

**EPA Superfund  
Record of Decision:**

**HARRIS CORP. (PALM BAY PLANT)  
EPA ID: FLD000602334  
OU 01  
PALM BAY, FL  
06/28/1990**

**HARRIS CORPORATION/PALM BAY FACILITY  
PALM BAY, BREVARD COUNTY, FLORIDA**

**#SBP**

**STATEMENT AND BASIS OF PURPOSE:**

THIS DECISION DOCUMENT REPRESENTS THE SELECTED REMEDIAL ACTION FOR THE HARRIS CORPORATION/PALM BAY FACILITY SITE DEVELOPED IN ACCORDANCE WITH THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980 (CERCLA), AS AMENDED BY THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (SARA) AND, TO THE EXTENT PRACTICABLE, THE NATIONAL OIL AND HAZARDOUS SUBSTANCES POLLUTION CONTINGENCY PLAN (NCP).

THIS DECISION IS BASED UPON THE CONTENTS OF THE ADMINISTRATIVE RECORD FOR THE HARRIS CORPORATION/PALM BAY FACILITY SITE.

THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY AND THE STATE OF FLORIDA AGREE ON THE SELECTED REMEDY.

**ASSESSMENT OF THE SITE:**

ACTUAL OR THREATENED RELEASES OF HAZARDOUS SUBSTANCES FROM THIS SITE, IF NOT ADDRESSED BY IMPLEMENTING THE RESPONSE ACTION SELECTED IN THIS RECORD OF DECISION (ROD), MAY PRESENT A CURRENT OR POTENTIAL THREAT TO PUBLIC HEALTH, WELFARE, OR THE ENVIRONMENT.

**STATUTORY DETERMINATIONS:**

THE SELECTED REMEDY IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT, COMPLIES WITH FEDERAL AND STATE REQUIREMENTS THAT ARE LEGALLY APPLICABLE OR RELEVANT AND APPROPRIATE TO THE REMEDIAL ACTION, AND IS COST-EFFECTIVE. THIS REMEDY UTILIZES PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT (OR RESOURCE RECOVERY) TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE AND SATISFIES THE STATUTORY PREFERENCE FOR REMEDIES THAT EMPLOY TREATMENT THAT REDUCES TOXICITY, MOBILITY, OR VOLUME AS A PRINCIPLE ELEMENT. AS THIS REMEDY WILL INITIALLY RESULT IN HAZARDOUS SUBSTANCES REMAINING ON-SITE ABOVE HEALTH-BASED LEVELS, A REVIEW WILL BE CONDUCTED WITHIN FIVE YEARS AFTER COMMENCEMENT OF REMEDIAL ACTION TO ENSURE THAT THE REMEDY CONTINUES TO PROVIDE ADEQUATE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT.

**#INT**

**1.0 INTRODUCTION**

THE HARRIS CORPORATION (HARRIS) SITE WAS PROPOSED FOR INCLUSION ON THE NATIONAL PRIORITIES LIST (NPL) IN APRIL 1985. THE HARRIS SITE HAS BEEN THE SUBJECT OF NUMEROUS INVESTIGATIONS PERFORMED BY THE RESPONSIBLE PARTY, HARRIS CORPORATION, UNDER AN ADMINISTRATIVE ORDER ON CONSENT WITH THE STATE OF FLORIDA THAT WAS SIGNED IN DECEMBER 1983. THESE PREVIOUS INVESTIGATIONS INCLUDE:

- 1) STUDIES OF AFFECTED GROUNDWATER, INCLUDING GEOLOGIC AND HYDROGEOLOGIC STUDIES;
- 2) STUDIES OF AFFECTED SOILS;
- 3) EVALUATION OF METHODS OF REMEDIATION AND TREATABILITY; AND
- 4) INVESTIGATIONS ASSESSING THE ONGOING REMEDIATION PROGRAM.

**#SNL**

**1.1 SITE NAME, LOCATION, AND DESCRIPTION**

THE HARRIS CORPORATION/PALM BAY FACILITY SITE IS LOCATED ON 345 ACRES ALONG PALM BAY ROAD IN PALM BAY, BREVARD COUNTY, FLORIDA (FIGURE 1). THE SITE CONSISTS OF GROUNDWATER AND SOILS CONTAMINATION ASSOCIATED WITH HARRIS CORPORATION INCLUDING THE GROUNDWATER PLUMES EXTENDING FROM HARRIS ONTO THE ADJACENT PROPERTY OWNED BY GENERAL DEVELOPMENT UTILITIES (GDU).

HARRIS CORPORATION MANUFACTURES ELECTRONIC COMPONENTS AS WELL AS COMMUNICATION AND INFORMATION PROCESSING EQUIPMENT. THERE ARE TWO MAJOR OPERATING DIVISIONS, THE GOVERNMENT SYSTEMS (NOW CALLED ELECTRONIC SYSTEMS) AND THE SEMICONDUCTOR COMPLEX. HARRIS ACQUIRED A THIRD AREA, BUILDING 100, IN 1970.

GDU, A SUBSIDIARY OF GENERAL DEVELOPMENT CORPORATION, PROVIDES THE PUBLIC WATER SUPPLY AND SEWAGE TREATMENT AND DISPOSAL FOR AT LEAST 33,000 RESIDENTS OF PALM BAY. THE GDU WELL FIELD CONSISTS OF 25 PRODUCING WELLS. A NUMBER OF THESE WELLS ARE LOCATED DIRECTLY SOUTH OF, AND DOWNGRAIDENT FROM, THE GOVERNMENT SYSTEMS FACILITY.

HARRIS CORPORATION HAS BEEN OPERATING THE GOVERNMENT SYSTEMS FACILITY IN PALM BAY SINCE 1967. HARRIS PURCHASED RADIATION CORPORATION, AN ELECTRONICS FIRM SUPPORTING THE SPACE INDUSTRY, WHICH OPERATED AT THE SITE FROM THE 1950'S TO THE EARLY 1960'S. ALL EXPANSION FROM THE ORIGINAL BUILDINGS HAS BEEN ONTO UNDEVELOPED PROPERTY WITH THE EXCEPTION OF BUILDING 100. TWO PREVIOUS MANUFACTURING FIRMS (SORBAN AND MOHAWK DATA SERVICES) OPERATED AT BUILDING 100 AND USED THE SITE FOR PAINTING OPERATIONS, A CHROMIUM PLATING OPERATION, A MACHINE SHOP, AND A DRUM STORAGE AREA.

THE HARRIS SITE IS SURROUNDED TO THE EAST, WEST, AND NORTH PRIMARILY BY COMMERCIAL AND OTHER INDUSTRIAL-ZONED PROPERTIES WHICH IN TURN ARE BOUNDED BY RESIDENTIAL PROPERTIES. A MUNICIPAL PARK, KNOWN AS KNECHT PARK, LIES EAST OF THE SITE. SITE USAGE IS NOT EXPECTED TO CHANGE.

THE SIGNIFICANT SURFACE FEATURES PRESENT INCLUDE SEVERAL SMALL BODIES OF WATER ON THE HARRIS PROPERTY, A POND IN KNECHT PARK, AND TURKEY CREEK (FIGURES 1 & 2). THE HARRIS PONDS ARE PRIMARILY USED FOR STORMWATER RETENTION, ALTHOUGH SOME ARE USED FOR IRRIGATION. THE SITE IS WITHIN THE DRAINAGE BASIN OF TURKEY CREEK AND ITS TRIBUTARIES WHICH LIE TO THE SOUTHWEST, SOUTH, AND SOUTHEAST. STORMWATER RUNOFF THAT IS NOT RETAINED ON-SITE IS DISCHARGED TO THE MUNICIPAL STORMWATER DRAINAGE SYSTEM AND EVENTUALLY INTO TURKEY CREEK.

## **#SHE**

### **1.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES**

IN 1981, THE EPA SAMPLED GDU PRODUCTION WELLS WHICH LIE SOUTH OF HARRIS GOVERNMENT SYSTEMS FACILITY AS PART OF A NATIONWIDE SURVEY OF GROUNDWATER QUALITY. IN MARCH 1982, THE EPA REPORTED TO THE FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION (FDER) THAT NUMEROUS VOLATILE ORGANIC COMPOUNDS (VOCs) WERE DETECTED IN SIX GDU PRODUCTION WELLS. HARRIS CONFIRMED THE PRESENCE OF VOCs IN MONITOR WELLS ON THE GOVERNMENT SYSTEMS PROPERTY IN 1982. HARRIS ENTERED INTO A CONSENT ORDER WITH FDER (OGC CASE NO. 82-0582) IN DECEMBER 1983 WITH AMENDMENTS IN JANUARY, 1984 AND OCTOBER, 1984. HARRIS AGREED TO CONDUCT A GROUNDWATER INVESTIGATION TO DETERMINE THE EXTENT OF CHEMICAL IMPACTS AND TO DEVELOP AND IMPLEMENT A GROUNDWATER RESTORATION PROGRAM. SINCE ENTERING INTO THIS AGREEMENT, HARRIS, WITH FDER OVERSIGHT, HAS CONDUCTED NUMEROUS INVESTIGATIONS, INSTALLED 134 WELLS AT GOVERNMENT SYSTEMS, AND CONDUCTED GROUNDWATER SAMPLING.

ALTHOUGH NOT ALL INCIDENTS INVOLVING THE RELEASE OF HAZARDOUS SUBSTANCES HAVE BEEN IDENTIFIED, SOME CONTRIBUTING EVENTS ARE KNOWN. TWO FIRES OCCURRED IN THE NORTHEAST CORNER OF BUILDING 6, ONE IN 1967 AND ANOTHER IN 1974. CHEMICAL VATS WERE DUMPED BY THE FIRE DEPARTMENT AND FLUSHED OUT THROUGH HOLES WHICH WERE BROKEN INTO THE FLOOR OF THE BUILDING. THE VOLUME OF CHEMICALS RELEASED IN THESE TWO INCIDENTS IS UNKNOWN.

SEVERAL POSSIBLE SOURCE AREAS HAVE BEEN IDENTIFIED AT HARRIS BASED ON KNOWLEDGE OF PAST OPERATING AND HANDLING PRACTICES. THE VOLUME OF MATERIALS RELEASED IS NOT KNOWN. FROM 1968 TO 1970, STORAGE DRUMS CONTAINING PAINTS, SOLVENTS AND SIMILAR MATERIALS WERE STORED IN THE AREA OF THE NORTHEAST CORNER OF BUILDING 6 AND ALONG THE WESTERN SIDES OF BUILDINGS 10 AND 11. IN THE LATE 1960'S AN ACID AND SOLVENT LINE BETWEEN BUILDING 6 AND A METAL-FINISHING WASTE TREATMENT PLANT APPARENTLY LEAKED. AS A RESULT, SOURCE AREAS MAY INCLUDE THE STORMWATER DRAIN EXTENDING FROM THIS AREA EASTWARD TO THE DRAINAGE SWALE ALONG PERIMETER ROAD AND TO TWO FORMER TREATMENT LAGOONS LOCATED IN THE SOUTHEAST CORNER OF THE SITE (FIGURE 3).

IN ADDITION, BUILDING 5 IS LOCATED ON THE FORMER SITE OF TWO NEUTRALIZATION LAGOONS THAT WERE CLEANED OUT IN 1980. A NEUTRALIZATION DITCH WAS LOCATED SOUTH OF THESE LAGOONS WHICH CONVEYED WATER TO THE TWO TREATMENT LAGOONS ALREADY MENTIONED. EAST OF BUILDING 15 IS AN AREA SUSPECTED TO BE THE LOCATION OF AN OLD TRASH SITE. THE OLD PUMP AND LIFT STATIONS ARE ALSO POTENTIAL SOURCES OF CONTAMINATION. MORE RECENTLY, HARRIS DOCUMENTED A 1986 ACID LINE LEAK IN THE AREA OF BUILDING 4.

THE ESTIMATED VOC PLUME CONFIGURATIONS INDICATE THAT THE MAJOR SOURCE AREA IS PROBABLY NEAR BUILDING 6. THEREFORE, THE MAJOR SOURCES MAY BE THE FIRES, BROKEN SOLVENT LINE, AND DRUM STORAGE AREAS NEAR BUILDING 6. THE TREATMENT LAGOONS PREVIOUSLY LOCATED NEAR BUILDING 5 MAY BE A SOURCE FOR THE SHALLOW PLUME IN THAT AREA.

THE HARRIS CORPORATION SITE WAS PROPOSED FOR THE NATIONAL PRIORITIES LIST (NPL) ON APRIL 1, 1985, AND BECAME A FINAL NPL SITE ON JULY 1, 1987. EPA ISSUED A GENERAL NOTICE LETTER TO HARRIS CORPORATION ON APRIL 6, 1989, NOTIFYING HARRIS OF ITS POTENTIAL LIABILITY UNDER THE COMPREHENSIVE ENVIRONMENTAL RESPONSE AND LIABILITY ACT OF 1980 (CERCLA). THIS NOTICE LETTER WAS ISSUED PURSUANT TO SECTION 104 AND OTHER PROVISIONS OF CERCLA AS AMENDED BY THE SUPERFUND REAUTHORIZATION ACT (SARA). IN THIS NOTICE LETTER, EPA RECOGNIZED THE REMEDIAL EFFORTS TAKEN BY HARRIS CORPORATION AT THE SITE IN COMPLIANCE WITH THE CONSENT ORDER EXECUTED BETWEEN HARRIS AND THE STATE OF FLORIDA.

FDER ELECTED TO ASSUME MANAGEMENT OF ENFORCEMENT ACTIVITIES AT THE SITE DUE TO THIS EXISTING AGREEMENT. EPA HAS PROVIDED TECHNICAL SUPPORT BY REVIEWING SITE DOCUMENTS INCLUDING THE SAMPLING AND ANALYTICAL RESULTS.

PREVIOUS INVESTIGATIONS CONDUCTED BY BOTH HARRIS AND GDU HAVE INCLUDED STUDIES ASSESSING THE NATURE AND EXTENT OF CHEMICAL IMPACTS ON THE GROUNDWATER AND SOILS, METHODS OF REMEDIATION, AND ASSESSMENTS OF THE ONGOING REMEDIAL ACTION. APPENDIX A LISTS THE REPORTS FOR STUDIES THAT HAVE BEEN CONDUCTED TO PERFORM CONTAMINANT ASSESSMENT PLAN AND FEASIBILITY STUDY ACTIVITIES.

### **1.3 COMMUNITY PARTICIPATION**

THE EPA PROPOSED PLAN FOR THE HARRIS CORPORATION SITE WAS RELEASED TO THE PUBLIC IN MARCH, 1990. THIS PROPOSED PLAN, ALONG WITH TECHNICAL REPORTS PREPARED BY HARRIS RELATING TO CONTAMINANT ASSESSMENT PLAN AND FEASIBILITY STUDY ACTIVITIES, WAS PLACED IN THE ADMINISTRATIVE RECORD. THE DECISION FOR THIS SITE IS BASED ON DOCUMENTS FOUND IN THE ADMINISTRATIVE RECORD. THE ADMINISTRATIVE RECORD IS LOCATED IN AN INFORMATION REPOSITORY MAINTAINED IN EACH OF TWO LOCATIONS: THE EPA RECORDS CENTER IN THE REGION IV OFFICE IN ATLANTA, GEORGIA, AND THE PALM BAY PUBLIC LIBRARY IN PALM BAY, FLORIDA. THE NOTICE OF AVAILABILITY FOR THESE DOCUMENTS WAS PUBLISHED IN THE FLORIDA TODAY NEWSPAPER ON MARCH 18, 1990. EPA MAILED A FACT SHEET ON MARCH 16 TO EACH PERSON ON THE SITE-RELATED MAILING LIST. ON MARCH 23, EPA ISSUED A PRESS RELEASE ANNOUNCING THE PUBLIC MEETING, COMMENT PERIOD, AND DOCUMENT AVAILABILITY.

A 30 DAY PUBLIC COMMENT PERIOD WAS HELD FROM MARCH 18, 1990 THROUGH APRIL 17, 1990. IN ADDITION, A PUBLIC MEETING WAS HELD ON MARCH 27, 1990 IN PALM BAY. AT THIS MEETING,

REPRESENTATIVES FROM EPA AND FDER PRESENTED INFORMATION AND ANSWERED QUESTIONS ABOUT THE PROBLEMS AT THE SITE AND THE ACTIONS TAKEN TO DATE. EPA RESPONSES TO THE COMMENTS RECEIVED DURING THIS PERIOD ARE INCLUDED IN THE RESPONSIVENESS SUMMARY, WHICH IS PART OF THIS RECORD OF DECISION.

## #SCO

### 1.4. SCOPE AND ROLE OF OPERABLE UNITS

AS WITH MANY SUPERFUND SITES, THE PROBLEMS AT THE HARRIS CORPORATION SITE ARE COMPLEX. THEREFORE, EPA HAS DIVIDED THE HARRIS SITE INTO A MINIMUM OF TWO OPERABLE UNITS (OUS) FOR BETTER MANAGEMENT OF THE RESPONSE ACTIVITIES. THESE OPERABLE UNITS ARE:

- OU ONE: CONTAMINATED GROUNDWATER ASSOCIATED WITH GOVERNMENT SYSTEMS
- OU TWO: CONTAMINATED GROUNDWATER AT THE REMAINDER OF THE SITE (INCLUDING THE SEMICONDUCTOR COMPLEX AND BUILDING 100) AS WELL AS CONTAMINATED SOILS AT THE ENTIRE SITE

THIS RECORD OF DECISION ADDRESSES ONLY OPERABLE UNIT ONE, CONTAMINATED GROUNDWATER ASSOCIATED WITH THE GOVERNMENT SYSTEMS FACILITY. UNDER OVERSIGHT FROM FDER, THIS OPERABLE UNIT IS CURRENTLY IN REMEDIATION USING A GROUNDWATER TREATMENT SYSTEM.

REMEDICATION OF THE GROUNDWATER AT THE SEMICONDUCTOR COMPLEX IS SCHEDULED TO BEGIN IN LATE 1990, ALSO UNDER FDER OVERSIGHT. ADDITIONAL SOIL SAMPLING TO IDENTIFY CONTAMINANT SOURCE LOCATIONS ALONG WITH TREATABILITY STUDIES MAY BE NECESSARY AS PART OF OPERABLE UNIT TWO. ANY INTERIM ACTIONS WILL BE CONSISTENT WITH ANY PLANNED FUTURE ACTIONS.

## #SSC

### 2.0 SUMMARY OF SITE CHARACTERIZATION

THE CHEMICAL CHARACTERIZATION OF GROUNDWATER FOR OPERABLE UNIT ONE AT THE SITE HAS BEEN STUDIED AND MONITORED SINCE 1984. APPENDIX A LISTS THE STUDIES CONDUCTED BY BOTH HARRIS AND GDU WHICH PROVIDE DOCUMENTATION CONCERNING THE NATURE AND EXTENT OF CHEMICAL IMPACTS UPON THE AQUIFER.

#### 2.1 SITE CONTAMINANTS

CONTAMINANTS IDENTIFIED AT THE GOVERNMENT SYSTEMS FACILITY CAN BE DIVIDED INTO FOUR CATEGORIES: VOLATILE ORGANIC COMPOUNDS (VOCS), ACID EXTRACTABLE ORGANICS (AEOS), METALS, AND FLUORIDE. THESE CONTAMINANTS ARE ASSOCIATED WITH PROCESSES CONDUCTED AT GOVERNMENT SYSTEMS.

#### VOCS

THE CONTAMINATION HAS BEEN APPROXIMATED VERTICALLY AND HORIZONTALLY AND IS TRACKED BY A NETWORK OF MONITOR WELLS. TWO SIGNIFICANT, AFFECTED GROUNDWATER ZONES HAVE BEEN IDENTIFIED IN THE GOVERNMENT SYSTEMS AREA: THE 40-FOOT ZONE AND THE 80-FOOT ZONE. THERE ARE TWO VOC PLUMES IDENTIFIED IN THE 40-FOOT ZONE (FIGURE 4). ONE PLUME LIES NEAR BUILDING 5 AT THE EASTERN EDGE OF THE SITE IN THE VICINITY OF THE OLD STORMWATER DRAIN OUTFALL AND TREATMENT LAGOONS. THE OTHER PLUME IS LOCATED NEAR BUILDING 6. THE VOC PLUME IN THE 80-FOOT ZONE OF THE LEAKY ARTESIAN AQUIFER EXTENDS FROM THE AREA NEAR BUILDING 6, AND CONTINUES SOUTH-EASTWARD TOWARD AND ACROSS THE SOUTHEAST BOUNDARY OF THE HARRIS PROPERTY (FIGURE 5).

#### AEOS

HARRIS CONDUCTED TESTING FOR ACID EXTRACTABLE ORGANICS (AEOS) IN GROUNDWATER FROM 90 WELLS ACROSS THE SITE AFTER TRACE LEVELS OF PHENOLS WERE DETECTED. SUBSEQUENT ANALYSES SHOWED THE

LEVEL OF AEOS TO BE BELOW DETECTION LIMITS EXCEPT FOR A PHENOL CONCENTRATION OF 20 UG/L IN A SAMPLE TAKEN IN 1986 FROM WELL GS-37S, ONE OF THE HARRIS EXTRACTION WELLS.

#### METALS

METALS ABOVE THE EPA AND FLORIDA MAXIMUM CONTAMINANT LEVELS (MCLS) WERE DETECTED IN SOME SHALLOW WELL-POINT SAMPLES COLLECTED DURING RECONNAISSANCE TESTING IN 1986 AROUND BUILDING 6. CHROMIUM AND LEAD WERE THE METALS OF PRIMARY CONCERN. SUBSEQUENT GROUNDWATER SAMPLING OF PERMANENT MONITOR WELLS AT HARRIS SHOWS THESE AND OTHER METALS (CADMIUM, SILVER, AND MERCURY) TO BE BELOW DETECTION LIMITS. AS A RESULT, MONITORING WELLS ARE NO LONGER ROUTINELY SAMPLED FOR METALS.

#### FLUORIDE

SHALLOW WELL-POINT SAMPLES DELINEATED AN AREA OF ELEVATED FLUORIDE IMMEDIATELY WEST AND SOUTH OF BUILDING 4. HARRIS PERFORMED A FOLLOW-UP STUDY WHICH FOUND ONE WELL (GS-M14) WITH SIGNIFICANTLY HIGH FLUORIDE LEVELS (6.64-6.68 MG/L). IN ORDER TO DETECT ANY MIGRATION OF FLUORIDE, MONITORING FOR THIS COMPOUND ALSO OCCURS IN THE SURROUNDING WELLS. FLUORIDE HAS BEEN DETECTED IN GROUNDWATER ONLY AT THE 15-FOOT DEPTH, NOT THE 40- AND 80-FOOT DEPTHS. THERE IS INSUFFICIENT EVIDENCE TO CONCLUDE THAT FLUORIDE IS MOVING Laterally OR VERTICALLY WITH THE GROUNDWATER.

#### 2.2 GEOLOGY

PHYSIOGRAPHICALLY, THE HARRIS SITE IS ON THE ATLANTIC COASTAL RIDGE, PART OF THE PAMLICO TERRACE. THIS SURFACE IS A RELICT BEACH RIDGE THOUGHT TO HAVE FORMED ABOUT 125,000 YEARS AGO (LATE PLEISTOCENE) WHEN SEA LEVEL WAS APPROXIMATELY 25 TO 30 FEET ABOVE THE PRESENT LEVEL. LAND SURFACE ELEVATION AT HARRIS IS APPROXIMATELY 19-22 FEET ABOVE SEA LEVEL.

THE SUBSURFACE GEOLOGY OF COASTAL BREVARD COUNTY IS RELATIVELY UNIFORM. THE HARRIS SITE IS LOCATED IN AN AREA WHERE THE SURFICIAL DEPOSITS ARE UNCONSOLIDATED SEDIMENTS APPROXIMATELY 110 FEET DEEP. THESE DEPOSITS ARE COMPRISED (IN DESCENDING ORDER) OF UNDIFFERENTIATED HOLOCENE SEDIMENTS, THE FORT THOMPSON AND ANASTASIA FORMATIONS OF PLEISTOCENE AGE, AND TAMIAMI FORMATION OF PLIOCENE AGE. THESE SEDIMENTS ARE RELATIVELY FLAT-LYING, FINE TO MEDIUM GRAINED SAND LAYERS CONTAINING VARIABLE AMOUNTS OF CLAY, SHELL FRAGMENTS, CARBONATE AND ORGANIC MATERIAL. THE CLAY LAYERS ARE DISCONTINUOUS AND OCCUR INTERMITTENTLY. SEVERAL DISTINCT LAYERS OF REDDISH-BROWN, SANDY SILTS ARE FOUND IN THE UPPER 40 FEET OF SEDIMENTS. AT DEPTHS BETWEEN 4 AND 12 FEET, A HARDENED SILT LAYER IS FOUND THAT HAS BEEN REFERRED TO AS A "HARDPAN".

UNDERLYING THE UPPER SURFICIAL DEPOSITS, STARTING AT ABOUT 90 TO 110 FEET, ARE CLAY LAYERS OF THE MIOCENE AGE HAWTHORN FORMATION. THIS FORMATION IS COMPRISED OF CLAYEY SILTS AND SANDS, PHOSPHATIC SEDIMENTS AND LIMESTONE, AND IS BETWEEN 100 AND 200 FEET IN TOTAL THICKNESS. BELOW THE HAWTHORN FORMATION, FROM ABOUT 330 TO 1920 FEET BELOW LAND SURFACE, THE STRATIGRAPHIC SECTION IS DOMINATED BY INTERBEDDED LIMESTONES AND DOLOMITES OF THE EOCENE AGE OCALA LIMESTONE, AVON PARK FORMATION AND LAKE CITY LIMESTONE. UNDERLYING THIS SECTION IS THE OLDSMAR FORMATION OF LOWER EOCENE AGE EXTENDING TO A DEPTH OF APPROXIMATELY 2640 FEET WHICH IS ALSO DOMINATED BY LIMESTONE AND DOLOMITE UNITS. FIGURE 6 SHOWS A GENERALIZED GEOLOGIC COLUMN FOR THE SITE.

#### 2.3 HYDROGEOLOGY

BOTH HARRIS AND GDU HAVE COMPLETED STUDIES ON THE CHARACTERIZATION OF THE HYDROLOGIC PROPERTIES OF THE SUBSURFACE SEDIMENTS. THESE STUDIES INCLUDE DIRECT MEASUREMENT OF HYDROLOGIC CONDUCTIVITY BY LABORATORY ANALYSIS OF WATER FLOW THROUGH CORE SAMPLES AS WELL AS INDIRECT CALCULATION OF THE ESTIMATED PERMEABILITY BASED ON PARTICLE SIZE ANALYSIS. HARRIS CONDUCTED AQUIFER TESTS AT GOVERNMENT SYSTEMS IN ADDITION TO THE AQUIFER TESTS PERFORMED AS PART OF THE DEVELOPMENT OF THE GDU WELLFIELD. GEOPHYSICAL INVESTIGATIONS OF THE PERMEABILITY AND

STRATIGRAPHY OF SUBSURFACE LAYERS HAVE BEEN COMPLETED USING ELECTRO-MAGNETIC, RESISTIVITY, AND GROUND-PENETRATING RADAR SURVEYS. PUMP TESTS SHOW HOW THE PUMPING AT GDU AFFECTS THE AQUIFER. IN ADDITION, SEVERAL STUDIES CHARACTERIZE THE POTENTIOMETRIC SURFACE FROM WATER LEVEL MEASUREMENTS.

AN UNCONFINED WATER TABLE AQUIFER LIES IN THE UPPER PORTION OF THE SURFICIAL UNCONSOLIDATED DEPOSITS TO A DEPTH OF APPROXIMATELY 40 TO 60 FEET. AT THAT DEPTH, A RELATIVELY LOW-PERMEABILITY (3 GPD/SQUARE FEET) DOMINANT CLAY LAYER CONTAINING FINE SAND AND SHELL SEPARATES IT FROM A LOWER, LEAKY ARTESIAN AQUIFER. THIS LOWER ARTESIAN AQUIFER EXTENDS TO A DEPTH OF APPROXIMATELY 90 TO 110 FEET AND IS UNDERLAIN BY IMPERMEABLE CLAY LAYERS OF THE HAWTHORN FORMATION.

