced because they supplement the work shown on the sheet, these reference titles should be brief.

5.13 Drawing Signature and Approvals

- 5.13.1 Exhibit 9-7b indicates the normal signature and approval requirements within Engineering Services.
- 5.13.2 Additional approvals by business units and clients may be required. See the Project Management Plan.
- 5.13.3 The professional engineer's and architect's seals are used as required by Engineering Procedure E-3 and identified in the Project Management Plan.

5.14 Revisions, Holds and Deletions

- 5.14.1 Revisions will be highlighted by drawing a cloud around the revised area. This cloud shall be placed on the reverse side of the tracing. A brief description of the revision shall be inserted in the drawing revision box. In-depth revisions may require a separate memo with a full description of

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the revisions to accompany the drawing to the field. A 5/16" triangle will be placed inside the cloud with the appropriate revision number. (See an example on Exhibit 9-8.) When and if subsequent revisions are made, the cloud shall be deleted. The revision triangle shall remain. On certain presentation drawings, and in cases where the revision is not specific to an area, omit the cloud.

- 5.14.2 A revised and replotted drawing shall not be signed and issued until the predecessor mylar has been stamped "Revised & Superseded by Dwg. No. ____, Rev. No. ____." The predecessor mylar shall be retained for the duration of the project.

The names or initials of the persons signing the original drawing shall be printed on the new drawing.

- 5.14.3 A hold is placed on a portion of a drawing which cannot be completed or released because of lack of information. As shown in Exhibit 9-9 the area in question is outlined on the back and the word "hold" is written on the back in reverse within the outline of the cloud. A brief note is required to clarify missing data.

- 5.14.4 A deletion of a detail or part shall be shown by cross hatching on the back of the tracing with the word "omit" written on the back in reverse. The revision symbol and outline are then shown as above. (See Exhibit 9-9 for an example.)

5.15 Abbreviations and Spelling

- 5.15.1 The use of abbreviations or words in notations should be restricted to commonly used abbreviations as listed in Exhibit 9-10. Do not invent new ones!
- 5.15.2 Avoid use of abbreviations in drawing titles.
- 5.15.3 Avoid excessive use of abbreviations. In general, avoid abbreviating short words where space permits full spelling.
- 5.15.4 Provide a legend of abbreviations used, where required (as for Corps of Engineers work). The legend shall appear only once in a set of drawings.
- 5.15.5 An abbreviation used only once and then shown in the legend is considered waste of time.

5.15.6 Spelling must be accurate. Misspelled words may not impair or destroy the intent of a design, but they leave a negative impression in the mind of the reader. If uncertain about the spelling of any word, take time to look it up. Use simple forms or the most common form of a word when there is a choice.

5.15.7 Avoid hyphenating a word at the end of a line. When hyphenation is necessary, hyphenate correctly.

5.16 Metric System (SI)

Drawings prepared for overseas construction using the metric system should conform to the codes and regulations of that particular country. Some countries, such as Brazil, specify drawing size, scales to be used, etc. All metric units and conversions should conform to ASTM:E380, "Standard Metric Guide - A Guide to the Use of SI - International System of Units."

6. EXHIBITS

- 9-1 Width and Character of Lines
- 9-2 Lettering
- 9-3 Section and Detail Designations
- 9-4 Construction Detail Request Forms
- 9-5 Material Indication Symbols
- 9-6 Drawing Sheet Specifications
- 9-7a&b Sample Title Block
- 9-8 Method of Showing a Revision
- 9-9 Methods of Showing a Hold and a Deletion
- 9-10 Standard Abbreviations

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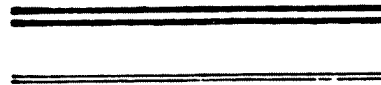
EXHIBIT 9-1

WIDTH AND CHARACTER OF LINES

Outline of Parts or Principal Feature.
The thickness may vary to suit size of drawing.



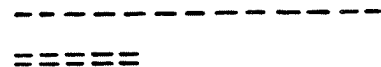
Parallel Lines.



Internal Parts. This should be a sharp line, but not so heavy as to detract from the outline.



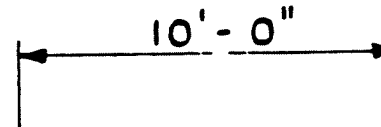
Hidden Lines. Short dashes, closely and evenly spaced.



Center Lines. Alternate long and short dashes, closely and evenly spaced.



Dimension and Extension Lines. Lines unbroken, dimensions above lines.



Match Line. Long and two short dashes alternately and evenly spaced.



Break Lines. Free hand line for short breaks.



Ruled line and free hand signing for long breaks.



Phantom Lines



EXHIBIT 9-2

LETTERING

$\frac{3}{16}$ " $\frac{1}{16}$ " $\uparrow$ ABCDEFGHIJKLMNOPQRSTUVWXYZ

$\frac{3}{16}$ " $\frac{1}{16}$ " $\uparrow$ 1 2 3 4 5 6 7 8 9 0 $\frac{1}{4}$ $\cdot$ $\frac{1}{2}$ $\cdot$ $\frac{3}{8}$ $\cdot$ $\frac{9}{16}$

$\frac{5}{32}$ " $\frac{1}{32}$ " $\uparrow$ ABCDEFGHIJKLMNOPQRSTUVWXYZ

$\frac{5}{32}$ " $\frac{1}{32}$ " $\uparrow$ 1 2 3 4 5 6 7 8 9 0 $\frac{1}{4}$ $\cdot$ $\frac{1}{2}$ $\cdot$ $\frac{3}{8}$ $\cdot$ $\frac{9}{16}$

$\frac{1}{8}$ " $\frac{1}{8}$ " $\uparrow$ ABCDEFGHIJKLMNOPQRSTUVWXYZ

$\frac{1}{8}$ " $\frac{1}{8}$ " $\uparrow$ 1 2 3 4 5 6 7 8 9 0 $\frac{1}{4}$ $\cdot$ $\frac{1}{2}$ $\cdot$ $\frac{3}{8}$ $\cdot$ $\frac{9}{16}$

$\frac{5}{32}$ " $\frac{1}{32}$ " $\uparrow$ ABCDEFGHIJKLMNOPQRSTUVWXYZ

$\frac{5}{32}$ " $\frac{1}{32}$ " $\uparrow$ ϕ 1 2 3 4 5 6 7 8 9 0 $\frac{1}{4}$ $\cdot$ $\frac{1}{2}$ $\cdot$ $\frac{3}{8}$ $\cdot$ $\frac{9}{16}$

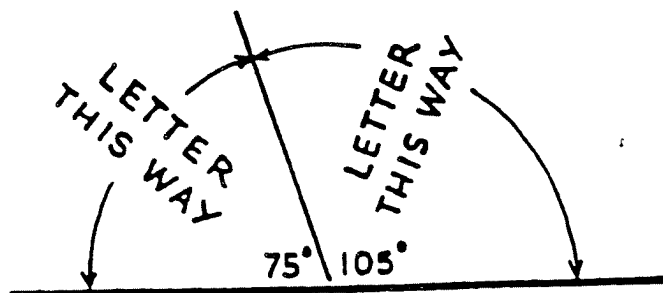
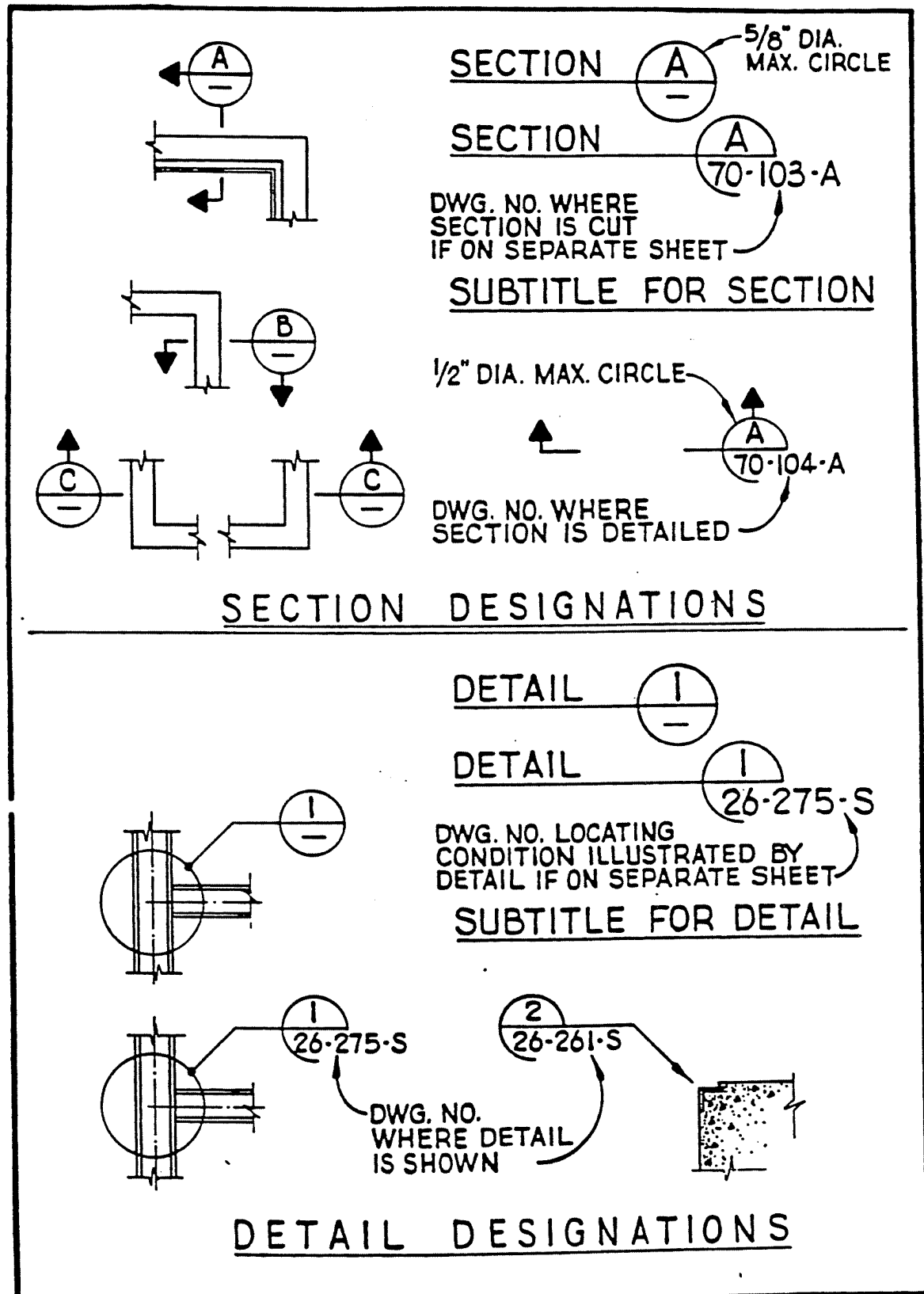


EXHIBIT 9-3



Engineering Procedures

E-9: Drafting Standards
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EXHIBIT 9-4

CONSTRUCTION DETAIL REQUEST FORM

NAME: _____ JOB NO.: _____
DATE: _____ DIRECTORY: _____
DATE REQUIRED: _____ PHONE NO.: _____
DISCIPLINE: _____ WORKING UNITS: _____

CONSTRUCTION DETAIL NUMBERS REQUIRED

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

FILENAME OF CD'S: _____

MATERIALS INDICATION SYMBOLS

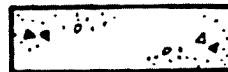
EARTH



ROCK



CONCRETE



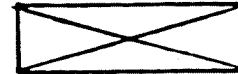
CONCRETE BLOCK
OR BRICK



WOOD



FINISH



DIMENSION LUMBER
& BLOCKING

METAL



STRUCTURAL STEEL



(NO CROSS HATCHING)

CHECKER PLATE



GRATING



INSULATION



EXHIBIT 9-6
MANUAL DRAFTING
DRAWING SHEET SPECIFICATIONS

All manual drawing sheets shall be mylar film unless requested otherwise by the client.

