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THE MANITOWOC PUBLIC LIBRARY, 808 HAMILTON STREET, MANITOWOC, WISCONSIN; THE WHITELAW VILLAGE HALL, 232 EAST MENASHA AVENUE, WHITELAW, WISCONSIN; AND THE FRANKLIN TOWN CHAIRMAN, STEVE BROOKS, HOME OFFICE, ROUTE 1, BOX 293A, WHITELAW, WISCONSIN. THE ADMINISTRATIVE RECORD FOR THE SITES HAS BEEN MADE AVAILABLE TO THE PUBLIC AT THE US EPA DOCKET ROOM IN REGION V AND AT THE MANITOWOC PUBLIC LIBRARY.

A PUBLIC MEETING WAS HELD ON MAY 22, 1991 TO DISCUSS THE FS AND THE PROPOSED PLAN. THE MEETING WAS CHAIRED BY REPRESENTATIVES FROM THE US EPA, WDNR, THE WISCONSIN DEPARTMENT OF HEALTH AND ATTENDED BY APPROXIMATELY 60 RESIDENTS.

THE FS AND PROPOSED PLAN WERE AVAILABLE FOR PUBLIC COMMENT FROM MAY 20, THROUGH JULY 29, 1991. COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND THE US EPA'S RESPONSES TO THOSE COMMENTS ARE INCLUDED IN THE ATTACHED RESPONSIVENESS SUMMARY, WHICH IS A PART OF THIS ROD. ADVERTISEMENTS ANNOUNCING THE AVAILABILITY OF THE PROPOSED PLAN, START OF THE COMMENT PERIOD AND EXTENSION OF THE COMMENT PERIOD WERE PUBLISHED IN THE MANITOWOC HERALD TIMES REPORTER.

THE PUBLIC PARTICIPATION REQUIREMENTS OF CERCLA SECTIONS 113 (K)(2)(I-V) AND 117 OF CERCLA HAVE BEEN MET IN THE REMEDY SELECTION PROCESS. THIS DECISION DOCUMENT PRESENTS THE SELECTED REMEDIAL ACTION FOR THE LEMBERGER SITES IN WISCONSIN, CHOSEN IN ACCORDANCE WITH CERCLA, AS AMENDED BY SARA AND, TO THE EXTENT PRACTICABLE, THE NATIONAL CONTINGENCY PLAN (NCP). THE DECISION FOR THIS SITE IS BASED ON THE ADMINISTRATIVE RECORD.

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D. SCOPE OF THE SELECTED REMEDY

AS WITH MANY SUPERFUND SITES, THE CONDITIONS AT THE LL AND LTR SITES ARE COMPLEX. AS A RESULT, US EPA ORGANIZED THE WORK INTO TWO PLANNED ACTIVITIES. THE REMEDIAL ACTION SELECTED IN THIS ROD ADDRESSES THE FIRST OF THESE TWO PLANNED ACTIVITIES OR OPERABLE UNITS AT THE SITES. THIS ROD ADDRESSES GROUNDWATER CONTAMINATION AT BOTH THE LL AND LTR SITES, AND SOURCE CONTAMINATION AT THE LL SITE ONLY (HEREAFTER REFERRED TO AS "THE SITES"). THIS RESPONSE ACTION WILL TREAT THE GROUNDWATER IN THE SHALLOW AND DEEP AQUIFERS AND INSTALL A SLURRY WALL AROUND THE WASTE IN THE LL SITE AND PLACE A CAP ON THE LL SITE. THIS REMEDY UTILIZES PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT OR RESOURCE RECOVERY TECHNOLOGY TO THE MAXIMUM EXTENT PRACTICABLE FOR EACH SITE, AND SATISFIES THE STATUTORY PREFERENCE FOR REMEDIES THAT EMPLOY TREATMENT THAT REDUCES TOXICITY, MOBILITY, OR VOLUME AS A PRINCIPAL ELEMENT.

THE SECOND AND FINAL ACTION WILL ADDRESS THE SOURCE OF CONTAMINATION AT THE LTR SITE. THE LTR LANDFILL CONTAINS HOT SPOTS WHICH NEED TO BE FURTHER CHARACTERIZED. WHEN THIS CONTINUED INVESTIGATION IS COMPLETED, A REMEDY FOR THE SECOND PLANNED ACTIVITY OR OPERABLE UNIT WILL BE SELECTED.

TREATMENT OF THE GROUNDWATER PLUMES AND CONTAINMENT OF THE SOURCE MATERIAL IN THE LL SITE INCLUDED IN THIS FIRST OPERABLE UNIT WILL BE CONDUCTED IN ACCORDANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS OF FEDERAL AND STATE LAW. US EPA CONSIDERS CONTAINMENT OF THE LANDFILL MATERIAL, WHICH IS A SOURCE OF GROUNDWATER CONTAMINATION, TO BE THE MOST PRACTICABLE REMEDY. BECAUSE HAZARDOUS SUBSTANCES ARE REMAINING AT THE SITE, A 5-YEAR REVIEW WILL BE CONDUCTED TO ASSURE HUMAN HEALTH AND THE ENVIRONMENT ARE BEING PROTECTED BY THE REMEDIAL ACTION BEING IMPLEMENTED AT THE SITE.

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E. SUMMARY OF CURRENT SITE CONDITIONS

THE RI INVOLVED SAMPLING AND ANALYSIS OF GROUNDWATER, AIR, SURFACE WATER, SEDIMENT, LEACHATE, SUBSURFACE SOIL, AND SURFACE SOIL IN ORDER TO DETERMINE SITE CONDITIONS. WATER SAMPLES WERE COLLECTED FROM NUMEROUS RESIDENTIAL AND MONITORING WELLS AROUND THE SITE. A GEOPHYSICAL INVESTIGATION CONSISTING OF A MAGNETIC SURVEY, AN ELECTROMAGNETIC SURVEY AND A SEISMIC SURVEY WAS CONDUCTED. SITE GEOLOGY, LANDFILL CHARACTERISTICS, AND GROUNDWATER FLOW PATTERNS WERE ALSO EXAMINED.

BASED ON THE RESULTS OF THE RI, US EPA DETERMINED THAT THE THREATS TO HUMAN HEALTH AND THE ENVIRONMENT ARE THROUGH EXPOSURE BY INGESTION OR DIRECT CONTACT TO VOLATILE ORGANIC COMPOUNDS (VOCS), SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCS), AND INORGANIC COMPOUNDS FOUND IN THE GROUNDWATER NEAR THE SITES AND IN LANDFILL CONTENTS ON THE SITES. THE FOLLOWING CONDITIONS WERE OBSERVED AT THE SITES:

1. TOPOGRAPHY

THE BRANCH RIVER, WHICH DRAINS INTO LAKE MICHIGAN, IS LESS THAN ONE MILE WEST AND NORTHWEST OF THE SITES. THE AREA CONSISTS OF ROLLING TO HILLY TERRAIN AND NUMEROUS WETLANDS. THE AREA IS GENERALLY CHARACTERIZED BY GLACIAL DEPOSITS AND VARIABLE BEDROCK. THE LL SITE TERRAIN GENERALLY SLOPES TO THE WEST AND NORTHWEST. ELEVATIONS ON THE LL SITE RANGE FROM ABOUT 860 FEET ABOVE MEAN SEA LEVEL (MSL) TO 820 FEET. THE LTR SITE SLOPES TO THE WEST, NORTHWEST WITH STEEPER SLOPES IN THE EAST. ELEVATIONS ON THE LTR SITE RANGE FROM 870 FEET TO 852 FEET ABOVE MSL. THERE ARE FOUR GENERAL GEOLOGIC UNITS PRESENT AT THE STUDY AREA, THE UPPER GRANULAR UNIT (UGU), THE COHESIVE UNIT (CU), THE LOWER GRANULAR UNIT (LGU) AND THE BEDROCK. THE UGU IS COMPOSED OF SANDY, GRAVELLY DEPOSITS AT OR CLOSE TO THE GROUND SURFACE. IT DOES NOT COVER THE WHOLE STUDY AREA. THE CU, OR CLAY LAYER, IS COMPOSED OF SILTY, CLAYEY DEPOSITS AND HAS LOW HYDRAULIC CONDUCTIVITY. THE LGU IS COMPOSED OF SANDY, GRAVELLY DEPOSITS UNDERLYING THE CLAY LAYER AND RESTS ON THE BEDROCK.

2. HYDROGEOLOGY

THERE ARE TWO GROUNDWATER SYSTEMS AT THE SITES. WITHIN THE UPPER GRANULAR UNIT IS A LOCALIZED PERCHED AQUIFER. THE CLAY LAYER SEPARATES IT FROM THE LOWER AQUIFER IN THE LOWER GRANULAR UNIT AND BEDROCK. A GROUNDWATER DIVIDE AS A RESULT OF A BEDROCK RIDGE RUNS NORTHEAST-SOUTHWEST ON THE SOUTHEAST SIDE OF THE STUDY AREA. THE WATER FLOWS AWAY FROM THE DIVIDE IN ALL DIRECTIONS BUT PRIMARILY TO THE NORTHWEST AND THE SOUTHEAST.

A. THE UPPER AQUIFER IS WITHIN THE UPPER GRANULAR UNIT AND IS LOCALIZED IN THE AREA OF THE LL SITE, APPARENTLY EXTENDING EAST INTO RIDGEVIEW LANDFILL, SOUTH INTO THE LTR SITE, AND NORTH AT LEAST AS FAR AS MONITORING WELL RM-4. THE POTENTIAL BOUNDARIES OF THE UPPER AQUIFER ARE SHOWN IN FIGURE 2. THE UPPER AQUIFER MAY BE A SINGLE PERCHED SYSTEM OR THERE MAY BE MORE THAN ONE INDEPENDENT PERCHED WATER TABLE SYSTEM IN THE AREA. GROUNDWATER IN THE UPPER AQUIFER APPEARS TO FLOW TO THE WEST THROUGH THE WASTE DISPOSED OF AT THE LL SITE. THE AVERAGE DEPTH OF THE UPPER AQUIFER IS THIRTEEN FEET.

B. THE COHESIVE OR CLAY LAYER, UNDERLIES THE UPPER AQUIFER AND IS INTERBEDDED WITH GRANULAR MATERIAL AT THE INTERFACE. THE THICKNESS OF THE CLAY LAYER VARIES CONSIDERABLY ACROSS THE STUDY AREA, RANGING FROM 1 TO 3 FEET THICK OVER THE BEDROCK RIDGE TO ALMOST 50 FEET THICK AT SEVERAL LOCATIONS WHERE THE BEDROCK SURFACE IS LOWER IN THE NORTH, NORTHWEST, AND WEST PORTIONS OF THE LEMBERGER SITES STUDY AREA.

C. THE LOWER AQUIFER IS VERTICALLY AND LATERALLY CONTINUOUS WEST OF THE LTR SITE. IT IS COMPOSED OF WELL-GRADED, DENSE SANDY GRAVEL AND GRAVELY SAND AND IS HYDRAULICALLY CONNECTED WITH THE UNDERLYING BEDROCK. THE THICKNESS AND DEPTH OF THE AQUIFER INCREASES AWAY FROM THE BEDROCK RIDGE, RANGING FROM 1 TO 3 FEET THICK AT THE BEDROCK RIDGE TO 25 FEET THICK NORTHWEST OF THE LEMBERGER SITES BETWEEN MONITORING WELLS RM-4 AND RM-2.

D. THE BEDROCK, UNDER THE CONSOLIDATED DEPOSITS IS A DOLOMITIC LIMESTONE THAT RANGES FROM A HIGHLY WEATHERED CONDITION IN ITS UPPER SURFACE TO A HIGHLY FRACTURED AND THEN UNFRACTURED BEDROCK BELOW.

THE LOWER WATER SYSTEM IS IN THE LIMESTONE BEDROCK AND HAS A REGIONAL DIRECTION OF GROUNDWATER FLOW TO THE EAST, TOWARD LAKE MICHIGAN. LOCALLY; HOWEVER, THE GROUNDWATER FLOWS TO THE NORTHWEST, TOWARD THE BRANCH RIVER. AN AREA OF LOCAL RECHARGE OF THE LOWER AQUIFER RUNS NORTHEAST-SOUTHWEST ON THE SOUTHEAST SIDE OF THE LEMBERGER SITES STUDY AREA. THE RECHARGE AREA FUNCTIONS AS A GROUNDWATER DIVIDE, WITH FLOW MOVING AWAY FROM THE DIVIDE IN ALL DIRECTIONS BUT PRIMARILY TO THE NORTHWEST OR THE SOUTHEAST.

3. CONTAMINATION

A. SOURCE

THE SOURCE OF CONTAMINATION FROM THE LEMBERGER SITES IS THE LANDFILLED WASTE. THE EXACT VOLUME OF WASTE IN THE LL SITE HAS NOT BEEN DETERMINED. THE VOLUME IS ESTIMATED IN THE FS AT 479,000 CUBIC YARDS; HOWEVER, ADDITIONAL INFORMATION ABOUT THE SITE IS REQUIRED TO REFINE THE ESTIMATE. THE WASTE IN THE LL SITE IS IN DIRECT CONTACT WITH THE SHALLOW OR PERCHED AQUIFER, WHICH MEANS THE WASTE IS IN DIRECT CONTACT WITH LATERALLY MOVING GROUNDWATER. GROUNDWATER CONTAMINATION IS PRODUCED IN TWO WAYS: 1) BY THE HORIZONTAL MOVEMENT OF

GROUNDWATER THROUGH THE WASTE AND, 2) BY THE VERTICAL MOVEMENT OF PRECIPITATION DOWN THROUGH THE EXISTING CAP AND INTO THE WASTE MASS. BOTH MEANS OF GROUNDWATER CONTAMINATION ARE PRESENT AT THE LL SITE. THE SOURCE OF CONTAMINATION AT THE LTR SITE IS CONTRIBUTING TO GROUNDWATER CONTAMINATION; HOWEVER, THE RISKS FROM SOILS WILL BE ADDRESSED IN THE SECOND RESPONSE ACTION OR OPERABLE UNIT, AND SUBSEQUENT ROD.

B. GROUNDWATER

THE PRESENCE OF HAZARDOUS CONSTITUENTS IN THE LANDFILL IS INDICATED BY THE CHEMICAL COMPOSITION OF THE GROUNDWATER. VOLATILE AND SEMI-VOLATILE ORGANIC COMPOUNDS, AND INORGANIC COMPOUNDS WERE DETECTED IN THE GROUNDWATER INCLUDING 1-1 DICHLOROETHANE, TRICHLOROETHELENE, 1,2-DICHLOROETHENE, ACETONE, TOLUENE, ETHYLBENZENE, XYLENE, 4-METHYL-2-PENTANONE, CHLOROETHANE, 1-1-TRICHLOROETHANE BARIUM, CHROMIUM, METHYLENE CHLORIDE, 2-BUTANONE AND CADMIUM. CONTAMINATION ABOVE MCL'S WAS FOUND AT A DEPTH OF 95.4 FEET.

THE UPPER AQUIFER CONTAINED HIGH CONCENTRATIONS (3,000 TO 5,000 UG/L) OF ACETONE AND 2-BUTANONE, AND HIGH CONCENTRATIONS (41,800 TO 1.3 MILLION UG/L) OF CALCIUM, IRON, MAGNESIUM, POTASSIUM AND SODIUM. MODERATE CONCENTRATIONS (100 TO 220 UG/L)OF METHYLENE CHLORIDE, 1,2-DICHLOROETHENE, AND TETRACHLOROETHENE WERE DETECTED. THREE SEMIVOLATILE PHENOLS WERE ALSO IDENTIFIED.

EXTENSIVE VOLATILE COMPOUNDS (GREATER THAN 1,000 UG/L) WERE FOUND IN THE LOWER AQUIFER INCLUDING CHLOROETHANE, METHYLENE CHLORIDE, 1,1-DICHLOROETHANE, 1,2-DICHLOROETHENE, AND 1,1,1-TRICHLOROETHANE. PHENOLS, PHTHALATES, PESTICIDES AND PCBS WERE ALSO DETECTED IN THE LOWER AQUIFER. CONCENTRATIONS BEGIN TO DECREASE NORTH OF THE LTR SITE AND TOWARD THE BRANCH RIVER. FIGURES 3 AND 4 SHOW THE CONTAMINANT PLUMES IN THE UPPER AND LOWER GROUNDWATER SYSTEMS.

C. SOILS

SURFACE AND SUBSURFACE SOIL SAMPLES AT THE LL SITE INDICATE THE PRESENCE OF VOLATILE COMPOUNDS RANGING FROM 1 TO 12 UG/KG AND SEMIVOLATILE ORGANIC COMPOUNDS RANGING FROM 71 TO 3,800 UG/KG. PESTICIDES INCLUDING 4,4-DDE, 4,4-DDD AND 4,4-DDT WERE FOUND AT CONCENTRATIONS OF 70 UG/KG, 190 UG/KG, AND 42 UG/KG RESPECTIVELY.