THE TRANSMISSIVE AQUIFER LAYERS ARE DOMINATED BY SHELL HASH CONTAINING VARIABLE AMOUNTS OF SAND AND CLAY (FIGURE 6). THE ESTIMATED AVERAGE TRANSMISSIVITY OF THE UNCONFINED WATER TABLE AQUIFER IS 3420 GPD/FEET. THE CLAY LAYER LYING BETWEEN THE TWO AQUIFERS HAS AN ESTIMATED AVERAGE TRANSMISSIVITY OF ONLY 24 GPD/FEET. THIS CLAY LAYER ACTS AS AN AQUITARD FOR DOWNWARD MIGRATION OF GROUNDWATER. (ESTIMATED TRANSMISSIVITIES OF THE LOWER ZONE OF HIGH PERMEABILITY LEAKY ARTESIAN AQUIFER RANGE FROM 7600 TO 15800 GPD/FEET IN THIS AREA.) THE LOWER ZONE OF HIGH PERMEABILITY IS ABOUT 20 TO 40 FEET THICK AND LIES AT DEPTHS OF ABOUT 80 FEET. THIS ZONE IS THE PRINCIPAL WATER-PRODUCING ZONE FROM WHICH WATER SUPPLIES ARE DRAWN BY GDU. BELOW THE LOWER SHALLOW AQUIFER ARE IMPERMEABLE CLAY LAYERS OF THE HAWTHORN FORMATION WHICH FORM AN AQUICLUDE BELOW THE PRODUCTION ZONE AND SEPARATE THIS SHALLOW AQUIFER FROM THE CONFINED FLORIDAN AQUIFER BELOW.

THE FLORIDAN AQUIFER EXISTS UNDER ARTESIAN CONDITIONS IN THE AREA WITH POTENTIOMETRIC LEVELS ABOVE LAND SURFACE. AS A RESULT, THERE IS NO RECHARGE TO THE FLORIDAN AQUIFER FROM THE SURFICIAL AQUIFER. THE FLORIDAN AQUIFER LIES WITHIN THE LIMESTONES AND DOLOMITES OF THE OCALA GROUP, AVON PARK FORMATION AND THE OLDSMAR FORMATION. WATER LEVEL MEASUREMENTS IN WELLS COMPLETED IN THE SURFICIAL AQUIFER (INCLUDING THE WATER TABLE AND LEAKY ARTESIAN AQUIFERS) ESTABLISH THAT THE POTENTIOMETRIC SURFACE (WATER LEVEL CONTOUR) IS AT SHALLOWER DEPTHS ON THE NORTH SIDE OF HARRIS THAN ON THE SOUTH SIDE. BASED ON THESE WATER LEVEL MEASUREMENTS, A HYDRAULIC GRADIENT EXISTS ACROSS THE HARRIS SITE TOWARD THE SOUTH AND SOUTHEAST (FIGURES 7 & 8).

FIELD TESTS DONE WITH GDU WELLS PUMPING AND THEN WITH THE WELLS TURNED OFF DEMONSTRATE THAT THE POTENTIOMETRIC SURFACE AND HYDRAULIC GRADIENT ARE SIGNIFICANTLY INFLUENCED BY PUMPAGE OF THE GDU PRODUCTION WELLS LOCATED SOUTH AND SOUTHEAST OF THE SITE. UNDER STATIC CONDITIONS (I.E., GDU PRODUCTION WELLS TURNED OFF), THE HYDRAULIC GRADIENT IN THE PRODUCTION ZONE (LEAKY ARTESIAN AQUIFER, 80-FOOT ZONE) WAS ESTIMATED TO BE ABOUT 0.004 FEET/FEET (ABOUT 20 FEET/MILE). WITH THE GDU WELLS PUMPING, THE HYDRAULIC GRADIENT AVERAGES 0.01 FEET/FEET (ABOUT 50 FEET/MILE) WHICH IS GREATER THAN TWO TIMES THE STATIC GRADIENT. THE HYDRAULIC GRADIENT AT THE SOUTHEAST CORNER OF THE SITE IS CALCULATED TO BE 0.0035 FEET/FEET. DURING ANOTHER INVESTIGATION, THE GRADIENT WAS CALCULATED TO BE 0.0094 FEET/FEET. THE GROUNDWATER GRADIENT IS MUCH STEEPER IN THE 80-FOOT ZONE THAN IN SHALLOWER ZONES DUE TO THE INFLUENCE OF THE GDU WELLFIELD. AS A RESULT, THIS GRADIENT CREATES A POTENTIAL FOR THE DOWNWARD MOVEMENT OF GROUNDWATER FROM SHALLOWER ZONES. USING THE ESTIMATED HYDRAULIC CONDUCTIVITIES AND POROSITIES OF THE TRANSMISSIVE LAYERS, GROUNDWATER FLOW RATES ARE ESTIMATED FOR THE 15-FOOT, 40-FOOT, AND 80-FOOT ZONES TO BE 16, 77 AND 273 FEET/YEAR, RESPECTIVELY.

THE CLIMATE IN THE PALM BAY AREA IS SUBTROPICAL HUMID, WITH THE WINTER MONTHS BEING GENERALLY DRYER THAN THE SUMMER MONTHS. AS PART OF THE MODELING OF THE HYDROLOGIC REGIME AT THE SITE, HARRIS CORPORATION RESEARCHED A NUMBER OF THE PARAMETERS RELATED TO THE CLIMATE OF THE AREA. AVERAGE RAINFALL IN THIS AREA IS ABOUT 56 INCHES PER YEAR. ADJUSTING FOR EVAPOTRANSPIRATION AND SURFACE RUNOFF, THE ESTIMATED EFFECTIVE RECHARGE OF THE SHALLOW AQUIFER IS 36 INCHES PER YEAR.

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### 3.0 SUMMARY OF SITE RISKS

EPA PERFORMED AN EVALUATION OF THE BASELINE PUBLIC HEALTH AND ENVIRONMENTAL RISK ASSOCIATED WITH THE HARRIS SITE. THIS BASELINE EVALUATION HELPS DETERMINE WHETHER OR NOT A REMEDIAL ACTION IS NECESSARY BY IDENTIFYING THE RISK POSED BY THE SITE IF NO REMEDIAL ACTION IS TAKEN. THE BASELINE ASSESSMENT ALSO PROVIDES THE FRAMEWORK FOR DEVELOPING THE PRELIMINARY REMEDIATION GOALS FOR THE SITE.

EPA HAS DETERMINED THAT ACTUAL OR THREATENED RELEASES OF HAZARDOUS SUBSTANCES FROM THIS SITE MAY PRESENT AN IMMINENT AND SUBSTANTIAL ENDANGERMENT TO PUBLIC HEALTH, WELFARE, OR THE ENVIRONMENT. IN ORDER TO ADDRESS THIS POTENTIALLY IMMINENT AND SUBSTANTIAL ENDANGERMENT, EPA RECOMMENDS THE IMPLEMENTATION OF THE RESPONSE ACTION SELECTED IN THIS ROD.

#### 3.1 IDENTIFICATION OF THE CONTAMINANTS OF CONCERN (INDICATOR CHEMICALS)

GROUNDWATER IS THE MEDIA OF CONCERN FOR OPERABLE UNIT ONE. THE CONTAMINANTS OF CONCERN ARE PRIMARILY VOLATILE ORGANIC COMPOUNDS (VOCS), BUT ALSO INCLUDE ACID EXTRACTABLE ORGANICS (AEOS) AND INORGANIC COMPOUNDS. THESE CONTAMINANTS HAVE BEEN SELECTED BASED ON SITE-SPECIFIC DATA COLLECTED BY HARRIS AS PART OF INITIAL SAMPLING EFFORTS AS WELL AS THE ONGOING MONITORING PROGRAM AT THE GOVERNMENT SYSTEMS FACILITY. THE IDENTIFIED CONTAMINANTS OF CONCERN CONSIST OF COMPOUNDS WHICH ARE THE MOST TOXIC, MOBILE, AND PRESENTLY PERSISTENT CHEMICALS RELATED TO THIS OPERABLE UNIT.

THE INDICATOR CHEMICALS FOR THIS SITE WERE BASED ON AN ANALYSIS OF THE COMPOUNDS IDENTIFIED IN GROUNDWATER SAMPLING CONDUCTED BY HARRIS. THE ANALYSIS FOR VOC CONTAMINATION INVOLVED DATA FROM A 1989 SAMPLING EVENT. THE ANALYSES FOR METALS AND FLUORIDE UTILIZED LESS RECENT DATA BECAUSE SAMPLING FOR THESE COMPOUNDS HAS BEEN LESS FREQUENT THAN FOR VOCS. DATA FROM WELLS WHERE NO CONTAMINANTS OF CONCERN WERE DETECTED HAVE BEEN EXCLUDED. IN CALCULATING THE AVERAGES ACROSS ALL WELLS SAMPLED, ONE-HALF THE DETECTION LIMIT WAS USED FOR THOSE CONTAMINANTS NOT DETECTED (IF AT LEAST ONE CONTAMINANT OF CONCERN WAS DETECTED IN THAT WELL).

TABLE I SHOWS THE CONCENTRATIONS FOR GROUNDWATER CONTAMINANTS OF CONCERN BASED ON SAMPLES COLLECTED FROM MONITORING WELLS AT GOVERNMENT SYSTEMS AND GDU. THESE GROUNDWATER SAMPLES CONTAINED ELEVATED CONCENTRATIONS OF THE FOLLOWING NINE VOCS: 1,1-DICHLOROETHANE (1,1-DCA), 1,1-DICHLOROETHYLENE (1,1-DCE), METHYLENE CHLORIDE (MC), TRICHLOROETHYLENE (TCE), VINYL CHLORIDE (VC), CHLOROBENZENE (CB), 1,2-DICHLOROBENZENE (1,2-DCB), 1,2-DICHLOROETHYLENE (1,2-DCE), AND ETHYL BENZENE (EB). IN ADDITION, METALS (CHROMIUM, LEAD, AND COPPER) AS WELL AS FLUORIDE WERE REPORTED AS PRESENT IN THE GROUNDWATER ASSOCIATED WITH GOVERNMENT SYSTEMS.

CHROMIUM, LEAD, AND COPPER AS WELL AS OTHER METALS HAD PREVIOUSLY BEEN DETECTED BENEATH THE HARRIS FACILITY AT LEVELS ABOVE WATER QUALITY STANDARDS. SUBSEQUENT SAMPLING BY HARRIS SHOWED STEADILY DECLINING LEVELS OF THESE METALS. IN ADDITION, THE MOST RECENT DATA ANALYZED BY EPA INDICATES THAT CHROMIUM WAS DETECTED IN ONLY ONE WELL AND COPPER IS NOT FOUND AT LEVELS OF CONCERN. ANALYSES FOR METALS AT GDU INDICATE THAT METALS ARE NOT DETECTED AT LEVELS ABOVE DRINKING WATER STANDARDS. FDER CONDUCTED SPLIT SAMPLING AT HARRIS IN 1985. THE RESULTS OF THIS SAMPLING WERE USED TO CONFIRM THE METHODOLOGY AND QUALITY ASSURANCE OF THE HARRIS SAMPLING PROCEDURES AS WELL AS THE ANALYTICAL RESULTS OBTAINED.

#### 3.2 EXPOSURE ASSESSMENT SUMMARY

THIS ROD ADDRESSES THE GROUNDWATER EXPOSURE PATHWAY. THE POTENTIAL HUMAN EXPOSURE PATHWAY OF PRIMARY CONCERN IS INGESTION. OTHER WATER USE PATHWAYS INCLUDE DERMAL CONTACT AND INHALATION.



THE PRELIMINARY CLASSIFICATION FOR THE CONTAMINATED GROUNDWATER AQUIFER IS CLASS II, A POTENTIAL OR EXISTING DRINKING WATER SOURCE. CLASS II AQUIFERS SHOULD BE REMEDIATED TO LEVELS THAT ARE PROTECTIVE OF HUMAN HEALTH.

GDU IS LOCATED DIRECTLY SOUTH OF THE HARRIS FACILITY. GROUNDWATER FLOW AT THE SITE IS TO THE SOUTH, SOUTHEAST TOWARDS THE GDU FACILITY WHICH PROVIDES THE PUBLIC WATER SUPPLY FOR PALM BAY. THEREFORE, THE POTENTIAL RECEPTORS OF CONTAMINATED GROUNDWATER IN THE ABSENCE OF GROUNDWATER REMEDIATION ARE THE PALM BAY RESIDENTS. IF THE REMEDIATION PROGRAM IS DISCONTINUED, THE CONTAMINATED GROUNDWATER WILL MIGRATE FURTHER INTO THE GDU WELL FIELD. ALSO, GROUNDWATER FROM THE SHALLOW ZONE OF THE AQUIFER COULD POTENTIALLY DISCHARGE TO TURKEY CREEK WHICH RUNS SOUTH OF THE FACILITY. IN THAT EVENT, THE CREEK COULD BECOME A HUMAN HEALTH AND/OR ENVIRONMENTAL EXPOSURE PATHWAY.

ANOTHER POTENTIAL HUMAN EXPOSURE PATHWAY OF CONCERN IS THE INHALATION OF OFF-GASSING FROM THE AIR STRIPPING SYSTEM. DURING PILOT TESTING OF THE AIR STRIPPING TOWER AT HARRIS, FDER ANALYZED PROJECTED AIR EMISSIONS. THIS ANALYSIS INDICATED THAT THE VOLUME OF EMISSIONS IS NOT HIGH ENOUGH TO PRESENT AN UNACCEPTABLE HEALTH RISK. EPA PERFORMED A SIMILAR ANALYSIS IN FEBRUARY, 1990 TO CONFIRM THESE RESULTS. HOWEVER, SINCE THE FDER ANALYSIS, EXPOSURE LIMITS FOR SOME VOLATILE ORGANIC COMPOUNDS, INCLUDING VINYL CHLORIDE, HAVE BEEN REDUCED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND THE AMERICAN CONFERENCE OF GOVERNMENTAL AND INDUSTRIAL HYGIENISTS (ACGIH). THEREFORE, THE HEALTH RISKS ASSOCIATED WITH THE AIR STRIPPER EMISSIONS SHOULD BE REVIEWED BASED ON THESE NEW LIMITS.

THE RISK CALCULATIONS FOR THE INGESTION OF GROUNDWATER ARE BASED ON THE EXPOSURE POINT CONCENTRATIONS WHICH REPRESENT THE UPPER (95 PERCENT) CONFIDENCE LIMIT ON THE ARITHMETIC AVERAGE. THE ARITHMETIC AVERAGE IS BASED ON SAMPLING DATA COLLECTED FROM WELLS IN THE AREA OF THE GROUNDWATER CONTAMINATION. THE EXPOSURE ASSUMPTION USED IN THE RISK ASSESSMENT IS THAT AN EXPOSED INDIVIDUAL CONSUMES TWO LITERS OF THE UNTREATED WATER DAILY FOR 70 YEARS.

### 3.3 TOXICITY ASSESSMENT SUMMARY

CANCER POTENCY FACTORS (CPFS) HAVE BEEN DEVELOPED BY THE EPA 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)<sup>(-1)</sup> 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 UNDERESTIMATING THE ACTUAL CANCER RISK HIGHLY UNLIKELY. CANCER POTENCY FACTORS ARE DERIVED FROM THE RESULTS OF HUMAN EPIDEMIOLOGICAL STUDIES OR CHRONIC ANIMAL BIOASSAYS TO WHICH ANIMAL-TO-HUMAN EXTRAPOLATION AND UNCERTAINTY FACTORS HAVE BEEN APPLIED (TABLE II).

REFERENCE DOSES (RFDS) HAVE BEEN DEVELOPED BY EPA FOR INDICATING THE POTENTIAL FOR ADVERSE HEALTH EFFECTS FROM EXPOSURE TO CHEMICALS EXHIBITING NONCARCINOGENIC EFFECTS. RFDS, WHICH ARE EXPRESSED IN UNITS OF MG/KG-DAY, ARE ESTIMATES OF LIFETIME DAILY EXPOSURE LEVELS FOR HUMANS, INCLUDING SENSITIVE INDIVIDUALS. ESTIMATED INTAKES OF 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 NONCARCINOGENIC EFFECTS TO OCCUR (TABLE II).

HEXAVALENT CHROMIUM IS A HUMAN CARCINOGEN WHEN INHALED. HOWEVER, ORAL AND DERNAL EXPOSURE HAVE NOT BEEN IDENTIFIED AS CARCINOGENIC. THE VOLATILE ORGANIC CONTAMINANTS OF CONCERN IN THE GROUNDWATER AT THE HARRIS FACILITY WHICH ARE CONSIDERED TO BE CARCINOGENS FROM ORAL EXPOSURE ARE

1,1-DCA; 1,1-DCE; MC; TCE; AND VC. THE INORGANIC CONSTITUENTS IN THE SITE GROUNDWATER ARE NOT CONSIDERED TO BE CARCINOGENIC FROM THE ORAL EXPOSURE ROUTE. THEREFORE, THE HAZARDS ASSOCIATED WITH THESE CONSTITUENTS ARE LOWER THAN FOR THE FIVE POTENTIAL CARCINOGENIC VOCS.

#### 3.4 RISK CHARACTERIZATION

A HAZARDOUS WASTE RISK ASSESSMENT CONSIDERS THE LIKELIHOOD THAT ADVERSE EFFECTS WILL OCCUR AS A RESULT OF EXPOSURE TO CHEMICALS RELEASED INTO THE ENVIRONMENT. THE RISK ASSESSMENT INCLUDES CARCINOGENIC AS WELL AS NONCARCINOGENIC EFFECTS.

EXCESS LIFETIME CANCER RISKS ARE DETERMINED BY MULTIPLYING THE INTAKE LEVEL WITH THE CANCER POTENCY FACTOR. THESE RISKS ARE PROBABILITIES THAT ARE GENERALLY EXPRESSED IN SCIENTIFIC NOTATION (E.G.,  $1 \times (10^{-6})$  OR  $(1E-6)$ ). AN EXCESS LIFETIME CANCER RISK OF  $1 \times (10^{-6})$  INDICATES THAT, AS A PLAUSIBLE UPPER BOUND, AN INDIVIDUAL HAS A ONE IN ONE MILLION CHANCE OF DEVELOPING CANCER AS A RESULT OF SITE-RELATED EXPOSURE TO A CARCINOGEN OVER A 70-YEAR LIFETIME UNDER THE SPECIFIC EXPOSURE CONDITIONS AT A SITE. THE AGENCY CONSIDERS INDIVIDUAL EXCESS CANCER RISKS IN THE RANGE OF  $1 \times (10^{-4})$  TO  $1 \times (10^{-6})$  AS PROTECTIVE. HOWEVER, THE  $1 \times (10^{-6})$  LEVEL IS GENERALLY USED AS THE POINT OF DEPARTURE FOR SETTING CLEANUP GOALS AT SUPERFUND SITES. TABLE III CONTAINS THE CONCENTRATIONS THAT ARE EQUIVALENT TO A  $1 \times (10^{-6})$  RISK LEVEL.

TABLE III ALSO CONTAINS THE EXCESS CANCER RISKS ASSOCIATED WITH A GROUNDWATER EXPOSURE LEVEL REPRESENTING THE 95 PERCENT UPPER CONFIDENCE LIMIT OF THE MEAN. THIS MEAN VALUE, SHOWN IN TABLE I ON PAGE 21, IS BASED ON AN ANALYSIS OF HARRIS SAMPLING DATA. THEREFORE, A POTENTIAL SOURCE OF UNCERTAINTY IN THIS RISK ASSESSMENT IS BASED ON THE METHODOLOGY (DISCUSSED IN SECTION 3.1) USED TO DETERMINE THE MEAN VALUES FOR CONTAMINANTS IN THE GROUNDWATER.

POTENTIAL CONCERN FOR NONCARCINOGENIC EFFECTS OF A SINGLE CONTAMINANT IN A SINGLE MEDIUM IS EXPRESSED AS THE HAZARD QUOTIENT (OR THE RATIO OF THE ESTIMATED INTAKE DERIVED FROM THE CONTAMINANT CONCENTRATION IN A GIVEN MEDIUM TO THE CONTAMINANT'S REFERENCE DOSE). BY ADDING THE HAZARD QUOTIENTS FOR ALL CONTAMINANTS WITHIN A MEDIUM OR ACROSS ALL MEDIA TO WHICH A GIVEN POPULATION MAY REASONABLY BE EXPOSED, THE HAZARD INDEX CAN BE GENERATED. THE HAZARD INDEX PROVIDES A USEFUL REFERENCE POINT FOR GAUGING THE POTENTIAL SIGNIFICANCE OF MULTIPLE CONTAMINANT EXPOSURES WITHIN A SINGLE MEDIUM OR ACROSS MEDIA. EPA HAS NOT PREPARED A HAZARD INDEX FOR THIS SITE. HOWEVER, TABLE III CONTAINS THE HAZARD QUOTIENTS FOR THE MEAN (UPPER 95 PERCENT CONFIDENCE LIMIT) GROUNDWATER CONCENTRATION FOR THE NONCARCINOGENS. THIS TABLE ALSO CONTAINS THE CONCENTRATION THAT IS EQUIVALENT TO THE REFERENCE DOSE.

#### 3.5 ENVIRONMENTAL RISKS

UNDER NATURAL CONDITIONS, SHALLOW GROUNDWATER DISCHARGES TO TURKEY CREEK WHICH RUNS SOUTH OF THE FACILITY. AT PRESENT, DUE TO THE PUMPING BY GDU AND THE HARRIS GROUNDWATER EXTRACTION SYSTEM, GROUNDWATER IS REPORTEDLY NOT DISCHARGING TO TURKEY CREEK. HOWEVER, IF THE PUMPING IS DISCONTINUED PRIOR TO COMPLETE REMEDIATION, TERRESTRIAL AND AQUATIC ORGANISMS COULD BE EXPOSED VIA CONTAMINATED SURFACE WATER. DISCHARGE TO SURFACE WATERS VIA STORMWATER RUN-OFF IS ANOTHER POTENTIAL ENVIRONMENTAL RISK.

THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) REVIEW OF SITE CONDITIONS IDENTIFIES TURKEY CREEK AS THE PRINCIPAL AREA OF EITHER SURFACE DISCHARGE OR GROUNDWATER DISCHARGE. FUTURE WORK ON THE REMAINING OPERABLE UNIT(S) SHOULD INCLUDE SAMPLING OF THE CREEK SEDIMENTS IN ORDER TO VERIFY THAT PAST RELEASES DID NOT LEAVE POTENTIALLY TOXIC LEVELS OF CONTAMINANTS IN TURKEY CREEK.

#### 4.0 DESCRIPTION OF ALTERNATIVES

EPA CONSIDERED SIX ALTERNATIVES FOR THE REMEDIATION OF THE GROUNDWATER ASSOCIATED WITH GOVERNMENT SYSTEMS. ALL OF THESE ALTERNATIVES ARE BASED ON THE USE OF THE EXISTING AERATION TREATMENT SYSTEM OPERATING AT GOVERNMENT SYSTEMS.

IN ORDER TO DOCUMENT ALL REMEDIAL ALTERNATIVES CONSIDERED AT THE SITE, THIS RECORD OF DECISION INCLUDES OPTIONS ELIMINATED EARLY IN THE EVALUATION PROCESS. THESE OPTIONS WERE REVIEWED BY HARRIS PRIOR TO SELECTING THE EXISTING SYSTEM AND ARE PRESENTED HERE AS ALTERNATIVES 4, 5, AND 6. THE COMPARISON OF ALL ALTERNATIVES IS BASED ON A MAXIMUM SYSTEM THROUGHOUT OF 750,000 GPD.

#### 4.1 ALTERNATIVE 1 - NO ACTION

THE SUPERFUND PROGRAM REQUIRES THAT THE "NO-ACTION" ALTERNATIVE BE CONSIDERED AT EVERY SITE. UNDER THE "NO-ACTION" ALTERNATIVE, EPA WOULD TAKE NO FURTHER ACTION AT THE SITE TO CONTROL OR TREAT THE SOURCE OF CONTAMINATION. THE "NO-ACTION" ALTERNATIVE SERVES AS A BASELINE WITH WHICH OTHER ALTERNATIVES CAN BE COMPARED. "NO ACTION" WOULD INVOLVE SHUTTING DOWN THE EXISTING GROUNDWATER EXTRACTION AND TREATMENT SYSTEM ON EACH OF THE HARRIS AND GDU PROPERTIES. WHILE THIS ALTERNATIVE DOES INCLUDE GROUNDWATER MONITORING, THE ONLY REDUCTION OF CONTAMINANT LEVELS WOULD BE VIA NATURAL PROCESSES SUCH AS DISPERSION. POTENTIAL HEALTH RISKS WOULD REMAIN FROM INGESTION OF, OR DERMAL CONTACT WITH, UNTREATED GROUNDWATER. FURTHERMORE, DISCHARGES INTO TURKEY CREEK COULD POTENTIALLY RESULT IN A THREAT TO TERRESTRIAL AND AQUATIC ORGANISMS THERE.

THE PRESENT (1990) VALUE COST OF THIS ALTERNATIVE IS APPROXIMATELY \$355,000. THIS ESTIMATED COST INCLUDES SHUTTING DOWN THE EXISTING TREATMENT SYSTEM AT \$50,000 AND GROUNDWATER MONITORING FOR FIVE YEARS AT \$61,000 PER YEAR.

#### 4.2 ALTERNATIVE 2 - CONTINUED OPERATION OF THE GROUNDWATER EXTRACTION AND TREATMENT SYSTEM WITH DEEP WELL INJECTION

ALTERNATIVE 2, CONTINUED OPERATION OF THE GROUNDWATER EXTRACTION AND TREATMENT SYSTEM WITH DEEP WELL INJECTION, IS CURRENTLY BEING PERFORMED AT THE SITE PURSUANT TO A CONSENT ORDER WITH THE STATE OF FLORIDA. TABLE IV LISTS THE AQUIFER CLEANUP LEVELS SPECIFIED IN THE FDER/HARRIS CONSENT ORDER.

GROUNDWATER WITHDRAWAL IS ACCOMPLISHED WITH A COMBINATION OF 11 WELLS, SIX IN THE 80-FOOT ZONE AND FIVE IN THE 40-FOOT ZONE. VOCs ARE THEN REMOVED AND TREATED BY A RELATIVELY SIMPLE MULTISTAGE AIR STRIPPING PROCESS. THE TREATED WATER IS CURRENTLY USED IN A MANUFACTURING PROCESS BEFORE BEING INJECTED APPROXIMATELY 2500 FEET DEEP INTO THE LOWER FLORIDAN AQUIFER. THE FLORIDAN AQUIFER IS SALINE AND NONPOTABLE IN THE AREA. THIS INJECTION PROCESS IS REGULATED BY FDER AND EPA THROUGH AN UNDERGROUND INJECTION CONTROL (UIC) PERMIT FOR A CLASS I NON-HAZARDOUS INDUSTRIAL WELL.

THE EXISTING SYSTEM WAS IMPLEMENTED IN THREE STAGES AS DESCRIBED BEGINNING ON PAGE 30.