1. Mylar Specification:

- Performance: To be equal to that of K&E film
- Thickness: 3 mils
- Texture Matt both sides
- Grid: Fade out - 8 lines/inch (other grid sizes upon special request only)

2. Requisitioning Mylar:

The following criteria shall be established as soon as a project becomes viable and authorization to proceed has been received by ICF KE:

- Size of sheets - 27"x40" unless otherwise requested by the client
- Number of sheets estimated to be needed for the entire project
- Approval of proper title block by the Legal Department, Project Manager and the Client

Then requisition of mylar film can be done as follows:

- The Principal Design Engineer responsible for the design of the project will send his request for mylar film to the Design Support Manager, who will then issue a requisition to the Purchasing Department.

3. Purchasing:

The decision to purchase mylar from a particular supplier will be made by the Purchasing Department on the basis of:

- Price
- Flexibility of the supplier in meeting demand
- Supplier's ability to stock enough material to prevent "dry outs"
- Possibly split order between two competitors.

ICF Kaiser Engineers

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EXHIBIT 9-7A

SAMPLE TITLE BLOCK

ICF KAISER ENGINEERS		ICF KAISER ENGINEERS INC. 1800 HARRISON STREET OAKLAND, CALIFORNIA 94612 P.O. BOX 23219 OAKLAND, CALIFORNIA 94623	
SAMPLE TITLE TEXT TX = : 5/32, LS = : 5/32, WT = 2			
JOB NO. 12345-678	DWG. NO. 12-34-5678	REVISION	R-0

REVISION NUMBER
LETTERS FOR PRE-CONSTRUCTION
ISSUE (A, B, C...)
NUMBERS FOR CONSTRUCTION
ISSUE AND REVISIONS (0, 1, 2...)

DRAWING NUMBER IN KEMS FORMAT

JOB NUMBER - MAY BE
5, 8, OR 10 DIGITS
DEPENDENT ON PROJECT
CARE PROCEDURES

Engineering Procedures

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EXHIBIT 9-7B

SAMPLE TITLE BLOCK

GIVE INITIALS AND FULL LAST NAME. NO MORE THAN ONE NAME SHOULD BE LISTED IN EACH LINE. THE SAME NAME SHALL NOT BE LISTED AS DESIGNER AND CHECKER.

GIVE SCALE IN INCHES OR FEET PER FOOT FOR MAIN PORTION OF DRAWING. ACCEPTABLE ALTERNATIVES ARE "NONE" (DRAWING NOT TO SCALE) AND "AS NOTED" (MULTIPLE SCALES).

DATES IN FORMAT OF MONTH-DATE-YEAR

CONSTRUCTION APPROVAL	APPROVAL	DATE	SCALE: 1/8" = 1' - 0"	DATE	PROFESSIONAL SEAL
			DESIGNED (DESIGNER)	(DATE)	DISCIPLINE JOB ENGINEER/ARCHITECT SIGNATURE
			DRAWN (DRAFTER)	(DATE)	
			CHECKED (CHECKER)	(DATE)	
			APPROVED (DESIGN MANAGER)	(DATE)	
			APPROVED (DESIGN MANAGER)	(DATE)	
INFORMATION CONFIDENTIAL: ALL PLANS, DRAWINGS, SPECIFICATIONS AND/OR INFORMATION FURNISHED HEREWITH ARE AND SHALL REMAIN THE PROPERTY OF ICF KAISER ENGINEERS, INC. AND SHALL BE HELD CONFIDENTIAL AND SHALL NOT BE USED FOR ANY PURPOSE NOT PROVIDED FOR IN AGREEMENT WITH ICF KAISER ENGINEERS INC.					

PROJECT ENGINEER INITIALS

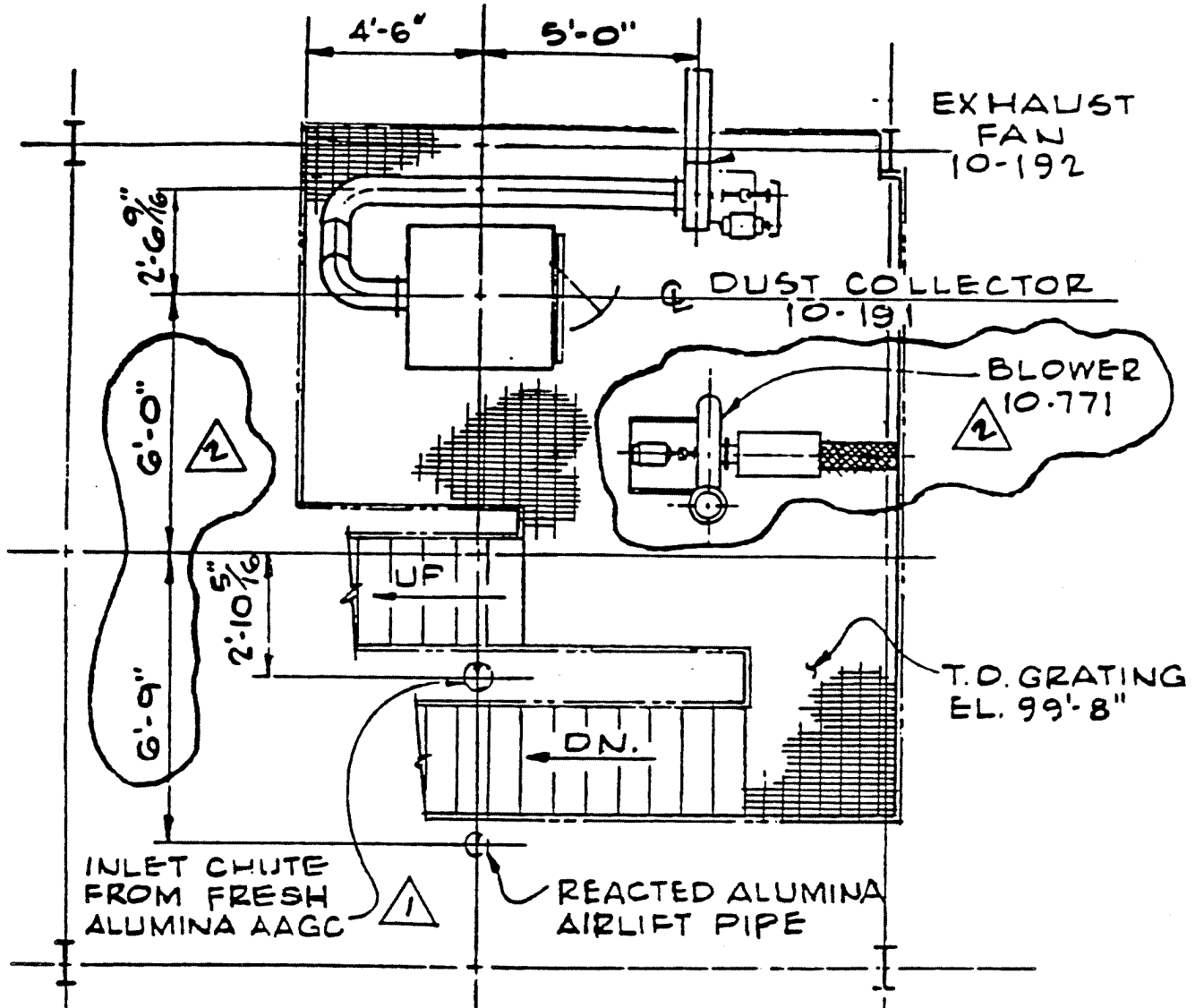
DESIGN MANAGER SIGNATURE

CHIEF DISCIPLINE ENGINEER/ARCHITECT INITIALS

ICF Kaiser Engineers

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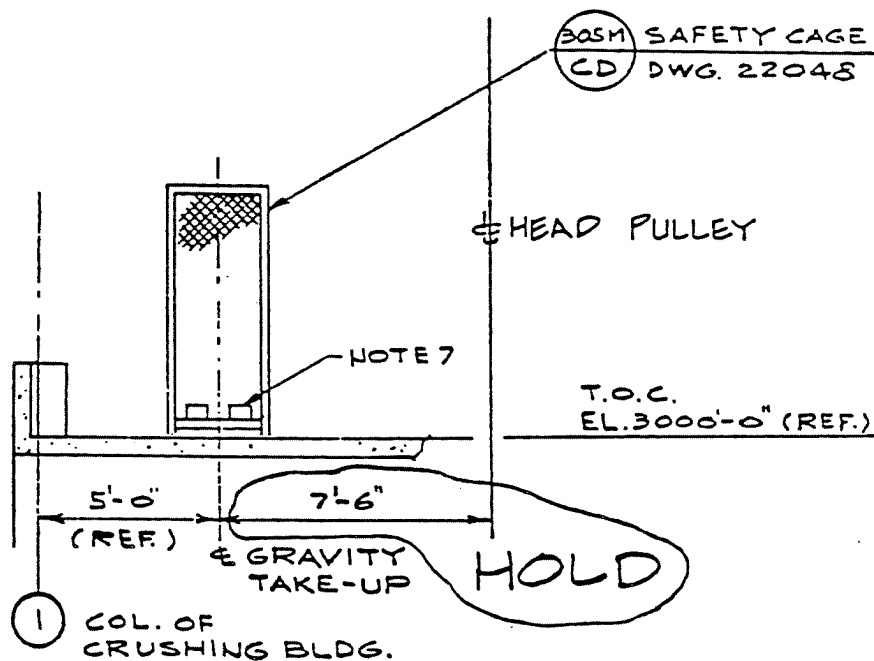
EXHIBIT 9-8



