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1995

EPA Superfund
Record of Decision:

NATIONAL STARCH & CHEMICAL CORP.
EPA ID: NCD991278953
OU 04
SALISBURY, NC
10/06/1994

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Chemical Starch & Chemical Company
Cedar Springs Road, Salisbury, Rowan County, North Carolina

STATEMENT OF BASIS AND PURPOSE

This decision document presents the Operable Unit Four Remedial Action for the National Starch & Chemical Company Superfund Site in Salisbury, North Carolina, chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthodzation Act of 1986 and, to the extent practicable, the National Oil and Hazardous Substances Contingency Plan. This decision is based on the Administrative Record file for this Site.

The State of North Carolina concurs with the selected remedy for Operable Unit Four. The State's concurrence on this Record of Decision can be found in Appendix A of this document.

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, may present an imminent and substantial endangerment to public health, welfare, or the environment. Presently, no unacceptable current risks were identified associated with the National Starch & Chemical Company Site. The principle threat pertains to the future and potential use of the groundwater beneath and downgradient of the Site and the potential adverse impact contaminated soils will have on the quality of the groundwater.

DESCRIPTION OF THE SELECTED REMEDY

This Operable Unit is the fourth and final Operable Unit for this Site. The first two Operable Units addressed the contamination associated with the Trench Area. The third and fourth Operable Units addressed the contamination associated with the active production area of the National Starch & Chemical Company facility and the wastewater treatment lagoon area. Operable Unit Three addressed the contaminated groundwater and this Operable Unit addresses the contaminated soils.

This Operable Unit, Operable Unit #4, is a contingency remedy initially relying on natural degradation processes to reduce the level of contaminants in the soil. In the event that natural degradation fails to result in a significant reduction in soil concentrations within two years of the signing of this Record of Decision, the contingency remedy will be implemented. The contingency remedy involves the installation of a soil vapor extraction system with an emissions control technology such as fume incineration or activated carbon filtration or a combination of both to control air stream discharged to the atmosphere.

The major components of the selected remedial alternative for Operable Unit #4 include:

- Devise and implement a biodegradative study to substantiate that natural degradation is occurring, identify where in the subsurface the degradation is occurring, and determine the rate of degradation.

- Implement institutional controls including deed restrictions and maintenance of both the fence around the plant operations area and the paved areas around Area 2.

- Develop and implement a long-term monitoring plan to ensure that natural degradation continues to be effective until the specified performance standard is achieved and maintained.

- Performance of five (5) year reviews in accordance to Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 until the cleanup goals specified in this Record of Decision are achieved.

The major components of the contingent remedial alternative include:

- Volatile organic contaminants will be removed from the soils by means of a vapor extraction systems.

- Extracted contaminated air from Area 2 will initially be treated using fume incineration. After concentrations of contaminants decrease in the extracted air, this contaminated vapor will be treated via vapor-phase activated carbon adsorption filters prior to the air stream being released into the atmosphere.

- The extracted contaminated air from the lagoon area would be treated using vapor-phase activated carbon adsorption filters to remove the volatile organics prior to the air stream being released into the atmosphere.

- The contaminants captured by the vapor-phase carbon filters would be destroyed through the thermal regeneration of the used activated carbon at an off-site, commercial regeneration facility.

- A review/assessment would be performed in accordance to Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 to verify that the soil vapor extraction system is proceeding as anticipated or achieved the specified cleanup goals stipulated in this Record of Decision.

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 technology to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. Since this remedy may result in hazardous substances remaining in the groundwater on-site above the chemical-specific applicable requirements, 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.