##### STAGE 1:

TO CREATE A HYDRAULIC CAPTURE ZONE ON THE SOUTHERN BOUNDARY OF THE HARRIS CORPORATION GOVERNMENT SYSTEMS FACILITY, HARRIS INSTITUTED AN EXTRACTION PROGRAM INVOLVING THREE WELLS (GS-123D, GS-124D, AND GS-125D). THESE WELL POSITIONS ALLOW FOR INTERCEPTION OF CONTAMINATED WATER FROM THE DEEP ZONE OF THE MAIN VOC PLUME, THE THREE WELLS CREATE A CONE OF DEPRESSION UPGRADIENT FROM THE GDU PRODUCTION WELLS. THE PLANNED PUMPING RATE OF EACH OF THE HYDRAULIC BARRIER WELLS WAS 25 GPM EACH. FIELD CHECKS BY HARRIS IN 1985 INDICATED THE FOLLOWING PRODUCTION RATES FOR THE HYDRAULIC BARRIER WELLS:

WELL	RATE
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GS-123D	40 GPM
GS-124D	53 GPM
GS-125D	52 GPM

#### STAGE 2:

ANOTHER DEEP EXTRACTION WELL (GS-127D) AND 10 WELL POINTS IN THE SHALLOW ZONE WERE ADDED DURING STAGE 2, IN ORDER TO INITIATE REMEDIATION ACTIVITIES IN TWO AREAS. THESE AREAS WERE: (1) THE HIGHLY CONTAMINATED SHALLOW ZONE NEAR BUILDING NO. 5 AND (2) THE SOUTHERN PART OF THE DEEP ZONE CONTAMINANT PLUME IN THE GOVERNMENT SYSTEMS PARKING LOT. WELL GS-127D IS IDENTICAL IN CONSTRUCTION TO THE THREE BARRIER WELLS USED IN STAGE 1 AND IS EQUIPPED WITH A 50-GPM (NOMINAL) SUBMERSIBLE PUMP DISCHARGING TO A HEADER THAT TRANSMITS CONTAMINATED GROUNDWATER TO THE GROUNDWATER TREATMENT SYSTEM. WELL GS-127D PRODUCED 50 GPM DURING CONTINUOUS PUMPING OF STAGE 1 AND STAGE 2 WELLS IN 1985. THE WELL POINT SYSTEM INSTALLED AS PART OF STAGE 2 ALLOWED FOR THE EXTRACTION OF GROUNDWATER FROM CONTAMINATED AREAS OF THE SHALLOW ZONE. THESE WELL POINTS WERE DESIGNED TO HAVE A JETTING SHOE BELOW THE SCREEN TO ALLOW INSTALLATION BY JETTING. TWO WELL POINT PUMPS PROVIDED THE VACUUM TO RUN THE SYSTEM. THE COMBINED PUMPING RATE OF THE 30 WELL POINTS DURING STAGE 1 AND STAGE 2 OPERATION WAS ABOUT 30 GPM (MEASURED AT THE GROUNDWATER TREATMENT SYSTEM). THESE WELL POINTS WERE EVENTUALLY REPLACED WITH TWO PERMANENT WELLS, GS-44S AND GS-18S.

#### STAGE 3:

IMPLEMENTATION OF STAGE 3 ALLOWED FOR THE EXTRACTION OF THE MOST HIGHLY CONTAMINATED PORTION OF THE PLUME, IN THE VICINITY OF BUILDING 6. SIX ADDITIONAL WELLS WERE ADDED DURING THIS STAGE: GS-35S (SHALLOW OR 40-FOOT ZONE), GS-35D (DEEP OR 80-FOOT ZONE), GS-37S, GS-37D, GS-43S, AND GS-43D. THESE WELLS ARE GROUPED IN THREE PAIRS, WITH EACH PAIR CONSISTING OF A SHALLOW ZONE AND A DEEP ZONE WELL. ALL SIX WELLS ARE EQUIPPED WITH 50-GPM (NOMINAL) SUBMERSIBLE PUMPS. THE SHALLOW AND DEEP ZONE EXTRACTION WELLS ARE OPERATED AT THE PUMPING RATES OF 25 AND 50 GPM RESPECTIVELY.

#### TREATMENT SYSTEM DESCRIPTION:

THE EXTRACTED GROUNDWATER FLOWS THROUGH A NETWORK OF PIPES TO A TREATMENT SYSTEM WHICH REMOVES VOCs BY A PACKED COLUMN AIR STRIPPING TOWER. THE PACKED COLUMN AERATION SYSTEM IS WIDELY USED FOR THE REMOVAL OF VOCs FROM CONTAMINATED DRINKING WATER. CONTAMINATED GROUNDWATER IS DELIVERED FROM THE EXTRACTION WELLS TO A 20,000-GALLON RAW WATER HOLDING TANK. THE RAW WATER IS PUMPED TO THE TOP OF THE 6-FOOT DIAMETER TOWER AND DISTRIBUTED OVER THE PACKING MEDIA BY A WEIR-TROUGH DISTRIBUTOR. THE WATER CASCADES OVER 25 FEET WITH COUNTER-CURRENT AIR FLOW SUPPLIED BY A FORCED DRAFT CENTRIFUGAL BLOWER. THE STRIPPING TOWER IS MOUNTED ON TOP OF THE 20,000-GALLON TREATED WATER HOLDING TANK. TOWER EFFLUENT FLOWS BY GRAVITY INTO THE HOLDING TANK AND IS THEN PUMPED TO A WATER REUSE SYSTEM ON THE SITE.

THE TREATED GROUNDWATER IS USED FOR PROCESS WATER UNDER A CONSUMPTIVE USE PERMIT ISSUED BY THE ST. JOHNS RIVER WATER MANAGEMENT DISTRICT. AFTER USE AS PROCESS WATER, THE TREATED GROUNDWATER IS DISPOSED OF BY DEEP WELL INJECTION INTO THE LOWER FLORIDAN AQUIFER. THIS INJECTION PROCESS UTILIZES A CLASS I NON-HAZARDOUS WELL WITH AN UNDERGROUND INJECTION CONTROL (UIC) PERMIT MONITORED BY FDER. THE FLORIDAN AQUIFER IS NOT CONSIDERED TO BE A POTABLE WATER SOURCE IN THIS AREA DUE TO HIGH TOTAL DISSOLVED SOLIDS (TDS) AND CHLORIDE CONCENTRATIONS.

IN ADDITION TO THE SYSTEM OPERATING ON THE HARRIS FACILITY, THERE IS A GROUNDWATER EXTRACTION AND TREATMENT SYSTEM ONGOING AT THE GDU FACILITY. WATER FROM SEVEN PRODUCTION WELLS IS PUMPED TO AN AIR STRIPPER. THE STRIPPER EFFLUENT IS MIXED WITH WATER FROM OTHER GDU PRODUCTION WELLS BEFORE UNDERGOING THE STANDARD WATER PURIFICATION PROCESS PRIOR TO PUBLIC CONSUMPTION. THE

CONSTRUCTION AND MONITORING OF THIS SYSTEM HAS BEEN FUNDED BY HARRIS. AN INFORMAL AGREEMENT EXISTS BETWEEN HARRIS AND GDU SUCH THAT GDU IS TO PROVIDE HARRIS SIX MONTHS ADVANCE NOTICE IN THE EVENT THAT GDU SELLS ITS PROPERTY.

THE EXISTING TREATMENT, DISPOSAL, AND MONITORING SYSTEM HAS BEEN IMPLEMENTED IN STAGES SINCE 1984. ALTERNATIVE 2 WOULD INVOLVE THE CONTINUED USE OF THIS EXISTING SYSTEM FOR AT LEAST ANOTHER THREE YEARS. THE PRESENT VALUE (1990) COST OF ALTERNATIVE 2 IS ESTIMATED TO BE \$792,000. THIS COST INCLUDES OPERATION AND MAINTENANCE OF THE EXISTING SYSTEM AND GROUNDWATER MONITORING FOR THREE YEARS AT A TOTAL OF \$264,000 PER YEAR.

#### 4.3 ALTERNATIVE 3 - MODIFICATION OF THE GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

ALTERNATIVE 3 INVOLVES CONTINUED OPERATION OF THE EXISTING EXTRACTION AND TREATMENT SYSTEM AS WELL AS A MODIFICATION OF THE SYSTEM. THIS MODIFICATION WILL BE DESIGNED TO IMPROVE THE CAPTURE OF SITE-RELATED CONTAMINANT PLUMES AND OPTIMIZE SYSTEM EFFECTIVENESS.

MODIFICATION IS NECESSARY TO BETTER DEFINE THE CONTAMINANT PLUMES, ENSURE CONTAINMENT OF THESE PLUMES, AND ENHANCE THE EFFICIENCY OF AQUIFER CLEANUP. SOURCE CHARACTERIZATION INDICATES THE POSSIBLE PRESENCE OF METALS AND AEOS IN THE GROUNDWATER. THE ANALYSES TO DATE DO NOT ADEQUATELY DEFINE THIS CONTAMINATION. THEREFORE, MODIFICATIONS MAY BE NEEDED TO MORE ADEQUATELY MONITOR AND, IF NECESSARY, TREAT THIS POTENTIAL CONTAMINATION IN THE GROUNDWATER.

EPA DEVELOPED A LIST OF PROPOSED MODIFICATIONS FOR THE PURPOSE OF ESTIMATING COSTS ASSOCIATED WITH ALTERNATIVE 3. THESE MODIFICATIONS MAY INCLUDE, BUT ARE NOT LIMITED TO: (1) INSTALLING APPROXIMATELY FOUR ADDITIONAL EXTRACTION WELLS, (2) DISCONTINUING THE USE OF SOME EXISTING WELLS, AND (3) DECOMMISSIONING MONITORING WELLS THAT ARE NO LONGER OF USE BUT ARE DETERMINED TO BE LOCATED IN SOURCE AREAS. THE EXACT NUMBER OF WELLS AFFECTED AND ANY ALTERED PUMPING RATES WILL BE DETERMINED DURING THE REMEDIAL DESIGN PHASE.

THE REMEDIAL DESIGN WILL INCLUDE A DETAILED DESIGN ANALYSIS OF THE EXISTING SYSTEM TO DETERMINE THE LOCATION OF ADDITIONAL WELLS. IT WILL ALSO ADDRESS, IF NECESSARY, THE DISCONTINUED PUMPING OF ANY EXISTING WELLS. THE DESIGN MAY INCLUDE A SCHEDULE FOR TEMPORARILY SHUTTING DOWN THE ENTIRE SYSTEM TO DETERMINE REMEDIAL ACTION SUCCESS. A SHUT-DOWN WOULD BE INITIATED ONLY AFTER CONTAMINANT LEVELS IN THE AQUIFER MET THE SPECIFIED CLEANUP GOALS. THIS SHUT-DOWN WOULD ALLOW THE GROUNDWATER TO RECHARGE AND REACH AN EQUILIBRIUM CONDITION. ADDITIONAL SAMPLING AND ANALYSES AS WELL AS CAREFUL MONITORING OF THE AQUIFER COULD THEN DETERMINE WHETHER OR NOT THE SOURCES OF CONTAMINATION HAD BEEN REMOVED.

THE EXISTING GROUNDWATER MONITORING PROGRAM WILL BE EVALUATED AND MODIFIED AS NECESSARY TO FULLY CHARACTERIZE THE EXTENT OF CONTAMINATION AT THE SITE. THE MODIFIED MONITORING PROGRAM WILL BE IMPLEMENTED FOR A PERIOD OF THREE YEARS OR UNTIL THE CLEANUP GOALS ARE MET. AFTER THE ONSET OF REMEDIAL ACTION, EPA WILL CONDUCT A REVIEW OF THE SITE WITHIN FIVE YEARS TO VERIFY THAT THE AQUIFER IS BEING RESTORED TO BENEFICIAL USE. IF THE CLEANUP GOALS APPEAR TO BE MET AFTER THE FIRST REVIEW, SAMPLING WOULD CONTINUE ANNUALLY OR SEMI-ANNUALLY FOR A PERIOD OF TIME NECESSARY TO VERIFY THAT LONG-TERM RESTORATION OF THE AQUIFER HAD OCCURRED. HOWEVER, IF THE REVIEW IDENTIFIES A NEED FOR FURTHER REMEDIAL ACTION, MONITORING, OR ATTAINMENT OF CLEANUP GOALS, THE APPROPRIATE ACTION WILL BE INITIATED.

THE PRESENT (1990) VALUE COST FOR THIS ALTERNATIVE IS ESTIMATED AT \$1,430,000. THIS ESTIMATED COST INCLUDES DESIGN MODIFICATIONS AND CONSTRUCTION OF ADDITIONAL WELLS AT A COST OF \$480,000. ALSO INCLUDED IS \$950,000 FOR THREE YEARS OF SYSTEM OPERATION AND MAINTENANCE AS WELL AS FIVE YEARS OF GROUNDWATER MONITORING.

#### 4.4 ALTERNATIVE 4 - DISPOSAL VIA SPRAY IRRIGATION

THIS ALTERNATIVE WOULD UTILIZE THE SAME GROUNDWATER EXTRACTION AND TREATMENT SYSTEM DESCRIBED IN ALTERNATIVE 2. HOWEVER, THE METHOD FOR DISPOSAL OF TREATED GROUNDWATER INVOLVES SPRAY IRRIGATION WITH DISCHARGE TO A DRAINAGE DITCH.

SPRAY IRRIGATION RELIES ON TWO NATURAL FORCES TO DISPOSE OF WATER, EVAPOTRANSPIRATION AND PERCOLATION. OF THE TWO, PERCOLATION IS THE PREDOMINANT DISPOSAL METHOD. SEVERAL DESIGN CRITERIA ARE CRITICAL IN EVALUATING A SPRAY IRRIGATION SYSTEM: THE AMOUNT OF AVAILABLE ACREAGE ON WHICH TO APPLY THE TREATED GROUNDWATER, HYDRAULIC ASSIMILATION CAPACITY OF THE SITE, AND THE APPLICATION RATE OF THE WATER.

THE AREA HAS TWO MAJOR SOIL TYPES, A SATELLITE SAND AND MYAKKA SAND.

THE ESTIMATED PERCOLATION RATE OF THIS AREA IS APPROXIMATELY 0.6 INCHES/HR. BASED ON A HYDROLOGIC BUDGET MODEL PREPARED FOR THE SITE, THE AVERAGE MAXIMUM HYDRAULIC LOAD THE SITE COULD SUPPORT IS 39 INCHES PER WEEK. HOWEVER, STANDING WATER HAS BEEN OBSERVED THROUGHOUT THE DRY SEASON. THIS PHENOMENON IS THE RESULT OF IMPROPER DRAINAGE BROUGHT ABOUT BY DEVELOPMENT ON THREE SIDES OF THE SITE, CREATING A BERMING EFFECT. IN ORDER TO MEET THE REQUIREMENTS FOR SPRAY IRRIGATION, FILL MATERIAL WOULD NEED TO BE BROUGHT IN TO RAISE THE AREA APPROXIMATELY THREE FEET.

IN ADDITION TO ITS POOR DRAINAGE, THIS SITE IS FURTHER RESTRICTED BY SECTION 17-6 OF THE FLORIDA ADMINISTRATIVE CODE (FAC), WHICH LIMITS THE HYDRAULIC LOADING OF SLOW RATE (SPRAY IRRIGATION) SYSTEMS TO TWO INCHES PER WEEK (UNLESS IT CAN BE SUFFICIENTLY DEMONSTRATED THAT THE LAND CAN HANDLE HIGHER HYDRAULIC LOADING RATES). ASSUMING THAT THE MAXIMUM HYDRAULIC LOADING ALLOWED IS TWO INCHES PER WEEK, THE MAXIMUM AMOUNT OF TREATED GROUNDWATER THAT COULD BE APPLIED TO THE SITE IS 402,000 GALLONS PER WEEK (OR APPROXIMATELY 57,000 GPD). THE REMAINING PORTION OF THE TREATED WATER WOULD HAVE TO BE DISCHARGED TO THE DRAINAGE DITCH. IN ORDER TO HANDLE 750,000 GPD AT THE TWO-INCH-PER-WEEK MAXIMUM APPLICATION RATE, HARRIS ESTIMATES A NEED FOR APPROXIMATELY 100 ACRES OF ADDITIONAL LAND.

ONE OF THE PRINCIPAL DISADVANTAGES OF USING A SPRAY IRRIGATION SYSTEM IS ITS DEPENDENCE ON WEATHER CONDITIONS, SPRAY IRRIGATION SYSTEMS CANNOT BE OPERATED DURING OR AFTER PERIODS OF HEAVY OR PROLONGED RAINFALL. DURING RAINY PERIODS, THE TREATED GROUNDWATER WOULD HAVE TO BE STORED OR DISCHARGED TO THE DRAINAGE DITCH. THE SPRAY IRRIGATION SYSTEM IS ALSO MORE LABOR INTENSIVE BECAUSE THE SYSTEM MUST BE SWITCHED ON AND OFF MANUALLY TO MEET THE CHANGING WEATHER CONDITIONS AND TO AVOID FLOODING OF THE AREA.

ENVIRONMENTALLY, SPRAY IRRIGATION IS ATTRACTIVE BECAUSE IT PROVIDES A SECONDARY METHOD OF AERATING THE TREATED GROUNDWATER, AND A PORTION OF THE WATER WILL BE PERCOLATED BACK INTO THE SURFICIAL AQUIFER FOR REUSE. THE PRINCIPAL ENVIRONMENTAL DISADVANTAGE IS THAT ALMOST HALF OF THE WATER WILL BE DISCHARGED TO THE DRAINAGE DITCH.

HARRIS DOES NOT CURRENTLY HAVE SUFFICIENT ACREAGE FOR COMPLETE SPRAY IRRIGATION. IN ADDITION, THE COST OF BRINGING IN FILL TO ELEVATE THE AREA IS PROHIBITIVE, ENVIRONMENTALLY, SPRAY IRRIGATION IS PREFERABLE TO REINJECTION, HOWEVER, SPRAY IRRIGATION WOULD BE TOO LAND INTENSIVE, REQUIRING APPROXIMATELY 100 ACRES OF LAND TO SPRAY IRRIGATE 750,000 GPD. TREATED WATER WOULD THEN HAVE TO BE PUMPED APPROXIMATELY FIVE MILES. SITE-SPECIFIC FEATURES THUS REDUCE THE TECHNICAL FEASIBILITY OF ALTERNATIVE 4. EPA DID NOT ESTIMATE THE COSTS ASSOCIATED WITH THIS ALTERNATIVE BECAUSE IT WAS ELIMINATED EARLY IN THE EVALUATION PROCESS AND NO CURRENT COST DATA EXISTS.

#### 4.5 ALTERNATIVE 5 - DISPOSAL VIA PERCOLATION

THIS ALTERNATIVE UTILIZES THE SAME GROUNDWATER EXTRACT ION AND TREATMENT SYSTEM DESCRIBED IN

ALTERNATIVE 2. HOWEVER, THE METHOD OF DISPOSAL OF TREATED GROUNDWATER WOULD BE TO RETURN THE TREATED WATER TO THE SURFICIAL AQUIFER THROUGH A PERCOLATION POND WITH OVERFLOW TO A DRAINAGE DITCH.

FOR THIS ALTERNATIVE, SEVERAL SIMPLIFYING ASSUMPTIONS WERE MADE REGARDING THE HYDROGEOLOGY OF THE AVAILABLE EIGHT ACRE TRACT. THE FIRST ASSUMPTION WAS THAT THE AQUIFER IS AN UNCONFINED, HOMOGENEOUS, ISOTROPIC, SINGLE-LAYER SYSTEM. (IN REALITY, THE SITE GEOLOGY IS KNOWN TO BE MORE COMPLEX AND ACTUALLY CONSISTS OF THREE LAYERS: AN UPPER AQUIFER, AN AQUITARD, AND A LOWER AQUIFER). SECOND, THE ASSUMED AVERAGE PERMEABILITY OF THE SINGLE-LAYER SYSTEM WAS 150 GPD/(SQUARE FEET). THIS VALUE WAS DETERMINED BY PROPORTIONING THE MEASURED PERMEABILITY VALUES AND THICKNESS OF EACH OF THE THREE GEOLOGIC LAYERS. THIRD, THE ASSUMED AVERAGE AQUIFER THICKNESS WAS 93 FEET, BASED ON PREVIOUS GEOLOGICAL INVESTIGATIONS. OTHER DATA USED IN THIS ANALYSIS INCLUDE THE FOLLOWING:

- AVERAGE GROUND SURFACE ELEVATION AT THE SITE IS +18 FEET MSL
- AVERAGE GROUNDWATER PIEZOMETRIC SURFACE AT THE SITE IS +10 FEET MSL
- ESTIMATED DISTANCE TO THE TURKEY CREEK OUTFALL IS 2,500 FEET
- PERCOLATION RATE IS 63 GALLON/DAY LINEAL FOOT OF POND
- ESTIMATED WATER SURFACE ELEVATION AT THE TURKEY CREEK OUTFALL IS LESS THAN +2 FEET MSL
- ASSUMED MAXIMUM PERCOLATION POND WATER SURFACE IS +22 INCHES MSL
- ASSUMED MAXIMUM USABLE POND AREA IS 625 FEET X 525 FEET (7.45 ACRES), BASED ON THE BERM CONFIGURATION

THESE DATA AND A MODIFIED VERSION OF DARCY'S LAW, LED TO THE CONCLUSION THAT THE MAXIMUM SEEPAGE FLOW AVAILABLE AT THE 8 ACRE TRACT IS ABOUT 40,000 GPD. HOWEVER, THE ACHIEVABLE SEEPAGE RATE AT THE SITE IS PROBABLY MUCH LESS THAN 40,000 GPD, BECAUSE THE ACTUAL SUBSURFACE CONDITIONS ARE LESS FAVORABLE FOR PERCOLATION THAN ASSUMED IN THIS ANALYSIS. FURTHER, THE ACTUAL HYDRAULIC GRADIENT MAY ALSO PROVE TO BE LOWER THAN THE GRADIENT ASSUMED FOR THIS ANALYSIS. ONE ALTERNATIVE WOULD BE TO CONSTRUCT A PERCOLATION POND ON THE 8 ACRE TRACT AND ALLOW THE OVERFLOW TO DISCHARGE TO THE DRAINAGE DITCH. THIS WOULD MEAN THAT DURING NORMAL OPERATING CONDITIONS, APPROXIMATELY 40,000 GPD WOULD ENTER THE SOIL AND UP TO 710,000 GPD OF TREATED GROUNDWATER WOULD BE DISCHARGED TO SURFACE WATERS.

THERE ARE SEVERAL FACTORS TO BE CONSIDERED REGARDING THE ENVIRONMENTAL IMPACT OF A PERCOLATION POND. ON THE POSITIVE SIDE, THE 8 ACRE POND WOULD PROVIDE A 110 DAY RETENTION TIME FOR TREATED WATER ENTERING THE POND, WHICH WOULD ALLOW FOR FURTHER VOLATILIZATION OF ANY VOCs. THE NEGATIVE ASPECT TO THE PERCOLATION POND IS THAT ONCE THE POND IS FILLED, UP TO 710,000 GPD OF TREATED WATER MUST BE DISCHARGED TO THE SURFACE WATERS AND CANNOT BE RETURNED TO THE AQUIFER FOR USE. IN ADDITION, VOLATILIZATION WILL OCCUR ONLY AT THE SURFACE INTERFACE UNLESS AN AERATOR IS USED TO ENHANCE VOLATILIZATION OF LESS ACCESSIBLE AREAS.

HARRIS DOES NOT CURRENTLY OWN ENOUGH ACREAGE ADJACENT TO THE GOVERNMENT SYSTEMS FACILITY TO CONSTRUCT A PERCOLATION POND TO DISPOSE OF 750,000 GPD SOLELY THROUGH PERCOLATION. CONSTRUCTION OF A SMALLER PERCOLATION POND ON THE AVAILABLE LAND WILL ALLOW PERCOLATION OF AN ESTIMATED 40,000 GPD. THE REMAINDER OF THE TREATED WATER WILL FLOW TO THE DRAINAGE DITCH. THE USE OF PERCOLATION PONDS IS NOT FEASIBLE, BECAUSE THERE IS INSUFFICIENT ACREAGE AVAILABLE TO CONSTRUCT A PERCOLATION POND LARGE ENOUGH TO DISPOSE OF MOST OF THE TREATED GROUNDWATER. NO CURRENT COST

DATA EXISTS FOR THIS ALTERNATIVE.

#### 4.6 ALTERNATIVE 6 - DISPOSAL VIA REINJECTION TO THE SURFICIAL AQUIFER

THIS ALTERNATIVE UTILIZES THE SAME GROUNDWATER EXTRACTION AND TREATMENT SYSTEM DESCRIBED IN ALTERNATIVE 2. HOWEVER, THE METHOD OF DISPOSAL OF TREATED GROUNDWATER INVOLVES RETURNING THE TREATED WATER TO THE SURFICIAL AQUIFER VIA REINJECTION WELLS.

A REVIEW OF THE HYDROGEOLOGICAL CHARACTERISTICS OF THE HARRIS SITE SHOWS THAT REINJECTION INTO THE SURFICIAL AQUIFER COULD TAKE PLACE IN EITHER OF THE TWO PERMEABLE ZONES PRESENT. THE UPPER PORTION OF THE SURFICIAL AQUIFER IS LOCATED FROM APPROXIMATELY +17 FEET TO -20 FEET MSL AND HAS AN AVERAGE PERMEABILITY OF 95 GPD/(SQUARE FEET). THE LOWER PORTION OF THE AQUIFER IS LOCATED FROM -30 FEET TO -80 FEET MSL, WITH AN AVERAGE PERMEABILITY OF 200 GPD/(SQUARE FEET).

BASED ON THE TRANSMISSIVITY AND PERMEABILITY OF THE SURROUNDING AREAS, 20 TO 30 FOUR-INCH DIAMETER SHALLOW WELLS WITH FIVE-FOOT SCREENS CAPABLE OF REINJECTING 2 TO 3.5 GPM WOULD BE REQUIRED TO INJECT 100,000 GPD TREATED WATER INTO THE UPPER AQUIFER. THE DEEPER ZONE OF THE SURFICIAL AQUIFER WOULD REQUIRE ONLY THREE SIX-INCH DIAMETER WELLS WITH TEN-FOOT SCREENS REINJECTING APPROXIMATELY 23 GPM TO DISPOSE OF 100,000 GPD TREATED WATER.

IN ORDER TO ACHIEVE MAXIMUM UTILIZATION OF THE AVAILABLE REINJECTION AREA, THE WELLS MUST BE LOCATED IN LINES RUNNING EAST AND WEST, GENERALLY PERPENDICULAR TO THE NORTH-SOUTH DIRECTION OF GROUNDWATER FLOW. THE REQUIRED DISTANCE BETWEEN WELLS IS BASED ON THE CONE OF INFLUENCE. THIS DISTANCE WOULD BE ABOUT 30 FEET FOR THE SHALLOW WELLS AND 200 FEET FOR THE DEEPER WELLS.

IN SELECTING THE SYSTEM LOCATION, THE FIRST CONSIDERATION IS TO POSITION THE REINJECTION WELLS OUTSIDE THE ZONE OF INFLUENCE ASSOCIATED WITH THE GROUNDWATER WITHDRAWAL WELLS. THIS POSITIONING IS NECESSARY TO AVOID A REDUCTION IN RADIUS OF INFLUENCE OF A GIVEN WITHDRAWAL SYSTEM, AND TO AVOID REPUMPING TREATED GROUNDWATER. THE ONLY AVAILABLE REINJECTION AREA NOT IN THE ZONE OF INFLUENCE OF THE GROUNDWATER WITHDRAWAL WELLS IS AN EIGHT ACRE TRACT LOCATED EAST OF PERIMETER ROAD ON THE GOVERNMENT SYSTEMS FACILITY. EITHER TWO ROWS OF 15 SHALLOW WELLS EACH OR THREE DEEP WELLS COULD BE INSTALLED IN THIS TRACT.

THE PRESENCE OF AN AQUITARD AT -20 FEET TO -28 FEET MSL IS ANOTHER CONDITION TO CONSIDER. THE AQUITARD LIMITS THE AMOUNT OF WATER WHICH CAN BE INJECTED INTO THE SHALLOW REINJECTION WELLS. TOO GREAT A REINJECTION RATE WILL CAUSE AN UPFLOW OF THE WATER, WHICH COULD RESULT IN PONDING. HOWEVER, THE AQUITARD HAS A POSITIVE EFFECT ON THE DEEPER REINJECTION WELLS BY ACTING AS A BARRIER PREVENTING WATER FROM RISING TO THE SURFACE.

THE INCREASED PRESSURE APPLIED TO THE AQUIFER SHOULD CHECK ANY FURTHER DISPERSION OF THE CONTAMINANTS TO THE EAST BY ESTABLISHING WELLS EAST OF THE SUSPECTED AREA OF CONTAMINATION. IN ADDITION, THE REINJECTED WATER CAN BE RETURNED TO THE AQUIFER INSTEAD OF BEING LOST TO SURFACE WATER DISCHARGE. HOWEVER, THERE IS A POTENTIAL FOR INTRODUCING TRACE AMOUNTS OF VOCs INTO GROUNDWATER CURRENTLY CONSIDERED FREE OF THESE CONTAMINANTS.