AT THE LTR SITE, SURFACE SOILS CONTAIN VOLATILE ORGANIC COMPOUNDS AT CONCENTRATIONS RANGING FROM 230 TO 2,000 UG/KG, SEMIVOLATILE COMPOUNDS RANGING FROM 94 TO 2,000 UG/KG AND PESTICIDES INCLUDING ALDRIN AT CONCENTRATIONS OF 240 UG/KG AND DEILDRIN AT CONCENTRATIONS OF 200 UG/KG. SUBSURFACE SOILS AT THE LTR SITE HAD LOWER CONCENTRATIONS OF VOLATILE COMPOUNDS THAN THE SURFACE SOILS, RANGING FROM 3 TO 620 UG/KG. SEMIVOLATILES, PESTICIDES, AND PCBS WERE NOT FOUND IN THE LTR SUBSURFACE SOILS. THE RISKS FROM THE SOILS FROM AT LTR SITE WILL BE ASSESSED IN THE SECOND RESPONSE ACTION OR OPERABLE UNIT.

D. SEDIMENT, SURFACE WATER AND LEACHATE

SEDIMENT AND SURFACE WATER SAMPLES WERE COLLECTED AT AND NEAR THE LL AND LTR SITES, INCLUDING THE WETLAND AREA. SEDIMENT SAMPLES SHOWED LOW CONCENTRATIONS OF VOLATILE COMPOUNDS; HOWEVER, ONE SAMPLE SOUTH OF THE LL SITE CONTAINED ACETONE DETECTED AT 510 UG/KG. SURFACE WATER SAMPLES CONTAINED PHTHALATES, METHYLENE CHLORIDE AND ACETONE AT LOW LEVELS. OF THE FOUR LEACHATE SAMPLE LOCATIONS PLANNED, LEACHATE WAS FOUND AT ONLY ONE LOCATION, IN THE NORTHWEST CORNER OF THE LL SITE. ORGANICS WERE NOT DETECTED IN THIS SAMPLE.

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F. SUMMARY OF SITE RISKS

THE ANALYTICAL DATA COLLECTED DURING THE RI AND THE BASELINE RISK ASSESSMENT INDICATED THE PRESENCE OF CONTAMINANTS IN VARIOUS MEDIA AT LEVELS THAT MAY PRESENT A RISK TO HUMAN HEALTH. PURSUANT TO THE NCP, A BASELINE RISK ASSESSMENT WAS PERFORMED BASED ON DATA FROM THE RI. THE BASELINE RISK ASSESSMENT ASSUMES NO CORRECTIVE ACTION WILL TAKE PLACE AND THAT NO SITE-USE RESTRICTIONS OR INSTITUTIONAL CONTROLS SUCH AS FENCING, GROUNDWATER USE RESTRICTIONS OR CONSTRUCTION RESTRICTIONS WILL BE IMPOSED. THE RISK ASSESSMENT THEN DETERMINES ACTUAL OR POTENTIAL RISKS OR TOXIC EFFECTS THE CHEMICAL CONTAMINANTS AT THE SITE POSE UNDER CURRENT AND FUTURE LAND USE ASSUMPTIONS.

THE BASELINE RISK ASSESSMENT FOR GROUNDWATER AND SOILS ON THE LL SITE INCLUDED THE FOLLOWING ASSUMPTIONS:

- NO DIRECT AIR EMISSIONS WERE OCCURRING, AND THE SOIL WILL NOT BE DISTURBED BY PLOWING OR EXCAVATION WHICH CAUSE SIGNIFICANT AIR EMISSIONS IN THE FUTURE;

- CURRENT LAND USE INCLUDES APPROXIMATELY 2,700 RESIDENTS WITHIN A THREE MILE RADIUS OF THE LEMBERGER SITES;

- RESIDENTS WILL ONLY BE EXPOSED TO CONTAMINANTS CURRENTLY DETECTED IN THE RESIDENTIAL WELLS SAMPLED DURING THE RI (REPLACED RESIDENTIAL WELLS NOT INCLUDED). MONITORING WELL DATA WERE NOT INCLUDED IN THE ESTIMATE OF CURRENT RESIDENTIAL RISKS;

- CURRENT RESIDENTIAL SOIL RISKS ASSUME ONSITE EXPOSURES DUE TO TRESPASSING ON THE SITES;

- COMPARATIVE FUTURE GROUNDWATER RESIDENTIAL RISKS ASSUME RESIDENTS WILL BE EXPOSED TO THE QUALITY OF WATER CURRENTLY IN ALL MONITORING WELLS.

1. CONTAMINANT IDENTIFICATION

THE MEDIUM OF CONCERN FOR HUMAN EXPOSURES FOR CURRENT AND FUTURE SCENARIOS WAS IDENTIFIED PRIMARILY AS GROUNDWATER WHICH HAS BEEN CONTAMINATED BY THE VERTICAL INFILTRATION OF PRECIPITATION THROUGH THE WASTE AND BY DIRECT CONTACT OF THE WASTE WITH THE GROUNDWATER. THE RI DETECTED SEVERAL CHEMICALS IN DIFFERENT MEDIA AT BOTH SITES AND DEVELOPED A LIST OF "CHEMICALS OF POTENTIAL CONCERN" USING THE FOLLOWING CRITERIA:

- CHEMICALS RETAINED INCLUDED THOSE POSITIVELY DETECTED IN MORE THAN ONE SAMPLE IN A GIVEN MEDIUM, INCLUDING CHEMICALS WITH NO QUALIFIERS ATTACHED AND CHEMICALS WITH QUALIFIERS ATTACHED THAT INDICATED KNOWN IDENTITIES AND ESTIMATED CONCENTRATIONS (SUCH AS J-QUALIFIED DATA).

- CHEMICALS WERE RETAINED THAT WERE DETECTED AT LEVELS AT LEAST FIVE TIMES GREATER THAN LEVELS DETECTED IN ASSOCIATED BLANK SAMPLES.

- FUTURE LL SOIL RISKS ASSUME ON SITE EXPOSURES DUE TO RESIDENTIAL USE.

CHEMICALS OF POTENTIAL CONCERN ARE LISTED IN TABLE 1.

2. HUMAN HEALTH EFFECTS

THE HEALTH EFFECTS FOR THE CONTAMINANTS OF CONCERN MAY BE FOUND IN THE APPENDICES SECTION OF THE FS.

3. EXPOSURE ASSESSMENT

POTENTIAL EXPOSURE TO CONTAMINANTS FROM THESE SITES CAN COME ABOUT THROUGH THE FOLLOWING POTENTIAL PATHWAYS OR ROUTES OF EXPOSURE:

- EXPOSURE TO DRINKING WATER THROUGH VARIOUS ROUTES, INCLUDING DIRECT INGESTION, DERMAL CONTACT (DRINKING WATER/SHOWER EXPOSURE) OR INHALATION OF VOCS IN THE GROUNDWATER BY RESIDENTS OR OTHERS USING CONTAMINATED GROUNDWATER;

- DIRECT CONTACT WITH, OR INGESTION OF CONTAMINATED SOIL BY SITE WORKERS, FARMERS, HUNTERS AND TRESPASSERS;

- INDIRECT EXPOSURES TO CONTAMINANTS FROM INGESTION OF ANIMALS THAT FEED ON CONTAMINATED CROPS (CURRENT AND FUTURE).

4. RISK CHARACTERIZATION

THE NON-CARCINOGENIC AND CARCINOGENIC HEALTH RISKS ASSOCIATED WITH EACH OF THE PATHWAYS AND POTENTIAL RECEPTORS LISTED ABOVE HAVE BEEN EVALUATED. BASIC TOXICITY INFORMATION USED TO CALCULATE RISK WAS DERIVED

FROM THE INTEGRATED RISK INFORMATION SYSTEM (IRIS), HEALTH EFFECTS ASSESSMENT SUMMARY TABLES (HEAST), AND NAPHTHALENE RFD VALUE (NAPH).

A. NON-CARCINOGENIC HEALTH RISKS

REFERENCE DOSES (RFDS) HAVE BEEN DEVELOPED BY EPA FOR INDICATING THE POTENTIAL FOR ADVERSE HEALTH EFFECTS FROM EXPOSURE TO CHEMICALS EXHIBITING NON-CARCINOGENIC EFFECTS. RFDS, WHICH ARE EXPRESSED IN UNITS OF MG/KG-DAY, ARE ESTIMATES OF LIFETIME DAILY EXPOSURE LEVELS FOR HUMANS, INCLUDING SENSITIVE INDIVIDUALS. ESTIMATED INTAKES OF CHEMICALS FROM ENVIRONMENTAL MEDIA (E.G., THE AMOUNT OF A CHEMICAL INGESTED FROM CONTAMINATED DRINKING WATER) CAN BE COMPARED TO THE RFD. RFDS ARE DERIVED FROM HUMAN EPIDEMIOLOGICAL STUDIES OR ANIMAL STUDIES TO WHICH UNCERTAINTY FACTORS HAVE BEEN APPLIED (E.G., TO ACCOUNT FOR THE USE OF ANIMAL DATA TO PREDICT EFFECTS ON HUMANS). THESE UNCERTAINTY FACTORS HELP ENSURE THAT THE RFDS WILL NOT UNDERESTIMATE THE POTENTIAL FOR ADVERSE NON-CARCINOGENIC EFFECTS TO OCCUR.

THE HAZARD INDEX, AN EXPRESSION OF NON-CARCINOGENIC TOXIC EFFECTS, MEASURES WHETHER A PERSON IS BEING EXPOSED TO ADVERSE LEVELS OF NON-CARCINOGENS. THE HAZARD INDEX PROVIDES A USEFUL REFERENCE POINT FOR GAUGING THE POTENTIAL SIGNIFICANCE OF MULTIPLE CONTAMINANT EXPOSURES WITHIN A SINGLE MEDIUM OR ACROSS MEDIA. THE HAZARD INDEX FOR NON-CARCINOGENIC HEALTH RISKS IS THE SUM OF ALL CONTAMINANTS FOR A GIVEN SCENARIO. ANY HAZARD INDEX VALUE GREATER THAN 1.0 SUGGESTS THAT A NON-CARCINOGEN POTENTIALLY PRESENTS AN UNACCEPTABLE HEALTH RISK.

B. CARCINOGENIC HEALTH RISKS

CANCER POTENCY FACTORS (CPFS) HAVE BEEN DEVELOPED BY EPA'S CARCINOGENIC ASSESSMENT GROUP FOR ESTIMATING EXCESS LIFETIME CANCER RISKS ASSOCIATED WITH EXPOSURE TO POTENTIALLY CARCINOGENIC CHEMICALS. CPFS, WHICH ARE EXPRESSED IN UNITS OF (MG/KG-DAY)(-1), ARE MULTIPLIED BY THE ESTIMATED INTAKE OF A POTENTIAL CARCINOGEN, IN MG/KG-DAY, TO PROVIDE AN UPPER-BOUND ESTIMATE OF THE EXCESS LIFETIME CANCER RISK ASSOCIATED WITH EXPOSURE AT THAT INTAKE LEVEL. THE TERM "UPPER BOUND" REFLECTS THE CONSERVATIVE ESTIMATE OF THE RISKS CALCULATED FROM THE CPF. USE OF THIS APPROACH MAKES UNDERESTIMATION OF THE ACTUAL CANCER RISK HIGHLY UNLIKELY. CANCER POTENCY FACTORS ARE DERIVED FROM THE RESULTS OF HUMAN EPIDEMIOLOGICAL STUDIES OR CHRONIC ANIMAL BIOASSAYS. THE EXCESS LIFETIME CANCER RISKS ARE THE SUM OF ALL EXCESS CANCER LIFETIME RISKS FOR ALL CONTAMINANTS OF A GIVEN SCENARIO.

EXCESS LIFETIME CANCER RISKS ARE DETERMINED BY MULTIPLYING THE INTAKE LEVEL WITH THE CANCER POTENCY FACTOR FOR EACH CONTAMINANT OF CONCERN. THESE RISKS ARE PROBABILITIES THAT ARE GENERALLY EXPRESSED IN SCIENTIFIC NOTATION (E.G. 1 X (10-6)). AN EXCESS LIFETIME CANCER RISK OF 1 X (10-6) INDICATES THAT A PERSON'S CHANCE OF CONTRACTING CANCER AS A RESULT OF SITE RELATED EXPOSURE OVER A 70-YEAR LIFETIME MAYBE INCREASED BY AS MUCH AS 1 IN ONE MILLION. THE USEPA GENERALLY ATTEMPTS TO REDUCE THE EXCESS LIFETIME CANCER RISK AT SUPERFUND SITES TO A RANGE OF 1 X (10-4) TO 1 X (10-6) (1 IN 10,000 TO 1 IN ONE MILLION), WITH AN EMPHASIS ON THE LOWER END (1 X (10-6)) OF THE SCALE. TABLE 2 DESCRIBES THE ACCEPTABLE INTAKES AND CARCINOGEN POTENCY FACTORS FOR CHEMICALS OF CONCERN AT THE LEMBERGER SITES. TABLE 3 LISTS THE WEIGHT OF EVIDENCE CATEGORIES FOR POTENTIAL CARCINOGENS.

THE FOLLOWING INDICATES THE EXCESS LIFETIME CANCER RISKS FOR DIFFERENT SCENARIOS INVOLVING INGESTION OR INHALATION OF, OR DIRECT CONTACT WITH, SITE CONTAMINANTS.

1. CURRENT AND FUTURE SOIL RISKS

THE ESTIMATED EXCESS CANCER RISK FOR POTENTIAL FUTURE RESIDENTS AT THE LL SITE WAS SLIGHTLY GREATER THAN 1 X (10-5). ARSENIC WAS ASSOCIATED WITH RISKS OF 1 X (10-5) AND BENZO(A)PYRENE ACCOUNTED FOR 2 X (10-6). THESE ESTIMATED RISK LEVELS INDICATE AN INCREASED CARCINOGENIC HEALTH RISK DUE TO POTENTIAL FUTURE RESIDENTIAL EXPOSURES TO CONTAMINANTS IN SURFACE SOIL AT THE LL SITE. (TABLE 4 SHOWS RISK CHARACTERIZATION FOR LAND USE SCENARIOS).

THE SOILS AT THE LTR LANDFILL SITE CONTAIN HOT SPOTS THAT NEED TO BE FURTHER CHARACTERIZED. THE RISKS FROM THE SOILS AT THIS SITE WILL BE ASSESSED IN THE SECOND OPERABLE UNIT.

2. FUTURE GROUNDWATER RISKS

FOR EXCESS CANCER RISKS, CONTAMINANT CONCENTRATIONS IN SAMPLES FROM 29 OF THE 33 MONITORING WELLS WERE ASSOCIATED WITH RISKS GREATER THAN 1 X (10-6). EIGHT OF THE MONITORING WELLS SHOWED AN EXCESS CANCER RISK OF EQUAL TO OR GREATER THAN 1 X (10-3) RISKS. THE GREATEST RISK OF 2 X (10-2) WAS FOUND AT TWO LOCATIONS BENEATH THE LTR SITE AND RISKS AS HIGH AS 3 X (10-4) WERE ASSOCIATED WITH SAMPLES FOUND BENEATH THE LL SITE. THE INDIVIDUAL CHEMICALS ASSESSED TO DETERMINE THE EXCESS CANCER RISK MAY BE FOUND IN TABLE 1.

5. RISK SUMMARY

HEALTH RISKS FOR EACH SITE WERE EVALUATED BASED ON A RESIDENTIAL USE SCENARIO. CONTAMINANT CONCENTRATIONS USED WERE THOSE IDENTIFIED DURING THE RI.

ALL RESIDENTS ON THE LL SITE WOULD BE EXPOSED TO CONTAMINANTS THROUGH INGESTION AND DERMAL CONTACT WITH SURFACE SOILS. THESE SOILS EXPOSURES WOULD RESULT IN AN EXCESS CANCER RISK OF 1 X (10-5) AND, FOR CHILDREN AGE 1 THROUGH 6, A CHRONIC HEALTH HAZARD INDEX OF 1.1.

FUTURE RESIDENTS ON THE LL SITE WHO INSTALLED A WELL INTO THE UPPER GROUNDWATER SYSTEM WOULD ALSO BE EXPOSED TO CONTAMINANTS THROUGH INGESTION, DERMAL SHOWER CONTACT, AND INHALATION OF CHEMICALS WHEN SHOWERING. BASED ON CONCENTRATIONS OF COMPOUNDS IDENTIFIED IN MONITORING WELLS ON THE LL SITE, THIS COULD RESULT IN AN EXCESS CANCER RISK OF 9 X (10-4) AND, FOR CHILDREN AGE 1 THROUGH 6, A CHRONIC HEALTH HAZARD INDEX OF 28.8. UTILIZATION OF THE LOWER GROUNDWATER SYSTEM WOULD RESULT IN AN EXCESS CANCER RISK OF 3 X (10-4) AND, FOR CHILDREN AGE 1 THROUGH 6, A CHRONIC HEALTH HAZARD INDEX OF 1.5.

ALL RESIDENTS ON THE LTR SITE WOULD BE EXPOSED TO CONTAMINANTS THROUGH INGESTION AND DERMAL CONTACT WITH SURFACE SOILS. THESE SOILS EXPOSURES WOULD RESULT IN AN EXCESS CANCER RISK OF 2 X (10-5) AND, FOR CHILDREN AGE 1 THROUGH 6, A CHRONIC HEALTH HAZARD INDEX OF 3.3.