John H. Hankinson, Jr.   Date
Regional Administrator

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LIST OF ACRONYMS

AOC	-	Administrative Order on Consent
ARAR	-	Applicable or Relevant and Appropriate Federal, State or Local Requirements
CERCLA	-	Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Superfund)
CD	-	Consent Decree
DNAPL	-	Dense Nonaqueous Phase Liquid
1,2-DCA	-	1,2-Dichloroethane
e.g.	-	for example
EPA	-	Environmental Protection Agency
FS	-	Feasibility Study
ft/day	-	Feet per day
ft/yr	-	Feet per year
HRS	-	Hazardous Ranking System
i.e.	-	that is
MCLs	-	Maximum Contaminant Levels
mg/kg	-	milligrams per kilogram
NCAC	-	North Carolina Administrative Code
NCDEHNR	-	North Carolina Department of Environment, Health, and Natural Resources
NCP	-	National Oil and Hazardous Substances Pollution Contingency Plan
ND	-	Not Detected
NPDES	-	National Pollution Discharge Elimination System
NPL	-	National Priority List
NSC	-	National Starch & Chemical Company
NSCC	-	National Starch & Chemical Company
O&M	-	Operation and Maintenance
OU	-	Operable Unit
BCPs	-	Polychlorinated Biphenyls
ppb	-	parts per billion
ppm	-	parts per million
PRP	-	Potentially Responsible Party
PW	-	Present Worth
RA	-	Remedial Action
RCRA	-	Resource Conservation and Recovery Act
RD	-	Remedial Design
RD/RA	-	Remedial Design/Remedial Action
RI	-	Remedial Investigation
RI/FS	-	Remedial Investigation/Feasibility Study
ROD	-	Record of Decision
SARA	-	Superfund Amendments and Reauthorization Act of 1986
SVOCs	-	Semi-volatile Organic Compounds
TAL	-	Target Analyte List
TBC	-	To Be Considered
TCL	-	Target Compound List
TCLP	-	Toxicity Characteristic Leaching Procedure
TMV	-	Toxicity, Mobility, or Volume
UAO	-	Unilateral Administrative Order
µg/kg	-	micrograms per kilogram
µg/l	-	micrograms per liter
VOCs	-	Volatile Organic Compounds

RECORD OF DECISION
SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
OPERABLE UNIT FOUR
NATIONAL STARCH & CHEMICAL COMPANY SUPERFUND SITE
SALISBURY, ROWAN COUNTY, NORTH CAROLINA

1.0 SITE NAME, LOCATION, AND DESCRIPTION

The National Starch & Chemical Company Site (NSCC Site or the "Site") is located on Cedar Springs Road in Salisbury, Rowan County, North Carolina. The Site is approximately 5 miles south of the City of Salisbury at latitude 35°37'49" north and longitude 80°32'03" west. Figure 1 shows the location of the Site with respect to the City of Salisbury. The areas of the Site that compose Operable Unit (OU) #4 are shown in Figure 2. OU #4 includes the following areas of the NSCC facility: Area 2, the parking lot, and the wastewater treatment lagoons. Area 2 consists of the following operations: Area 2 Reactor Room, the Tank Room, Raw Material Bulk Storage, and the Warehouse. The lagoon area includes three lagoons which were constructed between 1969-1970 as unlined lagoons. Wastewater was pumped into Lagoon 2 from 1970 to 1978. In 1978, Lagoon 1 was put into service and Lagoon 3 was lined with concrete. Lagoons 1 and 2 were originally used as settling and evaporation lagoons. In 1984, Lagoons 1 and 2 were excavated and also lined with concrete. Contaminated soil excavated from beneath the lagoons was removed and disposed of in an area west of the plant area. The saturated soil was landfarmed and then used as fill material for expanding the facility's parking lot. A fourth lagoon was installed in 1992 as part of the treatment system to treat the contaminated groundwater generated by the OU #1 Remedial Action (RA). In the remainder of this Record of Decision (ROD), the term "Site" refers to the areas investigated as part of OU #4 (i.e., Area 2 and the wastewater treatment lagoon area) unless otherwise specified.