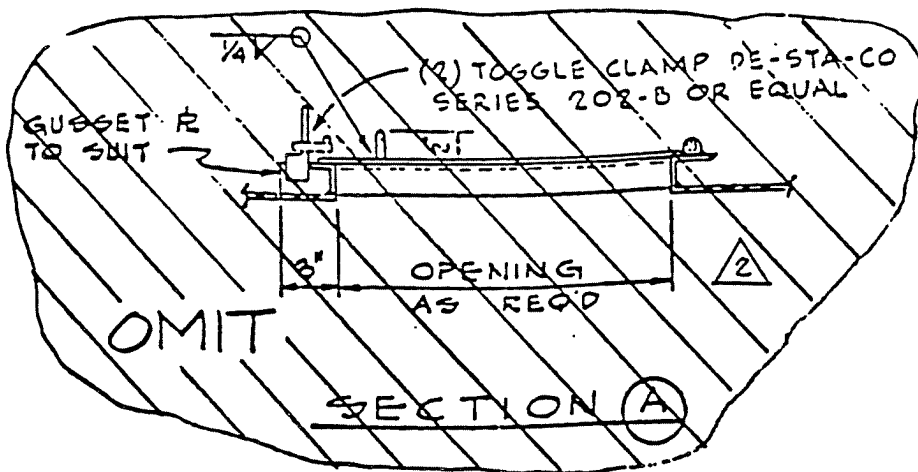
2	8-21-75	DIMENSIONS CHANGED-ADDED BLOWER 10-771	PS	LH				
1	8-12-75	ADDED INLET CHUTE	PS	SR				
NO.	DATE	REVISION	BY	CHK	APP.	APP.	D	BASE
								UPDATE

EXHIBIT 9-9

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METHOD OF SHOWING A "HOLD"



METHOD OF SHOWING A DELETION

EXHIBIT 9-10

STANDARD ABBREVIATIONS

air circuit breaker	ACB
alternating current	AC (or A-C as adjective)
aluminum	AL
amber	AMB
american wire gage	AWG
ampere	AMP
ampere-hour	AMP-HR
anchor bolt	AB
annunciator	ANN
approved	APPVD
approximate	APPROX
architectural	ARCH
atmosphere	ATM
average	AVG
back to back	B TO B
battery	BAT.
beam	BM
bearing	BRG
bench mark	BM
bill of material	B/M
blocking	BLKG
board	BD
board feet (measure)	FBM
bolt circle	BC
both faces	BF
bottom	BOT
bracing	BRCG
bracket	BRKT
British thermal unit	BTU
brake horsepower	BHP
building	BLDG
cabinet	CAB.
candlepower	CP
capacitor	CAP or C
cast iron	CI
catch basin	CB
ceiling	CLG
cement	CEM
center	CTR
centerline	CL

Engineering Procedures

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EXHIBIT 9-10 (CONT)

centers	CTRS
center to center	C to C
centimeter	CM
checker plate	CH PL
cleanout	CO
closet	CLOS
column	COL
concrete	CONC
conduit	CND or COND
construction joint	CONST JT
continuous	CONT
control relay	CR
control switch	CS
conveyor	CONV
corrugated	CORR
cosecant	CSC
cosine	COS
cotangent	COT
countersink or countersunk	CSK
cover plate	COV PL
cubic feet per minute	CFM
cubic feet per second	CFS
cubic feet or foot	CU FT or CF, FT ³
cubic yard	CY, or CU YD
cylinder	CYL
decibel	DB
degree	DEG (or °)
degree Centigrade	°C
degree Fahrenheit	°F
demand meter	DM
detail	DET
diagonal	DIAG
diameter	DIA
dimension	DIM.
direct current	DC (or D-C as adjective)
ditto	DO
division	DIV
dowel	DWL
down	DN
drawing	DWG
each	EA
each face	EF

ICF Kaiser Engineers

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EXHIBIT 9-10 (CONT)

each way	EW
electric	ELEC
elementary	ELEM
elevation	ELEV
equipment	EQUIP
exciter	EXCTR
existing	EXIST
expansion joint	EXP JT
explosion proof	EP
face to face	F TO F
far face	FF (concrete details)
far side	FS (steel details)
feet per minute	FPM
feet per second	FPS
finish	FIN
flange	FLG
flashing	FLSHG
flat face	FF (piping)
floor	FL
floor drain	FD
foot	FT
foot candle	FC
footing	FTG
foot pounds	FT LBS (or '#')
foot kips	FT KIPS (or 'K')
foundation	FDN
fractional horsepower	FHP
frequency	FREQ
gage	GA
gallon	GAL
gallons per minute	GPM
galvanized	GALV
galvanized iron	GI
glass	GL
generator	GEN
green	GRN
ground	GRD or GND
gypsum	GYP
hand hole	HH
handrail	H.R.
hanger	HGR
head	HD

Engineering Procedures

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EXHIBIT 9-10 (CONT)

heater	HTR
height	HT
hexagonal	HEX
high voltage	HV
horizontal	HORIZ
horsepower	HP
hour	HR
illuminate	ILLUM
incandescent	INCAND
inch	IN. (or ")
inclusive	INCL
inside	INS
inside diameter	ID
instrument	INSTR
invert	INV
joint	JT
junction	JCT
kilovolt	KV
kilovolt ampere	KVA
kilowatt	KW
kilowatt-hour	KWHR
laboratory	LAB
lamp, green indicating	GIL
lamp, red indicating	RIL
lamp, yellow indicating	YIL
lamp, white indicating	WIL
lavatory	LAV
left hand	LH
length	LG
light	LT
lighting	LTG
limit switch	LS
linear feet or foot	LIN FT or LF
logarithm	LOG
longitudinal	LONGIT
machine bolt	MB
magnet	MAG
manhole	MH
manufacturer	MFR
manufacturing	MFG
material	MATL
maximum	MAX

ICF Kaiser Engineers

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EXHIBIT 9-10 (CONT)

mechanical	MECH
meter	M
miles per hour	MPH
millimeter	MM
minimum	MIN
minute	MIN (or ')
miscellaneous	MISC
motor generator	MG
near face	NF (concrete details)
near side	NS (steel details)
nominal	NOM
normally closed	NC
normally open	NO
not in contract	NIC
not to scale	NTS
number	NO. (or #)
oil circuit breaker	OCB
oil insulated self-cooled	OISC
oil insulated fan-cooled	OIFC
on centers	OC
one pole	SP
open holes	OH
opening	OPG
opposite hand	OPP HAND
ounce	OZ
outside diameter	OD
outstanding leg	OSL
out to out	O TO O
overhead	OVHD
partition	PTN
piece	PC
pieces	PCS
plate	PL
pneumatic	PNEU
point	PT
positive	POS
potential	POT
potential transformer	PT
pounds	LBS (or #)
pounds per square foot	PSF
pounds per square inch	PSI
pounds per square inch absolute	PSIA

Engineering Procedures

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EXHIBIT 9-10 (CONT)

pounds per square inch gage	PSIG
power factor	PF
public address	PA
pull box	PB
pushbutton station	PB STA
radius	R or RAD
rectifier	RECT
reinforcing	REINF
required	REQD
resistance	RES
retaining wall	RET WALL
revision	REV
revolutions per minute	RPM
rheostat	RHEO
right hand	RH
riser	R
rivets	RIV
roadway	RDWY
secant	SEC
second	SEC (or ")
section	SECT
sheet	SHT
sine	SIN
solenoid	SOL
spacing or spaces	SPA
specifications	SPECS
square	SQ
square foot or feet	SQ FT or FT ²
square inch or inches	SQ IN
standard	STD
station	STA
steel	STL
stiffener	STIFF
structural	STRUCT
switch	SW
switchboard	SWBD
switchgear	SWGR
symmetrical	SYMM
tachometer	TACH
tangent	TAN
thousand board feet	MBM
thread	THD

ICF Kaiser Engineers

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EXHIBIT 9-10 (CONT)

time delay	TD
time delay opening	TDO
time delay closing	TDC
toggle	TGL
top of steel	TOS
transformer	XFMR
transmitter	XMTR
tread	T
typical	TYP
unit cooler	UC
unit heater	UH
urinal	U
vertical	VERT
volt	V
volt-amperes	VA
volt-meter	VM
watercloset	WC
watt	W
weather stripping	WS
weight	WT
white	WHT
with	W or W/
without	W/O
wood	WD
working point	WP
wrought iron	WI
yard	YD
year	YR
yellow	YEL



Worldwide Excellence in Meeting Client Needs

APPENDIX E

TABLES OF CONTENTS FOR REMEDIAL DESIGN DOCUMENTS

**NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066
CHEEKTOWAGA, NEW YORK**

Appendix E

Tables of Contents for Anticipated Remedial Design Documents

NYSDEC Inactive Hazardous Waste Site No. 9-15-066 Cheektowaga, New York

This appendix contains annotated tables of contents for the following remedial action plans:

- Sediment Removal, Stabilization and Disposal Plan (Design Basis Provided),
- Soil Removal, Treatment and Backfilling Plan (Design Basis Provided),
- Storm Sewer Closure and Augmentation Plan (Design Basis Provided),
- Permanent Groundwater Treatment Plant Plans and Specifications (If Required, Design Basis Provided),
- Permanent Groundwater Treatment Plant Start-up Plan (If Required),
- Construction Quality Assurance Plan,
- Permanent Groundwater Treatment Plant Operations and Maintenance Plan (If Required),
- Groundwater Monitoring Plan,
- Erosion & Sedimentation Control Plan,
- Release Contingency Plan, and
- Citizen Participation Plan.

Tables of contents provide the scope and general format for expected remediation design deliverables. Where appropriate, to facilitate and guide the pre-final (90 percent) design submittals, specific design bases are provided.

SEDIMENT REMOVAL, STABILIZATION AND DISPOSAL PLAN

NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066 CHEEKTOWAGA, NEW YORK

1.0 Introduction

Define the purpose of the Sediment Removal, Stabilization & Disposal Plan (SRSD Plan). Outline basic nature of the project.

2.0 Sediment Removal

2.1 Removal Procedures

Describe procedures for the removal of materials from excavations. Include contingency procedures for handling unanticipated situations (e.g., sediment dewatering).

2.2 Sediment Handling Procedures

Describe procedures for managing the handling and movement of sediment from the excavated areas to stabilization area and any intermediate staging areas.

2.3 Staging Procedures

Describe location, construction, and operation of anticipated staging areas required for project.

2.4 Monitoring Procedures

Outline air monitoring, soil screening, and any other procedures to be executed during the removal activities to insure both the safety of team members and the quality of the work. Details for procedures will be provided in separate stand alone documents.

3.0 Stabilization Plan

3.1 Stabilization Procedures

Describe procedures for stabilizing excavated materials, as needed, within the disposal transportation trucks. As shipped, sediments must pass the paint filter test and contain no free liquids.

3.2 Stabilization Materials/Equipment

Describe stabilization agent(s) and equipment required to perform stabilization. Stabilization agent must be non-toxic, cost-effective, and not cause secondary contamination issues (e.g., dusting).

4.0 Waste Material Disposal

Provide description of the waste materials that are anticipated to be generated during the remedial activities.