FUTURE RESIDENTS ON THE LTR SITE WHO INSTALLED A WELL INTO THE UPPER GROUNDWATER SYSTEM WOULD ALSO BE EXPOSED TO CONTAMINANTS THROUGH INGESTION, DERMAL SHOWER CONTACT, AND INHALATION OF CHEMICALS WHEN SHOWERING. BASED ON CONCENTRATIONS OF COMPOUNDS IDENTIFIED IN MONITORING WELLS ON THE LTR SITE, THIS COULD RESULT IN AN EXCESS CANCER RISK OF 3 X (10-4). UTILIZATION OF THE LOWER GROUNDWATER SYSTEM WOULD RESULT IN AN EXCESS CANCER RISK OF 2 X (10-2) AND, FOR CHILDREN AGE 1 THROUGH 6, A CHRONIC HEALTH HAZARD INDEX OF 30.8. (TABLE 4 SHOWS THE CHRONIC HAZARD INDEX AND THE EXCESS LIFETIME CANCER RISK FOR THE MONITORING WELLS AT THE SITE).

THE RISK ASSESSMENT CONCLUDED THAT THE PRIMARY HEALTH AND ENVIRONMENTAL THREATS POSED BY THE SITES ARE THROUGH CONSUMPTION OF HAZARDOUS SUBSTANCES IN THE GROUNDWATER THROUGH INGESTION, DERMAL ABSORPTION WHILE SHOWERING OR BATHING, AND INHALATION OF CHEMICALS EMITTED WHILE SHOWERING AND DIRECT CONTACT WITH CONTAMINATED SOIL AT THE SITES. THE PEOPLE AT RISK OF EXPOSURE TO SITE-RELATED CONTAMINANTS ARE THOSE USING THE GROUNDWATER AT THE SITES AS A POTABLE WATER SOURCE AND FARMERS, HUNTERS AND TRESPASSERS ENTERING THE SITES. IF THE SITES ARE FURTHER DEVELOPED, CONSTRUCTION WORKERS OR SITE RESIDENTS MAY ALSO BE EXPOSED THROUGH DIRECT CONTACT WITH CONTAMINATED SOIL.

ACTUAL OR THREATENED RELEASES OF HAZARDOUS SUBSTANCES FROM THESE SITES, IF NOT ADDRESSED BY IMPLEMENTING THE RESPONSE ACTION SELECTED IN THIS ROD, MAY PRESENT AN IMMINENT AND SUBSTANTIAL ENDANGERMENT TO PUBLIC HEALTH, WELFARE, OR THE ENVIRONMENT.

G. ENVIRONMENTAL STANDARDS NOT MET AT THE SITE

IN ADDITION TO POSING UNACCEPTABLE RISKS TO HUMANS, THE LEMBERGER SITES DO NOT MEET CERTAIN APPLICABLE OR RELEVANT AND APPROPRIATE FEDERAL OR STATE ENVIRONMENTAL STANDARDS AT THIS TIME.

1. GROUNDWATER

TABLE 5 LISTS THE REPRESENTATIVE CHEMICALS FOUND IN THE CONTAMINATED GROUNDWATER PLUMES AND THE CORRESPONDING FEDERAL AND STATE GROUNDWATER CLEANUP STANDARDS WHICH EPA BELIEVES TO BE ADEQUATELY PROTECTIVE. THE GROUNDWATER CONTAMINANT PLUMES CONTAIN CONCENTRATIONS OF HAZARDOUS SUBSTANCES WHICH EXCEED MOST OF THESE GROUNDWATER CLEANUP STANDARDS.

2. GROUNDWATER PROTECTION GOALS AND THE NATIONAL CONTINGENCY PLAN

US EPA'S GROUNDWATER PROTECTION GOAL HAS BEEN SET FORTH IN THE NCP AS FOLLOWS:

THE NATIONAL GOAL OF THE REMEDY SELECTION PROCESS IS TO SELECT REMEDIES THAT ARE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT, THAT MAINTAIN PROTECTION OVER TIME, AND THAT MINIMIZE UNTREATED WASTE. TITLE 40 OF THE CODE OF FEDERAL REGULATION (40 CFR) PART 300.430(A) (1) (I).

THE NCP STATES THAT US EPA EXPECTS TO RETURN USABLE GROUNDWATERS TO THEIR BENEFICIAL USES, WHEREVER PRACTICABLE, WITHIN A TIME FRAME THAT IS REASONABLE GIVEN THE PARTICULAR CIRCUMSTANCES OF THE SITE. WHENEVER RESTORATION OF GROUNDWATERS IS NOT PRACTICABLE, USEPA EXPECTS TO PREVENT FURTHER MIGRATION OF THE PLUME, PREVENT EXPOSURE TO THE CONTAMINATED GROUNDWATER, AND EVALUATE FURTHER RISK REDUCTION.

(40 CFR SECTION 300.430(A) (1) (III) (F)).

ALSO,THE NCP CONSIDERS THE USE OF INSTITUTIONAL CONTROLS TO LIMIT EXPOSURES TO HAZARDOUS SUBSTANCES IN THE GROUNDWATER: US EPA EXPECTS TO USE INSTITUTIONAL CONTROLS SUCH AS WATER USE AND DEED RESTRICTIONS TO SUPPLEMENT ENGINEERING CONTROLS AS APPROPRIATE FOR SHORT-AND LONG-TERM MANAGEMENT TO PREVENT OR LIMIT EXPOSURE TO HAZARDOUS SUBSTANCES, POLLUTANTS, OR CONTAMINANTS.... THE USE OF INSTITUTIONAL CONTROLS SHALL NOT SUBSTITUTE FOR ACTIVE RESPONSE MEASURES AS THE SOLE REMEDY UNLESS SUCH RESPONSE MEASURES ARE DETERMINED NOT TO BE PRACTICABLE....(40 CFR PART 300.430(A) (1) (III) (D).

H. DESCRIPTION OF REMEDIAL ALTERNATIVES

AS WITH MANY SUPERFUND SITES, THE CONDITIONS AT THE LL AND LTR SITES ARE COMPLEX. AS A RESULT, US EPA ORGANIZED THE WORK INTO TWO PLANNED ACTIVITIES FOR EFFECTIVE EVALUATION OF REMEDIAL ALTERNATIVES DESIGNED TO REDUCE SITE RISKS TO ACCEPTABLE LEVELS. THE REMEDIAL ACTION SELECTED IN THIS ROD ADDRESSES THE FIRST OF THESE TWO PLANNED ACTIVITIES OR OPERABLE UNITS AT THE SITES. THIS ROD ADDRESSES GROUNDWATER CONTAMINATION AT BOTH THE LL AND LTR SITES, AND SOURCE CONTAMINATION AT THE LL SITE ONLY.

THE GROUNDWATER ALTERNATIVES AND THE LL SITE SOURCE CONTAINMENT (SOIL, AND WASTE) ALTERNATIVES HAVE BEEN DEVELOPED SEPARATELY. THE GROUNDWATER ALTERNATIVES DO NOT INCLUDE ANY SOURCE CONTROL MEASURES OR MEANS OF MITIGATING CONTAMINANT MIGRATION FROM THE SOIL AND WASTES INTO THE GROUNDWATER. WITHOUT SOURCE CONTAINMENT FOR THE LL SITE, THE CONTAMINATED SOIL, LEACHATE AND WASTES MAY CONTINUE TO CONTAMINATE THE GROUNDWATER AND INCREASE THE TIME REQUIRED TO CLEANUP THE AQUIFERS; THEREFORE, BOTH A SOURCE CONTROL ALTERNATIVE FOR THE LL SITE AND A GROUNDWATER ALTERNATIVE WERE EVALUATED TOGETHER FOR THE LEMBERGER SITES.

SOURCE CONTAMINATION AT THE LTR SITE WILL BE FURTHER CHARACTERIZED AND A REMEDY WILL BE SELECTED FOR THE SECOND OPERABLE UNIT WHEN ADDITIONAL WORK IS COMPLETED. AT THAT TIME A SUBSEQUENT ROD WILL BE PREPARED TO ADDRESS SOURCE CONTROL AT THE LTR SITE.

1. LANDFILL SITE

ALTHOUGH THE NCP REAFFIRMS US EPA'S PREFERENCE FOR PERMANENT SOLUTIONS TO SUPERFUND SITE PROBLEMS THROUGH THE USE OF TREATMENT TECHNOLOGIES, THE PREAMBLE TO THE NCP CONTEMPLATES THAT MANY REMEDIAL ALTERNATIVES MAY BE IMPRACTICAL FOR CERTAIN SITES DUE TO SEVERE IMPLEMENTABILITY PROBLEMS OR PROHIBITIVE COSTS (E.G., TREATMENT OF THE ENTIRE CONTENTS OF A LARGE LANDFILL). SINCE THE LL SITE IS A 45 ACRE LANDFILL CONTAINING HOMOGENEOUS WASTES WHERE NO HOT SPOTS OF CONTAMINATION WERE FOUND, US EPA BELIEVES THAT TREATMENT OF THE LANDFILL CONTENTS IS IMPRACTICABLE BECAUSE OF SEVERE IMPLEMENTABILITY PROBLEMS, DANGER TO WORKERS AND NEARBY RESIDENTS, AND PROHIBITIVE COSTS; THEREFORE, THE FS WAS DIRECTED AT THE EVALUATION OF CONTAINMENT RATHER THAN TREATMENT OF THE LL SOURCE MATERIAL. SOURCE CONTROL ALTERNATIVES RANGE FROM NO ACTION TO CAPPING AND SLURRY WALL.

2. GROUNDWATER

THE OBJECTIVE OF THE GROUND REMEDIAL ACTION UNIT IS TO ACHIEVE FEDERAL DRINKING-WATER STANDARDS UNDER THE SAFE DRINKING WATER ACT AND THE STATE OF WISCONSIN GROUNDWATER RULE, CHAPTER NR 140. GROUNDWATER

ALTERNATIVES RANGE FROM NO ACTION TO GROUNDWATER EXTRACTION AND TREATMENT.

GROUNDWATER ALTERNATIVES

THE ALTERNATIVES CONSIDERED FOR DETAILED ANALYSIS IN THE FS ARE:

1. NO ACTION
4. GROUNDWATER CONTAINMENT BY HYDRAULIC CONTROLS
5. GROUNDWATER EXTRACTION AND TREATMENT FOR ACTIVE RESTORATION

(NOTE: THE NATIONAL CONTINGENCY PLAN (NCP) REQUIRES THAT ALTERNATIVES BE SUBJECTED TO AN INITIAL SCREENING TO ELIMINATE THOSE ALTERNATIVES THAT HAVE ADVERSE IMPACTS ON PUBLIC HEALTH AND THE ENVIRONMENT, ARE NOT APPLICABLE TO THE CONTAMINANTS AND MEDIA AT THE SITE, OR ARE MUCH MORE EXPENSIVE TO IMPLEMENT THAN OTHER ALTERNATIVES THAT PROVIDE ESSENTIALLY THE SAME LEVEL OF RISK REDUCTION. BASED ON THIS INITIAL SCREENING, TWO GROUNDWATER ALTERNATIVES WERE REJECTED BEFORE FINAL SCREENING. ALTERNATIVE 2, LIMITED ACTION, CONSISTS OF INSTITUTIONAL CONTROLS, GROUNDWATER MONITORING, AND DEED RESTRICTIONS. THIS ALTERNATIVE WAS REJECTED BECAUSE IT WOULD NOT MEET REMEDIAL ACTION OBJECTIVES. ALTERNATIVE 3, GROUNDWATER CONTAINMENT BY VERTICAL BARRIER CONSISTS OF GROUNDWATER CONTAINMENT BY A SLURRY WALL, TREATMENT OF EXTRACTED GROUNDWATER, MONITORING AND DEED RESTRICTIONS. THIS ALTERNATIVE WAS REJECTED BECAUSE IT WOULD NOT MEET REMEDIAL ACTION OBJECTIVES).

GROUNDWATER ALTERNATIVE 1: NO ACTION

A NO ACTION ALTERNATIVE WAS EVALUATED TO SERVE AS A BASELINE FOR COMPARISON AGAINST THE OTHER CLEANUP ALTERNATIVES. IT ASSUMES THAT NO CORRECTIVE ACTION WILL BE TAKEN AT THE SITE. NO REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT OR OF THE RATE OF LEACHING OF CONTAMINANTS TO THE GROUNDWATER WOULD BE PROVIDED BY THIS ALTERNATIVE; THEREFORE, NO RISK REDUCTION WOULD RESULT FROM THIS ACTION. THE NO ACTION ALTERNATIVE WOULD NOT MEET FEDERAL OR STATE DRINKING WATER STANDARDS FOR GROUNDWATER AND IS NOT PROTECTIVE. THERE ARE NO COSTS ASSOCIATED WITH THIS ALTERNATIVE.

GROUNDWATER ALTERNATIVE 4: GROUNDWATER CONTAINMENT BY HYDRAULIC CONTROLS

GROUNDWATER ALTERNATIVE 4 INCLUDES PUMPING AND TREATING GROUNDWATER IN THE VICINITY OF THE LL AND LTR SITES TO CONTAIN THE CONTAMINATED GROUNDWATER. THE PURPOSE OF THIS ALTERNATIVE IS TO CONTROL THE MOVEMENT OF CONTAMINATED GROUNDWATER RATHER THAN ACHIEVE GROUNDWATER CLEANUP GOALS. THE APPROXIMATE EXTENT OF THE PLUME IN THE UPPER AQUIFER IS 189 ACRES AND THE LOWER AQUIFER PLUME COVERS APPROXIMATELY 1,000 ACRES.

GROUNDWATER EXTRACTION SYSTEM

APPROXIMATELY SIX EXTRACTION WELLS WOULD BE INSTALLED IN THE UPPER AND LOWER AQUIFER TO EXTRACT THE GROUNDWATER PLUMES. THE WELLS IN THE UPPER AQUIFER WOULD BE INSTALLED SO THAT THEY TERMINATE AT THE TOP OF THE CLAY LAYER. THE EXTRACTION WELLS WOULD BE USED TO CHANGE THE GROUNDWATER FLOW PATTERN TO CONTROL THE MIGRATION OF THE CONTAMINATE PLUME. THE EXACT NUMBER OF EXTRACTION WELLS, WELL LOCATIONS AND PUMPING RATES IN GALLONS PER MINUTE (GPM) WOULD BE EVALUATED AND SELECTED DURING THE DESIGN PHASE OF THE REMEDY. IT IS ESTIMATED THAT THE WELLS WOULD BE PUMPED AT A COMBINED RATE OF 110 GPM (1.7 BILLION GALLONS OF GROUNDWATER) FOR 30 YEARS. AN ESTIMATE OF 30 YEARS WAS USED FOR COSTING PURPOSES ONLY; HOWEVER, IT IS EXPECTED THE PUMPS WILL RUN PERPETUALLY.

TREATMENT FACILITY

AN ON-SITE TREATMENT FACILITY WOULD BE BUILT AT THE LL SITE TO TREAT THE CONTAMINATED GROUNDWATER. TREATMENT PROCESSES (FIGURE 5) INCLUDE ELECTROCHEMICAL PRECIPITATION TO REMOVE INORGANIC CONTAMINANTS AND GRANULAR ACTIVATED CARBON (GAC) TO REMOVE ORGANIC CONTAMINANTS, UNLESS TREATABILITY STUDIES SHOW OTHER TECHNOLOGIES TO BE MORE EFFECTIVE. THE DESIGN OF THE ACTUAL PROCESS FLOW TRAIN AND THE SIZING OF THE TREATMENT PROCESSES WOULD BE COMPLETED FOLLOWING COMPLETION OF A TREATABILITY STUDY TO EVALUATE THE PERFORMANCE OF THE SYSTEMS. A 6-FOOT-HIGH CHAIN LINK SECURITY FENCE WOULD BE CONSTRUCTED AROUND THE TREATMENT FACILITY TO LIMIT GENERAL ACCESSIBILITY TO THE FACILITY AND THE POTENTIAL FOR PUBLIC EXPOSURE. DEED RESTRICTIONS WOULD BE PLACED ON PROPERTIES OVER THE CONTAMINANT PLUME TO PREVENT CONTAMINATED GROUNDWATER FROM BEING USED.

TREATED EFFLUENT FROM THE GROUNDWATER TREATMENT SYSTEM WOULD BE DISCHARGED INTO THE BRANCH RIVER. A WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM (WPDES) PERMIT WOULD NOT BE REQUIRED FOR ON-SITE DISCHARGE TO THE BRANCH RIVER; HOWEVER, THE SUBSTANTIVE STATE REQUIREMENTS FOR EFFLUENT DISCHARGE LIMITATIONS WOULD BE MET BEFORE DISCHARGE.

MONITORING PROGRAM

A MONITORING PROGRAM WOULD BE DEVELOPED TO EVALUATE THE EFFECTIVENESS OF THE EXTRACTION SYSTEM. SELECTED RESIDENTIAL WELLS (INCLUDING THE DENOR WELL) WOULD BE IDENTIFIED DURING DESIGN AND INCLUDED IN THE MONITORING PROGRAM.