Land use of the areas immediately adjacent to the NSCC property is a mixture of residential and industrial developments. An industrial park is located on the east and south sides of the NSCC facility. Another industrial park is located along the southern property line. A mobile home park adjoins the extreme southwestern comer of the property. Two housing developments lay to the north, one of which is adjacent to the facility property. The location of the nearest private, potable wells is approximately 2,700 feet north of Area #2.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

In September 1968, Proctor Chemical Company purchased the 465-acre tract of land on Cedar Springs Road. Within the next year, Proctor Chemical was acquired by NSCC which operated the facility as a separate subsidiary. Construction of the plant on Cedar Springs Road began in 1970. On January 1, 1983, Proctor Chemical Company was dissolved and its operations merged with NSCC.

The primary products of this facility are textile-finishing chemicals and custom specialty chemicals. Volatile and semi-volatile organic chemicals are used in the production process along with acidic and alkaline solutions. Acidic and alkaline solutions are also used in the cleaning processes. The liquid waste stream from the manufacturing processes include reactor and feed line wash and rinse solutions. This wastewater may include a combination of the following chemicals: acrylimide, 1,2-dichloroethane (1,2-DCA), methyl isobutyl ketone, methanol, styrene, maleic anhydride, vinyl toluene, sulphonated polystyrene, epichlorohydrin, octyl alcohol, ethyl alcohol, allyl alcohol, allyl chloride, sodium hydroxide, and sulfuric acid.

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As the result of finding contaminants in groundwater and in the surface water/sediment of the Northeast Tributary, the original scope of work specified in the initial 1987 Remedial Investigation/Feasibility Study (RI/FS) Work Plan was expanded. The first RI/FS resulted in OU #1 ROD which was issued by the Environmental Protection Agency (EPA or Agency) on September 30, 1988. The OU #1 ROD divided the Site into two Operable Units. The ROD for OU #1 required the installation of a groundwater interception, extraction, and treatment system in the western portion of the facility. The contaminants in the groundwater in this area are emanating from the trench area. OU #2 further investigated the contaminated soils in the trench area along with additional monitoring of the surrounding tributaries. OU #2 ROD was signed on September 28, 1990 and required additional work to identify, characterize, and delineate the contamination being continuously detected in the Northeast Tributary. This investigation resulted in the development of OU #3 and OU #4. OU #3 ROD was signed on October 7, 1993 and required a more thorough evaluation of alternatives to address the soil contamination in Area 2 and the wastewater treatment lagoon area (i.e., OU #4).

The NSCC Superfund Site was proposed for inclusion on the National Priorities List (NPL) in April 1985, re-proposed in June 1988, and finalized on the list in October 1989 with a Hazardous Ranking System (HRS) score of 46.51. The HR8 score was based on the following exposure route scores: exposure via groundwater pathway - 80.46, exposure via surface water pathway - 0.00, and exposure via air pathway - 0.00. Currently, the Site is cataloged as Number 257 of the 1,249 Superfund sites across the country on the NPL.

Since there has only been one owner/operator of this property after being developed into an industrial complex, no "Responsible Party Search" was performed. National Chemical Starch & Chemical Company has been and remains the owner/operator of the facility. A special notice letter was sent on May 30, 1986 to provide NSCC an opportunity to conduct the first RI/FS. A good faith offer was submitted and negotiations were concluded with NSCC signing an Administrative Order on Consent (AOC) on December 1, 1986. NSCC, the Potentially Responsible Party (PRP), has performed OU #1, OU #2, OU #3, and OU #4 under the direction and requirements specified in the December 1986 AOC.

The first RI/FS was completed on June 21, 1988 and September 8, 1988, respectively. Following the signing of OU #1 ROD, the Agency sent a special notice letter to the PRP to initiate negotiations on a Consent Decree (CD) for implementing the OU #1 Remedial Design/Remedial Action (RD/RA). However, negotiations on the CD were not successful resulting in the Agency issuing an Unilateral Administrative Order (UAO) directing NSCC to design and implement the RA specified in the OU #1 ROD. The effective date of the UAO was July 27, 1989. To date, NSCC is in compliance with the requirements of the July 1989 UAO.