4.1 Characterization

Outline logic flow diagram for the characterization of materials requiring disposal. Provide detail of each decision point and possible outcomes.

SEDIMENT REMOVAL, STABILIZATION, AND DISPOSAL PLAN (CONTINUED)

NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066 CHEEKTOWAGA, NEW YORK

4.2 Transportation & Disposal

Outline methods for transportation and disposal of waste materials organized by type of material.

ACTION/DESIGN BASIS

Evaluation

The reach of U-Crest Ditch that requires remedial action is estimated in Section 3.4.7 and Figure 9 of the July 1996 *Pre-Design Investigation Summary Report* by Blasland, Bouck & Lee, Inc. The horizontal limits of the U-Crest Ditch that require remediation as well as the depth of sediment removal (excavation) within this reach will be based on the results of pre-design evaluations. These evaluations are described in the *Pre-Design Evaluation Work Plan* (ICF Kaiser, April 1998).

Design

The design will establish the plans for safe removal of U-Crest Ditch sediments that exceed ROD-specified remedial objectives.

The following measures will be employed to control water within the work area:

- 1) Berms and/or dikes will be constructed at either end of the work area to minimize the amount of water entering the area and to keep water which has entered the area from discharging downstream. A 10-year, 24-hour design storm will be used to design diversion structures.
- 2) Water upstream of the contained area will be diverted downstream through installations of pumps and diversion piping. Where possible and practical, water will be diverted on the property.
- 3) Any free-flowing water entering the active work area will be contained and then pumped to a holding area for storage, testing, treatment and/or discharge.

Channel restoration will also be part of the design and remedial action. The channel will be shaped and revegetated to withstand design flow velocities.

Implementation

Excavated material will be transferred directly to roll-offs boxes or trucks for stabilization (if needed). As applicable, tires and exterior side walls of the trucks or roll-off boxes will be cleaned before they leave the Site. Excavated wet sediments will be stabilized to control moisture content for off-Site disposal. Trucks entering the Site with clean fill materials will stay on clean areas thereby eliminating contact with impacted sediments.

SOIL REMOVAL, TREATMENT AND BACKFILLING PLAN

NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066 CHEEKTOWAGA, NEW YORK

1.0 Introduction

Define the purpose of the Soil Removal, Treatment and Backfilling Plan (SRTB Plan). Outline basic nature of the project.

2.0 Soil Removal

2.1 Removal Procedures

Describe procedures for the removal of soil from excavations. Include contingency procedures for handling unanticipated situations (e.g., dewatering). See attached Figure Soil-1.

2.2 Soil Handling Procedures

Describe procedures for managing the handling and movement of soil from the excavated areas to the treatment area and any intermediate staging areas. See attached Figures Soil-2 and Soil-3.

2.3 Staging Procedures

Describe location, construction, and operation of anticipated staging areas required for project.

2.4 Monitoring Procedures

Outline air monitoring, soil screening, and other procedures to be implemented during the removal activities so that on-Site personnel are protected and that quality work standards are maintained.

3.0 Soil Treatment

Describe the handling, treatment and confirmatory sampling associated with on-Site low-temperature thermal desorption of soils.

Our anticipated low-temperature thermal desorption specialist for this project is Thermo Remediation, Inc. (TRI). TRI and their affiliates have successfully remediated over 7,000,000 tons of soil using low-temperature thermal desorption since 1989. They operate nine permanent facilities (including one in New York) for low-temperature desorption of contaminated soils and have successfully completed more mobile low-temperature thermal desorption projects than all the other companies in the United States.

3.1 Air Emission Permit

3.2 Mobilization

3.3 Staging/Treatment Area Construction [See attached Figure Soil-4]

3.4 Soil Handling and Treatment

3.5 Confirmatory Sample Collection and Analysis

3.6 Demobilization

Note: Applicable portions of the Interstate Technology and Regulatory Cooperation Task Group's *Technical Requirements for On-Site Thermal Desorption of Hazardous Solid Media Contaminated with Chlorinated Organics* (revised Draft, dated August 22, 1997) will be incorporated into this plan with the following clarifications that take advantage of TRI's extensive experience:

SOIL REMOVAL, TREATMENT AND BACKFILLING PLAN (CONTINUED)

NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066 CHEEKTOWAGA, NEW YORK

1. The characteristics of soils within the six excavation areas requiring treatment via on-Site low-temperature thermal desorption have been thoroughly documented and preclude the need for multiple test burns. The first week of on-Site operation of the low-temperature desorption unit will be specified as the test burn period. The pending *Soil Removal, Treatment, and Backfilling Plan* will document stack emission predictions and specify how they will be confirmed through increased test burn period monitoring.
2. The on-Site low-temperature thermal desorption unit will contain an appropriate baghouse for particulate filtration. The use of carbon filtration or wet scrubbers will not be required.
3. To confirm proper operation of the unit, continuous monitoring of stack air temperature will be required. Should exhaust temperatures deviate from pre-established norms, an alarm will be automatically triggered and the unit operator will immediately shut down the soil feedstock conveyor belt. Active soil desorption will not resume until the problem resolved.

In addition to continuous monitoring of exhaust stack air temperature, several operational parameters will be monitored and documented each hour of active soil desorption: the exhaust stack carbon monoxide level, the exhaust stack oxygen level, the soil entrance temperature, the soil exit temperature, and the baghouse vacuum. [This operational monitoring, when combined with on-Site personnel monitoring and Site perimeter monitoring (RD/RA Work Plan Appendix C), will facilitate safe on-Site operation of the low-temperature thermal desorption unit and precludes the need for continuous monitoring of exhaust stack emissions.]

4. Excavated soils suspected to contain the highest constituents of concern concentrations will be blended with those of lesser concentrations while they are being prepared for treatment within the soil stockpile and treatment area. Blending will reduce variations in the soil feedstock to the on-Site low-temperature thermal desorption unit and result in consistent exhaust stack emission quality.
5. One composite, post-treatment confirmatory soil sample will be collected and analyzed from each 500 tons of soil treated through on-Site low-temperature thermal desorption. [The mobile unit that TRI will use for this project is identical to the unit in their permanent facility in Newburgh, New York. TRI's permanent facility in Newburgh has been audited by NYDEC over 40 times. Based on those audits, NYDEC has reduced the facility's confirmatory sampling frequency to one sample per 1,400 tons.]

4.0 Backfilling

4.1 Backfill Material Selection

Describe the screening process for the import of backfill material onto the Site. Include chemical as well as physical analyses required and standards to be met.

SOIL REMOVAL, TREATMENT AND BACKFILLING PLAN (CONTINUED)

NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066 CHEEKTOWAGA, NEW YORK

4.2 Backfill Transportation and Management

Describe the plan for transportation of backfill material to the Site. Include routing information and any potential traffic control measures that may be required. Describe on-Site management procedures such as staging that may be required.

4.3 Backfill Placement/Compaction

Describe the procedures to be used for the placement and compaction of backfill material. List the standards (i.e., compaction) that must be met and the quality control procedures to be used. In general, backfill will be compacted to at least 85-percent of its Standard Proctor maximum dry density.

5.0 Temporary Water Treatment Plant

Provide a description of the purpose and location of the temporary water treatment plant. See attached Figure Soil-4.

5.1 Excavation Water Collection

Describe the excavation water collection system including anticipated amounts, locations, pumping, and connections to temporary water treatment plant.

5.2 Excavation Water Treatment

Describe the treatment procedure for the excavation water including primary settling, particulate filtering, activated carbon treatment, and treated water collection.

5.3 Treated Water Discharge

Describe the treated water holding and testing system and batch discharge requirements to the POTW.

ACTION/DESIGN BASIS

Evaluation

The extent of the soils that exceed ROD-specified remedial objectives has been identified through prior sampling and testing and documented in Section 3.4 and Figures 3 through 8 of the July 1996 *Pre-Design Investigation Summary Report* by Blasland, Bouck & Lee, Inc. No additional delineation needs to be performed. Confirmatory soil sampling, however, will be performed during soil excavation and prior to backfilling any excavation areas. Confirmatory sampling will confirm that ROD-specified Remedial Objectives are achieved for both the backfill soil and unexcavated soils (in-situ) within an excavation.

Pre-design evaluations will be performed to develop geotechnical parameters for assessing allowable excavation slopes.

SOIL REMOVAL, TREATMENT AND BACKFILLING PLAN (CONTINUED)

NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066 CHEEKTOWAGA, NEW YORK

Design

Preliminary excavation plans have been established using 1:1 horizontal to vertical side slope on all excavations. The use of such slopes will be confirmed through additional geotechnical sampling, testing, and stability analysis. The stability analysis will be used to develop safe allowable slopes as part of final excavation plans.

Based on results of pre-design evaluations, final excavation plans will be developed. These plans will establish excavation sequencing, excavation methods, equipment, sampling, testing and stockpiling procedures, and backfilling procedures. Dewatering plans and contingency plans will also be developed. The goal of the plan will be to establish safe and effective procedures for removal of soils that exceed ROD-specified remedial objectives and for restoration of the Site.

Implementation

Assumed to be clean side slope soils (beyond the current limits of the excavation areas) will be sampled and tested to be assess if treatment and/or disposal is required. Clean material will be segregated for replacement back into the excavation. Soil with constituent concentrations that exceed ROD-specified remedial objectives will be stockpiled for on-Site treatment. Once these materials are adequately treated they will placed back into the excavation. Clean borrow materials from off-Site sources may be used in some instances to expedite closure of an area or as make-up fill. All backfill materials will be placed and compacted in accordance with the anticipated future use of the Site. It is anticipated that materials will be compacted to 85% of Standard Proctor.

High groundwater flow is not anticipated into the excavations, however, two (2) - 100,000 gallon "Mod-u-Tanks" will be established on-Site for storage of pumped water. Water in the tanks will be tested, treated, and discharged appropriately.

STORM SEWER CLOSURE AND AUGMENTATION PLAN

NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066 CHEEKTOWAGA, NEW YORK

1.0 Introduction

Define the goals and purpose of the Storm Sewer Augmentation Plan. Outline the task scope as it relates to the overall project scope.

2.0 Pre-Design Field Work

2.1 Completed Field Activities

Describe the pre-design field activities related to storm sewer closure and augmentation including review of existing data, the storm sewer survey, and surface inlet plugging.

2.2 Results

Describe the results of the pre-design field activities as they relate to the design for storm sewer closure and augmentation.

3.0 Sewer Augmentation Methodology

Describe the procedure for storm sewer augmentation in the storm sewer manholes and trunk lines.

4.0 Outfall Closure

Describe the procedure for closure of the three outfall lines leading to U-Crest Ditch. See Attached Figure Sewer-1.

5.0 Connection to Permanent Groundwater Treatment Plant

Describe the sump manholes, piping, and lift pumps for connection of the augmented storm sewers to the permanent groundwater treatment plant.