THE EXISTING GROUNDWATER TREATMENT SYSTEM HAS BEEN DESIGNED TO REMOVE VOCs TO THE PRESCRIBED LEVELS IN THE HARRIS/FDER CONSENT ORDER. THIS SYSTEM ALSO HAS OPERATING SAFEGUARDS SUCH AS AN AUTOMATIC SHUTDOWN IN THE EVENT OF A MALFUNCTION IN THE AIR STRIPPING TOWER FAN.

DESPITE THESE PRECAUTIONS, THE POSSIBILITY EXISTS FOR INADVERTENTLY CONTAMINATING THE AQUIFER DUE TO THE LAG TIME BETWEEN SAMPLING THE TREATED EFFLUENT AND RECEIVING THE ANALYTICAL LABORATORY RESULTS. USE OF A 1.2 MILLION GALLON TREATED WATER HOLDING TANK WOULD ELIMINATE THE POSSIBILITY OF DISCHARGING CONTAMINATED WATER INTO THE AQUIFER. HOWEVER, PRIOR TO INITIATING REINJECTION, AN ACCEPTABLE AIR TO WATER RATIO FOR ACHIEVING THE CONCENTRATION LIMITS ESTABLISHED



IN THE CONSENT ORDER WOULD BE SET DURING START-UP ACTIVITIES. ONCE THE NORMAL OPERATION BEGINS, THIS RATIO IS EXPECTED TO BE FAIRLY CONSISTENT. THEREFORE, FAILURE OF THE TOWER FAN IS THE ONLY LIKELY MEANS OF INTRODUCING CONTAMINATED GROUNDWATER INTO THE CLEAN ZONE OF THE AQUIFER. THE MOTOR CONTROL SYSTEM DESIGN ADDRESSES THIS CONTINGENCY. IN THE EVENT OF TOWER FAN FAILURE THE INFLUENT PUMPS AUTOMATICALLY SHUT DOWN. AS A RESULT, THE SYSTEM WOULD NOT REQUIRE LARGE HOLDING TANKS.

THE PREFERRED ZONE OF REINJECTION WOULD BE OUTSIDE THE AREA OF CONTAMINATION IN THE LOWER SURFICIAL AQUIFER, WHICH IS MORE PERMEABLE, REQUIRES FEWER WELLS AND PREVENTS PONDING. ENVIRONMENTALLY, REINJECTION OFFERS TWO POSITIVE ASPECTS. PRESSURIZING THE AQUIFER WILL PREVENT THE SPREAD OF VOC CONTAMINATION TO THE EAST AND ALLOW THE TREATED WATER TO BE REUSED BY PLACING THE WATER BACK INTO THE SURFICIAL AQUIFER. THE POTENTIAL FOR REINJECTING CONTAMINATED WATER BACK INTO A CLEAN AREA MAY BE REDUCED BY INCORPORATING THE PROPER INSTRUMENTATION AND MOTOR CONTROL SWITCHES TO AVOID DISCHARGE OF CONTAMINATED WATER IF THE FAN MOTOR FAILS.

THE INFORMATION PRESENTED THUS FAR FOR ALTERNATIVE 6 RELATES TO THE REINJECTION OF 100,000 GPD. IN ORDER TO ACCOMMODATE THE REINJECTION OF A MAXIMUM OF 750,000 GPD, 20 ADDITIONAL DEEP REINJECTION WELLS WOULD BE REQUIRED ACROSS THE GOVERNMENT SYSTEMS PROPERTY. HOWEVER, ACCORDING TO HARRIS, PLACEMENT OF THE REINJECTION WELLS AROUND THE SITE WOULD BE DIFFICULT DUE TO THE EXTENSIVE NETWORK OF UNDERGROUND UTILITIES. AS WITH ALTERNATIVES 4 AND 5, NO CURRENT COST DATA FOR THIS ALTERNATIVE EXISTS.

## **5.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES**

EPA USES NINE CRITERIA FOR EVALUATING REMEDIAL ALTERNATIVES AT NPL SITES. THE FIRST TWO ARE KNOWN AS THRESHOLD CRITERIA AND ARE THE MINIMUM REQUIREMENTS THAT ALL ALTERNATIVES MUST MEET: OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT AND COMPLIANCE WITH SITE-SPECIFIC CLEANUP STANDARDS. THERE ARE FIVE BALANCING CRITERIA USED FOR COMPARISON OF THE ALTERNATIVES: LONG-TERM EFFECTIVENESS; REDUCTION OF TOXICITY, MOBILITY, OR VOLUME; SHORT-TERM EFFECTIVENESS; IMPLEMENTABILITY; AND COST. THE LAST TWO, STATE ACCEPTANCE AND COMMUNITY ACCEPTANCE, ARE KNOWN AS MODIFYING CRITERIA AND CAN SERVE TO INFLUENCE THE EPA PREFERRED REMEDY.

### **5.1 OVERALL PROTECTION OF HEALTH AND THE ENVIRONMENT**

ALTERNATIVE 1, NO ACTION, WOULD ALLOW FOR THE CONTINUED MIGRATION OF CONTAMINANTS TO THE GDU WELLFIELD DOWNGRADE OF THE SITE. THIS ALTERNATIVE IS NOT CONSIDERED EFFECTIVE BECAUSE IT DOES NOT MITIGATE POTENTIAL HEALTH RISKS ASSOCIATED WITH EXPOSURE TO GROUNDWATER BY INGESTION AND DERMAL ABSORPTION. ALTERNATIVE 1 EXCEEDS THE  $1 \times 10^{-4}$  TO  $1 \times 10^{-6}$  TARGET RISK RANGE AND, THEREFORE, IS NOT PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT. THE NO ACTION ALTERNATIVE WILL NOT BE CONSIDERED FURTHER AS A REMEDIAL OPTION FOR THIS SITE.

ALTERNATIVES 2 THROUGH 6 ARE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT BASED ON THE USE OF AIR STRIPPING TREATMENT FOR VOCs. BY PROVIDING A BARRIER FOR CONTAMINANT MIGRATION AS WELL AS TREATMENT OF THE CONTAMINANT PLUMED THESE ALTERNATIVES MITIGATE THE RISK OF MIGRATION TO THE GDU WELL FIELD AND OTHER POTENTIAL USERS OF THE AQUIFER. THE CAPTURE ZONE OF THE EXTRACTION SYSTEM PREVENTS MIGRATION AS WELL AS DISCHARGE OF CONTAMINATED GROUNDWATER TO SURFACE WATER, THUS AVOIDING A POTENTIAL ENVIRONMENTAL THREAT.

### **5.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)**

REMEDIAL ACTIONS PERFORMED UNDER CERCLA MUST COMPLY WITH ALL SITE-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS). THE ARARS FOR THIS SITE CAN BE GROUPED INTO SIX CATEGORIES. THE HARRIS REMEDIATION SYSTEM MUST COMPLY WITH CLEANUP STANDARDS FROM: THE SAFE DRINKING WATER ACT (SDWA), THE UNDERGROUND INJECTION CONTROL (UIC) PROGRAM, THE NATIONAL

POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES), THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA), THE STATE OF FLORIDA ADMINISTRATIVE CODE (FAC), AND THE CLEAN AIR ACT (CAA).

ALL ALTERNATIVES EXCEPT FOR THE NO ACTION ALTERNATIVE WOULD COMPLY WITH ARARS. "NO ACTION" WOULD ALLOW CONTAMINANTS TO REMAIN IN THE GROUNDWATER AT CONCENTRATIONS ABOVE DRINKING WATER STANDARDS. THIS LEVEL OF CONTAMINATION WOULD VIOLATE THE SDWA AND FAC. ALTERNATIVES 2-6 ASSIST IN RESTORING THE LEVELS OF CONTAMINANTS IN THE AQUIFER TO DRINKING WATER STANDARDS AND, THEREFORE, LEAD TO COMPLIANCE WITH THE SDWA AND FAC. WATER INJECTED INTO THE FLORIDAN AQUIFER IN ALTERNATIVES 2 AND 3 WOULD MEET THE UIC PERMIT REQUIREMENTS. WATER DISCHARGED TO THE DRAINAGE DITCH IN ALTERNATIVES 2 AND 3 WOULD MEET NPDES PERMIT LIMITS. IN ALTERNATIVES 2-6, THE EXTRACTED GROUNDWATER WOULD BE TREATED TO MEET HEALTH-BASED STANDARDS PRIOR TO DISPOSAL AND WOULD, THEREFORE, MEET THE CURRENT RCRA REGIONAL GUIDANCE REGARDING CONTAMINATED GROUNDWATER. FINALLY, EMISSIONS FROM THE AIR STRIPPER USED IN ALTERNATIVES 2-6 WOULD MEET NATIONAL AMBIENT AIR QUALITY STANDARDS.

#### SAFE DRINKING WATER ACT

THE SDWA MANDATES EPA TO PROTECT HUMAN HEALTH FROM CONTAMINANTS IN DRINKING WATER. SINCE THE GROUNDWATER IN THE AREA OF THE HARRIS SITE IS AN EXISTING DRINKING WATER SOURCE, THE AQUIFER IS CLASSIFIED AS CLASS II GROUNDWATER. THEREFORE, THE SDWA STANDARDS SET BY EPA ARE RELEVANT AND APPROPRIATE.

EPA HAS DEVELOPED TWO TYPES OF DRINKING WATER STANDARDS, PRIMARY AND SECONDARY STANDARDS. PRIMARY STANDARDS ARE BASED UPON PROTECTION OF HUMAN HEALTH. THESE MAXIMUM CONTAMINANT LEVELS (MCLS) ARE ENFORCEABLE AT THE FEDERAL LEVEL. MCLS ARE CONTAMINANT-SPECIFIC STANDARDS AND ARE POTENTIAL ARARS FOR AFFECTED POTABLE WATER AT NPL SITES. SECTION 121(D)(2)(B)(I) OF CERCLA PRESCRIBES THAT THESE STANDARDS, AS DETERMINED BY THE SAFE DRINKING WATER ACT (SDWA) (40 CFR PART 141 AND 142) AND SECTION 304 OF THE CLEAN WATER ACT, SHOULD BE USED IN SETTING CLEANUP GOALS FOR RESPONSE ACTIONS AT NPL SITES. SECONDARY STANDARDS (SMCLS) ARE OFTEN CONCERNED WITH THE AESTHETIC QUALITY OF WATER AS WELL AS ECONOMIC CONSIDERATIONS AND ARE NOT ENFORCEABLE AT THE FEDERAL LEVEL. HOWEVER, SMCLS ARE IN THE CATEGORY OF STANDARDS "TO-BE-CONSIDERED" (TBC) AS ARARS IN ORDER TO PROTECT THE GROUNDWATER FOR FUTURE USE.

FOR SOME CONSTITUENTS, THERE ARE NO PRIMARY OR SECONDARY STANDARDS ESTABLISHED PURSUANT TO THE SDWA. IN THIS EVENT, CONCENTRATIONS OF CONTAMINANTS IN GROUNDWATER REMAINING AT THE COMPLETION OF THE REMEDIAL ACTION MUST STILL BE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT. FOR CARCINOGENS, THE ONE IN ONE MILLION (1E-6) CANCER RISK LEVEL IS CONSIDERED ADEQUATELY PROTECTIVE OF HUMAN HEALTH. FOR NON-CARCINOGENS, A THRESHOLD VALUE MAY BE DETERMINED FROM THE CURRENTLY AVAILABLE EPA TOXICOLOGICAL DATA BASE. IF A PROPOSED MCL (PMCL) IS AVAILABLE FOR A CONSTITUENT, IT MAY ALSO BE USED. PROPOSED MCLS ARE NOT ENFORCEABLE STANDARDS, BUT ARE CONSIDERED TBCS.

IN SUMMARY, ALTERNATIVES 2 THROUGH 6 MEET THE ARARS FOR VOCs BASED ON USE OF THE AERATION TREATMENT SYSTEM. THE PRIMARY ARARS THAT APPLY TO AQUIFER REMEDIATION ARE THE MCLS PROMULGATED UNDER THE SWDA. THESE ARE APPLICABLE WHERE WATER WILL BE PROVIDED DIRECTLY TO 25 OR MORE PEOPLE OR TO 15 OR MORE SERVICE CONNECTIONS. MCLS ARE RELEVANT AND APPROPRIATE WHEN THE SURFACE OR GROUNDWATER IS USED OR MAY BE USED FOR DRINKING WATER. "TO BE CONSIDERED" REMEDIATION GOALS, INCLUDING PROPOSED MCLS AND RISK BASED CALCULATIONS, APPLY WHEN A POPULATION IS EXPOSED TO CONTAMINANTS.

#### UNDERGROUND INJECTION CONTROL

THE SAFE DRINKING WATER ACT ALSO PROVIDES FOR A PERMIT PROGRAM WHICH IS DESIGNED TO PREVENT CONTAMINATION OF UNDERGROUND SOURCES OF DRINKING WATER. THIS PROGRAM IS KNOWN AS THE UNDERGROUND INJECTION CONTROL (UIC) PROGRAM. THE UIC PROGRAM REGULATES UNDERGROUND INJECTION

INTO FIVE CLASSES OF WELLS. THERE ARE TWO CLASS I PERMITTED INJECTION WELLS PRESENT ON THE HARRIS CORPORATION GOVERNMENT SYSTEMS FACILITY FOR THE DISPOSAL OF INDUSTRIAL WASTE WATER. THESE WELLS ARE NOT CURRENTLY PERMITTED FOR THE INJECTION OF HAZARDOUS WASTE. THEREFORE, THE GROUNDWATER MUST BE TREATED TO HEALTH-BASED STANDARDS AS DESCRIBED IN THE TABLE III ON PAGE 26 BEFORE INJECTION.

ALTERNATIVES 2 AND 3 INVOLVE ADDITIONAL ARARS FOR THE DEEP WELL INJECTION OF TREATED GROUNDWATER INTO THE FLORIDAN AQUIFER. THE FLORIDAN AQUIFER IS NOT A POTENTIAL SOURCE FOR DRINKING WATER BECAUSE IT IS SALINE AND NONPOTABLE. THE UIC PERMIT ADMINISTERED BY FDER LISTS THE INJECTATE LIMITS AS SHOWN IN APPENDIX B.

#### NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

IN ADDITION, THE EXTRACTION AND TREATMENT SYSTEM DESCRIBED IN ALTERNATIVES 2 AND 3 MUST COMPLY WITH THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STANDARDS UNDER THE CLEAN WATER ACT (CWA). CURRENTLY, DISCHARGES FROM THE TREATMENT SYSTEM TO THE DRAINAGE DITCH EAST OF PERIMETER ROAD MAY OCCUR DURING EQUIPMENT FAILURE OR EMERGENCIES. AS AN ALTERNATIVE TO DEEP WELL INJECTION, THE TREATED GROUNDWATER CAN BE DISCHARGED TO THE SURFACE THROUGH THIS PERMITTED NPDES OUTFALL. ANY SURFACE WATER DISCHARGE FLOWING INTO THIS DITCH EVENTUALLY RUNS INTO A TRIBUTARY OF TURKEY CREEK. THE CURRENT NPDES DISCHARGE LIMITS ARE LISTED IN APPENDIX C.

#### RESOURCE CONSERVATION AND RECOVERY ACT

THE VOLATILE ORGANIC COMPOUNDS PRESENT IN THE GROUNDWATER ASSOCIATED WITH GOVERNMENT SYSTEMS ARE CHARACTERIZED AS SPENT SOLVENTS. SPENT SOLVENTS ARE RCRA "LISTED" HAZARDOUS WASTES AS DEFINED IN 40 CFR 261.31. SINCE IT CONTAINS A LISTED HAZARDOUS WASTE, THE CONTAMINATED GROUNDWATER MUST BE MANAGED AS A HAZARDOUS WASTE. AS A RESULT, GROUNDWATER CONTAINING HAZARDOUS WASTE CANNOT BE INJECTED INTO THE CLASS I INJECTION WELLS AT THE SITE. TO DO SO WOULD BE IN VIOLATION OF RCRA AND UIC REQUIREMENTS, INCLUDING THE LAND DISPOSAL RESTRICTIONS. AFTER TREATMENT TO HEALTH-BASED LEVELS, WHICH THE HARRIS SYSTEM ACCOMPLISHES, EPA CONSIDERS THAT THE GROUNDWATER NO LONGER CONTAINS HAZARDOUS WASTE. ONCE THESE HEALTH-BASED LEVELS ARE REACHED, THE GROUNDWATER IS NO LONGER SUBJECT TO REGULATION UNDER SUBTITLE C OF RCRA.

IN ADDITION, EPA HAS DETERMINED THAT RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) TECHNICAL STANDARDS REGARDING CORRECTIVE ACTION AND CLOSURE ARE RELEVANT AND APPROPRIATE FOR THE GROUNDWATER PLUMES AND CONTAMINANT SOURCE AREAS AT GOVERNMENT SYSTEMS. CORRECTIVE ACTION ON ANY PORTION OF THE SITE DETERMINED TO BE RELEASING CONTAMINANTS TO THE GROUNDWATER WILL COMPLY WITH RCRA TECHNICAL STANDARDS.

#### FLORIDA ADMINISTRATIVE CODE

EPA CONSIDERS ALL APPROPRIATE STATE STANDARDS AS POTENTIAL ARARS. THE STATE OF FLORIDA HAS REQUESTED THAT EPA INCLUDE THE FLORIDA ADMINISTRATIVE CODE (FAC) REQUIREMENT THAT THE AQUIFER BE CLEANED UP TO A LEVEL SUCH THAT THE GROUNDWATER IS "FREE FROM NUISANCE". EPA HAS DETERMINED THAT THE "FREE FROM" REQUIREMENT, A SECONDARY STANDARD PURSUANT TO THE SDWA, IS RELEVANT AND APPROPRIATE FOR THIS SITE. THE EXISTING CONSENT ORDER BETWEEN FDER AND HARRIS LISTS PROTECTIVE STANDARDS FOR AQUIFER CLEANUP. THESE STANDARDS ARE CONSIDERED TO MEET THE "FREE FROM" CRITERIA FOR THE SITE.

#### CLEAN AIR ACT

EMISSIONS FROM THE AIR STRIPPER USED IN ALTERNATIVES 2-6 MUST MEET AMBIENT AIR STANDARDS FROM THE NATIONAL AMBIENT AIR QUALITY STANDARDS (SECTION 109 OF THE CLEAN AIR ACT AS SET FORTH IN 40 CFR PART 50).

## CLEANUP GOALS FOR OPERABLE UNIT ONE

TABLE V IS A LIST OF THE SITE-SPECIFIC CONTAMINANTS AND THE APPROPRIATE CLEANUP LEVELS BASED ON THE ARARS DISCUSSED ABOVE. THESE CLEANUP LEVELS ARE BASED ON MCLS, THE FAC "FREE FROM" REQUIREMENTS, PMCLS, (1E-6) HEALTH-BASED RISK VALUES, AND SMCLS AS APPROPRIATE FOR EACH CONTAMINANT LISTED.

THE STATE OF FLORIDA MCLS THAT ARE MORE STRINGENT THAN FEDERAL STANDARDS WILL BE USED AS ARARS. IN ADDITION, THE CLEANUP CRITERIA IDENTIFIED IN THE FDER/HARRIS CONSENT ORDER WILL BE USED TO MEET THE FDER "FREE FROM" REQUIREMENTS. THIS APPROACH PROVIDES FOR CONSISTENT APPLICATION OF THE FDER CONSENT ORDER WITH RESPECT TO EPA RESPONSE GOALS.

### 5.3 LONG-TERM EFFECTIVENESS AND PERMANENCE

ALTERNATIVES 2-6 MITIGATE THE RISK TO THE POPULATION OF EXPOSURE TO CONTAMINATED GROUNDWATER. THE EXTRACTION AND TREATMENT SYSTEM USED IN ALL OF THESE ALTERNATIVES ADEQUATELY REDUCES THE EXPOSURE TO VOCS IN THE GROUNDWATER. ALTERNATIVE 3 ALLOWS FOR ENHANCED CONTROL OF CONTAMINANT MIGRATION BY MAKING THE SYSTEM MORE EFFICIENT IN TREATING FOR VOCS AS WELL AS ADDRESSING THE POTENTIAL FOR REO AND INORGANIC CONTAMINANTS. ALTERNATIVE 3 WOULD ALSO REMEDIATE THE GROUNDWATER TO A LONG-TERM ACCEPTABLE RISK RANGE. ALTERNATIVE 6 INVOLVES SOME RISK DUE TO THE ALTERNATIVE 6, THIS RISK IS ASSOCIATED WITH THE POTENTIAL EXPOSURE TO REINJECTION OF TREATED GROUNDWATER TO THE SURFICIAL AQUIFER. IN CONTAMINANTS IN THE DRINKING WATER FROM DOWNWARD MIGRATION TO THE LOWER AQUIFER.

### 5.4 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

ALTERNATIVES 2-6 REDUCE THE TOXICITY AND VOLUME OF THE CONTAMINANTS IN GROUNDWATER THROUGH TREATMENT. IN ADDITION, THESE ALTERNATIVES LIMIT THE MOBILITY OF CONTAMINANTS BY DECREASING THE SIZE OF THE CONTAMINANT PLUME AND/OR ELIMINATING PART OF THE SOURCE THROUGH THE USE OF EXTRACTION WELLS. ALTERNATIVE 3 NOT ONLY ALLOWS FOR MORE EFFICIENT REDUCTION OF THE CONTAMINANT PLUME, IT ALLOWS FOR TREATMENT OF THE POTENTIAL GROUNDWATER CONTAMINATION FROM METALS, FLUORIDE, AND AEOS.

### 5.5 SHORT-TERM EFFECTIVENESS

ALTERNATIVES 2-6 ELIMINATE THE IMMEDIATE RISK TO THE GENERAL POPULATION OF EXPOSURE TO CONTAMINATED GROUNDWATER. ANY SHORT-TERM RISK TO WORKERS INVOLVED IN CONSTRUCTION OF THE SELECTED REMEDY WOULD BE REDUCED THROUGH IMPLEMENTATION OF A HEALTH AND SAFETY PLAN.

THE ENVIRONMENTAL IMPACT OF ALTERNATIVES 2 AND 3 IS MINIMAL SINCE GROUNDWATER IS REINJECTED INTO THE DEEP FLORIDAN AQUIFER WHICH IS NOT A POTABLE WATER SOURCE IN THE AREA. ALTERNATIVES 4 AND 5 POSE SOME ENVIRONMENTAL IMPACT TO AQUATIC ORGANISMS EXPOSED TO THE SURFACE WATER AND ANY VOLATILE ORGANICS. ALTERNATIVE 6 POSES AN ENVIRONMENTAL THREAT TO THE SURFICIAL AQUIFER BY POTENTIALLY INTRODUCING TRACE AMOUNTS OF VOCS TO AN AREA CURRENTLY CONSIDERED FREE OF CONTAMINATION.

ALTERNATIVES 2 AND 3 WOULD EACH REQUIRE AN ESTIMATED THREE YEARS TO IMPLEMENT. IMPLEMENTATION TIME FRAMES FOR ALTERNATIVES 4 THROUGH 6 ARE NOT APPLICABLE BECAUSE THESE ALTERNATIVES WERE CONSIDERED AND ELIMINATED AT AN EARLY STAGE OF THE PROJECT.

FDER ESTIMATES THAT ALTERNATIVE 2 WILL SUBSTANTIVELY MEET THE CLEANUP CRITERIA STATED IN THE FDER CONSENT ORDER WITHIN THREE YEARS. IMPLEMENTATION OF ALTERNATIVE 3 WILL TAKE APPROXIMATELY THREE YEARS AND WILL PRODUCE INFORMATION NECESSARY TO ESTIMATE THE TIME REQUIRED FOR RESTORATION OF THE AQUIFER TO EPA STANDARDS.

## 5.6 IMPLEMENTABILITY

THE IMPLEMENTABILITY OF AN ALTERNATIVE IS BASED ON TECHNICAL AND ADMINISTRATIVE FEASIBILITY, CONSTRUCTIBILITY, AND THE AVAILABILITY OF MATERIALS AND SERVICES NEEDED TO IMPLEMENT A SPECIFIC REMEDY.

ALTERNATIVES 2 AND 3 ARE TECHNICALLY AND ADMINISTRATIVELY FEASIBLE. THESE TWO ALTERNATIVES INVOLVE TECHNOLOGIES WHICH HAVE BEEN USED IN THE PAST AND HAVE A DEMONSTRATED PERFORMANCE RECORD. THE GROUNDWATER RECOVERY, TREATMENT, AND DISPOSAL SYSTEM SPECIFIED IN ALTERNATIVE 2 IS ALREADY OPERATIONAL. ALTERNATIVE 3 ALSO UTILIZES THIS SYSTEM, BUT WITH MODIFICATIONS. ALTERNATIVES 4 AND 5 ARE NOT CURRENTLY IMPLEMENTABLE DUE TO A LACK OF AVAILABLE LAND. ALTERNATIVE 6 IS NOT ADMINISTRATIVELY FEASIBLE BECAUSE OF THE POTENTIAL FOR CONTAMINATION OF A DRINKING WATER AQUIFER IN THE EVENT OF EQUIPMENT FAILURE. THE TECHNICAL FEASIBILITY IS QUESTIONABLE BECAUSE OF THE UNCERTAINTIES IN OUR ABILITY TO PREDICT ITS EFFECT ON THE PHYSICAL CHARACTERISTICS OF THE AQUIFER. FOR EXAMPLE, REINJECTION INTO THE SURFICIAL AQUIFER MAY INTRODUCE INDETERMINATE INFLUENCES ON THE EXISTING GROUNDWATER FLOW PATTERNS.

EPA POLICY ALLOWS FOR INTERIM REMEDIES AT SITES INVOLVING GROUNDWATER CONTAMINATION. AN INTERIM REMEDY CAN BE LOCATION-SPECIFIC OR MEDIUM-SPECIFIC AND SHOULD BE USED WHEN THERE IS ENOUGH EXISTING INFORMATION TO EFFECT THE REMEDY. A LIMITED EVALUATION OF ALTERNATIVES CAN BE USED TO COMPARE THE ADVANTAGE OF TAKING AN EARLY ACTION TO THE POSSIBLE RAMIFICATIONS OF WAITING UNTIL A COMPREHENSIVE SITE INVESTIGATION HAS BEEN COMPLETED. AN INTERIM GROUNDWATER EXTRACTION AND TREATMENT SYSTEM AT HARRIS HAS SERVED TO PROTECT THE DRINKING WATER SUPPLIED BY GDU. AS A RESULT, THE PHASED IMPLEMENTATION OF THE EXISTING TREATMENT SYSTEM PRODUCED DATA THAT CAN BE USED IN OPTIMIZING THE SYSTEM DURING THE MODIFICATIONS TO BE DETERMINED IN ALTERNATIVE 3.

## 5.7 COST

THE PRESENT WORTH VALUE REPRESENTS THE TOTAL COST OF REMEDIATION EXPRESSED IN TODAY'S DOLLARS. THE PRESENT WORTH COST ASSOCIATED WITH ALTERNATIVE IS APPROXIMATELY \$355,000. ALTERNATIVE 2 HAS AN ESTIMATED PRESENT WORTH COST OF \$792,000, INCLUDING OPERATIONS AND MAINTENANCE (O&M) COSTS. THE ESTIMATED PRESENT WORTH COST OF ALTERNATIVE 3 IS \$1,430,000, INCLUDING COSTS. THE COSTS ASSOCIATED WITH ALTERNATIVES 4 THROUGH 6 HAVE NOT BEEN ESTIMATED BECAUSE THESE ALTERNATIVES WERE ELIMINATED EARLY IN THE EVALUATION PROCESS AND NO CURRENT COST DATA IS AVAILABLE.

## 5.8 STATE AGENCY ACCEPTANCE

THE STATE OF FLORIDA, AS REPRESENTED BY THE FDER, CONCURS WITH THE USE OF ALTERNATIVE 3 FOR OPERABLE UNIT ONE. THIS ALTERNATIVE IS ACCEPTABLE TO FDER WITH PROVISIONS THAT THE FDER IS A PART OF THE REVIEW PROCESS FOR THE DESIGN ANALYSIS. IN AN EARLY ACTION DESIGNED TO CAPTURE THE CONTAMINANT PLUME AND PROTECT THE GDU WELLFIELD, FDER APPROVED THE USE OF ALTERNATIVE 2 AFTER ALSO CONSIDERING ALTERNATIVES 4-6.