In support of OU #2, NSCC generated Supplemental RI and Feasibility Study (FS) Reports. These reports were prepared in accordance to the December 1, 1986 AOC. These reports were completed in May 1990 and September 1990, respectively. The Supplemental RI reported continued detections of contaminants in the Northeast Tributary but did not identify the source of this contamination. Consequently, the OU #2 ROD divided the Site into a third operable unit. Following the signing of the OU #2 ROD, the Agency sent the PRP another special notice letter in March 1991 to initiate negotiations on a second CD. This CD governed the implementation of the OU #2 RA. The CD was signed in August 1991 and was entered by the Federal Court on July 20, 1992.

On December 4, 1991, EPA issued written notification to NSCC to conduct a third RI/FS to determine the source, nature, and extent of contamination entering the Northeast Tributary as required by OU #2 ROD. As with the previous RI/FS efforts, the OU #3 RI/FS was conducted in accordance to the December 1, 1986 AOC. The OU #3 RI and FS reports were completed on June 2, 1993 and June 21, 1993, respectively. Due to an inadequate evaluation of source control remediation alternatives in the OU #3 FS document, the Agency decided to split the groundwater and source control efforts into OU #3 and OU #4, respectively. The OU #3 ROD was signed on October 7, 1993 and required a fourth operable unit. On October 12, 1993, EPA requested NSCC to initiate OU #4 in accordance to the December 1986 AOC. Since only the evaluation of the source control remediation alternatives was in question, the June 1993 OU #3 RI sufficed as the OU #4 RI report. The June 20, 1994 OU #4 FS was conditionally approved by the Agency on July 8, 1994. NSCC will be provided an opportunity to conduct the OU #3 and OU #4 RD/RA as specified in this ROD and OU #3 ROD through the issuance of a third RD/RA special notice letter.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

In 1986, community relations activities for this Site were initiated in conjunction with the development of the RI/FS Work Plan. In developing the August 1986 Community Relations Plan, the issues and concerns expressed by local citizens from the Site area were compiled and an overview of these issues and concerns was prepared. A copy of the Community Relations Plan was placed in the Information Repository located at the Rowan County Public Library in Salisbury. A mailing list was developed based upon people interviewed, citizens living around the Site, and people attending Site related public meetings. The mailing list also includes local, State, and Federal public servants and elected officials.

Numerous fact sheets were mailed and several public meetings were held with respect to OU #1, OU #2, OU #3, and OU #4. The following community relations activities were conducted by the Agency with respect to OU #4.

The public was informed through the Proposed Plan Fact Sheet and an ad published on July 12, 1994 in The Salisbury Post newspaper of the July 26, 1994 Proposed Plan Public Meeting. The Proposed Plan Fact Sheet was mailed to the public on July 8, 1994. The basis of the information presented in the Proposed Plan was the June 1994 OU #4 FS document. The Proposed Plan also informed the public that the public comment period would run from July 12, 1994 to August 11, 1994.

Prior to the Proposed Plan Public Meeting, representatives from EPA met with City and County officials to present to them a summary of information to be shared with the public during the evening public meeting. This meeting also provided locally elected officials the opportunity to ask questions and make comments concerning the Agency's proposed activities.

The goals of the Proposed Plan meeting were to review the remedial alternatives developed, identify the Agency's preferred alternative, present the Agency's rationale for the selection of this alternative, encourage the public to voice its own opinion with respect to the remedial alternatives reviewed and the remedial alternative selected by the Agency, and inform the public that the public comment period on the Proposed Plan would conclude on August 11, 1994. The public was also informed a 30 day extension to the public comment period could be requested and that all comments received during the public comment period would be addressed in the Responsiveness Summary.

After the Proposed Plan public meeting, the Agency received a request for a 30-day extension to the public comment period which extended the public comment period to midnight September 9, 1994. A notice was mailed on August 9, 1994 to the addressees on the mailing list informing them of this extension. An ad was also published in the August 11, 1994 edition of The Salisbury Post newspaper informing the public that the public comment period had been extended to September 9, 1994.