ACTION/DESIGN BASIS

Design

Storm sewer augmentation will only occur at locations where storm sewer main inlet inverts are located below the seasonal high groundwater table elevation (Figure Sewer-1). Augmentation will occur by perforating the manhole bases and trunk lines. Confined space entry work will be limited only to the manholes themselves, with no entry into the sewer trunk lines or laterals anticipated.

Outfall closure and sump construction will occur in the three outfall manholes and will consist of the bricking up of the sewer mains leading from the outfall manholes to the outfalls. If necessary, liners or structural steel members will be utilized to facilitate a 30-year closure design life-span. Sumps will be created in the outfall manholes and subsurface piping will be run from the manholes to the Permanent Groundwater Treatment Plant (PGTP). Confined space entry will be limited to the outfall manholes only with no entry into the piping trenches necessary. In addition, the hydraulic impact (if any) to existing storm sewer manholes due to closure of the outfall will be evaluated.

PERMANENT GROUNDWATER TREATMENT PLANT PLANS AND SPECIFICATIONS

NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066 CHEEKTOWAGA, NEW YORK

1.0 Introduction

As required, discuss the design and treatment goals of the PGTP and its relationship to the overall Site remediation.

2.0 Pre-Design Field Work

2.1 Pre-Design Field Activities

Describe the pre-design field activities related to the PGTP including groundwater sampling and flow monitoring.

2.2 Results

Describe the results of the pre-design field activities as they relate to the design for the PGTP.

3.0 Influent Characteristics

Describe the monitored and calculated influent characteristics used to design the PGTP.

4.0 Design Considerations

Discuss the design constraints for the PGTP including influent criteria, effluent requirements, degree of automation, and design life-span.

5.0 PGTP Overview

5.1 System Process Flow Diagram

Present the overall PGTP system process flow diagram.

5.2 System Logic and Flow Controls

Present the logic and flow controllers and degree of automation in the PGTP.

6.0 Groundwater Collection and Equalization

Discuss the storm water collection system, piping to PGTP, and primary equalization tanks.

7.0 Groundwater Treatment

Discuss the activated carbon and particulate filter systems and their modes of operation.

8.0 Treated Water Storage and Discharge

Discuss treated water storage and the requirements for discharge to the Publicly Owned Treatment Works (POTW).

**PERMANENT GROUNDWATER TREATMENT PLANT PLANS AND SPECIFICATIONS
(CONTINUED)**

**NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066
CHEEKTOWAGA, NEW YORK**

9.0 Equipment Housing

Discuss the PGTP building including location, sizing, utilities, and environmental controls.

10.0 System Specifications

10.1 Equipment Specifications

Present the PGTP equipment specifications.

10.2 Piping Specifications

Present the PGTP piping specifications.

10.3 Electrical Specifications

Present the PGTP electrical specifications.

10.4 Building Specifications

Present the PGTP building specifications.

10.5 Utility and Heating, and Ventilation Specifications

Present the PGTP utility and heating, and ventilation specifications.

ACTION/DESIGN BASIS

Design

If required to achieve discharge permit requirements, a PGTP will be designed and constructed. Design of the PGTP will be completed assuming a 30-year design life-span for the treatment plant building, equipment, and infrastructure. The treatment plant will be located at a level location with access to electric, water, and sewer utilities. The building and foundation will be a pre-engineered structure erected on-Site capable of supporting the required design load. The PGTP will be designed to treat influent to the levels specified in the OU2 ROD. Treatment for organic compounds is expected to occur through primary particulate filtration followed by secondary treatment with liquid phase activated carbon. Discharge will occur via permitted direct connection to the POTW sanitary sewer system or other permitted discharge location (i.e., a surface water body) Discharge is expected to be continuous except during storm events, when temporary discharge water storage will be utilized. The PGTP will be designed to operate with minimal manual monitoring and will be automated with automatic data recorders and alarm circuits for non-routine operating condition notification.

PERMANENT GROUNDWATER TREATMENT PLANT START-UP PLAN

NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066 CHEEKTOWAGA, NEW YORK

1.0 Introduction

If required to achieve discharge permit requirements, a PGTP will be designed, constructed, and utilized. Under those conditions, this plan would apply.

The introduction will provide a description of the PGTP start-up plan and its intended role and operation. Present the system process flow diagram and a simplified system piping and instrumentation diagram.

2.0 PGTP Equipment Testing

Describe the individual testing for the system equipment to confirm proper installation prior to system start-up.

3.0 PGTP Leak Testing

Describe leak testing to be performed on the PGTP piping to confirm joints and valves are correctly joined and no leaks are present in the system.

4.0 PGTP Start-up

4.1 System Start-up

Describe system start-up procedures for initial operation of the PGTP and the storm sewer collection system.

4.2 System Shakedown Testing

Describe the initial system testing to confirm that the PGTP and storm sewer collection systems are operating properly.

4.3 System Monitoring

Describe the system monitoring occurring during the PGTP start-up to provide documentation for proper start-up and operation of the plant.

4.4 Influent and Effluent Sampling and Analysis

Describe the influent and effluent sampling and analysis that is to occur to confirm that the PGTP is operating as intended.

CONSTRUCTION QUALITY ASSURANCE PLAN

NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066 CHEEKTOWAGA, NEW YORK

1.0 Introduction

Provide a description of the Construction Quality Assurance Plan (CQAP), its scope, and its function in providing confidence that remedial action activities are implemented and completed as intended and specified. Define Construction Quality Assurance (CQA) and Construction Quality Control (CQC).

2.0 CQAP Personnel Qualifications, Responsibilities and Authorities

Describe individual project team member qualifications and responsibilities relative to CQC along with those of the independent CQA inspector(s)

- 2.1 Project Manager**
- 2.2 Site Superintendent**
- 2.4 Field Engineer**
- 2.5 Corporate Quality Assurance Officer**
- 2.6 Independent Quality Assurance Inspector(s)**
- 2.7 Subcontractors**
- 2.8 Vendors**

3.0 Project Controls

Describe the lines of communication among CQAP personnel and specify specific CQAP meeting and non-compliance resolution protocols.

- 3.1 Pre-Construction Meeting**
- 3.2 CQA Progress Meetings**
- 3.3 Non-Compliance Actions**
- 3.4 Non-Compliance Resolutions**

4.0 Project Audits

Describe the scope and timing of CQA audits, including the protocols required to resolve observed deficiencies.

5.0 Construction Quality Tests and Evaluations

Describe the specific sampling strategies, CQC/CQA tests, and evaluations required to demonstrate that remedial action activities are being completed in accordance with the approved plans, specifications, and support documents.

- 5.1 Permit Compliance**
- 5.2 Soil Excavation and Confirmatory Sampling**
- 5.3 Underground Storage Tank Removal and Disposal**
- 5.4 On-Site Low-Temperature Thermal Desorption of Soils**
- 5.5 Excavation Backfilling**
- 5.6 Sediment Excavation, Stabilization, and Disposal**
- 5.7 U-Crest Ditch Restoration**
- 5.8 Storm Sewer Augmentation (Shallow Groundwater Collection System)**

PERMANENT GROUNDWATER TREATMENT PLANT OPERATIONS AND MAINTENANCE PLAN

NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066 CHEEKTOWAGA, NEW YORK

1.0 Introduction

As required, provide a description of the PGTP and its intended role and operation. Present the system process flow diagram and a simplified system piping and instrumentation diagram.

2.0 Routine Operations

2.1 Normal Flow Conditions

Discuss operation of the PGTP during normal groundwater flow conditions.

2.2 Low Flow Conditions

Discuss operation of the PGTP during low groundwater flow conditions when little or no water is entering from the storm sewer collection system.

2.3 High Flow Conditions

Discuss operation of the PGTP during high groundwater flow conditions when storm conditions exist and discharge to the POTW must be limited.

3.0 Non-routine Operations

Discuss emergency procedures including emergency shut-down and notification procedures.

4.0 Maintenance and Maintenance Schedule

Discuss system maintenance and provide a maintenance schedule for all components of the PGTP.

5.0 Augmented Storm Sewer Maintenance and Maintenance Schedule

Discuss storm sewer collection system maintenance and provide a maintenance schedule for all components of the storm water collection system.

6.0 Personnel Requirements

Training and operator qualifications will be established.

7.0 Environmental Monitoring Plan

In accordance with NYCRR 360-2.9

8.0 Appendices

Provide appendices of equipment manuals and relevant Material Safety Data Sheets.

**CONSTRUCTION QUALITY ASSURANCE PLAN
(CONTINUED)**

**NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066
CHEEKTOWAGA, NEW YORK**

5.9 Permanent Groundwater Treatment Plant Construction

- 5.9.1 Foundation
- 5.9.2 Pre-Engineered Building
- 5.9.3 Equipment Components and Materials
- 5.9.4 Equipment Placement and Interconnections
- 5.9.5 Electrical and Instrumentation
- 5.9.6 Heating and Ventilation

5.10 Groundwater Treatment System Construction and Start-Up

- 5.10.1 Temporary Construction Water
- 5.10.2 Permanent Groundwater

5.10 Site Restoration

6.0 Construction Quality Documentation

Describe specific CQC and CQA documentation requirements.

- 6.1 Daily Reports
- 6.2 Meetings
- 6.3 Audits
- 6.4 Off-Specification Work Resolutions
- 6.5 Tests and Evaluations
- 6.6 Photographic Record of Activities
- 6.7 Progress Reports
- 6.8 Remedial Action Report
- 6.9 Document Retention

GROUNDWATER MONITORING PLAN

NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066 CHEEKTOWAGA, NEW YORK

1.0 Introduction

Define the purpose of the groundwater monitoring plan and its role on the project.

2.0 Groundwater Monitoring Locations

Discuss the groundwater monitoring locations and justification for their selection.

3.0 Groundwater Sampling

3.1 Equipment

Discuss the required equipment for groundwater sampling.

3.2 Procedures

Discuss the procedures for groundwater sampling including monitoring, purging, and sampling.

3.3 Decontamination and Waste Handling

Discuss procedures for decontamination of sampling equipment and disposal of purge water generated during purging.

3.4 Data Quality Objectives and Assessment

In accordance with TAGM DSHM- 96-03.

4.0 QA/QC Requirements

Discuss the required QA/QC sampling including trip blanks, equipment rinsate blanks, and blind duplicates. Discuss the required QA/QC documentation including sampling logs, request-for-analysis forms, and chain-of-custody forms.

5.0 Sample Storage and Shipment

Discuss sample storage and shipment and maximum sample holding times.

6.0 Sample Analysis

Discuss analytical requirement for the samples.

EROSION & SEDIMENTATION CONTROL PLAN

NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066 CHEEKTOWAGA, NEW YORK

1.0 Introduction

Define the purpose and scope of the Erosion & Sedimentation Control Plan (ESC Plan).

2.0 Site Background

2.1 Site History

Relate summary of known Site history from the beginning of commercial/industrial operations to the present. Review regulatory involvement at the Site.

2.2 Project Scope

Relate the scope and purpose of the remedial actions to be taken at the Site.