MANAGEMENT OF TREATMENT RESIDUALS

TREATMENT OF THE CONTAMINATED GROUNDWATER WILL RESULT IN THE GENERATION OF RESIDUAL SLUDGE CONTAINING METALS AND OTHER CONTAMINANTS. THE SLUDGE WOULD BE STORED TEMPORARILY IN 55-GALLON DRUMS. APPROXIMATELY SEVEN CUBIC YARDS (21 DRUMS) OF WASTE WOULD BE GENERATED EVERY MONTH.

THE CONTAMINATED GROUNDWATER CONTAINS ORGANIC CONSTITUENTS WHICH ORIGINATED FROM LISTED WASTE AT THE LTR SITE. IT MAY BE POSSIBLE TO REMOVE THE ORGANICS FROM THE GROUNDWATER TO BELOW HEALTH BASE LEVELS, PRIOR TO GENERATING A METAL BEARING SLUDGE FROM THE CHEMICAL PRECIPITATION TREATMENT. IF THE GROUNDWATER HAS BEEN SUCCESSFULLY TREATED, THEN THE ORGANIC CONTAMINANTS WILL NOT MAKE THE SLUDGE A LISTED HAZARDOUS WASTE AND WILL NOT TRIGGER LAND DISPOSAL RESTRICTIONS (LDRS). IN THE EVENT THAT THE GROUNDWATER CANNOT BE TREATED TO REMOVE ALL ORGANICS ABOVE HEALTH BASED LEVELS, OR THE SLUDGE DOES CONTAIN DETECTABLE LEVELS OF ORGANIC CONTAMINANTS, THE SLUDGE WILL BE MANAGED AS A LISTED HAZARDOUS WASTE. IF THE SLUDGE IS A LISTED HAZARDOUS WASTE, IT MAY, IF POSSIBLE, BE DISPOSED OF AS PART OF THE LTR SOURCE CONTROL REMEDY. ALTERNATIVELY, IT MAY BE TREATED AND DISPOSED OF OFFSITE AT A RCRA SUBTITLE C LANDFILL.

THE SLUDGE IS NOT EXPECTED TO CONTAIN METALS AT CONCENTRATIONS ABOVE CHARACTERISTIC LEVELS. IF, AFTER TESTING BY THE TCLP, IT IS DETERMINED THAT THE SLUDGE IS CHARACTERISTIC FOR METALS, IT WILL BE TREATED BELOW CHARACTERISTIC LEVELS. SLUDGE WHICH DOES NOT CONTAIN ORGANICS AND IS NOT CHARACTERISTIC FOR METALS MAY BE DISPOSED OF AS A SOLID WASTE.

IF THE SLUDGE IS A LISTED HAZARDOUS WASTE, IT MAY, IF POSSIBLE, BE DISPOSED OF AS PART OF THE LTR SOURCE CONTROL REMEDY. ALTERNATIVELY, IT MAY BE TREATED AND DISPOSED OF OFFSITE AT A RCRA SUBTITLE C LANDFILL. IF ORGANICS ARE SUCCESSFULLY REMOVED PRIOR TO THE ELECTROCHEMICAL PRECIPITATION, THE SLUDGE CONTAINING METALS WOULD NOT BE A LISTED HAZARDOUS WASTE.

IF THE SLUDGE IS NEITHER A CHARACTERISTIC NOR A LISTED WASTE, IT WILL BE DISPOSED OF AS A SOLID WASTE, AND LAND DISPOSAL RESTRICTIONS WOULD NOT BE APPLICABLE. IF THE SLUDGE MUST BE MANAGED AS A LISTED HAZARDOUS WASTE, THEN THE SLUDGE WOULD BE TREATED TO APPROPRIATE LDR STANDARDS PRIOR TO ON- OR OFF-SITE DISPOSAL. IT IS EXPECTED THAT THE SPENT CARBON FROM THE TREATMENT SYSTEM WOULD BE RECYCLED IN A UNIT IN COMPLIANCE WITH 40 CFR 264 (SUBPART X).

WETLANDS

AN INVESTIGATION WOULD BE CONDUCTED DURING REMEDIAL DESIGN TO DETERMINE THE EXTENT OF THE WETLANDS ON THE LEMBERGER SITES AND THE IMPACT THAT PUMPING GROUNDWATER FROM THE UPPER AQUIFER WOULD HAVE ON THESE WETLANDS. MEASURES WOULD BE IMPLEMENTED TO AVOID DAMAGE TO THESE WETLANDS. POTENTIAL IMPACTS ON WETLANDS WOULD BE AVOIDED OR MITIGATED IN ACCORDANCE WITH CHS. NR 1.95 AND NR 103, WIS. ADM. CODE. IF DAMAGE OCCURS, THE IMPACT ON THE WETLANDS WILL BE MITIGATED.

CAPITAL COSTS	$ 2,800,000
ANNUAL O&M 1ST YEAR	442,000
EACH YEAR THEREAFTER	343,000
PRESENT WORTH	8,200,000
TIME TO IMPLEMENT	12 MONTHS

GROUNDWATER ALTERNATIVE 5: GROUNDWATER EXTRACTION AND TREATMENT FOR ACTIVE RESTORATION

GROUNDWATER ALTERNATIVE 5 INVOLVES PUMPING AND TREATING GROUNDWATER IN THE VICINITY OF THE LL AND LTR SITES TO ACTIVELY AND AGGRESSIVELY REMOVE THE CONTAMINANTS AND RESTORE THE AQUIFER TO MEET CLEANUP STANDARDS AT THE WASTE MANAGEMENT BOUNDARY. THE MAJOR DIFFERENCE BETWEEN GROUNDWATER ALTERNATIVE 4 AND 5 IS THAT THE PURPOSE OF ALTERNATIVE 4 IS ONLY TO CONTAIN THE CONTAMINATED GROUNDWATER TO PREVENT IT FROM MOVING OFF-SITE AND PURPOSE OF THIS ALTERNATIVE IS TO REMOVE CONTAMINATION FROM THE GROUNDWATER AND ACTIVELY RESTORE THE AQUIFER. THE DESCRIPTION OF THIS ALTERNATIVE IS THE SAME AS FOR GROUNDWATER ALTERNATIVE 4, BUT BECAUSE A GREATER VOLUME (FLOW RATE) OF GROUNDWATER WOULD BE REMOVED FROM THE AQUIFER (AT A MUCH FASTER RATE) AND TREATED, THE OPERATION AND MAINTENANCE OF THE SYSTEM WOULD BE GREATER AND A LARGER VOLUME OF SLUDGE REQUIRING DISPOSAL WOULD BE GENERATED FROM THE TREATMENT PROCESS. APPROXIMATELY 40 DRUMS OF WASTE WOULD BE GENERATED EACH MONTH. IT IS ESTIMATED 210 GPM OF GROUNDWATER (1.7 BILLION GALLONS) WOULD BE PUMPED AND TREATED FOR 16 YEARS. THE TARGET AREA AND EXTRACTION WELL PLACEMENT FOR GROUNDWATER ALTERNATIVE 5 IS ILLUSTRATED IN FIGURE 6.

TREATED EFFLUENT FROM THE GROUNDWATER TREATMENT SYSTEM WOULD BE DISCHARGED INTO THE BRANCH RIVER. A WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM (WPDES) PERMIT WOULD NOT BE REQUIRED FOR AN ON-SITE DISCHARGE TO THE BRANCH RIVER; HOWEVER, THE SUBSTANTIVE STATE REQUIREMENTS FOR EFFLUENT DISCHARGE LIMITATIONS WOULD BE MET BEFORE DISCHARGE.

MANAGEMENT OF TREATMENT RESIDUALS WOULD BE THE SAME AS FOR GROUNDWATER ALTERNATIVE 4.

MONITORING PROGRAM

A MONITORING PROGRAM WOULD BE DEVELOPED TO EVALUATE THE EFFECTIVENESS OF THE EXTRACTION SYSTEM. SELECTED RESIDENTIAL WELLS (INCLUDING THE DENOR WELL) WOULD BE IDENTIFIED DURING DESIGN AND INCLUDED IN THE MONITORING PROGRAM.

GROUNDWATER CLEANUP STANDARDS

GROUNDWATER WILL BE PUMPED AND TREATED UNTIL CONTAMINANTS DO NOT EXCEED FEDERAL MAXIMUM CONTAMINANT LEVELS (MCLS) OR MORE STRINGENT STATE STANDARDS, NOTABLY THE WISCONSIN PREVENTIVE ACTION LIMITS (PALS). COLLECTIVELY, THE CLEANUP LEVELS WILL COMPLY WITH THE (10-4) TO (10-6) RISK RANGE AS REQUIRED BY THE NATIONAL CONTINGENCY PLAN (NCP). IF THERE IS A CONTAMINANT FOR WHICH AN MCL, MCLG OR PAL DOES NOT EXIST, BUT FOR WHICH HEALTH-BASED DATA IS AVAILABLE, THEN THE RISK BASED NUMBER WILL BE USED. A HEALTH-BASED RISK LEVEL OF (10-6) WAS USED FOR CARCINOGENS AND AN HI LEVEL OF 1 (HI=1) WAS USED FOR NON-CARCINOGENS. THE GROUNDWATER STANDARDS ARE PRESENTED IN TABLE 6.

WETLANDS

AN INVESTIGATION WOULD BE CONDUCTED DURING REMEDIAL DESIGN TO DETERMINE THE EXTENT OF THE WETLANDS ON THE LEMBERGER SITES AND THE IMPACT THAT PUMPING GROUNDWATER FROM THE UPPER AQUIFER WOULD HAVE ON THESE WETLANDS. MEASURES WOULD BE IMPLEMENTED TO AVOID DAMAGE TO THESE WETLANDS. POTENTIAL IMPACTS ON WETLANDS WOULD BE AVOIDED OR MINIMIZED IN ACCORDANCE WITH CHS. NR 1.95 AND NR 103, WIS. ADM. CODE. IF DAMAGE OCCURS, THE IMPACT ON THE WETLANDS WILL BE MITIGATED.

CAPITAL COST:	$ 3,000,000
ANNUAL O&M 1ST YEAR	651,000
EACH YEAR THEREAFTER	552,000
PRESENT WORTH	9,300,000
TIME TO IMPLEMENT	12 MONTHS

SOURCE CONTROL ALTERNATIVES

THE ALTERNATIVES CONSIDERED FOR DETAILED ANALYSIS IN THE FS ARE:

1. NO ACTION

3. SOLID WASTE CAP
4. MULTILAYER CAP
5. SOLID WASTE CAP AND SLURRY WALL

(NOTE: THE NATIONAL CONTINGENCY PLAN (NCP) REQUIRES THAT ALTERNATIVES BE SUBJECTED TO AN INITIAL SCREENING TO ELIMINATE THOSE ALTERNATIVES THAT HAVE ADVERSE IMPACTS ON PUBLIC HEALTH AND THE ENVIRONMENT, ARE NOT APPLICABLE TO THE CONTAMINANTS AND MEDIA AT THE SITE, OR ARE MUCH MORE EXPENSIVE TO IMPLEMENT THAN OTHER ALTERNATIVES THAT PROVIDE ESSENTIALLY THE SAME LEVEL OF RISK REDUCTION. BASED ON THIS SCREENING, SOURCE CONTROL ALTERNATIVE 2, WAS REJECTED BECAUSE IT WOULD NOT MEET ALL REMEDIAL ACTION OBJECTIVES, ALTERNATIVE 6 WAS REJECTED BECAUSE IT IS ESSENTIALLY THE SAME AS SOURCE CONTROL ALTERNATIVE 5 AT A HIGHER COST AND ALTERNATIVE 7 WAS REJECTED BECAUSE IT WOULD BE DIFFICULT TO IMPLEMENT, WOULD CREATE DANGERS FOR WORKERS AND NEARBY RESIDENTS, AND WOULD HAVE EXTREMELY HIGH COSTS. THESE ALTERNATIVES WERE NOT EVALUATED IN DETAIL IN THE FS).

SOURCE CONTROL ALTERNATIVE 1: NO ACTION

THE DESCRIPTION FOR THIS ALTERNATIVE IS THE SAME AS FOR GROUNDWATER NO ACTION.

SOURCE CONTROL ALTERNATIVE 3: SOLID WASTE CAP

THIS ALTERNATIVE INVOLVES CAPPING THE KNOWN EXTENT OF THE WASTES AT THE LL SITE WITH A SOLID WASTE CAP TO REDUCE POTENTIAL CONTACT WITH CONTAMINATED MATERIAL AND REDUCE WATER INFILTRATION INTO WASTE AREAS. DRAINAGE CONTROLS, VEGETATION, AND A 6-FOOT HIGH SECURITY FENCE WOULD BE PROVIDED TO MINIMIZE EROSION AND LIMIT DISTURBANCES TO THE CAP. DEED RESTRICTIONS MAY BE PLACED ON THE SITE TO PREVENT FUTURE USES OF THE LAND. A CROSS SECTION OF THE SOLID WASTE CAP IS SHOWN ON FIGURE 7.

CAP CONSTRUCTION

THE WASTE AREA WOULD BE CLEARED AND REGRADED TO SMOOTH OUT THE EXISTING CAP. BORROW SOIL WOULD BE USED AS NECESSARY ON THE EXISTING CAP. THE CAP LAYERS INCLUDE FROM BOTTOM TO TOP: A GRADING LAYER (EXISTING COVER MAY BE USED, IF ADEQUATE) A COMPACTED CLAY LAYER, A DRAINAGE LAYER AN OPTIONAL GEOTEXTILE FABRIC, A COMPACTED NATIVE SOIL LAYER, TOPSOIL, AND A VEGETATIVE COVER. A CONCEPTUAL DESIGN IS PRESENTED IN FIGURE 8.

THE MINIMUM DESIGN REQUIREMENTS OF THE CAP WOULD MEET THE STATE OF WISCONSIN NR 504.07(1)-(7), WIS. ADM. CODE SOLID WASTE REGULATIONS. THE COMPACTED CLAY LAYER WOULD BE 2 FEET THICK AND WOULD HAVE A PERMEABILITY OF LESS THAN 1 X (10-7) CM/SEC. THE CLAY LAYER WOULD BE PLACED IN MAXIMUM 6 INCH THICK LIFTS. THE DRAINAGE LAYER WOULD BE PLACED ON TOP OF THE CLAY LAYER TO MINIMIZE HYDRAULIC PRESSURE AND WOULD BE A 6-INCH-THICK SAND LAYER. A GEOTEXTILE FABRIC MAY BE PLACED OVER THE SAND TO PREVENT CLOGGING. A MINIMUM 2-FOOT-THICK NATIVE SOIL LAYER AND A MINIMUM 6-INCH-THICK LAYER OF TOPSOIL WOULD COMPOSE THE TOP LAYERS OF THE CAP. THE DRAINAGE LAYER AND OVERLYING SOIL WOULD PROVIDE PROTECTION FOR THE COMPACTED CLAY AND REDUCE THE POTENTIAL FOR DAMAGE FROM FREEZE-THAW CYCLES AND OTHER ENVIRONMENTAL FACTORS. THE FINAL LAYER OF THE CAP WOULD BE GRADED TO A MINIMUM OF 3 TO 5 PERCENT AND A MAXIMUM OF 25 PERCENT. A VEGETATIVE COVER OF NATIVE GRASS WOULD BE ESTABLISHED TO MINIMIZE CAP EROSION. EARTHEN DRAINAGE CHANNELS WOULD BE LOCATED AROUND THE PERIMETER OF THE CAP TO COLLECT SURFACE RUNOFF AND WATER FROM THE DRAINAGE LAYER. THE COLLECTED WATER WOULD EVENTUALLY DRAIN INTO THE WETLANDS WEST OF THE LANDFILL. DOCUMENTATION OF THE COVER CONSTRUCTION SHALL BE IN ACCORDANCE WITH SUBSTANTIVE REQUIREMENTS OF NR 516, WIS. ADM. CODE.

GAS COLLECTION SYSTEM

AN ACTIVE GAS COLLECTION AND COMBUSTION SYSTEM WOULD BE INSTALLED IF REQUIRED TO MEET STATE REGULATIONS UNLESS IT COULD BE DEMONSTRATED THROUGH ADEQUATE TESTING THAT THE PERFORMANCE CRITERIA OF NR 504.04(4)(F), WIS. ADM. CODE, COULD BE ACHIEVED WITHOUT IMPLEMENTING SUCH A SYSTEM. THE COLLECTED LANDFILL GASES WOULD BE TREATED BY COMBUSTION. IT IS ASSUMED THAT SUPPLEMENTAL FUEL WOULD BE REQUIRED TO PROVIDE COMBUSTION. GAS MONITORING SHOULD BE CONDUCTED TO ENABLE ADEQUATE DESIGN OF THE GAS COLLECTION AND TREATMENT SYSTEM. THE ACTIVE GAS COLLECTION SYSTEM SHALL BE DESIGNED TO MEET THE REQUIREMENTS OF SS. NR 504.05(7), NR 504.07(3) AND NR 506.08(6), WIS. ADM. CODE. DOCUMENTATION OF THE SYSTEM CONSTRUCTION SHALL BE IN ACCORDANCE WITH CH. NR 516, WIS. ADM. CODE.