Pursuant to Section 113(k)(2)(B)(i-v) and 117 of Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), all documents associated with the development of the Proposed Plan and the selection of the remedial alternative specified in this ROD were made available to the public in the Administrative Record located both in the Information Repository maintained at the EPA Docket Room in Region IV's office and at the Rowan County Public Library in Salisbury, North Carolina. A copy of all literature distributed at each public meeting, as well as a transcript of meeting proceedings, were also placed in the information Repositories.

4.0 SCOPE AND ROLE OF OPERABLE UNIT WITHIN SITE STRATEGY

As with many Superfund sites, the problems at the NSCC Site are complex. As a result, EPA organized the work into four operable units. These are:

OU #1 -- Groundwater in western portion of the NSCC property

OU #2 -- Trench Area soils and surface water/sediments in the Northeast Tributary

OU #3 -- Groundwater under Area 2, the parking lot, and the wastewater treatment lagoons and the surface water/sediments in the Northeast Tributary

OU #4 -- Contaminated soils in and around Area 2 and the wastewater treatment lagoons.

This ROD has been prepared to summarize the remedial selection process and to present the selected remedial alternative for the contaminated soils in and around Area 2 and the wastewater treatment lagoons. Although neither surface nor subsurface soils pose an unacceptable current risk to the public health, there are unacceptable future risks due the concentration of chemicals found in the soils associated with OU #4. Based on a comparison between the target compound list (TCL) analytical results for 1,2-DCA in soil to the corresponding toxicity characteristic leachate procedure (TCLP) concentration by using a least squares linear regression on the data, it was hypothesized that the current concentration of 1,2-DCA in the soils could adversely impact the underlying groundwater above the performance standard presented in the OU #3 ROD which 1 microgram per liter (μg/l) or 1 part per billion (ppb).

EPA has already selected remedies for OU #1, OU #2, and OU #3. Construction on the OU #1 remedial action phase began in August 1990. OU #2 was initiated on July 20, 1992, the filing date for the CD. OU #2 ROD specified no action for the soils in the Trench Area, long-term monitoring of the soils in the Trench Area, and an investigation to determine the source of contamination being detected in the Northeast Tributary. The Agency will combine negotiations for performing the RD/RA for OU #3 and OU #4 with NSCC.

The purpose of this response is to prevent current or future exposure to the contaminated soils. OU #4 is the final operable unit for this Site.

5.0 SUMMARY OF SITE CHARACTERISTICS

The NSCC OU #4 RI/FS is complete. The June 2, 1993 RI report, conditionally approved by the Agency on July 7, 1993, identified the sources, characterized the nature, and defined the probable extent of the uncontrolled hazardous wastes in the soil, groundwater, and surface water/sediment in the areas addressed by this Operable Unit. The June 1993 RI report included the Baseline Risk Assessment. The Baseline Risk Assessment defined the risk posed by the hazardous contaminants present in the areas investigated. The Proposed Plan Fact Sheet, based on the June 20, 1994 OU #4 FS document, provided the public with a summary of the detailed analysis of the four (4) soil remediation alternatives.

The overall nature and extent of contamination associated with this area of the Site is based upon analytical results of environmental samples collected from surface and subsurface soils, the groundwater, surface water and sediment of the Northeast Tributary, and the chemical/physical and geological/hydrogeological characteristics of the area. Environmental samples were collected over a period of time and activities. The majority of the samples collected were screened for volatile organic compounds (VOCs) as the previous Remedial Investigations conducted at the NSCC facility identified VOCs as the primary contaminants at the Site. A review of the historical use of chemicals in the manufacturing processes at the Site also supports this appraisal. The remainder of the samples were analyzed for the entire TCL and target analyte list (TAL) constituents. The TCL includes VOCs, semi-volatile organic compounds (SVOCs), pesticides, and polychlorinated biphenyls (PCBs); the TAL includes inorganics such as metals and cyanide.