## 5.9 COMMUNITY ACCEPTANCE

EPA RECEIVED COMMENTS FROM LOCAL CITIZENS AT THE PUBLIC MEETING HELD ON MARCH 27, 1990 AND DURING THE PUBLIC COMMENT PERIOD. RESPONSES TO SPECIFIC COMMENTS ARE AVAILABLE IN THE RESPONSIVENESS SUMMARY FOR THIS RECORD OF DECISION. BASED ON THESE COMMENTS, THE COMMUNITY SUPPORTS THE EPA DECISION TO MODIFY THE EXISTING GROUNDWATER EXTRACTION AND TREATMENT SYSTEM AT THE HARRIS SITE.

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## 6.0 SELECTED REMEDY

OPERABLE UNIT ONE ADDRESSES THE GROUNDWATER CONTAMINATION ASSOCIATED WITH THE GOVERNMENT SYSTEMS FACILITY OF HARRIS CORPORATION. THE SELECTED REMEDY FOR THIS OPERABLE UNIT IS ALTERNATIVE 3, WHICH REQUIRES MODIFICATION TO THE EXISTING GROUNDWATER EXTRACTION AND TREATMENT SYSTEM.

THIS REMEDY CONSISTS OF: (1) CONTINUED OPERATION OF THE EXISTING EXTRACTION, TREATMENT, AND DISPOSAL SYSTEM, (2) A DESIGN ANALYSIS FOR PLUME CONTAINMENT AND TREATMENT, (3) MODIFICATION OF THE SYSTEM BASED ON RESULTS OF THE DESIGN ANALYSIS, (4) CONTINUED SAMPLING AND MONITORING OF THE CLEANUP, AND (5) A REVIEW OF THE SYSTEM BY EPA AND FDER WITHIN FIVE YEARS AFTER THE ONSET OF REMEDIAL ACTION. THIS REMEDY INCLUDES THE CURRENT DEEP WELL INJECTION OF GROUNDWATER TREATED TO EPA HEALTH-BASED LEVELS. AS AN ALTERNATIVE, THE TREATED GROUNDWATER WILL BE DISCHARGED TO THE SURFACE THROUGH A NPDES PERMITTED OUTFALL.

IMPLEMENTATION OF ALTERNATIVE 3 WILL IMPROVE THE TREATMENT AND CONTAINMENT OF THE EXISTING GROUNDWATER EXTRACTION AND TREATMENT SYSTEM. IT WILL INVOLVE A REVIEW OF EXISTING SAMPLING DATA AS WELL AS THE RESAMPLING OF WELLS OUTSIDE THE PLUME AS DEFINED BY HARRIS. THIS ALTERNATIVE WILL DETERMINE THE EFFECTS OF THE PRESENT REMEDIATION SYSTEM IN ACCORDANCE WITH EXISTING EPA POLICY. THE EFFECTS TO BE DETERMINED INCLUDE THE CURRENT AND FUTURE EFFECTS OF THE AIR EMISSIONS FROM THE AIR STRIPPING TOWERS AT HARRIS AND GDU. IN ADDITION, EPA WILL DETERMINE THE EFFECTIVENESS OF PLUME CONTAINMENT WITH RESPECT TO VOCS, AEOS, AND INORGANICS AS WELL AS THE EFFECTS OF THE VARIOUS GROUNDWATER PUMPING REGIMES IN THE IMMEDIATE AREA. FURTHERMORE, ALTERNATIVE 3 DOES NOT INVOLVE SIGNIFICANT ADDITIONAL CAPITAL COSTS TO ATTAIN THESE MEASURES.

AS PART OF THE DESIGN ANALYSIS, "POINT OF COMPLIANCE WELLS" WILL BE DESIGNATED IN ORDER TO DETECT THE PRESENCE OF CONTAMINATION ABOVE CLEANUP STANDARDS. SAMPLING INFORMATION OBTAINED FROM THESE WELLS WILL BE USED TO DETERMINE EXACT LOCATIONS OF THE PLUMES AND DESIGN GROUNDWATER EXTRACTION MODIFICATIONS FOR COMPLIANCE WITH THE RCRA TECHNICAL STANDARDS.

THE CLEANUP GOALS FOR THIS ALTERNATIVE ARE LISTED IN TABLE V ON PAGE 46. THESE CLEANUP LEVELS MAY BE MODIFIED IN ACCORDANCE WITH LATER GUIDANCE AND/OR REGULATIONS. IN ADDITION, THE GOALS MAY BE MODIFIED DUE TO POTENTIAL UNCERTAINTIES ABOUT THE ABILITY OF THE TREATMENT SYSTEM TO ACHIEVE ESTABLISHED CLEANUP GOALS WITHIN THE EXISTING PHYSICAL GROUNDWATER SYSTEM.

THE INTERAGENCY SECTION 7 CONSULTATION PROCESS, 50 CFR PART 402, REQUIRES THAT EPA CONSULT WITH THE DEPARTMENT OF INTERIOR, THE FISH AND WILDLIFE SERVICE, AND THE NATIONAL MARINE FISHERIES SERVICE AS APPROPRIATE DURING REMEDIAL DESIGN. THIS CONSULTATION WILL ASSURE THAT ENDANGERED OR THREATENED SPECIES ARE NOT ADVERSELY IMPACTED BY IMPLEMENTATION OF THIS REMEDY. EPA HAS ALREADY CONSULTED WITH THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION ON THE POTENTIAL ENVIRONMENTAL RISKS POSED BY THE SITE.

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## 7.0 STATUTORY DETERMINATIONS

THE EPA AND FDER HAVE DETERMINED THAT THIS REMEDY WILL SATISFY THE CERCLA STATUTORY REQUIREMENTS FOR PROVIDING PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT, ATTAINING ARARS RELATED TO OTHER FEDERAL AND STATE ENVIRONMENTAL STATUTES, IS COST-EFFECTIVE, AND UTILIZES EITHER PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE.

AT THE DATE OF THIS DECISION, THE SELECTED REMEDIAL ACTION MEETS ALL FEDERAL AND STATE REQUIREMENTS. HOWEVER, EPA IS CURRENTLY REVIEWING HARRIS COMPLIANCE WITH THE FDER UIC PROGRAM AS WELL AS THE SAFE DRINKING WATER ACT. AS A RESULT OF THIS REVIEW, HARRIS MAY BE REQUIRED TO MAKE MODIFICATIONS AS NECESSARY.

### 7.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

THE SELECTED REMEDY OF GROUNDWATER EXTRACTION, TREATMENT, AND DEEP WELL INJECTION TO THE FLORIDAN AQUIFER IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT. BY CONTAINING THE CONTAMINANT PLUME, TREATING THE CONTAMINATED GROUNDWATER, AND REMOVING THE SOURCES OF CONTAMINATION, THIS REMEDY WILL ELIMINATE THE CONTAMINANT PLUME. THIS REMEDY WILL ELIMINATE THE RISK OF MIGRATION TO THE GDU WELL FIELD AND THE ENTIRE POTABLE AQUIFER. BY REDUCING THE LEVEL OF CONTAMINATION IN THE GROUNDWATER, THIS REMEDY WILL REDUCE THE CARCINOGENIC AND NONCARCINOGENIC RISKS ASSOCIATED WITH EXPOSURE TO THE UNTREATED GROUNDWATER.

THE EXISTING TREATMENT SYSTEM WAS DESIGNED FOR TREATING GROUNDWATER IN ORDER TO MEET CLEANUP LEVELS ESTABLISHED IN THE FDER/HARRIS CONSENT ORDER. IN THIS SYSTEM, TREATED GROUNDWATER IS DISCHARGED TO THE FLORIDAN AQUIFER RATHER THAN TO SURFACE WATER AND, AS A RESULT, PRESENTS NO ENVIRONMENTAL RISK. THIS WATER IS PRESENTLY RECYCLED FOR MANUFACTURING USE AS EXHAUST SCRUBBER WATER BEFORE DISPOSAL VIA DEEP-WELL INJECTION.

#### 7.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

THIS REMEDY ASSURES THAT THE CONTAMINATED AQUIFER WILL BE CLEANED UP TO MEET APPROPRIATE MCLS UNDER THE SDWA. FOR THOSE CHEMICALS THAT DO NOT HAVE AN ASSIGNED MCL, THE ARARS BASED ON TO-BE-CONSIDERED HEALTH-BASED VALUES, FAC "FREE FROM" REQUIREMENTS, OR SMCLS WILL BE ATTAINED. DISCHARGE FROM THE GROUNDWATER TREATMENT SYSTEM WILL MEET EITHER THE UIC PERMIT INJECTION STANDARDS OR NPDES PERMIT DISCHARGE LIMITS UNDER THE CWA. THE TREATED GROUNDWATER WILL MEET RCRA LAND DISPOSAL RESTRICTIONS PRIOR TO DISPOSAL. THE CONTAMINANT PLUMES WILL BE MONITORED AND REMEDIATED ACCORDING TO THE TECHNICAL STANDARDS FOR RCRA CORRECTIVE ACTION AND CLOSURE. IN ADDITION, EMISSIONS FROM THE AIR STRIPPER WILL COMPLY WITH THE NATIONAL AMBIENT AIR QUALITY STANDARDS.

#### 7.3 COST-EFFECTIVENESS

THE EPA SELECTED REMEDY, ALTERNATIVE 3, ALLOWS FOR A HIGHER DEGREE OF OVERALL PROTECTIVENESS. MODIFICATION OF THE EXISTING EXTRACTION AND TREATMENT SYSTEM IN ACCORDANCE WITH THE EPA GROUNDWATER REMEDIATION POLICY WILL ENHANCE CLEANUP OF THE AQUIFER. ALTERNATIVE 3 REQUIRES CONTINUATION OF THE EXISTING PROCESS FOR DISCHARGING THE TREATED GROUNDWATER BY INJECTION INTO THE FLORIDAN AQUIFER WHICH IS A NONPOTABLE WATER SOURCE IN THE AREA. HOWEVER, THIS REMEDY ALLOWS FOR FULL CHARACTERIZATION OF CONTAMINATION AT GOVERNMENT SYSTEMS AND ENHANCES THE ELIMINATION OF THE CONTAMINANT PLUME. THEREFORE, THE SELECTED REMEDY YIELDS AN OVERALL EFFECTIVENESS THAT IS PROPORTIONAL TO ITS INCREASED COSTS.

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

EPA AND FDER HAVE DETERMINED THAT THIS REMEDY IS THE MOST APPROPRIATE REMEDY FOR OPERABLE UNIT ONE AND PROVIDES THE BEST BALANCE AMONG THE EVALUATION CRITERIA FOR THE REMEDIAL ALTERNATIVES EVALUATED, ALTERNATIVE 3 PROVIDES BOTH SHORT- AND LONG-TERM PROTECTION TO POTENTIAL HUMAN AND ENVIRONMENTAL RECEPTORS. THIS REMEDY ALLOWS FOR CONTAINING, TREATING AND ELIMINATING THE GROUNDWATER CONTAMINATION IN ORDER TO REDUCE RISK FROM POTENTIAL EXPOSURE TO THE GROUNDWATER. IN ADDITION, THIS REMEDY UTILIZES A PROVEN TECHNOLOGY FOR TREATING VOC CONTAMINATION AND CAN BE IMPLEMENTED YEAR ROUND.

#### 7.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

GROUNDWATER CONTAMINATION WITH VOLATILE ORGANIC COMPOUNDS IS THE PRINCIPAL THREAT AT THE SITE. AIR STRIPPING IS AN EFFECTIVE REMEDIATION METHOD FOR TREATING GROUNDWATER CONTAMINATED BY VOCs.

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## **RESPONSIVENESS SUMMARY**

### **1.0 INTRODUCTION**

A PUBLIC MEETING ADDRESSING THE HARRIS CORPORATION/PALM BAY FACILITY SUPERFUND SITE WAS HELD BY THE US ENVIRONMENTAL PROTECTION AGENCY (EPA), REGION IV, AT THE PALM BAY COMMUNITY CENTER IN BREVARD COUNTY, FLORIDA ON MARCH 27, 1990. THE MEETING WAS CHAIRED BY MS. CAMILLA WARREN, CHIEF OF THE SOUTH FLORIDA SUPERFUND SECTION. OTHER ATTENDEES FROM THE EPA REGION IV OFFICE IN ATLANTA, GEORGIA WERE MS. GAIL SCOGIN, SUPERFUND REMEDIAL PROJECT MANAGER FOR THE SITE; MS. SUZANNE DURHAM, THE SUPERFUND COMMUNITY RELATIONS COORDINATOR; MS. BECKY FOX, REGIONAL TOXICOLOGIST AND MR. ROBERT JAMES FROM THE OFFICE OF REGIONAL COUNSEL. MR. JOE APPLGATE, STATE PROJECT MANAGER WITH THE FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION (FDER) AND MR. LARRY SIMS FROM GERAGHTY & MILLER, INCORPORATED, A CONSULTANT FOR HARRIS CORPORATION, PRESENTED INFORMATION ON THE SITE HISTORY AND ACTIONS TAKEN TO DATE.

THE PURPOSE OF THE MEETING WAS TO INFORM THE PUBLIC OF THE GROUNDWATER REMEDIATION ALTERNATIVES CONSIDERED AT THE GOVERNMENT SYSTEMS FACILITY ON THE HARRIS SITE AND TO DISCUSS THE ALTERNATIVE PREFERRED BY EPA. EPA FIRST PRESENTED THE EVALUATION OF ALTERNATIVES AND THE PREFERRED ALTERNATIVE IN THE SUPERFUND PROPOSED PLAN FACT SHEET MAILED TO MEMBERS OF THE COMMUNITY ON MARCH 16, 1990 (ATTACHMENT A). THIS FACT SHEET WAS ALSO MADE AVAILABLE TO THE PUBLIC ALONG WITH THE ADMINISTRATIVE RECORD AT THE PALM BAY PUBLIC LIBRARY. EPA ANNOUNCED THE PUBLIC MEETING AND DOCUMENT AVAILABILITY IN A LEGAL ADVERTISEMENT IN THE FLORIDA TODAY SUNDAY NEWSPAPER ON MARCH 18, 1990 (ATTACHMENT B). THE FACT SHEET AND LEGAL NOTICE ANNOUNCED THE PUBLIC COMMENT PERIOD WHICH BEGAN ON MARCH 18, 1990 AND ENDED ON APRIL 17, 1990. LOCAL NEWSPAPERS PUBLISHED ARTICLES ON SITE ISSUES ON DECEMBER 13, 1989 AND MARCH 25 AND 27, 1990 AS SHOWN IN ATTACHMENT C.

THIS RESPONSIVENESS SUMMARY DOCUMENTS THE COMMENTS RECEIVED BY EPA REGION IV DURING THE PUBLIC COMMENT PERIOD REGARDING THE PROPOSED CLEANUP ALTERNATIVES DESCRIBED IN THE PROPOSED PLAN FACT SHEET AND AS PRESENTED AT THE PUBLIC MEETING HELD MARCH 27, 1990. THIS RESPONSIVENESS SUMMARY PROVIDES THE EPA WITH INFORMATION ABOUT THE VIEWS OF THE COMMUNITY AND POTENTIALLY RESPONSIBLE PARTIES REGARDING THE PROPOSED REMEDIAL ACTION AND ALTERNATIVES. THE RESPONSIVENESS SUMMARY DOCUMENTS HOW PUBLIC COMMENTS HAVE BEEN CONSIDERED DURING THE DECISION-MAKING PROCESS AND PROVIDES ANSWERS AND INFORMATION TO QUESTIONS AND ISSUES RAISED. THE RESPONSIVENESS SUMMARY BECOMES AVAILABLE TO THE PUBLIC AS PART OF THE RECORD OF DECISION (ROD) UPON SIGNATURE BY THE AGENCY.

THE RECORD OF ATTENDANCE, PROVIDED AS ATTACHMENT D, LISTS 49 ATTENDEES INCLUDING REPRESENTATIVES FROM HARRIS CORPORATION, GENERAL DEVELOPMENT UTILITIES, INCORPORATED (GDU), FLORIDA AUDOBON SOCIETY, TURKEY CREEK SANCTUARY ADVISORY BOARD, FLORIDA INSTITUTE OF TECHNOLOGY, THE ORLANDO SENTINEL NEWSPAPER, SOUTH BREVARD WATER AUTHORITY AS WELL AS CITY, COUNTY AND STATE OFFICIALS.

ATTACHMENT E CONTAINS THE TRANSCRIPT OF THE PUBLIC MEETING. EPA AND HARRIS CORPORATION UTILIZED OVERHEAD TRANSPARENCIES IN THE MEETING PRESENTATIONS TO DESCRIBE THE SITE HISTORY, GROUNDWATER CONTAMINATION, AND THE EXISTING HARRIS REMEDIATION PROGRAM AS WELL AS FIVE ADDITIONAL REMEDIAL ACTION ALTERNATIVES. EPA PROVIDED COPIES OF THE OVERHEADS AND OTHER INFORMATION TO MEETING ATTENDEES. ATTACHMENT F CONTAINS THE MEETING HANDOUTS.

### **2.0 OVERVIEW OF THE PROPOSED PLAN**

OF THE SIX ALTERNATIVES EVALUATED, EPA HAS DETERMINED THAT THE PREFERRED ALTERNATIVE IS ALTERNATIVE 3, MODIFICATION OF THE EXISTING GROUNDWATER EXTRACTION AND TREATMENT SYSTEM. ALTERNATIVE 3 COMPARES FAVORABLY WITH THE ALTERNATIVES BASED ON AN EVALUATION USING THE NINE CRITERIA MANDATED BY THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (SARA). EPA DEFINES OPERABLE UNIT ONE AS THE GROUNDWATER CONTAMINATION ASSOCIATED WITH THE GOVERNMENT



SYSTEMS FACILITY AT HARRIS. EPA HAS FURTHER IDENTIFIED AT LEAST ONE ADDITIONAL OPERABLE UNIT FOR MANAGEMENT OF RESPONSE ACTIVITIES AT OTHER PORTIONS OF THE SITE. ANY ADDITIONAL OPERABLE UNITS WILL INVOLVE SUBSEQUENT RODS.

THIS ROD PRESENTS ALTERNATIVE 3 AS THE APPROPRIATE COURSE OF REMEDIAL ACTION FOR OPERABLE UNIT ONE AT THE PALM BAY SITE. THIS REMEDY CONSISTS OF (1) CONTINUED OPERATION OF THE EXISTING EXTRACTION AND TREATMENT SYSTEM, (2) A DESIGN ANALYSIS FOR PLUME CONTAINMENT AND TREATMENT, (3) MODIFICATION OF THE SYSTEM BASED ON RESULTS OF THE DESIGN ANALYSIS, (4) CONTINUED MONITORING OF THE CLEANUP, AND (5) A REVIEW OF THE SYSTEM AND CLEANUP PROGRESS BY EPA AND FDER AFTER A PERIOD OF FIVE YEARS.

BASED ON COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD, THE RESIDENTS AND LOCAL OFFICIALS ARE AMENABLE TO EPA-DIRECTED MODIFICATIONS TO THE EXISTING TREATMENT SYSTEM. HOWEVER, ONE RESIDENT STATED SPECIFICALLY THAT HE IS AGAINST THE USE OF DEEP WELL REINJECTION. CITIZENS SUBMITTED TEN RESPONSE CARDS TO EPA, SIX AT THE CONCLUSION OF THE PUBLIC MEETING AND FOUR DURING THE PUBLIC COMMENT PERIOD. IN ADDITION, EPA RECEIVED FIVE LETTERS: ONE LETTER PRESENTED AT THE PUBLIC MEETING BY COUNSEL FOR GDU AND FOUR MAILED IN DURING THE PUBLIC COMMENT PERIOD. ATTACHMENT G CONTAINS ALL WRITTEN COMMENTS FROM THE PUBLIC RECEIVED DURING THE PUBLIC COMMENT PERIOD. ATTACHMENT H CONTAINS THE RESPONSE SUBMITTED BY HARRIS CORPORATION, THE POTENTIALLY RESPONSIBLE PARTY (PRP). ATTACHMENT I PROVIDES GDU COMMENTS AND RESPONSES RECEIVED BY EPA.

### **3.0 BACKGROUND ON COMMUNITY INVOLVEMENT**

COMMUNITY INTEREST IN THE HARRIS CORPORATION/PALM BAY FACILITY TO THE SPRING OF THE 1982 WHEN NEWS MEDIA SOURCES ANNOUNCED THAT GROUNDWATER CONTAMINATION WAS DISCOVERED AT GDU WELLS. FDER FREQUENTLY REACHED AN AGREEMENT WITH HARRIS IN 1983 TO DETERMINE THE EXTENT OF CONTAMINATION AND IMPLEMENT A GROUNDWATER RESTORATION PROGRAM. IN 1984, FDER HELD TWO PUBLIC MEETINGS AT PALM BAY'S CITY COUNCIL CHAMBERS TO DISCUSS CONTAMINATION FOUND ON HARRIS AND GDU PROPERTIES. AT THE SECOND MEETING ON APRIL 26, 1984, FDER ANNOUNCED THE GDU'S TREATMENT SYSTEM WAS SUCCESSFULLY REMOVING CONTAMINATION FROM THE DRINKING WATER SUPPLY.

THE POPULATION OF PALM BAY HAS DOUBLED SINCE 1982, AND MANY NEWER COMMUNITY MEMBERS HAVE NO KNOWLEDGE OF THE HISTORY OF GROUNDWATER CONCERNS AT THE HARRIS AND GDU PROPERTIES. CITY OFFICIALS REPORTED THAT NO PUBLIC CONCERN HAS SURFACED SINCE THE 1984 PUBLIC MEETINGS REGARDING THE SITE AND THERE HAS BEEN LIMITED NEWS MEDIA ATTENTION. THE FLORIDA TODAY NEWSPAPER ANNOUNCED THAT THE HARRIS SITE WAS BEING PROPOSED AS A SUPERFUND SITE IN 1985. EPA ANNOUNCED FINAL INCLUSION OF THE HARRIS/PALM BAY SITE ON THE NATIONAL PRIORITIES LIST (NPL) IN JULY 1987.

CURRENTLY, FDER AND HARRIS CORPORATION OFFICIALS PROVIDE LOCAL GOVERNMENT AGENCIES WITH REGULAR UPDATES AND MONITORING REPORTS. OFFICIAL FROM THESE LOCAL AGENCIES ALSO EXPRESSED AN INTEREST IN BEING INFORMED OF EPA INVOLVEMENT.

THE PRINCIPLE PUBLIC CONCERNS EXPRESSED DURING FDER REMEDIATION ACTIVITIES AT THE HARRIS SITE WERE GROUNDWATER CONTAMINATION AND RESULTING PUBLIC HEALTH CONCERNS. FDER ADDRESSED THESE CONCERNS THROUGH NEWSPAPER COVERAGE BY ANNOUNCING THAT CONTAMINATED WELLS AT GDU HAD BEEN REMOVED FROM PRODUCTION SERVICE, THEREBY MINIMIZING ANY POTENTIAL THREAT TO HUMAN HEALTH. FDER ALSO IDENTIFIED SUCCESSFUL GROUNDWATER TREATMENT METHODS BEING USED BY BOTH HARRIS AND GDU. OTHER PUBLIC CONCERNS INCLUDED SURFACE WATER CONTAMINATION, ESPECIALLY IF IT SHOULD REACH TURKEY CREEK, AS WELL AS POTENTIAL INCREASES IN WATER UTILITY RATES.

### **4.0 SUMMARY OF COMMENTS RECEIVED AND AGENCY RESPONSE**

COMMENTS RAISED DURING THE HARRIS CORPORATION/PALM BAY FACILITY PUBLIC COMMENT PERIOD ON THE PROPOSED PLAN ARE SUMMARIZED BRIEFLY BELOW. THE COMMENT PERIOD WAS HELD FROM MARCH 18, 1990 TO

APRIL 17, 1990. ALL WRITTEN PUBLIC COMMENTS RECEIVED BY EPA ARE PROVIDED AS ATTACHMENT G. THE COMMENTS ARE CATEGORIZED BY RELEVANT TOPICS.

#### 4.1 HEALTH ISSUES

1. HAS A HEALTH RISK ANALYSIS BEEN PERFORMED AT THE SITE, AND IF SO, IS IT AVAILABLE TO THE PUBLIC?

EPA RESPONSE: IN OCTOBER, 1988 THE FLORIDA DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES (FDHRS) PUBLISHED A PRELIMINARY HEALTH ASSESSMENT PREPARED FOR THE AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY (ATSDR). THIS REPORT STATES THAT "BASED ON THE EXISTING CONDITION OF THE HARRIS CORPORATION SITE, THE POTENTIAL ENVIRONMENTAL PATHWAYS OF CONCERN ARE MIGRATION OF CONTAMINATED GROUNDWATER AND WINDBLOWN VOLATILE ORGANIC COMPOUNDS FROM THE AIR STRIPPER. POTENTIAL HUMAN EXPOSURE PATHWAYS OF PRIMARY CONCERN ARE INGESTION AND DERMAL ABSORPTION OF CONTAMINATED GROUNDWATER, AND INHALATION OF OFF-GASSING VOLATILES FROM THE AIR STRIPPING SYSTEM."

DURING PILOT TESTING OF THE AIR STRIPPING TOWER AT HARRIS, FDER ANALYZED PROJECTED AIR EMISSIONS. THIS ANALYSIS INDICATED THAT THE PROJECTED VOLUME OF EMISSIONS WAS NOT HIGH ENOUGH TO PRESENT AN UNACCEPTABLE HEALTH RISK. EPA PERFORMED A SIMILAR ANALYSIS IN FEBRUARY, 1990 USING THE FDER AIR EMISSIONS CRITERIA USED FOR THE PILOT TEST ON THE 1988 AND 1989 AIR STRIPPER DATA FROM HARRIS. THIS ANALYSIS SHOWED THAT THE AIR STRIPPER EMISSIONS IN 1988 AND 1989 WERE WITHIN THE LIMITS USED BY FDER FOR THE PROJECTED EMISSIONS.

SINCE THE ORIGINAL FDER ANALYSIS, THE EXPOSURE LIMITS FOR MANY OF THE VOLATILE ORGANIC COMPOUNDS HAVE BEEN REDUCED AND NEWER CLEAN AIR REGULATIONS HAVE BEEN ENACTED BY FLORIDA AND EPA. EPA IS CURRENTLY ANALYZING THE AIR STRIPPER EMISSIONS USING THE MOST RECENT FLORIDA AND EPA CRITERIA AND COMPARING THE RESULTS WITH HEALTH RISKS AND THE RECENTLY REVISED CLEAN AIR 1 ACT AND FDER EQUIVALENTS. EPA WILL REQUIRE THAT THE AIR STRIPPER EMISSIONS COMPLY WITH THE NEW REQUIREMENTS.

IN ORDER TO ADDRESS THE REMAINING EXPOSURE PATHWAY OF GROUNDWATER INGESTION, EPA PREPARED A RISK (OR ENDANGERMENT) ASSESSMENT BASED ON THE AVAILABLE GROUNDWATER SAMPLING DATA. THIS RISK ASSESSMENT, IN THE FORM OF A MEMO, SHOWS THE RESULTS OF CALCULATIONS FOR THE RISKS ASSOCIATED WITH THE CONSUMPTION OF GROUNDWATER. THESE CALCULATIONS INDICATE THAT DRINKING UNTREATED GROUNDWATER AT GOVERNMENT SYSTEMS WOULD CONSTITUTE AN UNACCEPTABLE HUMAN HEALTH RISK. THIS MEMO AS WELL AS THE OTHER EPA AND ATSDR DOCUMENTS ARE AVAILABLE IN THE ADMINISTRATIVE RECORD FOR PUBLIC REVIEW.