MONITORING

MONTHLY SITE MONITORING WOULD BE PERFORMED TO PROVIDE CAP MAINTENANCE. LONG-TERM GROUNDWATER MONITORING WOULD BE ASSOCIATED WITH THE CAP OPERATION.

WETLANDS

AN INVESTIGATION WOULD BE CONDUCTED DURING REMEDIAL DESIGN TO DETERMINE THE EXTENT OF THE WETLANDS ON THE LEMBERGER SITES AND THE IMPACT THAT PUMPING GROUNDWATER FROM THE UPPER AQUIFER WOULD HAVE ON THESE WETLANDS. MEASURES WOULD BE IMPLEMENTED TO AVOID DAMAGE TO THESE WETLANDS. POTENTIAL IMPACTS ON WETLANDS WOULD BE AVOIDED OR MINIMIZED IN ACCORDANCE WITH CHS. NR 1.95 AND NR 103, WIS. ADM. CODE. IF DAMAGE OCCURS, THE IMPACT ON THE WETLANDS WILL BE MITIGATED.

CAPITAL COSTS	$8,500,000
ANNUAL O&M 1ST YEAR	79,000
EACH YEAR THEREAFTER	43,000
PRESENT WORTH	9,200,000
TIME TO IMPLEMENT	16 MONTHS

SOURCE CONTROL ALTERNATIVE 4: MULTILAYER CAP

THIS ALTERNATIVE IS THE SAME AS SOURCE CONTROL ALTERNATIVE 3 EXCEPT, THE CAP INCLUDES A SYNTHETIC MEMBRANE WITH A MINIMUM 60-MIL THICKNESS. THE MULTILAYER CAP CONSTRUCTION WOULD BE IN COMPLIANCE WITH THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) AND WOULD COMPLY WITH WDNR NR 600 REGULATIONS.

IN ADDITION TO THE MULTILAYER OR HAZARDOUS WASTE CAP, VEGETATION WOULD BE PLANTED AND SURFACE WATER WOULD DRAIN INTO TRENCHES CONSTRUCTED AT THE EDGE OF THE CAP. A SECURITY FENCE WOULD BE INSTALLED AROUND THE SITE TO PREVENT ACCESS. DEED RESTRICTIONS WOULD BE PLACED ON THE SITE TO PREVENT FUTURE USES OF THE LAND. THE GAS COLLECTION SYSTEM WOULD HAVE THE SAME REQUIREMENTS AS IN SOURCE CONTROL ALTERNATIVE 3. A CROSS SECTION FOR ALTERNATIVE 4 IS ILLUSTRATED IN FIGURE 9.

CAPITAL COSTS	$10,100,000
ANNUAL O&M 1ST YEAR	79,000
EVERY YEAR THEREAFTER	43,000
PRESENT WORTH COST	10,800,000
TIME TO IMPLEMENT	16 MONTHS

SOURCE CONTROL ALTERNATIVE 5: SOLID WASTE CAP AND SLURRY WALL

THE SOLID WASTE CAP PORTION OF THIS ALTERNATIVE IS THE SAME AS ALTERNATIVE 3. IN ADDITION TO THE SOLID WASTE CAP, A SLURRY WALL WOULD BE CONSTRUCTED AROUND THE PERIMETER OF THE WASTES AT THE LL SITE TO CONTROL THE AMOUNT OF GROUNDWATER INFILTRATION INTO THE WASTES AND THE AMOUNT OF CONTAMINANT MIGRATION FROM THE WASTE AREAS.

SLURRY WALL CONSTRUCTION

THE SLURRY WALL WOULD BE KEYED INTO THE CLAY LAYER. A TRENCH WOULD BE EXCAVATED AND BACKFILLED WITH A SLURRY CONSISTING OF BENTONITE, WATER, AND SOIL OR CEMENT TO FORM A LOW-PERMEABILITY CONTAINMENT WALL. FIGURE 10 SHOWS A CROSS SECTION OF THE CAP AND SLURRY WALL. FIGURE 11 SHOWS THE CONCEPTUAL DESIGN FOR SOURCE CONTROL ALTERNATIVE 5. AT LEAST ONE SMALL VOLUME EXTRACTION WELL WOULD BE INSTALLED IN THE UPPER AQUIFER TO COLLECT GROUNDWATER FROM WITHIN THE SLURRY WALL. THE EXACT NUMBER OF SMALL VOLUME EXTRACTION WELLS, WELL LOCATIONS, AND PUMPING RATES WOULD BE SELECTED DURING THE REMEDIAL DESIGN. THE DESIGN FOR THE NUMBER AND LOCATIONS OF INTERNAL EXTRACTION WELLS MUST PROVIDE FOR ADEQUATE INWARD GROUNDWATER GRADIENTS AT ALL POINTS WITHIN AND AT THE EDGES OF THE ENTIRE WASTE MASS. WATER EXTRACTED FROM THIS WELL(S) WOULD BE BLENDED WITH THE WATER BEING EXTRACTED FOR GROUNDWATER REMEDIATION AND WOULD BE TREATED AT THE GROUNDWATER TREATMENT FACILITY. THE EXTRACTION WELL(S) WOULD BE OPERATED FOR AS LONG AS CONTAMINATED GROUNDWATER WITHIN THE WALL IS GENERATED. FOR COSTING PURPOSES, THE WELLS ARE ASSUMED TO OPERATE FOR 30 YEARS.

CAPITAL COST	$9,200,000
ANNUAL O&M 1ST YEAR	80,000
EVERY YEAR THEREAFTER	44,000
PRESENT WORTH	9,900,000
TIME TO IMPLEMENT	19 MONTHS

I. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

IN ACCORDANCE WITH THE NCP, THE RELATIVE PERFORMANCE OF EACH ALTERNATIVE IS EVALUATED USING THE NINE CRITERIA (40 CFR 300.430) (E) (9) (III)), AS A BASIS OF COMPARISON. THIS EVALUATION DETERMINES THE REMEDY THAT PROVIDES THE BEST BALANCE OF THE NINE CRITERIA. EXCEPT FOR THE NO ACTION ALTERNATIVES, THE GROUNDWATER ALTERNATIVES ARE COMPATIBLE WITH EACH OF THE SOURCE CONTROL ALTERNATIVES TO DEVELOP A REMEDIAL ACTION. BOTH A GROUNDWATER ALTERNATIVE AND A SOURCE CONTROL ALTERNATIVE FOR THE LL SITE WERE EVALUATED IN ORDER TO DECREASE THE CONTINUED CONTAMINATION OF THE GROUNDWATER FROM THE WASTES AND THE LENGTH OF TIME REQUIRED TO CLEAN THE AQUIFERS TO WATER QUALITY STANDARDS. THE NINE CRITERIA EVALUATION IS AS FOLLOWS:

THRESHOLD CRITERIA

1. OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT ADDRESSES WHETHER A REMEDY PROVIDES ADEQUATE PROTECTION AND DESCRIBES HOW RISKS POSED BY EACH EXPOSURE PATHWAY ARE ELIMINATED, REDUCED, OR CONTROLLED THROUGH TREATMENT, ENGINEERING CONTROLS, OR INSTITUTIONAL CONTROLS.

THE NO ACTION ALTERNATIVES DO NOT PROVIDE PROTECTION. GROUNDWATER ALTERNATIVE 4 WOULD CONTAIN THE CONTAMINATION; HOWEVER, A RISK WOULD REMAIN BECAUSE THE GROUNDWATER WOULD NOT BE ACTIVELY REMEDIATED. GROUNDWATER ALTERNATIVE 5 IS MORE EFFECTIVE OVER TIME AND WOULD PROVIDE A REDUCTION OF RISK TO HUMAN HEALTH AND THE ENVIRONMENT BECAUSE CONTAMINANT CONCENTRATIONS GREATER THAN THE CLEANUP STANDARDS WOULD BE ACTIVELY REMOVED FROM THE AQUIFER AND REMEDIATED.

SOURCE CONTROL ALTERNATIVES 3, 4, AND 5 WOULD PROTECT HUMAN HEALTH BY REDUCING THE POTENTIAL FOR DIRECT CONTACT WITH CONTAMINANTS AND WOULD REDUCE THE MIGRATION OF CONTAMINANTS OFFSITE THROUGH CAPPING OF THE WASTES AT THE LL SITE. THE CAP WOULD PROTECT THE ENVIRONMENT BY REDUCING CONTAMINANT MIGRATION TO THE GROUNDWATER. SOURCE CONTROL ALTERNATIVE 5 WOULD PROVIDE THE GREATEST REDUCTION IN RISK BY THE ADDITION OF THE SLURRY WALL. THE SLURRY WALL AND INTERNAL HYDRAULIC CONTROLS, INCLUDING PUMPING WELLS, WOULD PROVIDE THE GREATEST BENEFIT BECAUSE IT WOULD PREVENT CLEAN GROUNDWATER FROM FLOWING INTO THE WASTE FROM OFF-SITE, AND WOULD ALSO PREVENT CONTAMINATED GROUNDWATER INSIDE THE WALL FROM FLOWING AWAY FROM THE SITE, FURTHER CONTAMINATING THE UPPER AQUIFER. SOURCE CONTROL ALTERNATIVES 3, 4, AND 5 WOULD MEET REMEDIAL ACTION OBJECTIVES.

2. COMPLIANCE WITH ARARS

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) ADDRESSES WHETHER OR NOT A REMEDY WILL MEET ALL OF THE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS OF OTHER FEDERAL AND STATE ENVIRONMENTAL STATUTES AND/OR PROVIDE GROUNDS FOR INVOKING A WAIVER.

THE MAJOR GROUNDWATER ARARS INCLUDE THE REQUIREMENTS OF THE FEDERAL SAFE DRINKING WATER AND CLEAN WATER ACTS AND STATE GROUNDWATER QUALITY STANDARDS, NR 140. THE MAJOR LANDFILL CLOSURE ARARS INCLUDE THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA), AND WISCONSIN SOLID WASTE LANDFILL CLOSURE REQUIREMENTS OF CHAPTERS NR 445, NR 500 SERIES AND NR 600 SERIES OF THE WIS. ADM. CODE.

GROUNDWATER AND SOURCE CONTROL NO ACTION ALTERNATIVES 1 ARE NOT EXPECTED TO MEET FEDERAL AND STATE ARARS. GROUNDWATER ALTERNATIVE 4 IS FOR THE PURPOSE OF CONTAINMENT ONLY, NOT AQUIFER RESTORATION, AND MAY NEVER MEET WATER QUALITY STANDARDS. ALL OTHER GROUNDWATER AND SOURCE CONTROL ALTERNATIVES ARE EXPECTED TO MEET ALL ARARS. ADDITIONAL INFORMATION ON ARARS MAY BE FOUND IN THE SECTION ON STATUTORY DETERMINATIONS.

PRIMARY BALANCING CRITERIA

3. LONG-TERM EFFECTIVENESS AND PERMANENCE.

LONG-TERM EFFECTIVENESS AND PERMANENCE REFERS TO EXPECTED RESIDUAL RISK AND THE ABILITY OF A REMEDY TO MAINTAIN RELIABLE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT OVER TIME ONCE CLEANUP GOALS HAVE BEEN MET.

GROUNDWATER ALTERNATIVES 4 AND 5 WOULD REDUCE RISK TO HUMAN HEALTH AND THE ENVIRONMENT OVER THE LONG TERM BY TREATING THE GROUNDWATER. GROUNDWATER ALTERNATIVE 5 HAS A GREATER REDUCTION IN RISK BECAUSE IT RESTORES THE AQUIFER TO CLEANUP GOALS. A LONG-TERM RISK WOULD REMAIN FOR GROUNDWATER ALTERNATIVE 4, SINCE THE CONTAMINATED GROUNDWATER WOULD REMAIN IN THE AQUIFER FOR A LONG PERIOD OF TIME. A RISK MAY EXIST FROM THE SLUDGE GENERATED DURING THE ELECTRO-CHEMICAL PRECIPITATION PROCESS IF IT CONTAINS HAZARDOUS CONSTITUENTS IN SUFFICIENT QUANTITIES TO MAKE IT A HAZARDOUS WASTE. IF THE SLUDGE IS CLASSIFIED AS A LISTED HAZARDOUS WASTE, IT WOULD BE TREATED TO MEET LDRS BEFORE DISPOSAL AT A HAZARDOUS WASTE FACILITY. SPENT CARBON IS EXPECTED TO BE REGENERATED, SO IT WOULD NOT EXHIBIT A LONG-TERM RESIDUAL RISK.

A LONG-TERM RISK WOULD REMAIN FROM THE SOURCE CONTROL ALTERNATIVES BECAUSE THE MATERIAL WOULD NOT UNDERGO TREATMENT. THE CAP WOULD, HOWEVER, REDUCE INFILTRATION AND SUBSEQUENT LEACHING OF CONTAMINANTS INTO THE GROUNDWATER. THE SLURRY WALL AND INTERNAL HYDRAULIC CONTROLS (INTERNAL PUMPING WELLS) COMBINED WITH THE CAP WOULD HAVE ADDED BENEFIT BY MINIMIZING CONTAMINANT MOVEMENT THAN WOULD A CAP ALONE AND WOULD ALLOW RESTORATION OF THE AQUIFER AT A MUCH FASTER RATE. THE SLURRY WALL WOULD PREVENT CLEAN GROUNDWATER FROM FLOWING INTO THE WASTE FROM OFF-SITE, AND WOULD ALSO PREVENT CONTAMINATED GROUNDWATER INSIDE THE WALL FROM FLOWING AWAY FROM THE SITE, FURTHER CONTAMINATING THE UPPER AQUIFER. THE CAP, SLURRY WALL, FENCING AND DEED RESTRICTIONS IN THE SOURCE CONTROL ALTERNATIVES WOULD ALSO MINIMIZE HUMAN CONTACT WITH THE WASTES.

4. REDUCTION OF TOXICITY, MOBILITY OR VOLUME THROUGH TREATMENT.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME IS THE ANTICIPATED PERFORMANCE OF THE TREATMENT TECHNOLOGIES A REMEDY MAY EMPLOY.

TREATMENT IN GROUNDWATER ALTERNATIVES 4 AND 5 WOULD REDUCE TOXICITY THROUGH ELECTROCHEMICAL PRECIPITATION AND CARBON ADSORPTION; HOWEVER, A TREATMENT SLUDGE WOULD REMAIN AND MAY REQUIRE FURTHER TREATMENT. NO TREATMENT WOULD BE CONDUCTED TO REDUCE TOXICITY, MOBILITY OR VOLUME IN SOURCE CONTROL ALTERNATIVES 3, 4, AND 5, BUT SOURCE CONTROL ALTERNATIVE 5 WOULD INDIRECTLY REDUCE CONTAMINANT MOBILITY BECAUSE THE REMEDY INVOLVES A SLURRY WALL PLACED AROUND THE PERIMETER OF THE WASTES WITH INTERNAL HYDRAULIC CONTROLS (INTERNAL PUMPING WELLS) WHICH WOULD PREVENT CLEAN GROUNDWATER FROM FLOWING INTO THE WASTE FROM OFF-SITE, AND WOULD ALSO PREVENT CONTAMINATED GROUNDWATER INSIDE THE WALL FROM FLOWING AWAY FROM THE SITE. IN ADDITION, SOURCE CONTROL ALTERNATIVE 5 WOULD TREAT THE EXTRACTED GROUNDWATER FROM WITHIN THE SLURRY WALL ALONG WITH THE GROUNDWATER FROM THE PUMP AND TREAT SYSTEM IN EITHER GROUNDWATER ALTERNATIVES 4 OR 5 AND WOULD, THEREFORE, UNDERGO A REDUCTION IN TOXICITY, MOBILITY, AND VOLUME OF CONTAMINANTS.

5. SHORT-TERM EFFECTIVENESS.

SHORT-TERM EFFECTIVENESS ADDRESSES THE PERIOD OF TIME NEEDED TO ACHIEVE PROTECTION, AND ANY ADVERSE IMPACTS ON HUMAN HEALTH AND THE ENVIRONMENT THAT MAY BE POSED DURING THE CONSTRUCTION AND IMPLEMENTATION PERIOD UNTIL CLEANUP GOALS ARE ACHIEVED.

GROUNDWATER ALTERNATIVES 4 AND 5 WOULD INVOLVE INSTALLATION OF EXTRACTION WELLS AND A GROUNDWATER TREATMENT FACILITY. RISKS TO THE COMMUNITY WOULD BE LOW, BUT COULD BE GREATER FOR WORKERS BECAUSE OF THE POTENTIAL FOR DIRECT CONTACT WITH CONTAMINANTS. PROTECTION FOR SITE WORKERS DURING IMPLEMENTATION OF GROUNDWATER ALTERNATIVES 4 AND 5 WOULD BE ADDRESSED BY SITE SAFETY PLANS. DURING THE OPERATION OF THE EXTRACTION/TREATMENT SYSTEM, INSTITUTIONAL CONTROLS WOULD BE USED TO MINIMIZE THE POTENTIAL FOR EXPOSURE TO CONTAMINATED GROUNDWATER.