VOCs, SVOCs, one pesticide, and numerous inorganic analytes were detected in the soils and groundwater and two VOCs and a number of metals were detected in the surface water/sediment samples. Detailed discussions on groundwater and surface water/sediment were provided in the OU #3 ROD.

Background/control samples were collected for groundwater and surface water and sediment. No background surface or subsurface soil samples were collected, therefore, any organic contaminant detected in the soils that could not be attributed to cross contamination, was presumed to be a Site related contaminant. The inorganic analytical results for the upgradient sediment sample collected from the Northeast Tributary was used to portray background conditions for evaluating inorganics detected in surface and subsurface soil samples.

Table 1 lists the contaminants detected in each environmental medium sampled as well as the frequency and range of concentrations detected. As can be seen, no PCBs were detected in any of the environmental samples collected. The pesticide detected at the Site was delta-hexachlorocyclohexane (delta-BHC). It was detected once in the soil and once in the groundwater at very low concentrations. Pesticides have never been manufactured at this facility. Cyanide was detected twice in the soil and twice in the groundwater. The concentration of delta-BHC is below health base clean up goals. Based on the above information, the following contaminants or group of contaminants will not be discussed in the following sections: PCBs and pesticides. The following sections discuss the results and interpretations of the data collected and generated for each environmental medium investigated as presented in the June 1993 RI report.

Air samples were not collected, however, the air was monitored during the RI field work as part of the field health and safety effort. Based of the information collected, the quality of the air at and around the Site is not currently being adversely impacted by the Site. The PRP also runs routine air sampling in the active portions of the facility as part of their internal, corporate health and safety procedures.

5.1 SOILS

A total of 107 soil samples were collected to identify the source, characterize the contaminants present, and delineate the extent of soil contamination. These soil samples were collected in 59 different locations in the following three areas of the Site: the parking lot, Area 2, and the wastewater treatment lagoon area. These soil samples included 11 surface soil samples (0 to 2 feet below the surface) with the rest being collected between 2 feet below surface to either the water table interface or auger refusal.

A total of 14 different VOCs, one (1) SVOC, one (1) pesticide, 14 metals, and cyanide were detected. As can be seen in Table 1, the VOCs most frequently detected and observed in the highest concentrations were acetone, 2-butanone, chloroform, 1,2-DCA, toluene, and vinyl chloride (listed alphabetically). A variety of inorganic analytes were also detected in the soils. Although these inorganic analytes occur naturally in soil, elevated concentrations of cyanide and eight (8) metals were detected. The following metals were either detected in onsite soils but not in the background sample or detected onsite at concentrations at least two times greater than the background concentration: barium, chromium, cobalt, copper, manganese, nickel, thallium, and vanadium.

As stated earlier, the landfarmed saturated soils from the wastewater treatment lagoon area was used as fill material in the expansion of the parking lot. Prior to placement of this soil in 1988, the soil was sampled and analyzed. The concentration of 1,2-DCA in the sample collected was 533 ppb. Figure 3 provides the location of the two soil samples collected in the parking lot area in June 1992 as part of the RI. The concentrations of 1,2-DCA were 220 ppb and 370 ppb in samples PLS-1 and PLS-2, respectively. Six (6) other VOCs were detected in these two soil samples.

TABLE 1 RANGE AND FREQUENCY OF DETECTION OF ORGANIC CONTAMINANTS AND INORGANIC CONSTITUENTS FOUND IN THE ENVIRONMENTAL MEDIA SAMPLED