3.0 Description of General Erosion and Sedimentation Controls

Define two types of ESC practices (stabilization and structural) -- all temporary protocols during remedial action.

3.1 Stabilization Practices

Outline and describe stabilization practices, including maintenance.

3.2 Structural Practices

Outline and describe structural practices, including maintenance.

4.0 Remediation-Specific Controls

Detail each remedial action with regard to ESC practices to be employed (i.e., sequencing of installation/removal). Reference an appendix for detailed descriptions.

5.0 Schedule

RELEASE CONTINGENCY PLAN

NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066 CHEEKTOWAGA, NEW YORK

1.0 Introduction

Define the purpose of the Release Contingency Plan (RC Plan) and state sources of information for the Plan. Outline basic nature of the project.

2.0 Emergency Coordinators

Outline the roles and responsibilities of both on-Site and off-Site project personnel in the event of an emergency

3.0 Emergency Communication

Identify the personnel and their communication responsibilities with regard to the media. Describe procedures for development, review, and delivery of any form of communication to the media in the event of an emergency.

4.0 Emergency Contact List

List of personnel and telephone numbers for project personnel including subcontractors, local authorities, and emergency response numbers (i.e. National Response Center, Poison Control Center)

5.0 Emergency Response Procedures

Detail procedures to be followed for specific types of emergencies. These procedures will cover liquid spills, solid spills, fires, and explosions at a minimum.

6.0 Evacuation Procedures

Outline the procedures to be followed in the event that an emergency results in the need to evacuate an area.

7.0 Waste Characteristics

Identify the types of hazardous materials likely to be present at the Site and their associated exposure symptoms.

CITIZEN PARTICIPATION PLAN

NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-066 CHEEKTOWAGA, NEW YORK

1.0 Introduction

Define the purpose of the Citizen Participation Plan (the Plan) and state sources of information for the Plan. Outline basic nature of the project.

2.0 Site Background and Key Concerns

2.1 Site History

Relate summary of known Site history from the beginning of commercial/industrial operations to the present. Review regulatory involvement at the Site.

2.2 Community Profile

Describe the geographic and demographic characteristics of the surrounding communities.

2.3 History of Community Involvement

Relate the involvement of the surrounding communities with the investigative and remedial activities being performed at the Site.

2.4 Issues of Community Concern

Outline issues of concern for the Site that have been defined by the surrounding communities. Categorize these concerns (health, safety, property values, etc.) to identify the required components of the Plan.

3.0 Objectives of the Citizen Participation Plan

Based on the history of the Site and the concerns of the surrounding communities, outline the primary objectives of the Plan. Provide detail concerning the information that needs to be communicated to interested parties.

4.0 Community Relations Activities

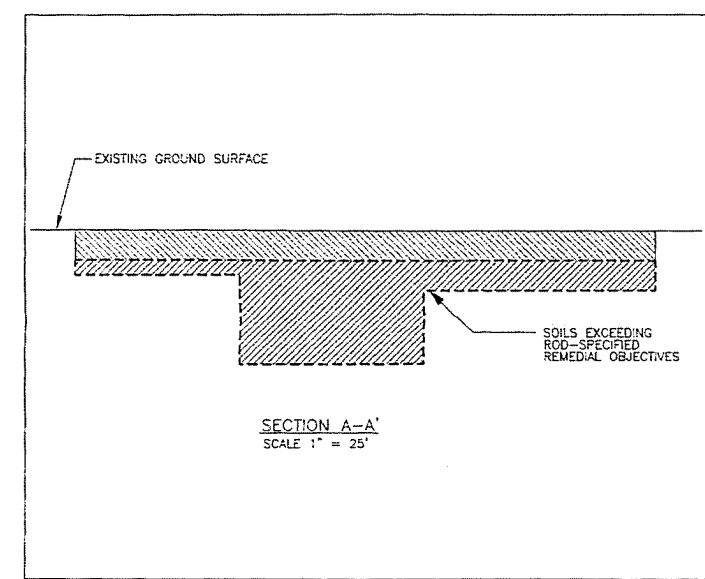
4.1 Required Activities

Outline the activities that are required by the National Contingency Plan (NCP) for the Superfund program.

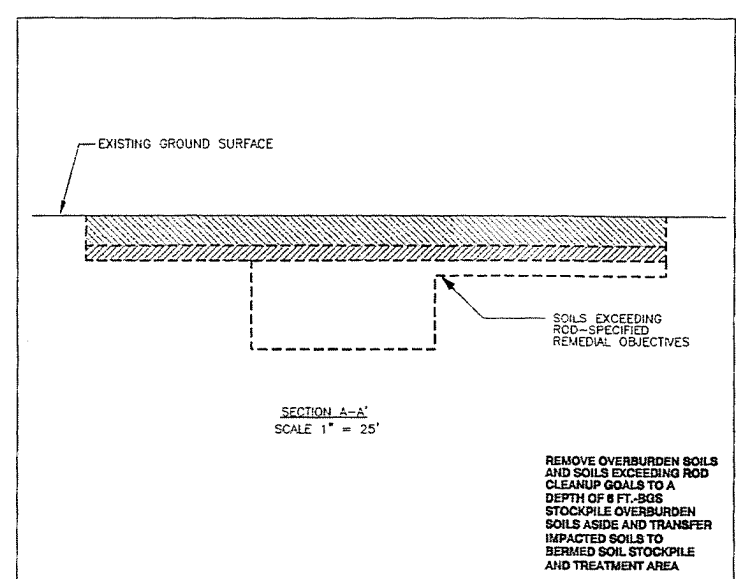
4.2 Recommended Activities

Identify any additional activities that may be needed beyond the required activities given the nature of the Site and the surrounding communities.

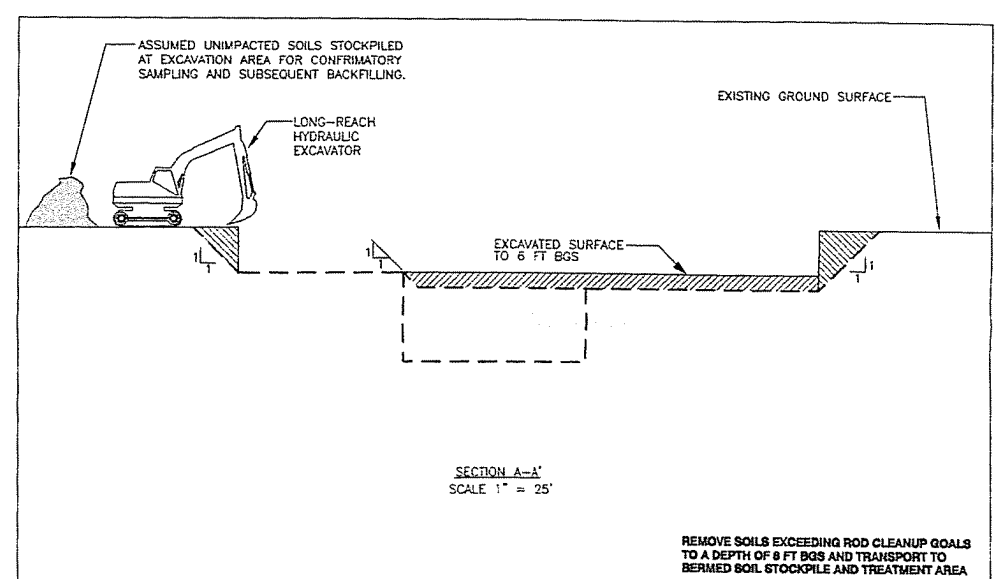
EXAMPLE STAGES OF A DEEP SOIL EXCAVATION