RISKS TO THE COMMUNITY DURING IMPLEMENTATION OF SOURCE CONTROL ALTERNATIVE 5 (CAP AND SLURRY WALL) WOULD BE MINIMAL BUT GREATER THAN SOURCE CONTROL ALTERNATIVES 3 AND 4 (CAPPING). WORKERS IN ALL SOURCE CONTROL ALTERNATIVES MAY BE EXPOSED TO CONTAMINANTS DURING VARIOUS CONSTRUCTION ACTIVITIES ASSOCIATED WITH CAPPING AND SLURRY WALL INSTALLATION. SITE SAFETY MEASURES WOULD BE TAKEN TO PROTECT THE COMMUNITY AND SITE WORKERS. HEALTH AND SAFETY PLANS WOULD BE DEVELOPED BEFORE CLEANUP ACTIVITIES BEGIN. WORKERS WOULD WEAR PROTECTIVE

CLOTHING AND BE IN COMPLIANCE WITH OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA) REQUIREMENTS. AIR CONTAMINANTS COULD BE EMITTED DURING CONSTRUCTION FOR ALL ALTERNATIVES. AIR MONITORING WOULD BE CONDUCTED TO DETERMINE IF AIR CONTAMINANTS WERE BEING EMITTED AND THE APPROPRIATE SAFETY MEASURES WOULD BE TAKEN.

SHORT-TERM ENVIRONMENTAL IMPACTS RESULTING FROM ALL ALTERNATIVES WOULD INCLUDE NOISE POLLUTION AND DUST DURING CONSTRUCTION. THE SOURCE CONTROL ALTERNATIVES MAY HAVE SURFACE-WATER RUNOFF RESULTING FROM CONSTRUCTION OF THE CAPS. MEASURES WOULD BE TAKEN TO AVOID IMPACTS ON THE WETLANDS. AGAIN, PROTECTION OF SITE WORKERS AND THE COMMUNITY DURING THE IMPLEMENTATION OF ALL ALTERNATIVES WOULD BE ADDRESSED BY SITE SAFETY PLANS.

THE ESTIMATED TIME UNTIL REMEDIAL ACTION GOALS ARE ACHIEVED FOR GROUNDWATER ALTERNATIVE 5 IS 16 YEARS. GROUNDWATER ALTERNATIVE 4 IS INTENDED FOR CONTAINMENT ONLY AND WILL TAKE A LEAST 30 YEARS TO MEET GROUNDWATER CLEANUP GOALS.

6. IMPLEMENTABILITY

IMPLEMENTABILITY IS THE TECHNICAL AND ADMINISTRATIVE FEASIBILITY OF A REMEDY, INCLUDING THE AVAILABILITY OF MATERIALS AND SERVICES NEEDED TO IMPLEMENT A PARTICULAR OPTION.

ALL THE ALTERNATIVES CONSIDERED ARE TECHNICALLY FEASIBLE. THE TREATMENT PROCESSES IN GROUNDWATER ALTERNATIVES 4 AND 5 HAVE BEEN USED AT OTHER SUPERFUND SITES AND ARE FAMILIAR IN THE CONSTRUCTION INDUSTRY. THE CONSTRUCTION TECHNIQUES FOR THE LANDFILL COVER, SLURRY WALL AND GROUNDWATER EXTRACTION WELLS ARE ALSO PROVEN TECHNOLOGIES. SOURCE CONTROL ALTERNATIVE 5 WOULD BE MORE LABOR INTENSIVE TO CONSTRUCT BECAUSE OF THE SLURRY WALL. IF WELLS WERE REQUIRED IN THE CAP AREA FROM THE GROUNDWATER ALTERNATIVES, WATERTIGHT CONNECTIONS BETWEEN THE MEMBRANE AND THE WELL CASINGS WOULD BE REQUIRED FOR SOURCE CONTROL ALTERNATIVE 4. ACCESS MAY BE DIFFICULT AS A FEW RESIDENTS HAVE BEEN RELUCTANT TO ALLOW ACCESS DURING THE RI/FS.

7. COST

ESTIMATED COST INCLUDES ESTIMATED CAPITAL, OPERATION AND MAINTENANCE, AND PRESENT NET WORTH COSTS.

THE ESTIMATED COSTS FOR REMEDIAL ACTION ALTERNATIVES, LISTED IN THE FOLLOWING TABLE, ARE ORDER-OF-MAGNITUDE ESTIMATES WITH AN INTENDED ACCURACY RANGE OF +50 PERCENT AND -30 PERCENT FOR THE IDENTIFIED REMEDY. THE ESTIMATED COST OF THE SELECTED REMEDY WILL BE FURTHER REFINED IN THE FINAL DESIGN. CAPITAL COSTS ARE THE DIRECT AND INDIRECT COSTS REQUIRED TO INITIATE AND INSTALL A REMEDIAL ACTION. ANNUAL OPERATION AND MAINTENANCE COSTS (O&M) INCLUDES THE ANNUAL OPERATING COST FOR A REMEDIAL ACTION INCURRED AND PAID ON A YEARLY BASIS FOLLOWING IMPLEMENTATION OF THE REMEDIAL ACTION. PRESENT WORTH ANALYSIS PROVIDES A METHOD FOR EVALUATING AND COMPARING COSTS THAT OCCUR OVER DIFFERENT TIME PERIODS BY DISCOUNTING FUTURE EXPENDITURES TO THE PRESENT YEAR.

EACH GROUNDWATER ALTERNATIVE (EXCEPT NO ACTION) WAS COMBINED WITH EACH SOURCE CONTROL ALTERNATIVE (EXCEPT NO ACTION) TO ESTIMATE COSTS. THEY MUST BE COMBINED TO MEET REMEDIAL ACTION GOALS. TABLE 6 SHOWS THE COSTS FOR GROUNDWATER ALTERNATIVE 4, CONTAINMENT BY HYDRAULIC CONTROLS, COMBINED WITH EACH OF THE SOURCE CONTROL ALTERNATIVES AND GROUNDWATER ALTERNATIVE 5, EXTRACTION AND TREATMENT FOR ACTIVE RESTORATION, ALSO COMBINED WITH EACH OF THE SOURCE CONTROL ALTERNATIVES. ALL ALTERNATIVES ARE SIMILAR IN COST. GROUNDWATER CONTAINMENT BY HYDRAULIC CONTROLS COMBINED WITH A CAP IS THE LEAST EXPENSIVE, WITH A PRESENT NET WORTH COST OF $17.4 MILLION. THE GROUNDWATER HYDRAULIC CONTROLS ALTERNATIVE COMBINED WITH THE MULTILAYER CAP ALTERNATIVE COSTS $19 MILLION. THE GROUNDWATER ACTIVE RESTORATION ALTERNATIVE COMBINED WITH THE CAP AND SLURRY WALL ALTERNATIVE COSTS $19.2 MILLION AND IS LESS EXPENSIVE THAN ACTIVE RESTORATION COMBINED WITH THE MULTILAYER CAP ALTERNATIVE WHICH COSTS $20.1 MILLION. GROUNDWATER HYDRAULIC CONTROLS COMBINED WITH THE CAP AND SLURRY WALL ARE LESS COSTLY AT $18.1 MILLION.

MODIFYING CRITERIA

8. STATE ACCEPTANCE

THE STATE OF WISCONSIN IS IN AGREEMENT WITH THE SELECTION OF GROUNDWATER ALTERNATIVE 5 AND SOURCE CONTROL

ALTERNATIVE 5 FOR REMEDIATION OF THE LEMBERGER LANDFILL, INC AND THE LEMBERGER TRANSPORT & RECYCLING SITE AND HAS PROVIDED US EPA WITH A LETTER OF CONCURRENCE.

9. COMMUNITY ACCEPTANCE.

BASED ON THE COMMENTS RECEIVED BY US EPA, THE SELECTED ALTERNATIVE IS ACCEPTABLE TO THE COMMUNITY. COMMUNITY CONCERNS ARE ADDRESSED IN THE ATTACHED RESPONSIVENESS SUMMARY.

#SR

J. THE SELECTED REMEDY

BEFORE NOTING THE MAJOR COMPONENTS AND COSTS OF THE SELECTED REMEDY, IT IS APPROPRIATE TO DISCUSS REMEDIATION GOALS FOR GROUNDWATER AT THE SITE. THE GOAL OF THIS REMEDIAL ACTION IS TO RESTORE ALL PORTIONS OF THE AQUIFER TO THE WASTE MANAGEMENT BOUNDARY, SO THAT IT MAY SERVE AS A DRINKING WATER RESOURCE. SOME STUDIES SUGGEST; HOWEVER, THAT NOT ALL GROUNDWATER EXTRACTION AND TREATMENT PROGRAMS ARE COMPLETELY SUCCESSFUL IN REDUCING CONTAMINANT CONCENTRATIONS TO HEALTH-BASED LEVELS THROUGHOUT AN AQUIFER. US EPA THEREFORE RECOGNIZES THAT REVIEW OF FUTURE OPERATING DATA MAY INDICATE THE TECHNICAL IMPRACTICABILITY OF ATTAINING HEALTH-BASED GROUNDWATER QUALITY STANDARDS THROUGHOUT THE AQUIFER. IF, AT ANY OF THE SUBSEQUENT FIVE-YEAR REVIEWS, IT BECOMES APPARENT THAT UNSATISFACTORY PROGRESS IS BEING MADE IN ATTAINING GROUNDWATER GOALS, THE REMEDY MAY BE REEVALUATED. IF THE REMEDY IS REEVALUATED, ANY CHANGE IN REMEDY SHALL BE ACCOMPLISHED BY REOPENING AND AMENDMENT OF THE ROD, TO INCLUDE AN EXPLANATION AND DOCUMENTATION OF ALL FINDINGS, IN ACCORDANCE WITH 42 USC. 9261(D)(4), AND 9617.

BASED ON THE FINDINGS OF THE RI/FS, AND THE EVALUATION OF THE NINE CRITERIA, US EPA AND THE STATE OF WISCONSIN HAVE IDENTIFIED GROUNDWATER ALTERNATIVE 5 AND SOURCE CONTROL ALTERNATIVE 5 AS THE FINAL REMEDY FOR THE LEMBERGER LANDFILL, INC. SITE AND THE FIRST OPERABLE UNIT FOR THE LEMBERGER TRANSPORT & RECYCLING SITE. THIS COMBINATION OF ALTERNATIVES REPRESENTS THE BEST BALANCE AMONG THE EVALUATION CRITERIA AND SATISFIES THE STATUTORY REQUIREMENTS FOR PROTECTIVENESS, COMPLIANCE WITH ARARS, COST EFFECTIVENESS, AND THE USE OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES OR RESOURCE RECOVERY TECHNOLOGIES, TO THE MAXIMUM EXTENT PRACTICABLE. SEE FIGURE 12 FOR THE CONCEPTUAL DESIGN.

GROUNDWATER ALTERNATIVE 5: SOURCE CONTROL ALTERNATIVE 5

TIME TO IMPLEMENT:	19 MONTHS
TOTAL PRESENT WORTH COST:	$19,200,000
CAPITAL COST:	$12,200,000
ANNUAL O&M COST: FIRST YEAR	$ 731,000
SECOND YEAR TO CLEANUP	$ 596,000

MAJOR COMPONENTS OF THE SELECTED REMEDY ARE THE FOLLOWING:

GROUNDWATER EXTRACTION SYSTEM

APPROXIMATELY SIX EXTRACTION WELLS WOULD BE INSTALLED IN THE UPPER AND LOWER AQUIFER TO EXTRACT THE GROUNDWATER PLUME. GROUNDWATER SHALL BE EXTRACTED UNTIL THE GROUNDWATER CLEANUP STANDARDS IN TABLE 6 ARE ACHIEVED AT THE WASTE MANAGEMENT BOUNDARY, IN THIS CASE, THE EDGE OF THE SLURRY WALL. ANY DISRUPTION OF RESIDENTIAL WATER SUPPLY DUE TO THE OPERATION OF THE GROUNDWATER EXTRACTION SYSTEM MUST BE COMPENSATED FOR THROUGH AN ALTERNATIVE SUPPLY OF WATER. THE EXACT NUMBER OF EXTRACTION WELLS, WELL LOCATIONS AND PUMPING RATES (TOTAL GALLONS PER MINUTE (GPM) SHALL BE EVALUATED AND SELECTED DURING THE ENGINEERING DESIGN PHASE OF THE REMEDY. IT IS ESTIMATED THAT THE WELLS WOULD BE PUMPED AT A COMBINED RATE OF 210 GPM FOR 16 YEARS. ANY IMPACT FROM THE RIDGEVIEW SITE WILL BE ADDRESSED IN THE DESIGN.

TREATMENT FACILITY

AN ON-SITE TREATMENT FACILITY WOULD BE BUILT AT THE LL SITE TO TREAT THE CONTAMINATED GROUNDWATER. TREATMENT PROCESSES (FIGURE 3) INCLUDE ELECTROCHEMICAL PRECIPITATION TO REMOVE INORGANIC CONTAMINANTS AND GRANULAR ACTIVATED CARBON (GAC) TO REMOVE ORGANIC CONTAMINANTS UNLESS TREATABILITY STUDIES SHOW OTHER TECHNOLOGIES TO

BE MORE EFFECTIVE. THE DESIGN OF THE ACTUAL PROCESS FLOW TRAIN AND THE SIZING OF THE TREATMENT PROCESSES SHALL BE COMPLETED FOLLOWING COMPLETION OF A TREATABILITY STUDY TO EVALUATE THE PERFORMANCE OF THE SYSTEMS. SLUDGE WILL BE GENERATED FROM THE PROCESSES AND WILL REQUIRE DISPOSAL ACCORDING TO FEDERAL AND STATE REGULATIONS. IF POSSIBLE, SPENT CARBON WILL BE RECYCLED. TREATED EFFLUENT FROM THE GROUNDWATER TREATMENT SYSTEM WILL BE DISCHARGED INTO THE BRANCH RIVER ACCORDING TO APPLICABLE FEDERAL AND STATE REGULATIONS. A 6-FOOT-HIGH CHAIN LINK SECURITY FENCE WOULD BE CONSTRUCTED AROUND THE TREATMENT FACILITY TO LIMIT GENERAL ACCESSIBILITY TO THE FACILITY AND THE POTENTIAL FOR PUBLIC EXPOSURE. DEED RESTRICTIONS MAY BE USED TO LIMIT THE USE OF CONTAMINATED GROUNDWATER.

MONITORING PROGRAM

NEW AND EXISTING MONITORING WELLS WOULD BE USED TO VERIFY THE HYDRAULIC PERFORMANCE OF THE EXTRACTION WELLS, TO DETERMINE THE EXTENT OF THE CONES OF DEPRESSION AROUND THE EXTRACTION WELLS. SELECTED RESIDENTIAL WELLS, INCLUDING THE DENOR WELL, WILL BE INCLUDED IN THE MONITORING PROGRAM.

MANAGEMENT OF TREATMENT RESIDUALS

TREATMENT OF THE CONTAMINATED GROUNDWATER WILL RESULT IN THE GENERATION OF RESIDUAL SLUDGE CONTAINING METALS AND OTHER CONTAMINANTS. THE SLUDGE WOULD BE STORED TEMPORARILY IN 55-GALLON DRUMS. APPROXIMATELY SEVEN CUBIC YARDS (21 DRUMS) OF WASTE WOULD BE GENERATED EVERY MONTH.

THE CONTAMINATED GROUNDWATER CONTAINS ORGANIC CONSTITUENTS WHICH ORIGINATED FROM LISTED WASTE AT THE LTR SITE. IT MAY BE POSSIBLE TO REMOVE THE ORGANICS FROM THE GROUNDWATER TO BELOW HEALTH BASE LEVELS, PRIOR TO GENERATING A METAL BEARING SLUDGE FROM THE CHEMICAL PRECIPITATION TREATMENT. IF THE GROUNDWATER HAS BEEN SUCCESSFULLY TREATED, THEN THE ORGANIC CONTAMINANTS WILL NOT MAKE THE SLUDGE A LISTED HAZARDOUS WASTE AND WILL NOT TRIGGER LAND DISPOSAL RESTRICTIONS (LDRS). IN THE EVENT THAT THE GROUNDWATER CANNOT BE TREATED TO REMOVE ALL ORGANICS ABOVE HEALTH BASED LEVELS, OR THE SLUDGE DOES CONTAIN DETECTABLE LEVELS OF ORGANIC CONTAMINANTS, THE SLUDGE WILL BE MANAGED AS A LISTED HAZARDOUS WASTE. IF THE SLUDGE IS A LISTED HAZARDOUS WASTE, IT MAY, IF POSSIBLE, BE DISPOSED OF AS PART OF THE LTR SOURCE CONTROL REMEDY. ALTERNATIVELY, IT MAY BE TREATED AND DISPOSED OF OFFSITE AT A RCRA SUBTITLE C LANDFILL.

THE SLUDGE IS NOT EXPECTED TO CONTAIN METALS AT CONCENTRATIONS ABOVE CHARACTERISTIC LEVELS. IF, AFTER TESTING BY THE TCLP, IT IS DETERMINED THAT THE SLUDGE IS CHARACTERISTIC FOR METALS, IT WILL BE TREATED BELOW CHARACTERISTIC LEVELS. SLUDGE WHICH DOES NOT CONTAIN ORGANICS AND IS NOT CHARACTERISTIC FOR METALS MAY BE DISPOSED OF AS A SOLID WASTE.