COMPOUND	SOIL	GROUNDWATER	SURFACE WATER	SEDIMENT
VOLATILE ORGANIC COMPOUNDS				
Acetone	22-4,000 (40)	9-4,200 (15)	18-52 (3)	12-63 (7)
Bis(2-chloroethyl)ether		13-32 (2)		
Bromodichloromethane	1-220 (7)	1 (1)		
2-Butanone	3-42 (30)			
Carbon Disulfide		4-8 (3)		
Chloroethane		3-35 (6)		
Chloroform	2-900 (17)	7-8,900 (2)		
Dibromochloromethane	3-31 (5)			
1,2-Dichloroethane	2-1,600,000 (42)	1-660,000 (30)	2-3,200 (7)	9-1,000 (5)
1,1-Dichloroethene		1-14 (3)		
1,2-Dichloroethene		1-200 (4)		
1,2-Dichloropropane		5 (1)		
Ethylbenzene		9-36 (2)		
Methylene Chloride		1-160 (5)		
Tetrachloroethene	2(1)	107 (4)		
Toluene	1-3,100 (12)	1-120 (3)		
1,1,2-Trichloroethane		1-3 (4)		
Trichloroethene	11-17 (2)	1-5 (10)		
Total Xylenes	1 (1)	2-90 (4)		
Vinyl Chloride	32-190 (12)	1-120 (8)		
SEMI-VOLATILE ORGANIC COMPOUNDS				
Bis(2-ethylthexyl)phthalate		8 (1)		
Di-n-butyl Phthalate		2-17 (3)		
Di-n-octyl Phthalate		2 (1)		

TABLE 1 RANGE AND FREQUENCY OF DETECTION OF ORGANIC CONTAMINANTS AND INORGANIC CONSTITUENTS FOUND IN THE ENVIRONMENTAL MEDIA SAMPLED

COMPOUND	SOIL	GROUNDWATER	SURFACE WATER	SEDIMENT
PESTICIDE				
Delta-Hexachlorocyclohexane	22 (1)	0.16 (1)		
INORGANIC CONSTITUENTS				
Antimony	5,100-8,2000 (5)	2-30 (3)		7,600 (1)
Arsenic	530-2,900 (7)	2.4 (1)		1,100-1,900 (2)
Barium	33,300-198,000 (7)	28.2-737 (8)	32.1-38.2 (2)	50,300-88,400 (2)
Beryllium	240-680 (7)	1-2.5 (2)		490-980 (2)
Chromium	10,000-97,900 (7)	12.9-59.6 (6)		35,100-36,500 (2)
Cobalt	13,700-74,100 (7)	47-66.4 (2)		23,600-28,000 (2)
Copper	46,700-161,000 (7)	12.4-23.7 (2)		48,400-90,300 (2)
Cyanide	2,500-21,900 (2)	12-16 (2)		NA
Lead	1,300-9,400 (7)	3.3-3.9 (2)		3,000-15,100 (2)
Manganese	82,000-2,610,000 (7)	1.5-12,000,000 (14)	60-134 (2)	162-1,020,000 (2)
Mercury				50-60 (2)
Nickel	4,900-22,900 (7)	23.4-39.6 (3)		10,300-11,600 (2)
Selenium				880
Thallium	2,500 (1)	1-3 (2)		380
Vanadium	71,600-379,000 (7)	10.7-272 (11)	14.8-24.4 (2)	146,000-176,000 (2)
Zinc	19,700-50,000 (7)	22-6,410,000 (4)	10.3-11.4 (2)	23,900-48,500 (2)

Concentrations for water samples are reported in micrograms per liter (æg/l) or in parts per billion (ppb).
Concentrations for soil/sediment samples are reported in micrograms per kilogram (æg/kg) or in ppb.
Number appearing in parentheses is the frequency of detection.
NA -- Not Analyzed

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The objective of investigating the vadose zone in Area 2 and the wastewater treatment lagoon area was to establish the lateral and vertical extent of soil contamination, the location of the highest levels of 1,2-DCA in the soils, and to estimate the mass of contaminants present in the soils. Figures 4 through 9 show the lateral and vertical distribution of 1,2-DCA, the location of the sampling points as well as the highest concentration of 1,2-DCA detected in each boring, and the depth this sample was collected.

Contamination of soil by 1,2-DCA is most extensive around Area 2. The lateral extent of soil contamination in this area is shown in Figure 4. In Area 2, there are two areas where soil contamination is concentrated:

- along an elongated area northwest of the main plant and
- in a broad area northeast of the loading docks and warehouse area.