2. DO VOCS IN GROUNDWATER PERCOLATE UP THROUGH THE SOIL - OR CONCRETE, IF THERE ARE CRACKS IN THE CONCRETE?

EPA RESPONSE: ACCORDING TO ATSDR, IT IS POSSIBLE FOR VOCS TO VOLATILIZE FROM THE WATER TABLE AND MIGRATE THROUGH THE SOIL AND CRACKS IN THE CONCRETE TO REACH THE AIR ABOVE GROUND. THE VOCS MIGRATING THROUGH THE SOIL TYPICALLY ENTER THE AIR VIA THE SOIL/AIR INTERFACE OR VIA CRACKS IN THE CONCRETE IN AREAS WHERE THE SOIL IS COVERED.

SOME WORKERS AT THE SITE HAVE EXPRESSED CONCERN ABOUT VOCS ENTERING THE BUILDINGS. A NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH (NIOSH) REPRESENTATIVE STATES THAT THE MIGRATION OF VOCS THROUGH CRACKS IN CONCRETE AND INTO THE BUILDINGS IS UNLIKELY TO CAUSE A HEALTH HAZARD AT THIS SITE. WHILE IT IS POSSIBLE FOR VOCS TO ENTER THE BUILDINGS, THE HEALTH HAZARD WOULD BE MINIMIZED BY THE AIR EXCHANGE RATE IN THE BUILDINGS AND THE DILUTION OF THE VOCS BY THE EXISTING AIR IN THE BUILDINGS. PLEASE SEE THE RESPONSE TO QUESTION 3 FOR MORE INFORMATION.

3. ARE THERE ANY RISKS AT THIS SITE FROM BREATHING EITHER INDOOR OR OUTDOOR AIRBORNE

CONTAMINANTS?

EPA RESPONSE: FDER ANALYZED OUTDOOR EMISSION PROJECTIONS FOR THE AIR STRIPPER WHICH DO NOT INDICATE THAT INHALATION PRESENTS A HEALTH-BASED RISK AT THIS SITE. FURTHER, EPA RECEIVED THE RESULTS FROM INDOOR AIR QUALITY STUDIES PERFORMED IN NOVEMBER, 1989 BY NIOSH AND CONCURRENTLY BY THE HARRIS CORPORATION HEALTH AND SAFETY DEPARTMENT. THE DETECTION LIMITS THAT NIOSH USED ARE WELL BELOW THE LEVELS ESTABLISHED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AS PERMISSIBLE FOR AN EIGHT HOUR OCCUPATIONAL EXPOSURE. THESE STUDIES INDICATE THAT THE INDOOR AIR IN BUILDING 8 ON THE HARRIS FACILITY IS NOT CONTAMINATED WITH AIRBORNE VOLATILE ORGANIC COMPOUNDS. IN ADDITION, THE HEALTH SYMPTOMS REPORTED TO NIOSH IN A SELF-ADMINISTERED EMPLOYEE QUESTIONNAIRE "WERE MOSTLY RESPIRATORY AND SINUS COMPLAINTS WHICH COULD HAVE BEEN THE RESULT OF ALLERGIES, COLDS, OR EPISODIC RESPIRATORY INFECTIONS COMMONLY EXPERIENCED BY ANY WORKER POPULATION."

4. IS IT ACCEPTABLE FOR PEOPLE TO BE WORKING AT THIS SITE? WHAT ARE THE RISKS, HEALTH EFFECTS, OR POSSIBILITY OF ONE DYING AS A RESULT OF WORKING 10 OR 20 YEARS AT THIS SITE IN A LOCATION DIRECTLY ABOVE THE AREA OF HIGHEST CONCENTRATION IN THE GROUNDWATER PLUME?

EPA RESPONSE: VARIOUS STUDIES AND INVESTIGATIONS HAVE BEEN CONDUCTED AT THE SITE BY FDER, USEPA, ATSDR, AND NIOSH. NEITHER THE INFORMATION AVAILABLE FROM THESE STUDIES NOR THE SCIENTIFIC LITERATURE INDICATE THAT UNDUE OR SIGNIFICANT ADVERSE HEALTH EFFECTS CAN BE EXPECTED OR HAVE BEEN OBSERVED FROM EXPOSURE TO THE VOCs IN THE GROUNDWATER.

IN ADDITION, THERE IS NO INFORMATION IN THE SCIENTIFIC OR MEDICAL, LITERATURE THAT ADDRESSES THE POSSIBILITY OF DYING FROM LONG TERM ABOVE-GROUND EXPOSURE TO VOCs IN GROUNDWATER. FURTHER COMMENTS ON THIS ISSUE WOULD BE CONJECTURE.

5. HAS ANY HEALTH MONITORING FOR CHEMICAL TOXICITY SYMPTOMS IN WORKERS BEEN DONE AT THIS SITE? IF SO, ARE THESE REPORTS AVAILABLE TO THE PUBLIC? WILL MEDICAL PROFILES BE ESTABLISHED FOR WORKERS AT THE SITE?

EPA RESPONSE: THESE ARE ISSUES THAT ARE APPROPRIATELY DIRECTED TO THE HARRIS CORPORATION HEALTH AND SAFETY DEPARTMENT. EPA CONTACTED HARRIS AND DETERMINED THAT CERTAIN HARRIS EMPLOYEES UNDERGO ROUTINE MEDICAL MONITORING BASED ON THE POTENTIALLY HAZARDOUS NATURE OF THEIR JOBS. HOWEVER, MONITORING OF OTHER WORKERS AT THE SITE WOULD BE INITIATED AT THE REQUEST OF AN INDIVIDUAL EMPLOYEE OR PROGRAM DIRECTOR, IN THE CASE OF A NON-HARRIS EMPLOYEE. HARRIS REPORTED THAT TO DATE THERE HAVE BEEN NO INDIVIDUAL REQUESTS FOR MEDICAL SURVEILLANCE.

6. HAVE LOCAL CANCER RATES BEEN STUDIED TO SEE IF THERE IS A CORRELATION BETWEEN CHEMICAL EXPOSURE AT HARRIS AND THE INCIDENCE OF CANCER?

EPA RESPONSE: EPA IS NOT AWARE OF ANY SUCH STUDIES. HOWEVER, THE FDHRS MAINTAINS A CANCER SURVEILLANCE PROGRAM ON EACH COUNTY IN FLORIDA. ONE CAN OBTAIN FURTHER INFORMATION FROM:

DR. ROGER INMAN, CHIEF  
TOXICOLOGY AND HAZARD ASSESSMENT SECTION  
FLORIDA DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES  
1317 WINEWOOD BOULEVARD  
TALLAHASSEE, FL 32301

THE TELEPHONE NUMBER IS (904) 488-3931.

7. HAVE LOCAL HEALTH OFFICIALS/PROFESSIONALS BEEN GIVEN DETAILED INFORMATION ABOUT THE LOCATION, TYPE, AND TOXICITY LEVELS OF THE CHEMICAL POLLUTANTS RELATED TO THIS SITE?

EPA RESPONSE: INFORMATION ON CHEMICAL POLLUTANTS AT THIS SITE IS PUBLICLY AVAILABLE IN TWO WAYS. FIRST, EPA ESTABLISHED AN INFORMATION REPOSITORY ON MARCH 6, 1990 CONTAINING INFORMATION ABOUT THE GROUNDWATER CONTAMINATION ASSOCIATED WITH THE GOVERNMENT SYSTEMS FACILITY. SECOND, THE EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT OF 1986 (ALSO KNOWN AS TITLE III) ESTABLISHES REQUIREMENTS FOR FEDERAL, STATE, AND LOCAL GOVERNMENTS AND INDUSTRY REGARDING EMERGENCY PLANNING AND "COMMUNITY RIGHT-TO-KNOW" REPORTING ON HAZARDOUS AND TOXIC CHEMICALS.

OSHA REQUIRES COMPANIES TO COMPILE INFORMATION ON THE IDENTITY OF HAZARDOUS CHEMICALS USED OR PRODUCED INCLUDING THE HEALTH AND PHYSICAL HAZARDS AS WELL AS EXPOSURE LIMITS FOR THESE CHEMICALS. THIS INFORMATION IS REPORTED ON MATERIAL SAFETY DATA SHEETS (MSDSS).

SECTION 311 OF THE EMERGENCY PLANNING AND COMMUNITY RIGHT-TO KNOW ACT (ACT) REQUIRES FACILITIES THAT MUST PREPARE MSDSS UNDER OSHA REGULATIONS TO SUBMIT EITHER COPIES OF THEIR MSDSS OR A LIST OF MSDS CHEMICALS TO THE LOCAL EMERGENCY PLANNING COMMITTEE (LEPC), THE STATE EMERGENCY RESPONSE COMMISSION (SERC), AND THE LOCAL FIRE DEPARTMENT. IF A LIST IS SUBMITTED, THE FACILITY MUST SUBMIT A COPY OF THE MSDS FOR ANY CHEMICAL ON THE LIST AT THE REQUEST OF THE LEPC OR SERC.

THE LEPC FOR BREVARD COUNTY, FLORIDA IS BASED IN WINTER PARK AND THE CONTACT PERSON IS LESLIE BANKS WHO CAN BE REACHED AT (407) 645-3339. THE SERC IS LOCATED IN TALLAHASSEE AND IS COMPRISED OF MEMBERS WHO ARE APPOINTED BY THE GOVERNOR TO OVERSEE AND IMPLEMENT TITLE III PROVISIONS. THE CONTACT PERSON FOR THE SERC IS JIM LOOMIS OF THE DEPARTMENT OF COMMUNITY AFFAIRS. HE CAN BE REACHED AT (904) 488-1472.

IF THE FACILITY SUBMITS A LIST OF MSDS CHEMICALS, THE LIST MUST INCLUDE THE CHEMICAL OR COMMON NAME OF EACH SUBSTANCE AND MUST IDENTIFY THE APPLICABLE HAZARD CATEGORIES. THESE CATEGORIES INCLUDE AMONG OTHERS, THE IMMEDIATE (ACUTE) HEALTH HAZARD AND DELAYED (CHRONIC) HEALTH HAZARD.

SECTION 313 OF THE ACT REQUIRES EPA TO ESTABLISH AN INVENTORY OF ROUTINE TOXIC CHEMICAL EMISSIONS FROM CERTAIN MANUFACTURING FACILITIES. THESE FACILITIES MUST HAVE MORE THAN TEN FULL TIME EMPLOYEES AND MANUFACTURE, PROCESS OR OTHERWISE USE A LISTED TOXIC CHEMICAL (FROM A LIST CONTAINING OVER 300 COMPOUNDS) IN EXCESS OF SPECIFIED THRESHOLD QUANTITIES. FOR EXAMPLE, FACILITIES MANUFACTURING OR PROCESSING ANY OF THESE LISTED CHEMICALS IN EXCESS OF 50,000 POUNDS IN 1988 WERE REQUIRED TO REPORT TO EPA BY JULY 1, 1989 THEIR ROUTINE RELEASES TO THE ENVIRONMENT. THIS INFORMATION IS MAINTAINED IN THE TOXIC RELEASE INVENTORY SYSTEM (TRIS) DATABASE AS WELL AS TOXNET, A SIMILAR DATABASE THAT IS ACCESSIBLE TO THE PUBLIC. EPA HAS CONFIRMED THAT HARRIS REPORTED ROUTINE TOXIC CHEMICAL EMISSIONS UNDER SECTION 313 FOR 1987 AND 1988. THIS INFORMATION IS AVAILABLE ON REQUEST UNDER THE FREEDOM OF INFORMATION ACT BY CONTACTING:

MS. PHYLLIS STRONG  
OFFICE OF PUBLIC AFFAIRS  
US ENVIRONMENTAL PROTECTION AGENCY  
345 COURTLAND STREET N.E.  
ATLANTA, GA 30365

8. AT WHAT LEVEL IS VINYL CHLORIDE OR THE OTHER VOLATILE ORGANICS AT THE SITE TOXIC IN AIR AND WATER? AT WHAT CONCENTRATIONS CAN THESE COMPOUNDS BE SMELLED?

EPA RESPONSE: THE OSHA PERMISSIBLE EXPOSURE LIMIT FOR AIRBORNE VINYL CHLORIDE (VC) IN THE WORKPLACE IS 1 PART PER MILLION (PPM) OVER AN EIGHT HOUR PERIOD. IN DRINKING WATER, THE HEALTH-BASED RISK FOR VC IS 0.02 PARTS PER BILLION (PPB). THE ODOR THRESHOLD FOR VC IN AIR IS 260 PPM.

EXHIBIT 1 AND THE FOLLOWING DISCUSSION GIVE MORE DETAILED INFORMATION ABOUT THE TOXIC LEVELS FOR

VC AND OTHER VOCs IN AIR AND WATER. FOR WATER, HEALTH-BASED RISK LEVELS CAN BE EXPRESSED AS CONCENTRATIONS REPRESENTING THE LIFETIME CONSUMPTION LEVEL THAT WOULD RESULT IN AN ADDITIONAL INCREASED LIFETIME CANCER RISK OF ONE IN ONE MILLION. FOR AIR, THREE PRIMARY HEALTH-BASED RISK LEVELS ARE USED TO DETERMINE ACCEPTABLE EXPOSURES IN THE WORKPLACE. THESE LEVELS ARE THE THRESHOLD LIMIT VALUES (TLV) AS DETERMINED BY THE AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH), PERMISSIBLE EXPOSURE LIMITS (PEL) ENFORCED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA), AND RECOMMENDED EXPOSURE LIMITS (REL) DETERMINED BY NIOSH.

THE TLVS AS DEFINED BY THE ACGIH REFER TO AIRBORNE CONCENTRATIONS OF SUBSTANCES AND REPRESENTS CONDITIONS UNDER WHICH IT IS BELIEVED THAT NEARLY ALL WORKERS MAY BE REPEATEDLY EXPOSED DAY AFTER DAY WITHOUT ADVERSE EFFECTS. THERE ARE THREE CATEGORIES OF TLVS WHICH ARE SPECIFIED AS FOLLOWS:

A) THRESHOLD LIMIT VALUE - TIME-WEIGHTED AVERAGE (TLVTWA) - THE TIME-WEIGHTED AVERAGE CONCENTRATION FOR A NORMAL 8-HOUR WORKDAY AND A 40-HOUR WORK WEEK TO WHICH NEARLY ALL WORKERS MAY BE REPEATEDLY EXPOSED, DAY AFTER DAY, WITHOUT ADVERSE EFFECTS.

B) THRESHOLD LIMIT VALUE - SHORT TERM EXPOSURE LIMIT (TLV-STEL) - A 15 MINUTE TIME-WEIGHTED AVERAGE EXPOSURE WHICH SHOULD NOT BE EXCEEDED AT ANY TIME DURING A WORK DAY EVEN IF THE 8-HOUR TIME-WEIGHTED AVERAGE IS WITHIN THE TLV. EXPOSURES AT THE STEL SHOULD NOT BE LONGER THAN 15 MINUTES AND SHOULD NOT BE REPEATED MORE THAN FOUR TIMES PER DAY. THERE SHOULD BE AT LEAST 60 MINUTES BETWEEN SUCCESSIVE EXPOSURES AT THE STEL.

C) THRESHOLD LIMIT VALUE - CEILING (TLV-C) - THE CONCENTRATION THAT SHOULD NOT BE EXCEEDED DURING ANY PART OF THE WORKING EXPOSURE.

9. SEVERAL PEOPLE WORKING ON THE SITE HAVE EXPRESSED CONCERN THAT A VERY SERIOUS AND UNADDRESSED PROBLEM EXISTS THAT IS THREATENING WORKER HEALTH. FOR EXAMPLE, A GOVERNMENT EMPLOYEE WORKING IN BUILDING 8 ON THE HARRIS GOVERNMENT SYSTEMS FACILITY IS CONCERNED ABOUT AN UNDIAGNOSED PERSISTENT COUGH SHE HAS EXPERIENCED SINCE BEGINNING WORK AT THE SITE IN 1985. SHE EXPLAINED THAT NONE OF THE 35 PEOPLE IN HER OFFICE WERE INFORMED THAT THEY WORK TEN FEET OVER GROUNDWATER CONTAINING TOXIC WASTES. ALTHOUGH SHE HAS NOT NOTICED ANY VOC ODORS, SHE IS CONCERNED ABOUT VOCs PERCOLATING INTO THE BUILDING DUE TO A GROUNDWATER TO AIR MEDIA TRANSFER AND THE RESULTING POTENTIAL ADVERSE HEALTH EFFECTS.

EPA RESPONSE: AIR SAMPLING CONDUCTED AT BUILDING 8 BY NIOSH AND THE HARRIS HEALTH AND SAFETY DEPARTMENT IDENTIFIED NO AIRBORNE CONTAMINATION IN THE BREATHING ZONE. AT THIS TIME EPA HAS NOT PERFORMED A RISK ANALYSIS FOR AN AIR EXPOSURE PATHWAY.

ALTHOUGH HE SEES NO CAUSE FOR ALARM, AN ATSDR REPRESENTATIVE HAS ADVISED THIS EMPLOYEE TO CONTACT HER MANAGEMENT ABOUT RELOCATING TO A DIFFERENT OFFICE SPACE IF NECESSARY TO ALLEVIATE THESE CONCERNS.

10. THE SAME GOVERNMENT EMPLOYEE FILED A NIOSH COMPLAINT WHICH RESULTED IN A NIOSH AIR QUALITY STUDY CONDUCTED BY MR. STANLEY SALISBURY IN NOVEMBER, 1989. THE EMPLOYEE IDENTIFIED THREE CONCERNS ABOUT HOW THE STUDY WAS CONDUCTED:

A. MR. SALISBURY REPORTEDLY NORMALLY DEALS WITH AIR QUALITY ISSUES RELATING TO DUST, SPORES, AND BACTERIA RATHER THAN WITH TOXIC WASTE.

B. NIOSH CONDUCTED THE STUDY DURING THE COOLER MONTH OF NOVEMBER AND, IN ADDITION, THE AIR CONDITIONING SYSTEM WHICH HAD NOT BEEN OPERATING FORMERLY WAS RUNNING DURING THE TEST. SHE BELIEVES THAT THESE FACTORS MAY INVALIDATE THE TEST.

C. THE RESULTS REPORTED VALUES IN THE PARTS PER MILLION RANGE AND SHE IS CONCERNED ABOUT PARTS PER BILLION EXPOSURE.

IN ADDITION, HAS ANY OTHER AIR QUALITY SAMPLING BEEN DONE IN BUILDING 8 OR ELSEWHERE AT THE SITE?

EPA RESPONSE: THE DETECTION LIMITS USED BY NIOSH WERE SEVERAL ORDERS OF MAGNITUDE BELOW THE OSHA PERMISSIBLE EXPOSURE LIMITS FOR WORKERS. ALSO, THE EXISTING OCCUPATIONAL AIR EXPOSURE STANDARDS FOR VINYL CHLORIDE, FOR EXAMPLE, IS IN THE PARTS PER MILLION RANGE. LEVELS OF VINYL CHLORIDE IN THE GROUNDWATER ARE REPORTED IN THE PARTS PER BILLION RANGE AND THEREFORE, WOULD NOT LIKELY RESULT IN ANY SIGNIFICANT HUMAN EXPOSURE. EPA CONTACTED MR. SALISBURY TO ADDRESS THE ABOVE-MENTIONED CONCERNS ABOUT THE STUDY. HE STATED THAT HE HAS HAD SIGNIFICANT EXPERIENCE WITH INDOOR AIR QUALITY AND MEASURED FOR "THE SIX VOCS PRESENT IN GROUNDWATER AT CONCENTRATIONS IN EXCESS OF THE CURRENT GROUNDWATER STANDARDS" ACCORDING TO THE ESTABLISHED NIOSH PROTOCOL. HE CONFIRMED THAT THE HARRIS HEALTH AND SAFETY DEPARTMENT CONDUCTED CONCURRENT AIR MONITORING DURING HIS VISIT. THE HARRIS HEALTH AND SAFETY DEPARTMENT'S RESULTS WERE CONSISTENT WITH THE NIOSH RESULTS WHICH INDICATED NO MEASURABLE VOC AIRBORNE CONTAMINATION.

EPA CONTACTED HARRIS TO DETERMINE WHETHER OR NOT ANY ADDITIONAL INDOOR AIR MONITORING HAS TAKEN PLACE. HARRIS REPORTED PREVIOUS SAMPLING FOR VOCS AND CARBON DIOXIDE IN RESPONSE TO WORKER CONCERNS ABOUT CONTAMINATION FROM PAST MANUFACTURING OPERATIONS IN BUILDING 6. THIS SAMPLING IS CONSISTENT WITH THE HARRIS POLICY IN WHICH THE HEALTH AND SAFETY DEPARTMENT CONDUCTS AIR MONITORING ON REQUEST FOR THE NUMEROUS BUILDINGS AT THE SITE.

11. IS THE CONTAMINATED GROUNDWATER GETTING TO GDU? IF SO, HOW MUCH CONTAMINATION IS THE PUBLIC RECEIVING FROM THE DRINKING WATER?

EPA RESPONSE: THE CONTAMINATION HAS REACHED SOME OF THE GDU WELLS. AT LEAST ONE OF THE WELLS HAS BEEN SHUT DOWN AND THE WATER FROM SEVERAL OTHER WELLS IS BEING PRE-TREATED FOR VOCS USING AN AIR STRIPPER. THE WATER UNDERGOING PRE-TREATMENT IS TESTED BEFORE AND AFTER AIR STRIPPING. THE VOC TEST RESULTS AFTER AIR STRIPPING DO NOT SHOW VOCS TO BE PRESENT ABOVE THE DETECTION LIMITS (MEASURED IN PARTS PER BILLION). IN ADDITION, THE FINISHED WATER DISTRIBUTED TO PALM BAY RESIDENTS IS TESTED BEFORE DISTRIBUTION. THE VOC TEST RESULTS FOR THE FINISHED WATER DO NOT SHOW VOCS TO BE PRESENT ABOVE THE DETECTION LIMITS (MEASURED IN PARTS PER BILLION). SAMPLING ANALYSES INDICATE THAT THE RESIDENTS RECEIVE WATER FROM GDU THAT MEETS DRINKING WATER STANDARDS.

IN APRIL, 1989 GDU HAD TARGET COMPOUND LIST (TCL) ANALYSES PERFORMED ON WATER SAMPLES FROM EIGHT PRODUCTION WELLS BEFORE PRE-TREATMENT AND ON ONE FINISHED WATER SAMPLE. PESTICIDES, PCBS, AND SEMI-VOLATILE ORGANICS WERE NOT PRESENT ABOVE THE DETECTION LIMITS (MEASURED IN PARTS PER BILLION) IN THE SAMPLES FROM THE PRODUCTION WELLS. SEVERAL VOCS WERE DETECTED IN THE SAMPLES FROM THE PRODUCTION WELLS, BUT WERE NOT PRESENT ABOVE THE DETECTION LIMITS IN THE FINISHED WATER. LEAD, CHROMIUM, AND ZINC WERE PRESENT AT LOW CONCENTRATIONS IN SEVERAL OF THE PRODUCTION WELLS, BUT THE LEVELS WERE WITHIN THE PRIMARY AND SECONDARY DRINKING WATER STANDARDS.

THE FINISHED WATER SAMPLE ANALYSES SHOWED NO CONTAMINANTS ABOVE THE DETECTION LIMITS, EXCEPT FOR SEVERAL TRIHALOMETHANES, CHROMIUM, AND ZINC. THE TRIHALOMETHANES, WHICH ARE COMMON VOCS IN FINISHED WATER, WERE DETECTED AT LOW CONCENTRATIONS BUT WERE WITHIN THE TOTAL TRIHALOMETHANE MCL (100 PPB) FOR FINISHED WATER. THE CHROMIUM AND ZINC VALUES WERE BELOW THE PRIMARY MAXIMUM CONTAMINANT LEVEL (MCL) FOR CHROMIUM (MCL IS 50 PPB) AND THE SECONDARY MAXIMUM CONTAMINANT LEVEL (SMCL) FOR ZINC (SMCL IS 5000 PPB).

12. A RESIDENT ASKED WHY THE AIR STRIPPING TOWER CONTAINED NO AIR POLLUTION CONTROL DEVICES, AND IF ANYONE PERFORMING MAINTENANCE OF THIS AIR STRIPPER WOULD BE IN ANY DANGER FROM THE EMISSIONS.

EPA RESPONSE: BEFORE CONSTRUCTION OF THIS TOWER, FDER ANALYZED THE PROJECTED EMISSIONS BASED ON THE VOLUME OF GROUNDWATER TO BE TREATED. FDER DETERMINED THAT BASED ON AN EIGHT-HOUR OCCUPATIONAL EXPOSURE AND 24-HOUR RESIDENTIAL EXPOSURE OVER A LONG PERIOD OF TIME, THE TREATMENT SYSTEM DESIGN WOULD PRESENT NO SIGNIFICANT SHORT OR LONG TERM RISK.

#### 4.2 TECHNICAL ISSUES

1. WHY DOES EPA WANT TO MODIFY THE CURRENT TREATMENT FACILITIES? COULDN'T MODIFICATION CAUSE LEAKAGE BETWEEN THE AQUIFERS FROM FURTHER DRILLING OR MAINTENANCE?

EPA RESPONSE: THE CURRENT EPA CLEANUP GOALS ARE SIGNIFICANTLY DIFFERENT FROM THOSE IDENTIFIED IN THE FDER CONSENT ORDER. THEREFORE, A TREATMENT SYSTEM THAT MEETS THE CRITERIA SPECIFIED IN THE ORDER WOULD NOT NECESSARILY MEET THE EPA CRITERIA FOR CLEANUP OF THE AQUIFER. FOR EXAMPLE, VINYL CHLORIDE AND TRICHLOROETHYLENE NOW HAVE MORE STRINGENT CLEANUP GOALS. THESE AND THE OTHER EPA CLEANUP GOALS ARE SPECIFIED IN THE RECORD OF DECISION.

EPA AND FDER WILL OVERSEE A MONITORING PROGRAM TO DETERMINE WHEN THE AQUIFER HAS BEEN REMEDIATED TO AN ACCEPTABLE LEVEL SO THAT THE TREATMENT SYSTEM IS NO LONGER REQUIRED. A DESIGN ANALYSIS WILL HELP DETERMINE SYSTEM EFFECTIVENESS AND EFFICIENCY AS WELL AS PREDICTING THE REMEDIATION TIME FRAME.

IT IS UNLIKELY THAT MODIFICATIONS TO THE EXISTING REMEDIATION SYSTEM WOULD RESULT IN LEAKAGE BETWEEN THE AQUIFERS. THE ADDITIONAL MONITORING WELLS WHICH ARE BEING CONSIDERED WOULD BE DRILLED USING ESTABLISHED METHODS THAT MINIMIZE THE CHANCE OF CREATING REMEDY-RELATED LEAKAGE BETWEEN THE AQUIFERS. THESE DRILLING METHODS OFFER THE ABILITY TO PLACE CASING IN THE BOREHOLE AT SELECTED DEPTHS TO EFFECTIVELY SEAL OFF ONE AQUIFER FROM ANOTHER.

EPA AND FDER WOULD REVIEW ANY PROPOSED DRILLING, WELL INSTALLATION, OR WELL COMPLETION PROCEDURES FOR COMPLIANCE WITH EPA-ACCEPTED PROCEDURES PRIOR TO DRILLING. EPA AND FDER WOULD ALSO CHECK THAT PROCEDURES WOULD NOT CREATE LEAKAGE BETWEEN THE AQUIFERS IN SITUATIONS WHERE SEVERAL AQUIFERS WOULD BE DRILLED THROUGH OR RESULT IN POTENTIALLY CONTAMINATED FLUIDS INSIDE THE CASING FROM ONE AQUIFER BEING INTRODUCED TO ANOTHER AQUIFER. DEVIATIONS FROM ACCEPTED PROCEDURES WOULD BE CORRECTED PRIOR TO ACTUAL DRILLING. EPA AND/OR FDER REPRESENTATIVES WOULD BE PRESENT DURING DRILLING, WELL INSTALLATION, AND WELL COMPLETION ACTIVITIES TO CONFIRM THAT PROPER PROCEDURES HAD BEEN FOLLOWED.

IN ADDITION TO THE ABOVE PRECAUTIONS, UNUSED MONITOR WELLS OR SUSPECT MONITOR WELLS WOULD BE DECOMMISSIONED TO PREVENT THEM FROM BEING OR BECOMING POTENTIAL CONDUITS FOR DOWNWARD OR UPWARD MIGRATION OF CONTAMINANTS. DECOMMISSIONING WOULD BE IN ACCORDANCE WITH RECOGNIZED METHODS WHICH PREVENT THE CREATION OF VERTICAL CONDUITS BETWEEN THE AQUIFERS BY REMOVING THE MATERIALS USED TO CONSTRUCT THE DECOMMISSIONED WELL AND SEALING THE DECOMMISSIONED WELL BOREHOLE WITH AN IMPERMEABLE GROUT.