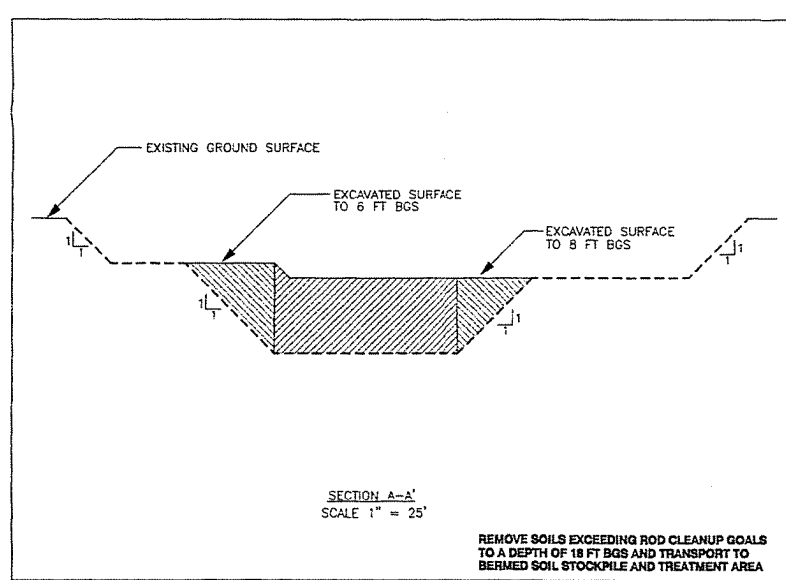
INITIAL CONDITIONS



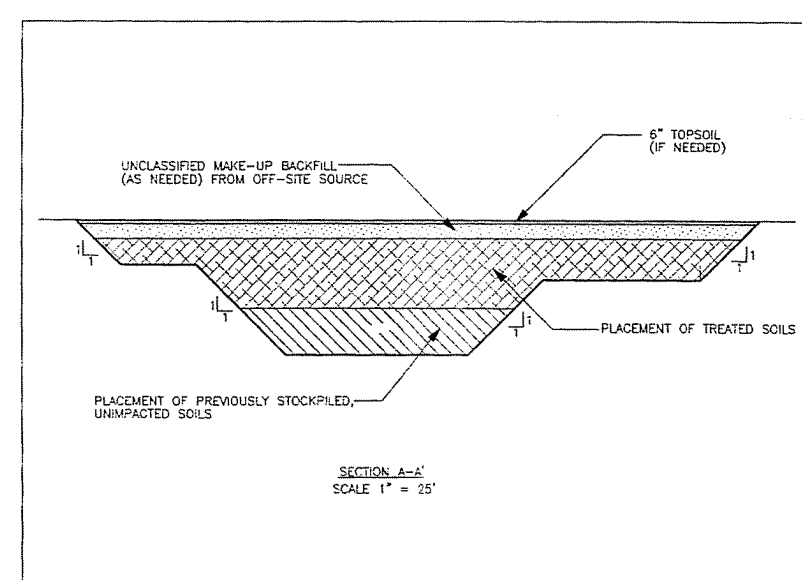
STAGE 1: 6 FT., VERTICAL WALL CUT



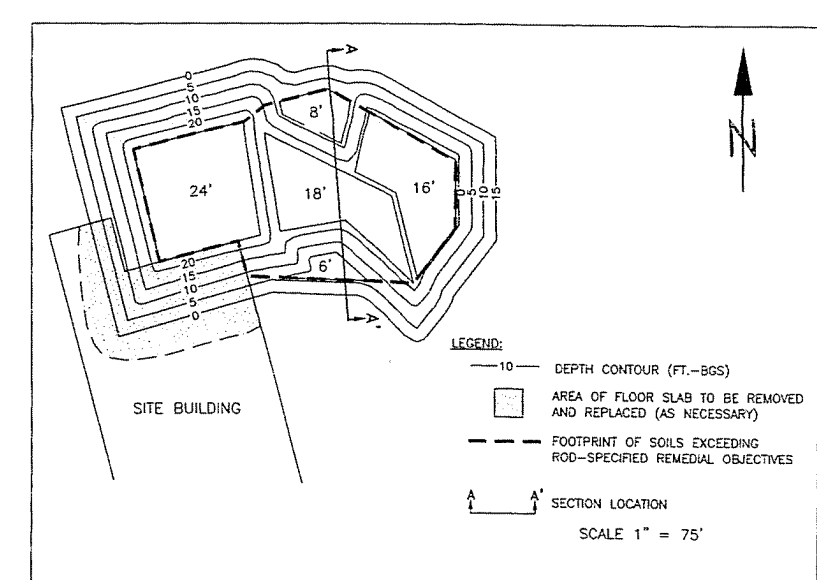
STAGE 2: 8 FT. CUT WITH 1:1 SLOPE WALLS



STAGE 3: 18 FT. CUT WITH 1:1 SLOPE WALLS



STAGE 4: BACKFILL PLACEMENT FOLLOWING ACCEPTANCE OF CONFIRMATORY SOIL ANALYSES



SECTION LOCATION AND EXCAVATION PLAN VIEW

NOTES:

1. CONSTRUCTION DEWATERING PUMPS, PIPING, AND GROUNDWATER TABLE NOT SHOWN.
2. BACKFILL TO BE PLACED IN 1 FT. TO 2 FT. LIFTS AND COMPACTED.
3. BACKFILL TO PROCEED ONLY AFTER ACCEPTABLE POST-EXCAVATION CONFIRMATORY SOIL ANALYSIS RESULTS ARE ACHIEVED (BOTH "ASSUMED UNIMPACTED SOILS" AND "SOILS EXCEEDING ROD-SPECIFIED REMEDIATION OBJECTIVES").
4. ROD -- RECORD OF DECISION.
5. FT-BGS -- FEET BELOW GROUND SURFACE.

LEGEND:

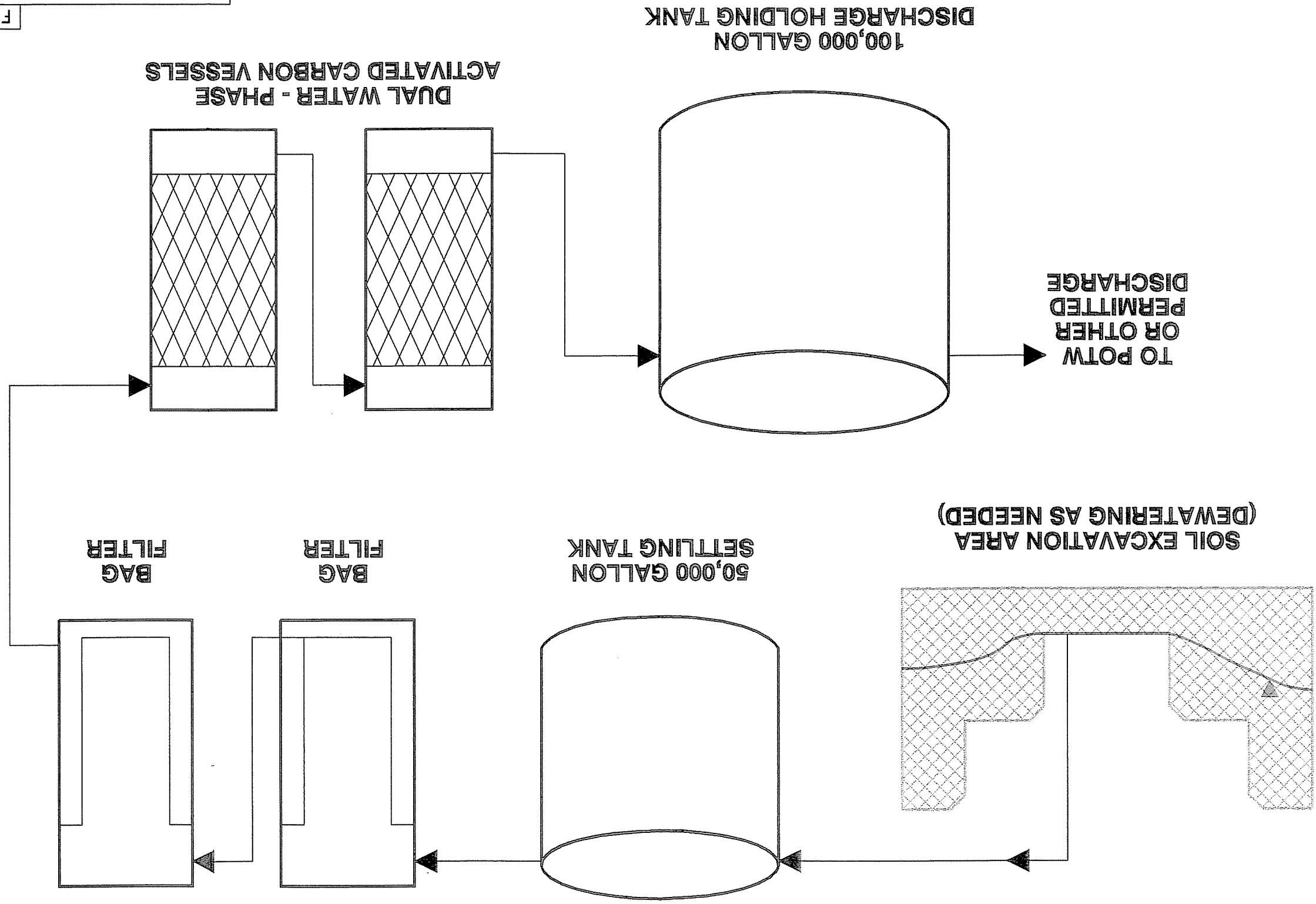
- ASUMED UNIMPACTED OVERBURDEN SOILS OR ASSUMED UNIMPACTED SOILS EXCAVATED FOR 1:1 EXCAVATION WALL SLOPES.
- SOIL EXCEEDING ROD-SPECIFIED REMEDIAL OBJECTIVES.
- LIMITS OF SOILS EXCEEDING ROD-SPECIFIED REMEDIAL OBJECTIVES.
- POST-STAGE EXCAVATION GROUND SURFACE.