IF THE SLUDGE IS A LISTED HAZARDOUS WASTE, IT MAY, IF POSSIBLE, BE DISPOSED OF AS PART OF THE LTR SOURCE CONTROL REMEDY. ALTERNATIVELY, IT MAY BE TREATED AND DISPOSED OF OFFSITE AT A RCRA SUBTITLE C LANDFILL. IF ORGANICS ARE SUCCESSFULLY REMOVED PRIOR TO THE ELECTROCHEMICAL PRECIPITATION, THE SLUDGE CONTAINING METALS WOULD NOT BE A LISTED HAZARDOUS WASTE.

IF THE SLUDGE IS NEITHER A CHARACTERISTIC NOR A LISTED WASTE, IT WILL BE DISPOSED OF AS A SOLID WASTE, AND LAND DISPOSAL RESTRICTIONS WOULD NOT BE APPLICABLE. IF THE SLUDGE MUST BE MANAGED AS A LISTED HAZARDOUS WASTE, THEN THE SLUDGE WOULD BE TREATED TO APPROPRIATE LDR STANDARDS PRIOR TO ON- OR OFF-SITE DISPOSAL. IT IS EXPECTED THAT THE SPENT CARBON FROM THE TREATMENT SYSTEM WOULD BE RECYCLED IN A UNIT IN COMPLIANCE WITH 40 CFR PART 264 (SUBPART X).

WETLANDS

AN INVESTIGATION WOULD BE CONDUCTED DURING REMEDIAL DESIGN TO DETERMINE THE EXTENT OF THE WETLANDS ON THE LEMBERGER SITES AND THE IMPACT THAT PUMPING GROUNDWATER FROM THE UPPER AQUIFER WOULD HAVE ON THESE WETLANDS. MEASURES WOULD BE IMPLEMENTED TO AVOID DAMAGE TO THESE WETLANDS. POTENTIAL IMPACTS ON WETLANDS WOULD BE AVOIDED OR MINIMIZED IN ACCORDANCE WITH CHS. NR 1.95 AND NR 103, WIS. ADM. CODE. IF DAMAGE OCCURS, THE IMPACT ON THE WETLANDS WILL BE MITIGATED.

CAP CONSTRUCTION

THE WASTE AREA WOULD BE CLEARED AND REGRADED TO SMOOTH OUT THE EXISTING CAP. BORROW SOIL WOULD BE USED AS NECESSARY ON THE EXISTING CAP. THE CAP LAYERS INCLUDE FROM BOTTOM TO TOP: A GRADING LAYER (EXISTING COVER MAY BE USED, IF APPROPRIATE) A COMPACTED CLAY LAYER, A DRAINAGE LAYER AN OPTIONAL GEOTEXTILE FABRIC, A COMPACTED NATIVE SOIL LAYER, TOPSOIL, AND A VEGETATIVE COVER. A CONCEPTUAL DESIGN IS PRESENTED IN FIGURE 6.

THE MINIMUM DESIGN REQUIREMENTS OF THE CAP WOULD MEET THE STATE OF WISCONSIN SS. NR 504.07(1)-(7), WIS. ADM. CODE SOLID WASTE REGULATIONS. THE COMPACTED CLAY LAYER WOULD BE 2 FEET THICK AND WOULD HAVE A PERMEABILITY OF LESS THAN 1 X (10-7) CM/SEC. THE CLAY LAYER WOULD BE PLACED IN MAXIMUM 6 INCH THICK LIFTS. THE DRAINAGE LAYER WOULD BE PLACED ON TOP OF THE CLAY LAYER TO MINIMIZE HYDRAULIC PRESSURE AND WOULD BE A 6-INCH-THICK SAND LAYER. A GEOTEXTILE FABRIC MAY BE PLACED OVER THE SAND TO PREVENT CLOGGING. A MINIMUM 2-FOOT-THICK NATIVE SOIL LAYER AND A MINIMUM 6-INCH-THICK LAYER OF TOPSOIL WOULD COMPOSE THE TOP LAYERS OF THE CAP. THE DRAINAGE LAYER AND OVERLYING SOIL WOULD PROVIDE PROTECTION FOR THE COMPACTED CLAY AND REDUCE THE POTENTIAL FOR DAMAGE FROM FREEZE-THAW CYCLES AND OTHER ENVIRONMENTAL FACTORS. THE FINAL LAYER OF THE CAP WOULD BE GRADED TO A MINIMUM OF 3 TO 5 PERCENT AND A MAXIMUM OF 25 PERCENT. A VEGETATIVE COVER OF NATIVE GRASS WOULD BE ESTABLISHED TO MINIMIZE CAP EROSION. EARTHEN DRAINAGE CHANNELS WOULD BE LOCATED AROUND THE PERIMETER OF THE CAP TO COLLECT SURFACE RUNOFF AND WATER FROM THE DRAINAGE LAYER. THE COLLECTED WATER WOULD EVENTUALLY DRAIN INTO THE WETLANDS WEST OF THE LANDFILL. DOCUMENTATION OF THE COVER CONSTRUCTION SHALL BE IN ACCORDANCE WITH CH. NR 516, WIS. ADM. CODE.

SLURRY WALL CONSTRUCTION

THE SLURRY WALL WOULD BE KEYED INTO THE CLAY LAYER. A TRENCH WOULD BE EXCAVATED AND BACKFILLED WITH A SLURRY CONSISTING OF BENTONITE, WATER, AND SOIL OR CEMENT TO FORM A LOW-PERMEABILITY CONTAINMENT WALL. FIGURE 8 SHOWS A CROSS SECTION OF THE CAP AND SLURRY WALL. AT LEAST ONE SMALL VOLUME EXTRACTION WELL WOULD BE INSTALLED IN THE UPPER AQUIFER TO COLLECT GROUNDWATER FROM WITHIN THE SLURRY WALL. THE EXACT NUMBER OF SMALL VOLUME EXTRACTION WELLS, WELL LOCATIONS, AND PUMPING RATES WOULD BE SELECTED DURING THE REMEDIAL DESIGN. THE DESIGN FOR THE NUMBER AND LOCATIONS OF INTERNAL EXTRACTION WELLS MUST PROVIDE FOR ADEQUATE INWARD GROUNDWATER GRADIENTS AT ALL POINTS WITHIN AND AT THE EDGES OF THE ENTIRE WASTE MASS. WATER EXTRACTED FROM THIS WELL(S) WOULD BE BLENDED WITH THE WATER BEING EXTRACTED FOR GROUNDWATER REMEDIATION AND WOULD BE TREATED AT THE GROUNDWATER TREATMENT FACILITY. THE EXTRACTION WELL(S) WOULD BE OPERATED FOR AS LONG AS CONTAMINATED GROUNDWATER WITHIN THE WALL IS GENERATED. FOR COSTING PURPOSES, THE WELLS ARE ASSUMED TO OPERATE FOR 30 YEARS.

TREATED EFFLUENT FROM THE GROUNDWATER TREATMENT SYSTEM WOULD BE DISCHARGED INTO THE BRANCH RIVER. A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT WOULD NOT BE REQUIRED FOR DISCHARGE; HOWEVER, THE SUBSTANTIVE PORTION OF THE REQUIREMENTS WOULD BE MET BEFORE DISCHARGE.

OTHER PROVISIONS

THE BRANCH RIVER IS A HABITAT FOR THE GREATER REDHORSE FISH, WHICH WAS LISTED AS A SPECIAL CONCERN SPECIES IN 1979 AND UPLISTED TO THREATENED IN 1989. THE RECOMMENDED WATER QUALITY DISCHARGE LIMITATIONS SHOULD PROVIDE PROTECTION OF THIS THREATENED SPECIES; HOWEVER, BACKGROUND WATER QUALITY ASSUMPTIONS MUST BE VERIFIED BY BACKGROUND WATER QUALITY TESTING IN THE BRANCH RIVER AS SPECIFIED BY THE WDNR.

THE SELECTED REMEDY WILL ACHIEVE RISK REDUCTION THROUGH EXTRACTION OF CONTAMINATED GROUNDWATER AND TREATMENT TO HEALTH-BASED LEVELS AND BY CONSTRUCTION OF A SLURRY WALL AND CAP TO CONTAIN THE WASTES. THESE MEASURES WILL MEET THE REMEDIATION GOALS OUTLINED IN THE FS. A SECOND OPERABLE UNIT WILL ADDRESS THE SOURCE OF CONTAMINATION AT THE LTR SITE.

#SD

K. STATUTORY DETERMINATIONS

THE SELECTED REMEDY MUST SATISFY THE REQUIREMENTS OF SECTION 121 (A-E) OF CERCLA, AS AMENDED BY SARA, TO:

A. PROTECT HUMAN HEALTH AND THE ENVIRONMENT;
B. COMPLY WITH ARARS (OR JUSTIFY A WAIVER);
C. BE COST EFFECTIVE;

D. UTILIZE PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE; AND,
E. SATISFY THE PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT OR PROVIDE AN EXPLANATION AS TO WHY THIS PREFERENCE IS NOT SATISFIED.

THE IMPLEMENTATION OF GROUNDWATER ALTERNATIVE 5 AND SOURCE CONTROL ALTERNATIVE 5 AT THE LL AND LTR SITES SATISFIES THE REQUIREMENTS OF CERCLA, AS AMENDED BY SARA, AS DETAILED BELOW:

PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

IMPLEMENTATION OF THE SELECTED ALTERNATIVE WILL REDUCE AND CONTROL POTENTIAL RISKS TO HUMAN HEALTH AND THE ENVIRONMENT POSED BY EXPOSURE TO SITE CONTAMINANTS BY COMBINING SOURCE CONTROL AND CONTAINMENT, GROUNDWATER TREATMENT MEASURES AND SHORT TERM SITE ACCESS RESTRICTIONS, THUS SIGNIFICANTLY REDUCING THE RISKS POSED BY DIRECT CONTACT, INHALATION, OR INGESTION OF SITE-RELATED CONTAMINANTS. GROUNDWATER CONTAMINANT LOADING WILL BE REDUCED DUE TO THE DECREASED INFILTRATION OF WATER THROUGH THE LANDFILL. ACCESS RESTRICTIONS WILL PREVENT DIRECT CONTACT WITH CONTAMINATED GROUNDWATER UNTIL THE GROUNDWATER CLEANUP STANDARDS ARE MET. COLLECTIVELY, THE CLEANUP LEVELS WILL COMPLY WITH THE (10-4) TO (10-6) RISK RANGE FOR CARCINOGENS AND A RISK-BASED LEVEL OF HI=1 FOR NON-CARCINOGENS AS REQUIRED BY THE NCP.

NO UNACCEPTABLE SHORT-TERM RISKS OR CROSS-MEDIAL IMPACTS WILL BE CAUSED BY THE IMPLEMENTATION OF THE REMEDY. THE COMMUNITY AND SITE WORKERS MAY BE EXPOSED TO DUST AND NOISE NUISANCES DURING CONSTRUCTION OF THE CAP AND SLURRY WALL. STANDARD SAFETY PROGRAMS, SUCH AS FENCING, USE OF PROTECTIVE EQUIPMENT, MONITORING AND DUST CONTROL MEASURES, SHOULD MITIGATE ANY SHORT-TERM RISKS. MITIGATIVE MEASURES WILL BE TAKEN DURING REMEDY CONSTRUCTION ACTIVITIES TO MINIMIZE IMPACTS OF CONSTRUCTION UPON THE SURROUNDING COMMUNITY. AMBIENT AIR MONITORING WOULD BE CONDUCTED AND APPROPRIATE SAFETY MEASURES WOULD BE TAKEN IF CONTAMINANTS WERE EMITTED.

COMPLIANCE WITH ARARS

THE SELECTED ALTERNATIVE WILL MEET ALL FEDERAL AND STATE ARARS. THE FOLLOWING IS A DESCRIPTION OF THE ENVIRONMENTAL LAWS WHICH ARE LEGALLY APPLICABLE OR RELEVANT AND APPROPRIATE TO DIFFERENT COMPONENTS OF THE REMEDY:

CLAY/SOIL CAP

REGULATIONS FOUND IN CHAPTER 504 OF THE WISCONSIN ADMINISTRATIVE CODE GOVERN SOLID WASTE DISPOSAL FACILITIES. WHILE BOTH SOLID AND HAZARDOUS WASTE REGULATIONS ARE POTENTIAL ARARS, IT WAS DETERMINED THAT AN NR 504.07 CAP, IN CONJUNCTION WITH A SLURRY WALL, PROVIDES ADEQUATE PROTECTION. SUBTITLE C LANDFILL REQUIREMENTS, WHILE RELEVANT, WERE DETERMINED NOT TO BE APPROPRIATE. THE LANDFILL SITE DID NOT RECEIVE RCRA WASTES, SO A SUBTITLE C CAP IS NOT APPLICABLE, NOR WOULD A SUBTITLE C CAP PROVIDE ADDITIONAL BENEFIT FROM THAT OF A SUBTITLE D CAP AND THE COST WOULD BE GREATER; THEREFORE, IT IS NOT APPROPRIATE. SECTION 504.07 SEEKS TO MINIMIZE INFILTRATION BY SPECIFYING CLAY TYPE, SLOPE AND TOPSOIL REQUIREMENTS FOR A FINAL COVER FOR THE LANDFILL. THE REGULATIONS MAY REQUIRE A GAS VENTING SYSTEM, TO RELIEVE GAS BUILD-UP BENEATH THE CAP (NR 445, NR 504.07, NR 506, NR 508, NR 514.07 WIS. ADM. CODE). WISCONSIN STATUTE CHAPTER 160 AND NR 140 WIS. ADM. CODE INDICATE THAT FOR FINAL ACTION ONE MUST PREVENT THE CONTINUED RELEASE OF CONTAMINANTS TO GROUNDWATER, AT OR ABOVE STATE GROUNDWATER QUALITY STANDARDS.

GROUNDWATER EXTRACTION AND TREATMENT

THE STATE OF WISCONSIN IS AUTHORIZED TO ADMINISTER THE IMPLEMENTATION OF THE FEDERAL SDWA. THE STATE HAS ALSO PROMULGATED GROUNDWATER QUALITY STANDARDS IN NR 140 WIS. ADM. CODE, WHICH, ACCORDING TO WDNR, IS BEING CONSISTENTLY APPLIED TO ALL FACILITIES, PRACTICES, AND ACTIVITIES WHICH ARE REGULATED BY WDNR AND WHICH MAY AFFECT GROUNDWATER QUALITY IN THE STATE. CHAPTER 160, WIS. STATS., DIRECTS WDNR TO TAKE ACTION TO PREVENT THE CONTINUING RELEASE OF CONTAMINANTS AT LEVELS EXCEEDING STANDARDS AT THE POINT OF STANDARDS APPLICATION. PREVENTIVE ACTION LIMITS (PALS) AND ENFORCEMENT STANDARDS (ESS), HAVE BEEN PROMULGATED IN NR 140, WIS. ADM. CODE. PALS ARE THE GROUNDWATER CLEANUP STANDARD UNDER NR 140. PALS ARE GENERALLY MORE STRINGENT THAN CORRESPONDING FEDERAL STANDARDS AND, THEREFORE, ARE ARARS FOR THE LEMBERGER SITES.

CONSISTENT WITH THE EXEMPTION CRITERIA OF NR 140.28, WIS. ADM. CODE, AN ALTERNATIVE CONCENTRATION LIMIT, (WACL) MAY BE ESTABLISHED IF IT IS DETERMINED THAT IT IS NOT TECHNICALLY AND ECONOMICALLY FEASIBLE TO ACHIEVE THE PAL FOR A SPECIFIC SUBSTANCE. EXCEPT WHERE THE BACKGROUND CONCENTRATION OF A COMPOUND EXCEEDS THE ES, AND CONSISTENT WITH THE CRITERIA IN NR 140. 28(4)(B), THE WACL THAT IS ESTABLISHED MAY NOT EXCEED THE ES FOR THAT COMPOUND.

THE NCP, 55 FED. REG. 8753, PROVIDES THAT GROUNDWATER CLEANUP STANDARDS SHOULD GENERALLY BE ATTAINED THROUGHOUT THE CONTAMINANT PLUME OR AT AND BEYOND THE EDGE OF THE WASTE MANAGEMENT AREA WHEN WASTE IS LEFT IN PLACE.

THE IMPLEMENTATION OF THE SELECTED REMEDY AT THE LEMBERGER SITES WILL BE IN COMPLIANCE WITH NR 140, WIS. ADM. CODE, IN THAT PALS WILL BE MET UNLESS WACLS ARE ESTABLISHED PURSUANT TO THE CRITERIA IN NR 140.28, WIS. ADM. CODE, IN WHICH CASE THE WACLS WILL BE MET. THESE STANDARDS WILL BE MET IN ACCORDANCE WITH THE NCP AT THE WASTE BOUNDARY, IN THE CASE OF THE LANDFILL SITE, THE EDGE OF THE SLURRY WALL, AND WHEREVER GROUNDWATER IS MONITORED BEYOND THE POINT OF COMPLIANCE.