THE GROUNDWATER TREATMENT SYSTEM WOULD CONTINUE TO OPERATE DURING ANY DECOMMISSIONING OR ADDITIONAL DRILLING PROCEDURES.

2. DO VOLATILE ORGANICS DECOMPOSE ON THEIR OWN NATURALLY? DO THEY DECOMPOSE TO SAFER OR MORE HARMFUL COMPONENTS?

EPA RESPONSE: SOME DECOMPOSE TO SAFER MATERIALS AND EVENTUALLY TO CARBON DIOXIDE (CO<sub>2</sub>). OTHERS DECOMPOSE THROUGH INTERMEDIARY STAGES THAT BECOME MORE TOXIC. THE DECOMPOSITION OF TRICHLOROETHYLENE (TCE) TO VINYL CHLORIDE (VC), SHOWN IN EXHIBIT 2, IS AN EXAMPLE OF THE ORGANIC DEGRADATION PRODUCT BEING MORE TOXIC THAN THE ORIGINAL CONTAMINANT.

3. WHAT WAS THE HAZARD RANKING SYSTEM RATING FOR HARRIS AND HOW DOES THIS COMPARE WITH OTHER SITES?

EPA RESPONSE: THE HAZARD RANKING SYSTEM (HRS) INVOLVES A MATHEMATICAL MODEL WHICH SCORES SITES FROM 0 TO 100, INDICATING THE PROBABILITY AND MAGNITUDE OF RISK TO PUBLIC HEALTH AND THE ENVIRONMENT. ANY SITE WITH A SCORE OF 28.50 OR HIGHER IS ELIGIBLE FOR INCLUSION ON THE NATIONAL PRIORITIES LIST (NPL), WHICH WOULD MAKE AVAILABLE FEDERAL SUPERFUND MONIES FOR CLEANING UP THE SITE AS NECESSARY. THE HIGHEST SCORE RECEIVED BY A SITE IS 75.60. THE HARRIS SITE RECEIVED AN HRS RANKING OF 35.52.

4. WHAT IS DONE WITH THE CONTAMINATED WASTE THAT IS ELIMINATED FROM THE WATER AT HARRIS?

EPA RESPONSE: VOCS IN THE GROUNDWATER ARE REMOVED FROM THE WATER IN AN AIR STRIPPING TOWER. THE DESIGN OF THE TOWER ALLOWS THE VOLATILES TO DISPERSE INTO THE AIR AT A RATE THAT YIELDED AN ACCEPTABLE RISK RANGE FOR PROTECTION OF HUMAN HEALTH BASED UPON THE FDER PROJECTED EMISSIONS CALCULATIONS. THE TREATED GROUNDWATER IS USED AS PROCESS WATER IN PARTS OF THE HARRIS MANUFACTURING PROCESS. THIS PROCESS WATER IS SUBSEQUENTLY DISCHARGED INTO A DEEP SALINE AQUIFER UNDER A PERMIT FROM FDER.

5. IS HARRIS INTRODUCING NEW WASTE PRODUCTS INTO THE AQUIFER OR HAS THAT BEEN STOPPED?

EPA RESPONSE: EPA IS NOT AWARE OF ANY NEW CONTAMINATION AS A RESULT OF THE CURRENT OPERATIONS AT THE SITE. HOWEVER, A COMPREHENSIVE ANALYSIS OF POTENTIAL SOURCE AREAS MAY IDENTIFY ANY ONGOING, PREVIOUSLY UNIDENTIFIED CONTAMINATION AREAS.

6. CAN THE WATER AT THE 40 FOOT ZONE MIGRATE IN DIRECTIONS OTHER THAN THE SOUTHERLY DIRECTION INDICATED BY THE WATER LEVEL CONTOUR MAP?

EPA RESPONSE: IN GENERAL, THE GROUNDWATER FLOW DIRECTION MAY BE DETERMINED FROM WATER LEVEL CONTOUR MAPS BY DRAWING LINES THAT INTERSECT THE WATER LEVEL ELEVATION CONTOURS AT RIGHT ANGLES. THIS INDICATES THAT THE OVERALL GROUNDWATER FLOW DIRECTION AT HARRIS IS SOUTHERLY IN THE 40 FOOT ZONE. LOCALIZED DEVIATIONS WITH MORE SOUTHEASTERLY OR SOUTHWESTERLY DIRECTIONS CAN OCCUR IN AREAS WHERE THE WATER LEVEL ELEVATION IS IRREGULAR OR WHERE THE DISTANCE BETWEEN THE WATER LEVEL ELEVATION CONTOURS IS LARGE RELATIVE TO THE DIFFERENCE IN WATER LEVEL ELEVATION THEREBY CREATING A NEARLY FLAT GRADIENT. HOWEVER, THESE LOCALIZED DEVIATIONS RESUME A SOUTHERLY FLOW DIRECTION WITHIN SHORT DISTANCES.

7. HOW CLOSE ARE THESE CONTAMINANTS TO THE SURFACE AND WHAT IS THE HIGHEST CONCENTRATION FOUND THERE?

EPA RESPONSE: VOLATILE ORGANIC CONTAMINANTS ARE PRESENT IN THE GROUNDWATER WITHIN 15 FEET BELOW THE GROUND SURFACE IN SOME AREAS OF THE GOVERNMENT SYSTEMS FACILITY. THE CONTAMINANT CONCENTRATIONS MEASURED IN GROUNDWATER FROM SP-2 (LOCATED NEAR BUILDING 6 IN THE 15-FOOT ZONE) IN DECEMBER, 1986, ARE:

- 42 PPB 1,1-DICHLOROETHANE (DCA)
- 19 PPB CHLOROETHANE
- 1.7 PPB TRANS-1,2-DICHLOROETHYLENE
- 1.5 PPB VINYL CHLORIDE
- 1.2 PPB TRICHLOROETHYLENE



#### 4.3 AIR QUALITY ISSUES

1. WHAT IS THE POSSIBLE INTERACTION OF VOLATILE COMPOUNDS WITH OTHER WASTE GASES OR AIRBORNE PRODUCTS FROM NEARBY SOURCES AND WHAT KIND OF EFFECTS DOES IT HAVE ON THE ATMOSPHERE?

EPA RESPONSE: EPA HAS NOT LOOKED AT LOCAL WASTE GAS ISSUES SINCE THE PRIMARY RISK BEING ADDRESSED BY THE AGENCY AT THIS TIME IS GROUNDWATER. HOWEVER, THE STATE IS INVOLVED IN AIR ANALYSES AT AND AROUND THE SITE. EPA WILL CONTINUE TO COORDINATE ANY FURTHER ANALYSIS WITH THE STATE. HOWEVER, DURING PILOT TESTING OF THE AIR STRIPPING TOWER AT HARRIS, FDER ANALYZED PROJECTED AIR EMISSIONS. THIS ANALYSIS INDICATED THAT THE PROJECTED EMISSION VOLUME WOULD NOT BE HIGH ENOUGH TO PRESENT AN UNACCEPTABLE HEALTH RISK.

2. WHAT ARE THE OTHER WASTE GASES THAT ARE BEING DISCHARGED FROM HARRIS CORPORATION OR ANY OTHER INDUSTRIES IN THE AREA?

FDER RESPONSE: THE FDER AIR SECTION HAS COLLECTED SOME AIR SAMPLES; SPECIFIC INFORMATION IS AVAILABLE FROM CHUCK COLLINS AT THE FDER DISTRICT OFFICE IN ORLANDO. HIS TELEPHONE NUMBER IS (407) 894-7555.

3. NUMEROUS RESIDENTS HAVE COMPLAINED TO CITY OFFICIALS AND AGENCIES ABOUT ODORS COMING FROM OR AROUND THE AREA OF HARRIS CORPORATION. NEITHER FDER NOR THE LOCAL FIRE DEPARTMENT HAVE BEEN ABLE TO IDENTIFY THE SOURCE. ONE RESIDENT MENTIONED THAT THE SMELL IS HEAVY AND SWEETISH. OTHERS DESCRIBE CHLORINE OR ASPIRIN-LIKE SMELLS. THE SWEET, HEAVY ODOR OCCURS FREQUENTLY AFTER SUNDOWN, SOMETIMES UNTIL THE EARLY MORNING HOURS. THIS SMELL CAN BE SO REPULSIVE IN THE AREA WHERE ONE RESIDENT LIVES WEST OF HARRIS SEMICONDUCTOR THAT SHE DOES NOT GO OUTSIDE. SHE AND OTHERS ARE NOW CONCERNED THAT THE ODOR COULD BE FROM THE AIR STRIPPER AND WOULD LIKE TO KNOW HOW TO RECOGNIZE THE SMELL OF VOLATILE ORGANIC COMPOUNDS.

EPA RESPONSE: EPA HAS BEEN INFORMED BY THE CITY OF THE CONCERNS OF THE ODORS AND WILL CONTINUE TO WORK WITH FDER WHO IS THE AGENCY ADDRESSING THIS CONCERN. CITY OFFICIALS HAVE INFORMED EPA THAT THIS ODOR PROBLEM IS RECENT. SINCE THE AIR STRIPPER OPERATION HAS BEEN ONGOING FOR SEVERAL YEARS, FDER WILL ALSO BE INVESTIGATING ANY NEW SOURCES. EXHIBIT 1 (SEE PAGE 14) INDICATES THE ODOR THRESHOLDS FOR VARIOUS VOCS.

#### 4.4 WATER TREATMENT ISSUES

1. WHAT IS DONE WITH THE SLUDGE RESIDUE WHICH REMAINS AFTER WATER TREATMENT PROCESSES AT GDU?

GDU RESPONSE: SLUDGES FROM WASTEWATER IS TREATED WITH LIME AND IS TRUCKED AS MIL-ORGANITE TO FARMS FOR DISPOSAL ON PASTURE LAND. IT HAS SOME FERTILIZER VALUE TO IT AND NO HEAVY METALS. IT IS TESTED QUARTERLY AND MEETS THE REGULATORY REQUIREMENTS FOR THAT TYPE OF DISPOSAL.

2. WHAT HAPPENS TO WATER THAT IS DEEP WELL INJECTED?

EPA RESPONSE: TREATED WATER IS INJECTED INTO A DEEP WELL IN A SALINE AQUIFER WHICH IS NOT POTABLE OR ACCEPTABLE FOR IRRIGATION. THIS DISPOSAL METHOD IS CURRENTLY OPERATING UNDER AN FDER UNDERGROUND INJECTION PERMIT. A CONSULTANT FOR HARRIS CORPORATION INDICATED THAT THE CASE DEPTH OF THE WELL IS 2000 FEET AND THE AQUIFER IS AN OPEN HOLE TO 2500 FEET. MONITORING WELLS OVERLAYING THIS ZONE HAVE NOT DETECTED ANY LEAKAGE FROM THE WELLS INTO OTHER AQUIFERS.

3. MEMBERS OF THE AUDIENCE WERE AWARE THAT GDU HAD SHUT DOWN A WELL RECENTLY BECAUSE OF VOC CONTAMINATION. ONE MEMBER OF THE AUDIENCE WANTED TO KNOW HOW EPA CAN SAY THAT HARRIS WELLS ARE SUCCESSFULLY CAPTURING CONTAMINANTS FROM THEIR SITE WHEN A GDU WELL HAS TO BE CLOSED DUE TO

#### INCREASED CONTAMINANTS.

EPA RESPONSE: THE GDU VEIL THAT WAS SHUT DOWN ABOUT 4 MONTHS AGO WAS NOT PART OF THE TREATMENT SYSTEM. HOWEVER, NONE OF THE GDU WELLS UNDERGOING TREATMENT CONTAINS VOLATILE ORGANICS WHICH EXCEED THE ALLOWED MAXIMUM CONTAMINANT LEVEL (MCL), EVEN BEFORE TREATMENT.

THE GDU WELL THAT WAS SHUT DOWN IS NEAR THE HARRIS BUILDING 100, RECENTLY IDENTIFIED AS AN AREA OF CONTAMINATION. IT IS NOT UNCOMMON TO FIND NEW AREAS OF CONTAMINATION OR TRACE CONTAMINANTS DURING AN INVESTIGATION. EPA IS ADDRESSING THESE FINDINGS IN A SUBSEQUENT OPERABLE UNIT OR AS A PART OF THE SYSTEM MODIFICATION IN THIS RECORD OF DECISION. GDU HAS A PROGRAM IN PLACE TO ASSURE THAT THE PUBLIC WATER SUPPLY IS TESTED AND MEETS DRINKING WATER STANDARDS BEFORE IT LEAVES THE PLANT.

#### 4.5 LOCAL WELL WATER SUPPLY ISSUES

1. A RESIDENT LIVING JUST WEST OF THE HARRIS SITE WAS CONCERNED ABOUT THE CIRCUMSTANCES UNDER WHICH GROUNDWATER WOULD MIGRATE FROM HARRIS IN A WESTERLY DIRECTION AND THEREBY BE DRAWN INTO THE RESIDENTIAL SPRINKLER SYSTEM.

EPA RESPONSE: IT IS UNLIKELY THAT GROUNDWATER WOULD MIGRATE WESTWARD FROM THE HARRIS SITE. PRIVATE WELLS USED FOR SPRINKLER SYSTEMS WILL NOT SIGNIFICANTLY IMPACT THE SOUTHWARD DIRECTIONAL DRAW OF GROUNDWATER WHICH IS CREATED BY THE EXTRAORDINARILY LARGE PUMPING RATE REQUIRED AT THE GDU WELLFIELD.

2. A RESIDENTIAL SUBDIVISION EAST OF TURKEY CREEK IS NOT SERVICED BY GDU. A RESIDENT OF THIS SUBDIVISION WANTED TO KNOW THE POSSIBILITY OF CONTAMINATION IN THEIR LOCAL WELLS, PERHAPS FROM ISOLATED CONTAMINATED GROUNDWATER POCKETS FROM YEARS AGO.

EPA RESPONSE: IF THERE IS CONCERN ABOUT THE WATER QUALITY OR ANOTHER POTENTIAL SOURCE OF CONTAMINATION NEARBY, EPA SUGGESTS THAT THE RESIDENT CONTACT THE LOCAL HEALTH DEPARTMENT OR FDER. WITHOUT ADDITIONAL INFORMATION REGARDING THE LOCAL WELLS IN QUESTION, FURTHER DISCUSSION WOULD BE SPECULATIVE.

3. ANOTHER RESIDENT IS CONCERNED ABOUT WHETHER WELL SURVEYS HAVE BEEN DONE FOR RESIDENTIAL WELLS NEAR THE HARRIS PROPERTY. NO ONE KNOWS HOW LONG CONTAMINATED GROUNDWATER MAY HAVE BEEN CONSUMED BY RESIDENTS, SINCE THE CONTAMINATION WAS NOT FOUND UNTIL 1981. THE PLUME LOCATION WAS FIRST IDENTIFIED IN 1984. THE RESIDENT WAS CONCERNED THAT CONTAMINATED WATER SUPPLIES MAY HAVE BEEN CONSUMED UNKNOWINGLY OVER A LONG PERIOD OF TIME.

EPA RESPONSE: A WELL SURVEY WAS DONE RECENTLY AS PART OF AN INVESTIGATION AT THE SEMICONDUCTOR COMPLEX ON THE HARRIS SITE.

WITHOUT HISTORICAL ANALYTICAL AND WATER WELL LOCATION DATA, IT IS SPECULATIVE TO DETERMINE WHERE AND HOW MUCH CONTAMINATION EXISTED BEFORE 1981. HOWEVER, HISTORICAL CONTAMINATION MAY HAVE ORIGINATED AT RADIATION CORPORATION, WHICH BEGAN OPERATIONS IN 1960. HARRIS HAS PLACED MONITOR WELLS EAST OF THE KNOWN PLUME AREA NEAR RESIDENCES TO DETERMINE WHETHER GROUNDWATER CONTAMINATION MAY BE PRESENT. SAMPLING DATA FROM THESE MONITOR WELLS HAVE NOT SHOWN EVIDENCE OF CONTAMINATION.

#### 4.6 SOIL TESTING ISSUES

1. HOW HAS SOIL CONTAMINATION BEEN ADDRESSED?

EPA RESPONSE: HARRIS HAS CONDUCTED INVESTIGATIONS TO DETERMINE THE IMPACT OF VOCS, METALS, AND

ACID EXTRACTABLE ORGANICS AT GOVERNMENT SYSTEMS AS WELL AS OTHER AREAS OF THE SITE. SOIL SAMPLES AT GOVERNMENT SYSTEMS WERE TAKEN BASED ON THE LOCATION OF POSSIBLE SOURCE AREAS IDENTIFIED BY PAST OPERATING AND HANDLING PRACTICES. THESE SAMPLING LOCATIONS ARE SHOWN IN EXHIBIT 3.

SOIL FOUND TO CONTAIN VOCs WERE REMEDIATED BY A PROCESS OF REMOVAL, SPREADING, AND DISCING THE SOIL IN ORDER TO ALLOW THE CHEMICALS TO VOLATILIZE. THIS REMEDIATION TOOK PLACE FOR SOILS IN THE AREA OF THE OLD NEUTRALIZATION DITCH AND TREATMENT LAGOONS NEAR THE EAST SIDE OF GOVERNMENT SYSTEMS AND FROM AN AREA ALONG THE LOCATION OF THE OLD STORMWATER DRAIN NORTH OF BUILDING 6.

2. WERE SOIL SAMPLES TAKEN BENEATH THE BUILDINGS? AT WHAT LEVELS WERE THESE CONTAMINANTS FOUND FROM THE SURFACE?

EPA RESPONSE: NUMEROUS SOIL SAMPLES HAVE BEEN TAKEN AROUND BUILDINGS AT GOVERNMENT SYSTEMS AND ON ONE OCCASION SAMPLES WERE TAKEN BY DRILLING HOLES INTO THE FLOOR OF BUILDING 6. NO VOCs WERE DETECTED IN SOIL SAMPLES TAKEN IN 1985 IN AND AROUND BUILDING 6. HOWEVER, SOME PHENOLIC COMPOUNDS (ACID EXTRACTABLE ORGANICS) WERE DETECTED AT LOW LEVELS (1 PPM OR LESS) IN EIGHT SAMPLES COLLECTED FROM FOUR LOCATIONS AT THE 3-FOOT AND 6-FOOT LEVELS. IN ADDITION, SEVERAL METALS WERE FOUND WITH COPPER AND LEAD BEING OF GREATEST CONCERN. FLUORIDE WAS ALSO REPORTED IN THESE SOIL SAMPLES. THE MAXIMUM LEVELS OF METALS IN THESE SAMPLES WERE 407 MG/KG COPPER, 38 MG/KG LEAD, AND 94 MG/KG FLUORIDE, ALL AT THE 6-FOOT LEVEL. SUBSEQUENT SOILS ANALYSES DONE IN 1987 FROM THREE BORINGS AROUND BUILDING 6 SHOWED PHENOLIC COMPOUNDS TO BE BELOW THE DETECTION LIMITS. THESE SAMPLES WERE TAKEN IN INTERVALS FROM 3 TO 39 FEET. COPPER WAS FOUND AT A MAXIMUM OF 37 MG/KG AT THE 39-FOOT DEPTH, AND FLUORIDE WAS FOUND AT MAXIMUM OF 6 MG/KG AT A DEPTH OF 5 FEET.

#### 4.7 WATER UTILITY COSTS AND SERVICES ISSUES

1. ONE CITIZEN EXPRESSED CONCERN THAT HE IS PAYING FOR THE COST OF WATER TREATMENT IN HIS MONTHLY UTILITY BILL.

EPA RESPONSE: HARRIS CORPORATION HAS BEEN RESPONSIBLE FOR THE COSTS ASSOCIATED WITH THE GROUNDWATER TREATMENT SYSTEM ON THE HARRIS PROPERTY AS WELL AS THE COSTS FOR CONSTRUCTING, MAINTAINING, AND MONITORING OF THE AIR STRIPPING TOWER AT GDU.

#### 4.8 HARRIS CORPORATION COMMENT

HARRIS CORPORATION SUBMITTED A LETTER DURING THE PUBLIC COMMENT PERIOD IDENTIFYING QUESTIONS AND CONCERNS ABOUT THE EPA PREFERRED ALTERNATIVE. THE LETTER AND ATTACHED REPORT ARE PROVIDED AS ATTACHMENT H.

1. THIS LETTER STATED THE HARRIS POSITION THAT "THE ISSUES OF CHEMICAL SOURCE AREAS AND METALS IN THE SOILS AND GROUNDWATER HAVE BEEN ADEQUATELY ADDRESSED" AND THAT "NO ADDITIONAL WORK ON SOILS REMOVAL OR METAL CHARACTERIZATION IS NECESSARY."

EPA RESPONSE: EPA HAS REVIEWED THE HARRIS COMMENT LETTER AND REPORT ENTITLED "SUMMARY OF SOILS INVESTIGATION AND METALS IN GROUNDWATER". DESPITE HARRIS' ASSERTION THAT "THIS REPORT INDICATES METALS ARE NOT AN ISSUE OF CONCERN AT THE SITE, THERE ARE NO EXISTING SOURCES OF CHEMICALS REMAINING IN THE SOILS AND SEDIMENTS, AND NO ADDITIONAL WORK ON SOILS REMOVAL OR METAL CHARACTERIZATION IS NECESSARY.", METALS IN THE SOIL AND GROUNDWATER ARE A CONCERN. THE REPORT IS NOT SUFFICIENT TO ADDRESS THIS ISSUE. SOIL REMEDIAL LEVELS BASED UPON ANALYTICAL METHODS WITH WHICH WE ARE UNFAMILIAR MAY NOT BE SUFFICIENTLY PROTECTIVE OF GROUNDWATER QUALITY AND THEREFORE MAY NOT SUPPORT THE REMEDIAL ACTION TAKEN BY HARRIS. AS A RESULT, ADDITIONAL SOIL/SOURCE CHARACTERIZATION MAY BE NECESSARY AT THE HARRIS SITE.

HYDROXIDE SLUDGES WERE REPORTEDLY OBSERVED IN THE NEUTRALIZATION LAGOON, BUT METAL ANALYSES WERE NOT PERFORMED. EPA HAS NOT LOCATED A DISCUSSION OF WHAT BECAME OF THE HYDROXIDE SLUDGES, WHICH ARE SOURCES FOR METALS. IN ADDITION, THE GROUNDWATER MONITORING PROGRAM FOR METALS HAS BEEN INCONSISTENT; NOT ALL WELLS HAVE BEEN ANALYZED FOR METALS. THE WELLS WHICH HAVE UNDERGONE METALS ANALYSES SHOW AN IRREGULAR SAMPLING FREQUENCY. MANY WELLS LISTED IN THE TABLES WERE ONLY SAMPLED ONCE, TYPICALLY IN THE FOURTH QUARTER OF 1986. THE IRREGULAR SAMPLING FREQUENCY MAKES IT DIFFICULT TO DETERMINE THE NATURE OF THE CONTAMINATION AND THE BEHAVIOR OF CONTAMINANTS OVER TIME. THUS, IT IS NOT POSSIBLE TO CONCLUDE THAT METALS-ARE NOT AN ISSUE OF CONCERN. ALSO, THE EXISTING TREATMENT SYSTEM (AIR STRIPPING) DOES NOT REMOVE METALS FROM GROUNDWATER.

THERE ARE INSTANCES WHERE EPA CONTAMINANT-SPECIFIC CLEANUP GOALS WERE EXCEEDED, BUT SUBSEQUENT SAMPLING WAS NOT PERFORMED. FOR EXAMPLE, THERE WAS NO SUBSEQUENT SAMPLING IN WELL SC-17S WHERE LEAD WAS FOUND AT 140 PARTS PER BILLION IN FEBRUARY, 1988. THE EPA HEALTH-BASED CLEANUP LEVEL FOR LEAD IS 5 PARTS PER BILLION. IN ADDITION, THERE ARE MANY CASES WHERE THE DETECTION LIMIT EXCEEDED THE EPA CLEANUP STANDARD FOR THE CONTAMINANT, BUT SUBSEQUENT SAMPLING WAS NOT PERFORMED TO ATTAIN A DETECTION LIMIT BELOW THE CLEANUP STANDARD.

2. THE HARRIS COMMENT LETTER STATES THAT "THE EXISTING RECOVERY SYSTEM IS NOT ONLY REDUCING THE CONCENTRATION OF CHEMICALS IN THE GROUNDWATER, BUT ALSO EFFECTIVELY CAPTURING THE PLUME AND EFFECTIVELY REMEDIATING THE AQUIFER." THEREFORE, NO MODIFICATION TO THE EXISTING SYSTEM IS NECESSARY.

EPA RESPONSE: EPA HAS NOT YET REVIEWED THE GROUNDWATER MODELING PROGRAM CONDUCTED BY GERAGHTY & MILLER ON THE EXISTING HARRIS RECOVERY SYSTEM. HOWEVER, THIS RECOVERY SYSTEM WAS DESIGNED TO MEET THE REQUIREMENTS SPECIFIED IN AN ADMINISTRATIVE ORDER ON CONSENT WITH FDER. THE CURRENT EPA CLEANUP CRITERIA FOR THE AQUIFER ARE MORE STRINGENT, IN SOME CASES, THAN THOSE IDENTIFIED IN THE ORDER. ALSO, THE PLUMES HAVE BEEN DEFINED BY AN AGGREGATE VALUE FOR VOCS RATHER THAN BY VALUES FOR INDIVIDUAL CONTAMINANTS. THEREFORE, IT IS UNCERTAIN WHETHER OR NOT THE EXISTING RECOVERY SYSTEM IS EFFECTIVELY CAPTURING THE PLUMES AND THUS PREVENTING CONTAMINANTS FROM ESCAPING THE RECOVERY SYSTEM. AS A RESULT, EPA MUST FIRST VERIFY THROUGH A COMPREHENSIVE SITE GROUNDWATER EVALUATION WHAT MODIFICATIONS ARE NECESSARY AND THEN DETERMINE THE SPECIFIC MODIFICATIONS REQUIRED TO OPTIMIZE THE SYSTEM FOR TREATMENT OF THE AQUIFER.

UNTIL THIS COMPREHENSIVE EVALUATION OCCURS, IT IS UNCERTAIN WHAT MODIFICATIONS WILL BE REQUIRED. THE MODIFICATIONS MAY INVOLVE A DIFFERENT GROUNDWATER RECOVERY SYSTEM, I.E. INSTALLATION OF ADDITIONAL RECOVERY WELLS OR DISCONTINUED USE OF EXISTING WELLS. IN ADDITION, THE SAMPLING REGIME MAY BE MODIFIED TO VERIFY THAT THE SYSTEM IS MEETING EPA CLEANUP CRITERIA. MONITORING WELLS IN POTENTIAL SOURCE AREAS MAY BE SEALED (OR DECOMMISSIONED), IF NECESSARY, TO PREVENT THE DOWNWARD MIGRATION OF CONTAMINATION FROM THE SURFACE. SIMILARLY, EPA WILL MAKE AN INDEPENDENT DETERMINATION OF WHETHER OR NOT THE WELLS "WERE CONSTRUCTED IN A FASHION THAT SEALS THE ZONES OF THE AQUIFER FROM INTERCONNECTING."

3. HARRIS "QUESTIONS THE PREMISE THAT AIR EMISSIONS FROM THE AIR STRIPPING TOWER MAY REQUIRE ADDITIONAL TESTING."

EPA RESPONSE: TESTING OF THE AIR EMISSIONS FROM THE AIR STRIPPER WILL BE REQUIRED TO DEMONSTRATE COMPLIANCE WITH APPLICABLE AIR CLEANUP STANDARDS. THE EPA AIR, PESTICIDES AND TOXICS MANAGEMENT DIVISION STATES THAT THE AIR STRIPPER TECHNOLOGY WILL COMPLY WITH THE CLEANUP STANDARDS, BUT THIS DOES NOT RELIEVE HARRIS OF ITS RESPONSIBILITY TO DEMONSTRATE THAT THE AIR EMISSIONS AND EFFLUENTS ARE IN COMPLIANCE WITH FEDERAL AND FLORIDA AIR QUALITY STANDARDS.