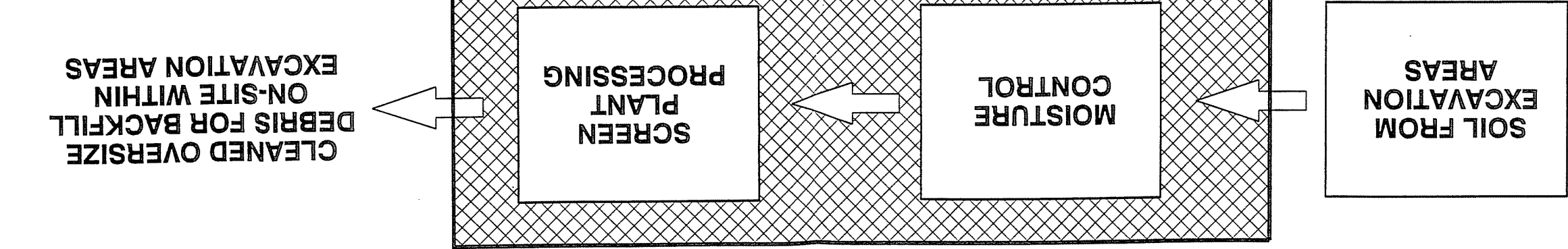
FIGURE SOIL-1

ICF KAISER ENGINEERS

NYSDEC INACTIVE HAZARDOUS WASTE SITE NO. 9-15-006
 CHEEKTOWAGA, NEW YORK

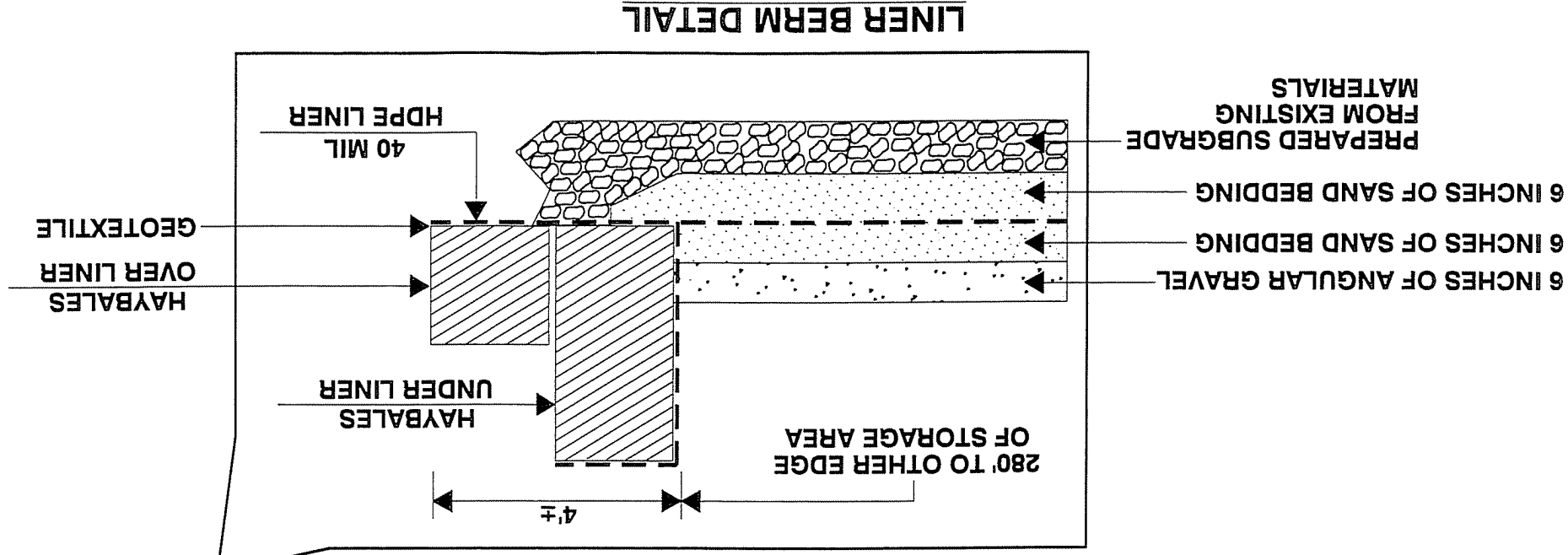
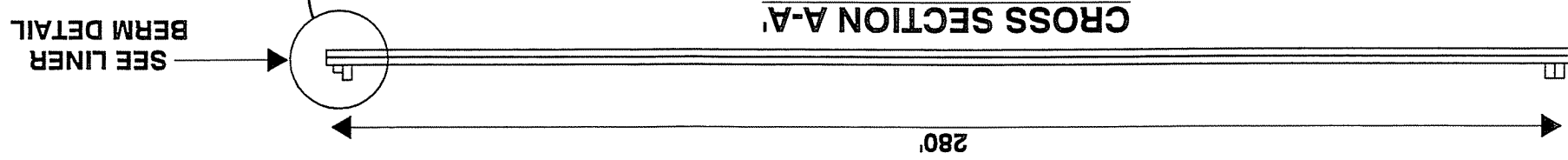
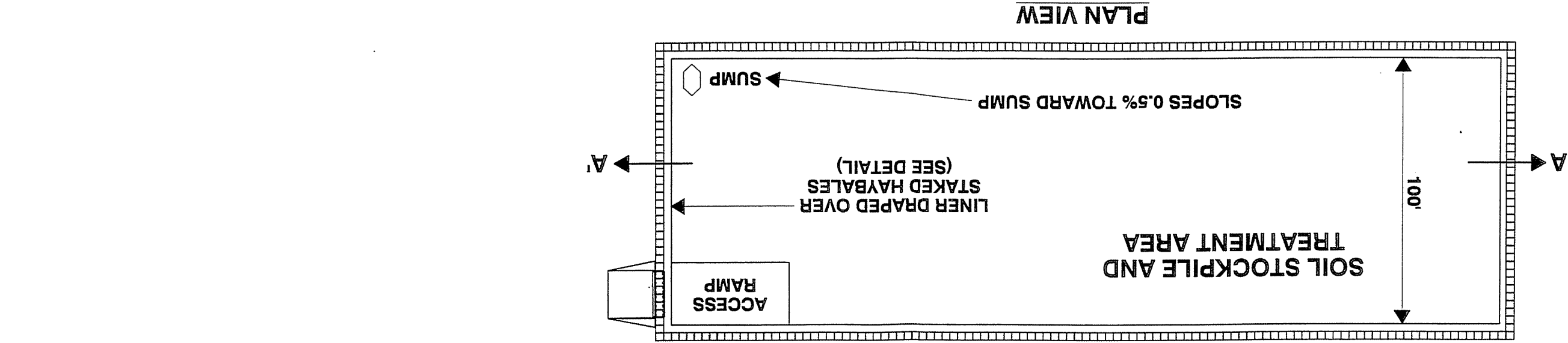
STAGES OF TYPICAL DEEP SOIL EXCAVATION





SOIL STOCKPILE
AND TREATMENT AREA

BACKFILL ON-SITE WITHIN
EXCAVATION AREAS FOLLOWING
ACCEPTABLE CONFIRMATORY
ANALYTICAL RESULTS



LEGEND:

● MH-001-08 STORM SEWER MANHOLE

○ MH-001-09 ENHANCED STORM SEWER OUTFALL MANHOLE (SEE DETAIL)

— STORM SEWER LINE

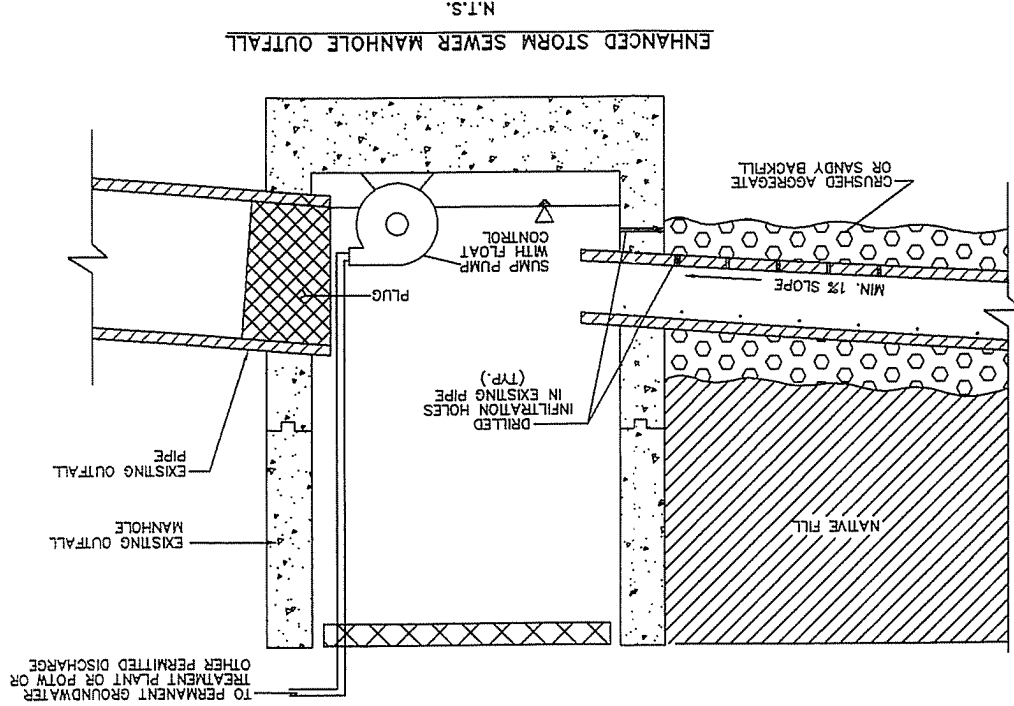
--- GROUNDWATER COLLECTION LINE

==== TO POTW OR OTHER PERMITTED DISCHARGE

--- SITE BOUNDARY

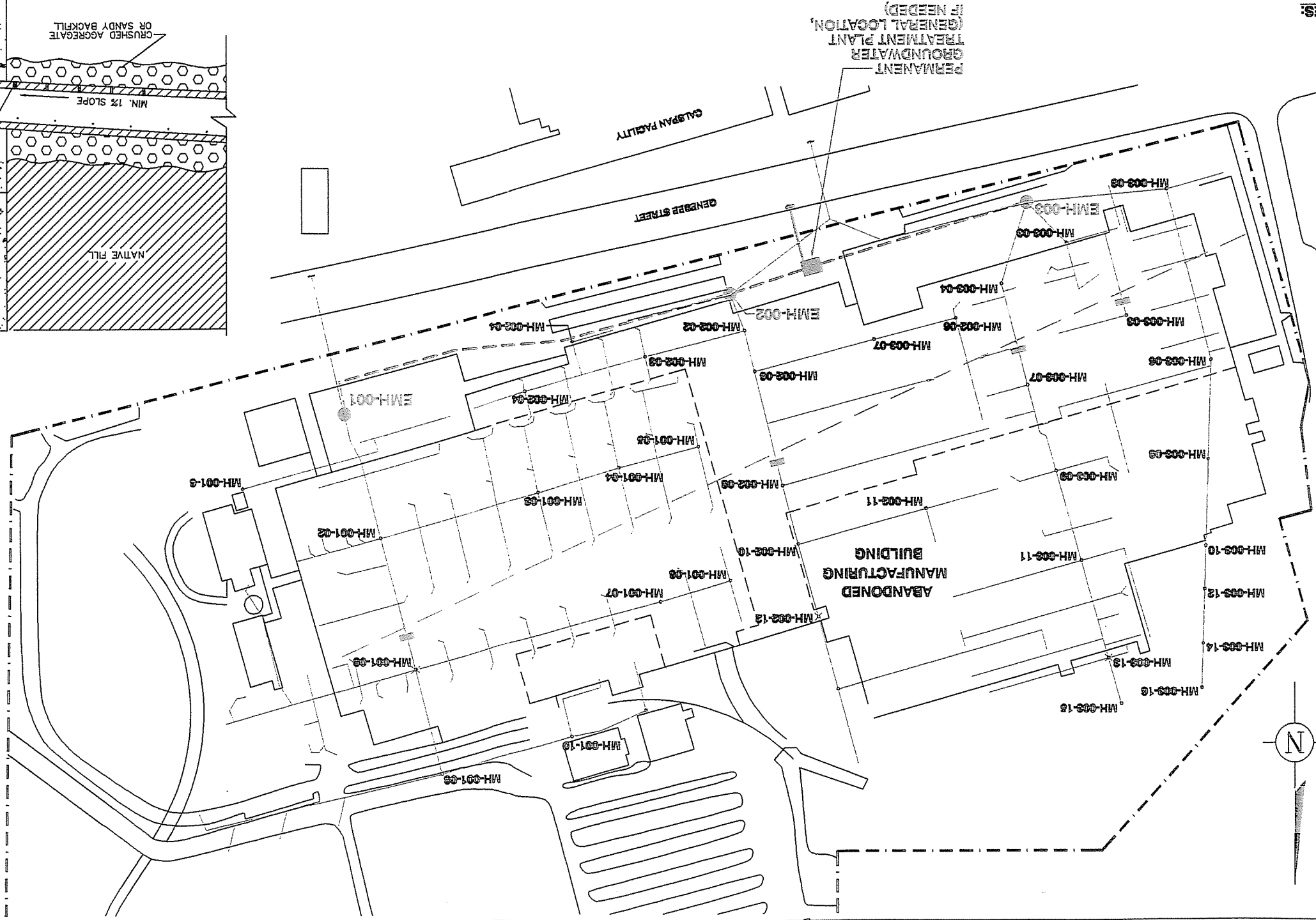
--- EXAMPLE LOCATION OF FINALIZED GROUNDWATER INFLUENCE LINE

--- STORM SEWER LINE & BEDDING MATERIAL CUTOFF (NOT TO SCALE)



SCALE: 1" = 120'

0 120' 240'



NOTES:

1. ALL LOCATIONS ARE APPROXIMATE.
2. DESIGN CONCEPTUAL IN NATURE.
3. THE FINALIZED LOCATION OF THE GROUNDWATER INFLUENCE LINE WILL BE BASED ON A SURVEY OF STORM SEWER PIPE INVERT ELEVATIONS AND GROUNDWATER ELEVATIONS.
4. STORM SEWER INLETS LOCATED SOUTH OF THE FINALIZED GROUNDWATER INFLUENCE LINE WILL BE SEALED.
5. THE GROUNDWATER INFLUENCE LINE DEMARKATES (TO THE NORTH) TO BELOW THE SEASONAL HIGH ABOVE THE SEASONAL HIGH GROUNDWATER TABLE WHERE STORM SEWER PIPE INVERTS TRANSITION FROM ABOVE THE SEASONAL HIGH GROUNDWATER TABLE (TO THE SOUTH).

REFERENCE:

BASE MAP ADAPTED FROM REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT, VOLUME 1: REMEDIAL INVESTIGATION REPORT (TEXT) SEPTEMBER, 1994 (DUNN ENGINEERING COMPANY).