US EPA HAS NO SPECIFIC DOCUMENTATION THAT LISTED HAZARDOUS WASTES WERE DISPOSED OF AT THE LL SITE; HOWEVER, THE LL SITE MAY CONTAIN CHARACTERISTIC WASTE. THEREFORE, THE HAZARDOUS WASTE REGULATIONS MAY BE RELEVANT AND APPROPRIATE TO THE DESIGN OF THE SELECTED REMEDY.

THERE IS SPECIFIC DOCUMENTATION; HOWEVER, THAT LISTED HAZARDOUS WASTES F002 WAS DISPOSED OF AT THE LTR SITE. THEREFORE, THE HAZARDOUS WASTE REGULATIONS ARE APPLICABLE TO ANY WASTES OR CONTAMINATED MEDIA ORIGINATING FROM THAT SITE WHICH CONTAIN CONSTITUENTS OF F002. ANY CONTAMINATED GROUNDWATER THAT CONTAINS CONSTITUENTS ABOVE HEALTH BASED LEVELS FROM THE LISTED HAZARDOUS WASTE FROM THE LTR SITE MUST BE MANAGED AS A HAZARDOUS WASTE. ANY SLUDGE OR RESIDUALS GENERATED FROM TREATMENT OF GROUNDWATER THAT CONTAINS THE LISTED HAZARDOUS WASTE ABOVE DETECTION LIMITS, WOULD ITSELF BE A LISTED HAZARDOUS WASTE.

TREATMENT OF THE CONTAMINATED GROUNDWATER WILL RESULT IN THE GENERATION OF RESIDUAL SLUDGE CONTAINING METALS AND OTHER CONTAMINANTS. THE SLUDGE WOULD BE STORED TEMPORARILY IN 55-GALLON DRUMS. APPROXIMATELY SEVEN CUBIC YARDS (21 DRUMS) OF WASTE WOULD BE GENERATED EVERY MONTH.

THE CONTAMINATED GROUNDWATER CONTAINS ORGANIC CONSTITUENTS WHICH ORIGINATED FROM LISTED WASTE AT THE LTR SITE. IT MAY BE POSSIBLE TO REMOVE THE ORGANICS FROM THE GROUNDWATER TO BELOW HEALTH BASED LEVELS, PRIOR TO GENERATING A METAL BEARING SLUDGE FROM THE CHEMICAL PRECIPITATION TREATMENT. IF THE GROUNDWATER HAS BEEN SUCCESSFULLY TREATED, THEN THE ORGANIC CONTAMINANTS WILL NOT MAKE THE SLUDGE A LISTED HAZARDOUS WASTE AND WILL NOT TRIGGER LAND DISPOSAL RESTRICTIONS (LDRS). IN THE EVENT THAT THE GROUNDWATER CANNOT BE TREATED TO REMOVE ALL ORGANICS ABOVE HEALTH BASED LEVELS, OR THE SLUDGE DOES CONTAIN DETECTABLE LEVELS OF ORGANIC CONTAMINANTS, THE SLUDGE WILL BE MANAGED AS A LISTED HAZARDOUS WASTE. IF THE SLUDGE IS A LISTED HAZARDOUS WASTE, IT MAY, IF POSSIBLE, BE DISPOSED OF AS PART OF THE LTR SOURCE CONTROL REMEDY. ALTERNATIVELY, IT MAY BE TREATED AND DISPOSED OF OFFSITE AT A RCRA SUBTITLE C LANDFILL.

THE SLUDGE IS NOT EXPECTED TO CONTAIN METALS AT CONCENTRATIONS ABOVE CHARACTERISTIC LEVELS. IF, AFTER TESTING BY THE TCLP, IT IS DETERMINED THAT THE SLUDGE IS CHARACTERISTIC FOR METALS, IT WILL BE TREATED BELOW CHARACTERISTIC LEVELS. SLUDGE WHICH DOES NOT CONTAIN ORGANICS AND IS NOT CHARACTERISTIC FOR METALS MAY BE DISPOSED OF AS A SOLID WASTE.

IF THE SLUDGE IS A LISTED HAZARDOUS WASTE, IT MAY, IF POSSIBLE, BE DISPOSED OF AS PART OF THE LTR SOURCE CONTROL REMEDY. ALTERNATIVELY, IT MAY BE TREATED AND DISPOSED OF OFFSITE AT A RCRA SUBTITLE C LANDFILL. IF ORGANICS ARE SUCCESSFULLY REMOVED PRIOR TO THE ELECTROCHEMICAL PRECIPITATION, THE SLUDGE CONTAINING METALS WOULD NOT BE A LISTED HAZARDOUS WASTE.

IF THE SLUDGE IS NEITHER A CHARACTERISTIC NOR A LISTED WASTE, IT WILL BE DISPOSED OF AS A SOLID WASTE, AND LAND DISPOSAL RESTRICTIONS WOULD NOT BE APPLICABLE. IF THE SLUDGE MUST BE MANAGED AS A LISTED HAZARDOUS WASTE, THEN THE SLUDGE WOULD BE TREATED TO APPROPRIATE LDR STANDARDS PRIOR TO ON- OR OFF-SITE DISPOSAL. IT IS EXPECTED THAT THE SPENT CARBON FROM THE TREATMENT SYSTEM WOULD BE RECYCLED IN A UNIT IN COMPLIANCE WITH 40 CFR 264 (SUBPART X).

GROUNDWATER WHICH IS EXTRACTED, TREATED AND SUBSEQUENTLY DISCHARGED MUST MEET THE SUBSTANTIVE REQUIREMENTS OF THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM (WPDES). DISCHARGE OF TREATED GROUNDWATER TO THE BRANCH RIVER SHOULD MEET THE SUBSTANTIVE REQUIREMENTS OF SECTION 402 AND THE CLEAN WATER ACT AND SHALL NOT EXCEED DISCHARGE LIMITS ESTABLISHED BY THE STATE OF WISCONSIN.

THE SELECTED REMEDY WILL ACHIEVE STATE ARARS FOR DISCHARGE TO SURFACE WATER THROUGH DISCHARGE TO THE BRANCH RIVER. WISCONSIN EFFLUENT LEVELS FOR DISCHARGE TO THE BRANCH RIVER WILL BE ESTABLISHED IN ACCORDANCE WITH CHS. NR 102, NR 104, NR 106, NR 108 AND NR 207, WIS. ADM. CODE. PRELIMINARY DISCHARGE EFFLUENT LIMITS ARE OUTLINED IN A WDNR MEMO DATED MARCH 13, 1991. THESE LIMITATIONS ARE DEPENDENT ON RECEIVING WATER QUALITY AND EFFLUENT PH AND HARDNESS VALUES. ANY DEVIATION FROM THESE ASSUMED VALUES DOWNWARD FOR ACTUAL EFFLUENT DISCHARGE OR BACKGROUND CONCENTRATIONS WILL REQUIRE A REASSESSMENT OF THE DISCHARGE LIMITATIONS. TO VERIFY THE LIMITS, BACKGROUND SURFACE WATER QUALITY TESTING AND AN ASSESSMENT OF THE EXISTING HABITAT FOR THE STATE THREATENED SPECIES, THE GREATER REDHORSE FISH, IS REQUIRED DURING THE REMEDIAL DESIGN PHASES, IN ACCORDANCE WITH ATTACHMENT A. IN ADDITION, TREATABILITY STUDIES MUST BE PERFORMED TO IDENTIFY TREATMENT TECHNOLOGIES TO PREVENT WHOLE EFFLUENT TOXICITY AS REQUIRED UNDER CH. NR 106, WIS. ADM. CODE. THE REQUIREMENTS OF CH. NR 220, WIS. ADM. CODE, MUST ALSO BE SATISFIED.

GROUNDWATER MONITORING WELLS WILL BE INSTALLED IN ACCORDANCE WITH NR 141, WIS. ADM. CODE. EXTRACTION WELLS WILL BE INSTALLED AND OPERATED IN ACCORDANCE WITH CH. NR 112, WIS. ADM. CODE.

WETLANDS POLICY

US EPA HAS A WETLANDS POLICY WHICH REGULATES FILLING OF WETLANDS (40 CFR 230). IMPACTS TO THE WETLANDS WILL BE CONSIDERED AND MINIMIZED TO THE MAXIMUM EXTENT POSSIBLE DURING THE DESIGN PHASE OF THIS REMEDIAL ACTION AS DIRECTED IN EXECUTIVE ORDER 11990. THE STATE OF WISCONSIN ALSO HAS POLICIES ON PROTECTION OF WETLANDS (NR 1.95, NR 115, NR 117 WIS. ADM. CODE), AND PROTECTION OF LAKES AND STREAMS (NR 102, NR 103 WIS. ADM. CODE). WISCONSIN ENDANGERED AND THREATENED SPECIES PROTECTION LAW (29.415 WIS. STATS. AND NR 27 WIS. ADM. CODE) PROHIBIT THE "TAKING" OR HARMING OF ENDANGERED OR THREATENED WILDLIFE RESOURCES. THESE LAWS ARE ARARS FOR THIS REMEDIAL ACTION, AS POISONING OF ENDANGERED OR THREATENED SPECIES BY SITE CONTAMINANTS COULD BE CONSIDERED A "TAKING".

THE FOLLOWING ARARS ARE ASSOCIATED WITH THE PREFERRED REMEDY CHOSEN IN THIS ROD:

CHEMICAL SPECIFIC

- WATER QUALITY CRITERIA (AWQC). 40 CFR PART 131 QUALITY CRITERIA FOR WATER, 1986.
- SURFACE WATER QUALITY STANDARDS (NR 102, NR 105, NR 106, NR 147, WIS. ADM. CODE)

ACTION SPECIFIC

- LAND DISPOSAL RESTRICTIONS (40 CFR PART 268, 261)
- NATIONAL POLLUTANT DISCHARGE ELIMINATION (40 CFR PART 125); INCLUDES BEST AVAILABLE TECHNOLOGY
- STANDARDS APPLICABLE TO OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE AND DISPOSAL FACILITIES (40 CFR PART 264.90)
- STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE (NR 600 ET SEQ, WIS. ADM. CODE)
- RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) (42 USC. 6924(U), (V) AND 6928(H)).
- GROUNDWATER MONITORING AND RECOVERY WELL REQUIREMENTS (NR 112, NR 141, NR 508, NR 600 ET SEQ, WIS. ADM. CODE)
- REQUIREMENTS AND STANDARDS FOR POLLUTION DISCHARGE SYSTEMS (NR 102, 104, 106, 108, 200,

207, 218, 219, 220, WIS. ADM. CODE)

- STANDARDS FOR LANDFILL CAP DESIGN (NR 504, NR 514, NR 516 NR 600 ET SEQ, WIS. ADM. CODE)
- STANDARDS FOR EMISSIONS CONTROL (NR 400-499, WIS. ADM. CODE)
- REQUIREMENTS FOR COLLECTION AND CONTROL OF LANDFILL GAS (NR 504, NR 506, NR 508, NR 514, NR 516, NR 600 ET SEQ, WIS. ADM. CODE)
- NATIONAL PRIMARY AND SECONDARY AMBIENT AIR QUALITY STANDARDS (40 CFR PART 50)
- NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (40 CFR PART 61)

LOCATION SPECIFIC

- PROTECTION OF WETLANDS (EXEC. ORDER NO. 11990, 40 CFR 6.302(A) AND APPENDIX A).
- GUIDELINES FOR SPECIFICATIONS OF DISPOSAL SITES FOR DREDGED OR FILL MATERIAL (40 CFR 230)
- PROTECTION OF WETLANDS (NR 1.95, NR 103, NR 115, NR 117, WIS. ADM. CODE)
- PROTECTION OF LAKES AND STREAMS (NR 102, 103, WIS. ADM. CODE)
- PROTECTION OF ENDANGERED AND THREATENED SPECIES (29.415 WIS. STATS., NR 27, WIS. ADM. CODE)

"TO BE CONSIDERED" REQUIREMENTS

- CERCLA OFF-SITE POLICY. (MAY 12, 1986), REVISED NOVEMBER 13, 1987, OSWER DIR. 9834.11.
- WISCONSIN "INTERIM POLICY FOR PROMOTING THE IN-STATE AND ON-SITE MANAGEMENT OF HAZARDOUS WASTES IN THE STATE OF WISCONSIN" PROVIDES A PRIORITIZATION OUTLINE FOR THE TREATMENT AND DISPOSAL OF HAZARDOUS WASTES AND IS "TO-BE-CONSIDERED" FOR THE SITE.

IF RESIDUAL MATERIAL IS CONSIDERED A CHARACTERISTIC HAZARDOUS WASTE (TCLP), ADDITIONAL TREATMENT WOULD BE NECESSARY TO MEET THIS STATE POLICY SINCE TREATMENT WOULD BE IN COMPLIANCE WITH THE SUBSTANTIVE REQUIREMENTS OF BOTH FEDERAL AND STATE RCRA REGULATIONS. AFTER TREATMENT, THE SLUDGE, FORMERLY CHARACTERISTIC, WOULD BE RENDERED NONHAZARDOUS AND DISPOSED IN COMPLIANCE WITH ARARS.

L. COST-EFFECTIVENESS

COST-EFFECTIVENESS COMPARES THE EFFECTIVENESS OF AN ALTERNATIVE IN PROPORTION TO ITS COST OF PROVIDING ITS ENVIRONMENTAL BENEFITS. TABLE 6 LISTS THE COSTS ASSOCIATED WITH THE IMPLEMENTATION OF THE REMEDIES.

THE SELECTED REMEDY IS COST-EFFECTIVE BECAUSE IT PROVIDES A HIGH DEGREE OF OVERALL EFFECTIVENESS PROPORTIONAL TO ITS COSTS, THE NET PRESENT WORTH BEING $19,200,000. THE ESTIMATED COST OF THE SELECTED REMEDY IS COMPARABLE WITH THE OTHER ALTERNATIVES AND ASSURES A HIGH DEGREE OF CERTAINTY THAT THE REMEDY WILL BE EFFECTIVE IN THE LONG-TERM DUE TO THE SIGNIFICANT REDUCTION OF THE TOXICITY OF THE CONTAMINANTS BY ONE ORDER OF MAGNITUDE FOR METALS AND TWO ORDERS OF MAGNITUDE FOR ORGANICS, ACHIEVED THROUGH TREATMENT OF THE GROUNDWATER AND CONTROL AND CONTAINMENT OF THE SOURCE MATERIAL THAT CONSTITUTE THE PRINCIPAL THREAT AT THE SITE. GROUNDWATER ALTERNATIVE 5 COMBINED WITH SOURCE CONTROL ALTERNATIVE 4 IS SLIGHTLY LESS EXPENSIVE BUT DOES NOT REDUCE THE RISK TO PUBLIC HEALTH AND THE ENVIRONMENT OR PROVIDE EFFECTIVENESS OVER THE LONG TERM TO THE EXTENT OF THE SELECTED REMEDY.

UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE.

US EPA BELIEVES AND THE STATE OF WISCONSIN CONCURS THAT THE SELECTED REMEDY REPRESENTS THE MAXIMUM EXTENT TO WHICH PERMANENT SOLUTIONS AND TREATMENT TECHNOLOGIES CAN BE UTILIZED IN A COST-EFFECTIVE MANNER FOR THE REMEDIAL ACTION AT THE LL AND LTR SITES. A COMBINATION OF TREATMENT, CONTAINMENT AND SOURCE CONTROL WILL SIGNIFICANTLY REDUCE THE HAZARDS POSED BY THE CONTAMINATED LANDFILL WASTE, SOIL AND GROUNDWATER AT THE SITES. THE GROUNDWATER WILL BE RESTORED AND GROUNDWATER CLEANUP WILL OCCUR AT A MORE RAPID RATE COMPARED TO OTHER OPTIONS. OF THE ALTERNATIVES THAT ARE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT AND COMPLY WITH ARARS, US EPA HAS DETERMINED THAT THE SELECTED REMEDY PROVIDES THE BEST BALANCE OF TRADEOFFS IN TERMS OF LONG-TERM EFFECTIVENESS AND PERMANENCE, REDUCTION OF TOXICITY, MOBILITY OR VOLUME THROUGH TREATMENT, SHORT-TERM EFFECTIVENESS, IMPLEMENTABILITY, COST AND STATE AND COMMUNITY ACCEPTANCE.

PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

THE SELECTED REMEDY FOR THE FINAL ACTION FOR THE LL SITE AND THE FIRST OPERABLE UNIT FOR THE LTR SITE SATISFIES THE STATUTORY PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT THROUGH TREATMENT OF THE CONTAMINANTS IN THE GROUNDWATER IN AN ON-SITE GROUNDWATER TREATMENT PLANT. TREATMENT OF THE CONTAMINANTS USING GAC AND RECYCLING THE SPENT CARBON WILL RESULT IN A SIGNIFICANT REDUCTION OF CONTAMINANT TOXICITY. RESIDUALS WILL BE HANDLED AS DESCRIBED UNDER GROUNDWATER EXTRACTION AND TREATMENT IN THIS SECTION.