4. HARRIS STATES THAT "ADDITIONAL ANALYSIS OF WELLS OUTSIDE THE IDENTIFIED PLUME AREAS IS UNNECESSARY" BECAUSE OF THE EXTENSIVE SAMPLING CONDUCTED TO DATE.

EPA RESPONSE: EPA CONFIRMS THAT AN EXTENSIVE AMOUNT OF SAMPLING DATA HAS BEEN COLLECTED AT THE SITE. HOWEVER, THE SAMPLING REGIME WAS NOT SYSTEMATIC IN SOME CASES. AS A RESULT, IT IS DIFFICULT TO GET A COMPREHENSIVE VIEW OF THE CONTAMINATION AT THE SITE. IN ADDITION, CONTAINMENT OF PLUMES WILL ULTIMATELY BE DETERMINED BY THE REGULAR SAMPLING OF MONITOR VEILS OUTSIDE THE PLUME AREAS.

5. THE HARRIS COMMENT LETTER STATES THE GOVERNMENT SYSTEMS GROUNDWATER REMEDIATION SYSTEM IS NOT AN INTERIM MEASURE, BUT WAS DESIGNED AS THE "FINAL REMEDIAL ALTERNATIVE FOR THE IDENTIFIED PLUMES OF CHEMICALS" UNDER THE GOVERNMENT SYSTEMS FACILITY.

EPA RESPONSE: EPA POLICY ON THE EXTRACTION AND TREATMENT OF CONTAMINATED GROUNDWATER CONSIDERS RECENT EVIDENCE SUGGESTING THAT IT MAY BE MORE DIFFICULT THAN IS OFTEN ESTIMATED TO ACHIEVE CLEANUP CONCENTRATION GOALS IN GROUNDWATER. THE POLICY RECOMMENDS AN APPROACH INVOLVING THE INITIATION OF EARLY ACTION WHILE GATHERING MORE DETAILED DATA PRIOR TO COMMITTING TO FULL-SCALE RESTORATION. THIS RECOMMENDATION ENCOURAGES THE COLLECTION OF DATA TO ALLOW FOR THE DESIGN OF AN EFFICIENT CLEANUP APPROACH THAT MORE ACCURATELY ESTIMATES THE TIME FRAMES REQUIRED FOR ACHIEVING THE GROUNDWATER CLEANUP GOALS. EARLY ACTION PROVES VALUABLE IN PREVENTING THE CONTAMINANT PLUME FROM SPREADING WHILE THE INVESTIGATION TO OPTIMIZE THE REMEDIATION SYSTEM PROGRESSES.

6. THE HARRIS LETTER STATES THAT "SHOULD GDU CHOOSE UNILATERALLY TO SIGNIFICANTLY MODIFY ITS GROUNDWATER WITHDRAWAL SCHEME, THIS WILL DIRECTLY IMPACT THE ABILITY OF THE HARRIS REMEDIAL SYSTEM TO CONTROL THE PLUME IN THE LOWER SURFICIAL AQUIFER."

EPA RESPONSE: DUE TO THE LONG-TERM NATURE OF THE CLEANUP PROCESS, THE HARRIS REMEDIATION SYSTEM MUST BE ABLE TO FUNCTION INDEPENDENTLY OF GDU GROUNDWATER WITHDRAWALS. THE REMEDIAL SYSTEM SHOULD BE DESIGNED SUCH THAT IT CAN TAKE ADVANTAGE OF GDU'S WITHDRAWALS AND THE PREDICTABLE IMPACTS ON THE GROUNDWATER FLOW, AS WELL AS CONTAMINANT TRANSPORT. THE REMEDIAL SYSTEM SHOULD ALSO BE DEMONSTRATED TO BE ADAPTABLE AND RESPONSIVE TO MODIFICATIONS IN GDU'S GROUNDWATER WITHDRAWAL SCHEME.

7. THE LETTER STATES THAT "IT IS NOT NECESSARY OR APPROPRIATE FOR WATER FROM THE TREATMENT SYSTEM TO MEET POTABLE WATER STANDARDS" BECAUSE THE TREATED WATER IS USED STRICTLY FOR INDUSTRIAL PURPOSES.

EPA RESPONSE: THE TREATMENT STANDARDS FOR DISPOSING TREATED GROUNDWATER DEPEND UPON THE INTENDED DISPOSAL METHOD. IF TREATED GROUNDWATER IS TO BE USED FOR HUMAN CONSUMPTION OR RETURNED TO THE AQUIFER VIA PERCOLATION PONDS OR REINJECTION WELLS, THE DRINKING WATER QUALITY STANDARDS ARE THE TREATMENT CRITERIA.

THIS RECORD OF DECISION SELECTS A DISPOSAL OPTION INVOLVING THE USE OF PERMITTED UNDERGROUND INJECTION WELLS OR, AS AN ALTERNATE, SURFACE WATER DISCHARGE. IN EITHER CASE, THE TREATED WATER MUST MEET PERMIT REQUIREMENTS; THE UNDERGROUND INJECTION CONTROL (USC) PERMIT FOR DEEP WELL INJECTION AND THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT FOR SURFACE WATER DISCHARGE. THESE PERMITS SPECIFY THE LEVELS TO WHICH THE GROUNDWATER MUST BE TREATED BEFORE DISPOSAL. FOR EXAMPLE, BEFORE DISPOSAL INTO THE USC PERMITTED WELLS, THE TREATED GROUNDWATER MUST NOT CONTAIN HAZARDOUS WASTE. REGIONAL GUIDANCE STATES THAT EPA CONSIDERS THAT THE GROUNDWATER NO LONGER CONTAINS HAZARDOUS WASTE ONCE IT HAS BEEN TREATED TO HEALTH-BASED LEVELS.

8. EPA HAS REVIEWED THE REPORT THAT ACCOMPANIED THE COMMENT LETTER. THIS REPORT RECAPS DATA COLLECTED BETWEEN 1986 THROUGH MARCH 1989 WHICH HAS BEEN PRESENTED IN PREVIOUS REPORTS.

EPA RESPONSE: THE STATEMENT THAT "SUFFICIENT DATA ARE AVAILABLE TO ASSESS THE LEVEL OF METALS IN

GROUNDWATER AT DIFFERENT DEPTHS ACROSS THE SITE." IS INACCURATE. MOST OF THE MONITORING WELLS ON THE SITE HAVE NOT BEEN ANALYZED RECENTLY FOR METALS. GIVEN THIS, IT IS NOT POSSIBLE TO CONCLUDE THAT "METAL LEVELS IN THE GROUNDWATER DO NOT CURRENTLY EXCEED MCLS..."

THE DATA INCLUDED IN THE REPORT SHOWS THAT GROUNDWATER CLEANUP GOALS FOR METALS ARE EXCEEDED (OR ARE POTENTIALLY EXCEEDED) IN SEVERAL INSTANCES.

IN TWELVE WELLS SAMPLED IN 1987, A DETECTION LIMIT OF 50 PARTS PER BILLION (PPB) WAS REPORTED FOR CADMIUM. THE MAXIMUM CONTAMINANT LEVEL (MCL) IS 10 PPB. THEREFORE, WE DO NOT KNOW IF THESE WELLS ARE CONTAMINATED TO A LEVEL THAT EXCEEDS THE MCL. THESE WELLS HAVE NOT BEEN RESAMPLED. TWO WELLS HAD POSITIVE RESULTS FOR CADMIUM, ONE ABOVE AND ONE BELOW THE MCL.

CHROMIUM CONCENTRATIONS HAVE BEEN RECORDED AT LEVELS WELL ABOVE THE MCL OF 50 PARTS PER BILLION IN NUMEROUS WELLS. ALTHOUGH THE MORE RECENT SAMPLING RESULTS DO NOT SHOW ELEVATED LEVELS OF CHROMIUM IN THESE WELLS, THE LIKELY EXPLANATION FOR THIS PHENOMENON IS THAT THE CONTAMINANT PLUME HAS MOVED AWAY FROM THESE WELLS OVER THE INTERVENING THREE YEAR PERIOD. THIS SITUATION ILLUSTRATES THE NEED TO MORE COMPLETELY CHARACTERIZE THE NATURE AND EXTENT OF GROUNDWATER CONTAMINATION AT THE SITE.

AT LEAST FIVE WELLS HAVE SHOWN LEVELS OF LEAD ABOVE THE MCL OF 50 PPB, AND NUMEROUS OTHERS HAVE BEEN SHOWN TO BE CONTAMINATED ABOVE THE HEALTH-BASED CLEANUP LEVEL OF 5 PPB. THE FREQUENCY OF POSITIVE DETECTIONS HAS DECREASED OVER TIME. HOWEVER, IT IS UNCERTAIN TO WHAT LOCATIONS THESE METALS HAVE MIGRATED IN THE GROUNDWATER. IN ADDITION, THE ASSUMPTION THAT THE LEAD CONCENTRATION IN SC-17S IS ANOMALOUS IS INAPPROPRIATE. AN APPROPRIATE PROCEDURE WOULD BE TO PERFORM SUBSEQUENT SAMPLING TO CONFIRM EITHER THAT THE VALUE IS ANOMALOUS OR THAT LEAD IS PRESENT IN THE GROUNDWATER.

THE HYDROXIDE SLUDGES IN THE OLD NEUTRALIZATION LAGOON (NOW UNDER BUILDING 5) WERE NOT CHEMICALLY CHARACTERIZED FOR METALS. EPA HAS NOT RECEIVED DOCUMENTATION FOR WHAT BECAME OF THESE SLUDGES. WHETHER OR NOT THE HYDROXIDE SLUDGES AND UNDERLYING SOILS WOULD HAVE REQUIRED REMEDIATION IS NOT KNOWN. AS A RESULT, THE AREA AROUND BUILDING 5 REMAINS A POTENTIAL SOURCE AREA.

BASED UPON THE DATA PRESENTED IN THE REPORT, IT IS NOT POSSIBLE TO CONCLUDE THAT "METALS ARE NOT PRESENT IN GROUNDWATER... AT LEVELS THAT WARRANT REMEDIATION." THE ABOVE-MENTIONED EXAMPLES INDICATE THAT THE METALS CONTAMINATION AT THE SITE IS NOT WELL-DEFINED AND POTENTIALLY SIGNIFICANT. IF HARRIS HAS ADDITIONAL DATA WHICH HAS BEEN USED TO REACH THEIR CONCLUSION, THE DATA OR STUDIES SHOULD BE MADE AVAILABLE TO EPA FOR ANALYSIS.

#### 4.9 GENERAL DEVELOPMENT UTILITIES COMMENT

GDU SUBMITTED TWO LETTERS DURING THE PUBLIC COMMENT PERIOD IDENTIFYING CONCERNS ABOUT EPA ACTIONS AND THE PREFERRED REMEDIAL ALTERNATIVE AT THE HARRIS CORPORATION SITE. THESE LETTERS ARE PRESENTED IN ATTACHMENT I.

1. THE GDU LETTER POSES THE QUESTION OF WHETHER THE CLEANUP STANDARDS WILL BE THE CURRENT EPA STANDARDS AND NOT THOSE STANDARDS IDENTIFIED IN THE CONSENT ORDER BETWEEN FDER AND HARRIS.

EPA RESPONSE: THE CLEANUP STANDARDS IDENTIFIED IN THE EPA RECORD OF DECISION FOR OPERABLE UNIT ONE OF THE HARRIS SITE ARE BASED ON THE CONTAMINANT LEVELS NECESSARY TO RESTORE BENEFICIAL USE OF THE AQUIFER. THREE OF THESE CLEANUP LEVELS (TRICHLOROETHYLENE, VINYL CHLORIDE, AND METHYLENE CHLORIDE) ARE MORE STRINGENT THAN THOSE IDENTIFIED IN THE 1983 FDER/HARRIS CONSENT ORDER. THESE AQUIFER CLEANUP LEVELS ARE OBTAINED FROM A NUMBER OF SOURCES AS APPROPRIATE FOR EACH CONTAMINANT. THESE SOURCES ARE: THE CURRENT STATE OF FLORIDA MAXIMUM CONTAMINANT LEVELS (MCLS),

HEALTH-BASED CRITERIA FOR A ONE IN ONE MILLION EXCESS CANCER RISK LEVEL, THE CLEANUP CRITERIA IDENTIFIED IN THE 1983 FDER/HARRIS CONSENT ORDER, AND SECONDARY MCLS.

2. THE GDU LETTER EXPRESSES CONCERN THAT A TEMPORARY SHUT-DOWN OF THE HARRIS REMEDIATION SYSTEM WILL ACCELERATE MIGRATION OF THE CONTAMINANT PLUME AND AFFECT GDU WELLS.

EPA RESPONSE: SUCH A SHUT-DOWN WOULD BE INITIATED ONLY AFTER CONTAMINANT LEVELS IN THE AQUIFER HAD REACHED OR WAS BELOW THE CLEANUP GOALS SPECIFIED IN THE ROD AND HAD REACHED AN ASYMPTOTIC LEVEL BELOW WHICH NO DECREASE OCCURRED OVER A SIGNIFICANT PERIOD OF TIME. IN THIS CASE, A TEMPORARY SHUTDOWN OF THE EXTRACTION SYSTEM CONCURRENT WITH CAREFUL MONITORING OF THE GROUNDWATER WOULD ALLOW US TO DETERMINE WHETHER OR NOT THE SOURCES OF CONTAMINATION HAD BEEN REMOVED.

3. IT IS UNCLER HOW THE MONITORING PROGRAM IDENTIFIED IN THE ROD WILL BE IMPLEMENTED.

EPA RESPONSE: THE EXISTING MONITORING PROGRAM WILL BE MODIFIED AS NECESSARY TO FULLY CHARACTERIZE THE EXTENT OF CONTAMINATION AT THE SITE. A MONITORING PROGRAM WILL CONTINUE FOR AN ESTIMATED THREE YEARS OR UNTIL THE CLEANUP GOALS ARE MET. FOLLOWING THE ONSET OF THE EPA SPECIFIED REMEDIAL ACTION (ALTERNATIVE 3), EPA WILL CONDUCT A REVIEW OF THE SITE TO VERIFY THAT THE AQUIFER HAS BEEN RESTORED TO BENEFICIAL USE.

4. GDU IS CONCERNED THAT THE HARRIS REMEDIATION SYSTEM IS DEPENDENT UPON THE GDU WATER SUPPLY WELLS.

EPA RESPONSE: AS DESCRIBED EARLIER, DUE TO THE LONG-TERM NATURE OF THE CLEANUP PROCESS, THE HARRIS REMEDIATION SYSTEM MUST BE ABLE TO FUNCTION INDEPENDENTLY OF GDU GROUNDWATER WITHDRAWALS. THE REMEDIAL SYSTEM MAY BE ABLE TO TAKE ADVANTAGE OF GDU'S WITHDRAWALS AND ANY PREDICTABLE IMPACTS ON THE GROUNDWATER FLOW. THE REMEDIAL SYSTEM SHOULD ALSO BE ADAPTABLE AND RESPONSIVE TO MODIFICATIONS IN GDU'S GROUNDWATER WITHDRAWAL SCHEME.

## **5.0 REMAINING PUBLIC CONCERNS**

ISSUES AND CONCERNS WHICH EPA WAS UNABLE TO ADDRESS DURING REMEDIAL PLANNING ACTIVITIES FOR OPERABLE UNIT ONE, GROUNDWATER REMEDIATION AT THE GOVERNMENT SYSTEMS COMPLEX, INCLUDED THE FOLLOWING:

- SPECIFYING THE MODIFICATIONS TO BE MADE TO THE EXISTING GROUNDWATER EXTRACTION AND TREATMENT SYSTEM.
- REQUEST FOR EPA TO THOROUGHLY REVIEW THE ISSUES RAISED AT THE PUBLIC MEETING AND TO ADVISE THE PUBLIC OF ANTICIPATED ACTIONS IN A FOLLOW-UP MEETING.

SPECIFIC MODIFICATIONS TO THE TREATMENT SYSTEM WILL NOT BE AVAILABLE UNTIL A DESIGN ANALYSIS IS CONDUCTED FOR THE TREATMENT SYSTEM. EPA WILL RELEASE THIS INFORMATION AS SOON AS IT IS AVAILABLE.

ADDITIONAL OPERABLE UNITS MAY BE DESIGNED FOR GROUNDWATER CLEANUP AT OTHER PORTIONS OF THE HARRIS FACILITY, E.G., THE SEMICONDUCTOR COMPLEX AND BUILDING 100. ANOTHER POTENTIAL OPERABLE UNIT IS SOURCE CONTROL OR SOIL CLEANUP OF DISCRETE SOURCES AT THE FACILITY. THE PUBLIC WILL BE NOTIFIED OF ONGOING INVESTIGATIONS AND FINDINGS AS WELL AS OPPORTUNITIES FOR PUBLIC PARTICIPATION.

TABLE I

**SAMPLING DATA FOR GROUNDWATER CONTAMINANTS OF  
CONCERN AT GOVERNMENT SYSTEMS**

CARCINOGENS	MAXIMUM CONCENTRATION (UG/L)	MEAN (UG/L) (A)	NUMBER OF SAMPLES	FREQUENCY OF DETECTION
1,1-DICHLOROETHANE	1790	123	29	22
1,1-DICHLOROETHYLENE	671	50	29	8
METHYLENE CHLORIDE	26	5	29	3
TRICHLOROETHYLENE	1860	311	29	16
VINYL CHLORIDE	2280	323	29	18
NONCARCINOGENS (B)				
VOCS				
1,1-DICHLOROETHANE	1790	123	29	22
1, 1-DICHLOROETHYLENE	671	50	29	8
METHYLENE CHLORIDE	26	5	29	3
CHLOROBENZENE	16	3	29	10
1,2-DICHLOROBENZENE	19	5	29	8
1,2-DICHLOROETHYLENE	240	84	29	24
ETHYL BENZENE	76	13	29	5
METALS				
CHROMIUM	30	C	8	1
LEAD	80	56	9	7
COPPER (D)				
MERCURY	E	E	12	0
FLUORIDE	8580	3181	15	11

A - THIS CONCENTRATION REPRESENTS THE 95 PERCENT UPPER CONFIDENCE LIMIT ON THE ARITHMETIC AVERAGE.

B - THIS CATEGORY INCLUDES CARCINOGENS WHICH ARE ALSO CONSIDERED TO HAVE NONCARCINOGENIC TOXIC EFFECTS.

C - CHROMIUM WAS ONLY DETECTED AT ONE SAMPLING LOCATION.

D - COPPER WAS NOT DETECTED AT LEVELS OF CONCERN.

E - MERCURY WAS NOT DETECTED. HOWEVER, THE DETECTION LIMIT THAT WAS USED IS 2.5 TIMES GREATER THAN THE EPA REQUIRED QUANTITATION LIMIT.



TABLE II

REFERENCE DOSES (RFD) AND CANCER POTENCY FACTORS (Q\*)  
FOR CONSTITUENTS DETECTED AT GOVERNMENT SYSTEMS

CONSTITUENT	REFERENCE DOSE ORAL (MG/KG/DAY)	CANCER POTENCY FACTOR ORAL (MG/KG/DAY)
ORGANICS		
TRICHLOROETHYLENE	---	0.011
VINYL CHLORIDE	---	2.3
1,1-DICHLOROETHANE	0.12	0.091
1,1-DICHLOROETHYLENE	0.009	0.6
METHYLENE CHLORIDE	0.060	0.0075
CHLOROBENZENE	0.027	---
1,2-DICHLOROBENZENE	0.089	---
T-1,2-DICHLOROETHYLENE	0.020	---
ETHYL BENZENE	0.10	---
INORGANICS		
MERCURY	0.0003	---
CHROMIUM	0.0050	---
COPPER	---	---
FLUORIDE	0.060	---
LEAD	0.0014	---

CONSTITUENT	EPA CLASSIFICATION
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ORGANICS

TRICHLOROETHYLENE	B2
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VINYL CHLORIDE	A
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1,1-DICHLOROETHANE	B2
--------------------	----

1,1-DICHLOROETHYLENE	C
----------------------	---

METHYLENE CHLORIDE	B2
--------------------	----

CHLOROBENZENE	D
---------------	---

1,2-DICHLOROBENZENE	D
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T-1,2-DICHLOROETHYLENE	D
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ETHYL BENZENE	D
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INORGANICS

MERCURY	D
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CHROMIUM	D (ORAL)
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COPPER	D
--------	---

FLUORIDE	D
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LEAD	D
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A = HUMAN CARCINOGEN (SUFFICIENT EVIDENCE IN HUMANS)

B1 = PROBABLE HUMAN CARCINOGEN (LIMITED EVIDENCE IN HUMANS)

B2 = PROBABLE HUMAN CARCINOGEN (LIMITED EVIDENCE IN ANIMALS)

C = POSSIBLE HUMAN CARCINOGEN (LIMITED EVIDENCE IN ANIMALS)

D = INADEQUATE EVIDENCE OF ANIMAL OR HUMAN CARCINOGENICITY

--- = AGENCY VERIFIED TOXICITY NUMBER IS NOT AVAILABLE

TABLE III

RISK CHARACTERIZATION FOR GROUNDWATER CONTAMINANTS  
AT GOVERNMENT SYSTEMS

CARCINOGENS	GROUNDWATER RISK LEVEL MAXIMUM/AVERAGE	(10 <sup>-6</sup> ) EXCESS CANCER RISK CONCENTRATION (UG/L)
1,1-DICHLOROETHANE	4.6 X (10 <sup>-1</sup> )/3.1 X (10 <sup>-4</sup> )	0.39
1,1-DICHLOROETHYLENE	1.1 X (10 <sup>-2</sup> )/8.3 X (10 <sup>-4</sup> )	0.06
METHYLENE CHLORIDE	5.5 X (10 <sup>-6</sup> )/1.1 X (10 <sup>-6</sup> )	4.80
TRICHLOROETHENE	5.7 X (10 <sup>-4</sup> )/9.6 X (10 <sup>-5</sup> )	3.20
VINYL CHLORIDE	1.5 X (10 <sup>-1</sup> )/2.1 X (10 <sup>-2</sup> )	0.02

NONCARCINOGENS (A)	HAZARD QUOTIENT MAXIMUM/AVERAGE	CONCENTRATION EQUIVALENT TO RFD (UG/L) (B)
1,1-DICHLOROETHANE	4.3 X (10 <sup>-1</sup> )/2.9 X (10 <sup>-2</sup> )	700
1,1-DICHLOROETHYLENE	2.1 X (10 <sup>-0</sup> )/1.6 X (10 <sup>-1</sup> )	63
METHYLENE CHLORIDE	1.2 X (10 <sup>-2</sup> )/2.5 X (10 <sup>-3</sup> )	420
CHLOROBENZENE	1.6 X (10 <sup>-2</sup> )/3.6 X (10 <sup>-3</sup> )	140
1,2-DICHLOROBENZENE	6.2 X (10 <sup>-3</sup> )/1.6 X (10 <sup>-3</sup> )	630
1,2-DICHLOROETHYLENE	3.4 X (10 <sup>-1</sup> )/1.2 X (10 <sup>-1</sup> )	140
ETHYL BENZENE	2.2 X (10 <sup>-2</sup> )/3.8 X (10 <sup>-3</sup> )	700
MERCURY	C	2
CHROMIUM (D)	1.7 X (10 <sup>-1</sup> )	35
COPPER	E	---
FLUORIDE	4.1 X (10 <sup>+0</sup> )/1.5 X 9(0 <sup>+0</sup> )	420

A = THIS CATEGORY INCLUDES CARCINOGENS WHICH ARE ALSO CONSIDERED TO HAVE NONCARCINOGENIC TOXIC EFFECTS. HAZARD VALUES WERE NOT QUANTIFIED FOR LEAD SINCE THERE ARE NO CURRENT AGENCY VERIFIED TOXICITY VALUES FOR LEAD.

B = THIS CONCENTRATION REPRESENTS THE GROUNDWATER CONCENTRATION EQUIVALENT TO THE RFD AND A 20 PERCENT RELATIVE SOURCE CONTRIBUTION.

C = MERCURY WAS NOT DETECTED. HOWEVER, IN SOME CASES, THE DETECTION LIMIT USED IS 2.5 TIMES GREATER THAN THE CLP REQUIRED QUANTITATION LIMIT.

D = CHROMIUM WAS DETECTED ABOVE THE DETECTION LIMIT IN ONLY ONE WELL. THE MAXIMUM HAZARD QUOTIENT WAS BASED ON THE DATA FROM THIS WELL AND THE RFD FOR HEXAVALENT CHROMIUM.

E = THE HAZARD QUOTIENT WAS NOT CALCULATED BECAUSE THERE IS NO RFD.

TABLE IV

AQUIFER CLEANUP LEVELS SPECIFIED  
IN THE FDER/HARRIS CONSENT ORDER

CONSENT AGREEMENT CONSTITUENT	DESIGN SPECIFICATION (UG/L)
TRICHLOROETHYLENE	LT 5
1,1-DICHLOROETHYLENE	LT 5
CIS-1,2-DICHLOROETHYLENE	LT 5
TRANS-1,2-DICHLOROETHYLENE	LT 5
VINYL CHLORIDE	LT 5 (*)
1,1,1-TRICHLOROETHANE	LT 5
1,1-DICHLOROETHANE	LT 5
METHYLENE CHLORIDE	LT 25
ORTHO-DICHLOROBENZENE	LT 25
CHLOROBENZENE	LT 25
ETHYL BENZENE	LT 25
TOLUENE	LT 25

(\*) THIS CONCENTRATION IS HIGHER THAN THE CURRENT MCL OR PMCL

**TABLE V**  
**GOVERNMENT SYSTEMS GROUNDWATER REMEDIATION GOALS**

CONTAMINANTS	CONCENTRATION (PPB)	BASIS
VINYL CHLORIDE	1	MCL (1)
TRICHLOROETHYLENE	3	MCL (1)
1,1-DICHLOROETHYLENE	5	CO
C-1,2-DICHLOROETHYLENE	5	CO
METHYLENE CHLORIDE	5	1E-6, PMCL,
TBC		
1,1-DICHLOROETHANE	5	CO
CHLOROBENZENE	25	CO
T-1,2-DICHLOROETHYLENE	5	CO
1,2-DICHLOROBENZENE	25	CO
ETHYL BENZENE	25	CO
TOLUENE	25	CO
1,1,1-TRICHLOROETHANE	5	CO
TRICHLOROBENZENE	25	CO
LEAD	15	MCL (2),TBC
MERCURY	2	MCL
CHROMIUM	50	MCL
COPPER	1000	SMCL
FLUORIDE	2000	SMCL

MCL = MAXIMUM CONTAMINANT LEVEL

- (1) THE STATE OF FLORIDA HAS PROMULGATED MCLS FOR TCE AND VC WHICH ARE MORE STRINGENT THAN EPA'S MCLS, THEREFORE, THE STATE MCLS ARE ARARS FOR THE HARRIS SITE,
- (2) THE PRESENT MCL FOR LEAD IS 50 PPB. A LEVEL OF 15 PPB HAS BEEN PROPOSED AS A HEALTH-BASED STANDARD AND IS, THEREFORE, A TO-BE-CONSIDERED (TBC) SITE CLEANUP GOAL.

CO = THESE STANDARDS ARE LISTED IN THE 3983 FDER/HARRIS CONSENT ORDER AND ARE CONSIDERED TO BE THE "FREE FROM" CRITERIA IDENTIFIED IN THE FLORIDA ADMINISTRATIVE CODE.

TBC TO-BE-CONSIDERED CLEANUP GOAL

1E-6 ONE IN ONE MILLION EXCESS CANCER RISK LEVEL

PMCL PROPOSED MAXIMUM CONTAMINANT LIMIT (40 CFR/ VOL. 54, NO. 971 MAY 22, 1989)

SMCL SECONDARY MAXIMUM CONTAMINANT LEVEL

NOTE: THIS LIST DOES NOT INCLUDE CLEANUP GOALS FOR ACID EXTRACTABLE ORGANICS (AEOS) BECAUSE CURRENT SAMPLING DATA DO NOT IDENTIFY SPECIFIC AEOS.