Cross-section lines A-A' and B-B' shown in Figure 5 illustrate the locations of vertical contamination profiles at Area 2. Figures 6 and 7 show the vertical distribution of 1,2-DCA in soils at Area 2 along cross-sections A-A' and B-B', respectively. Unsaturated soils at Area 2 exhibited a pattern of 1,2-DCA concentrations decreasing downward. The distribution pattern of 1,2-DCA at Area 2 is that which would be expected from leaking pipes; concentrations comparatively high in soils near the ground surface, and decreasing downward. This type of pattern is very well developed along the soil profile B-B'. Soils at Area 2 are capped by concrete and asphalt surfaces; therefore, recharge or infiltration through the soil at this location is extremely restricted. The analytical data for the samples collected to evaluate Area 2 is presented in Table 2.

In the area around the wastewater treatment lagoons, 1,2-DCA contamination in soil is much less widespread. The lateral extent of contamination in this area is shown in Figure 8. The orientation of cross-section C-C' is shown in Figure 5. Figure 9 shows the vertical distribution of 1,2-DCA in soils at the wastewater treatment lagoons. Where unsaturated soils exhibit 1,2-DCA concentrations, the levels either increase downward towards the water table or exhibit non-detectable levels until the water table is reached. The highest levels are found in soils near the northeast corner of Lagoon 2 (Figure 8) just above the water table. The analytical data for the samples collected to evaluate the soils in wastewater treatment lagoon area is presented in Table 3.

The vertical soil contamination pattern found in the soils at the wastewater treatment lagoon area is in stark contrast to the pattern observed in the profile for Area 2. The soil contamination profiles of Area 2 and the wastewater treatment lagoon area indicate that the concentrations of contaminants in the soils in the vadose zone at the wastewater treatment lagoon area are decreasing. This reduction is due the infiltration of precipitation flushing the contaminants downward; whereas, the impervious surfaces in Area 2 effectively prevent the infiltration of precipitation and thereby eliminate this flushing action.

Acetone is also widely distributed in the soils around Area 2 and the wastewater treatment lagoon area as can be seen in Figure 10. Around the wastewater treatment lagoon area, the distribution of acetone in soil appears to be very similar to the distribution pattern of 1,2-DCA in the soil. However, the same cannot be said for the distribution of acetone in Area 2. In Area 2, no distribution pattern is evident.

Table 4 presents the analytical data for the samples analyzed for SVOCs, pesticides, and inorganics. This table also presents the analytical data for sample SE-13 which was used to define the background conditions for inorganics. All metals detected are naturally occurring for this area. Metals do not present an unacceptable risk.

In general, the greatest concentrations of organic contaminants were found in two (2) areas. In the soils underneath Area 2 and north-northeast of the lagoon area. The majority of the elevated levels of metals were detected in Area 2. Based on the information generated and collected as part of the RI, the following sources of contamination have been identified. In Area 2, two sources of contamination were identified: the buried, terra-cotta (fired-clay) pipeline and a solvent recovery system (distillation unit). The underground terra-cotta pipeline transported wastewater from the production area to the wastewater treatment lagoons. In February 1994, NSCC completed the replacement of the terra-cotta pipeline with an overhead stainless steel pipeline, therefore, the terra-cotta pipeline is no longer in use. The solvent recovery system now sits on a bermed, concrete platform so that any spills associated with the operation of this system are controlled and not released into the environment.

NSCC has also controlled surface water runoff from Area 2 through the use of berms and sumps. The berms and the grade of the paved surfaces direct the surface runoff into the sumps. The surface water runoff collects in the sumps and is then pumped through above ground pipes to the wastewater treatment lagoons.

In the lagoon area, the source of contamination was eliminated in 1984 when NSCC lined its lagoons with concrete. The contamination currently being detected in the soils and groundwater in this area is the result of past practices and the residual contamination in the soil.

The only additional field work conducted to support the OU #4 FS focused on addressing the concern that 1,2-DCA may exist as a dense nonaqueous phase liquid (DNAPL) or as a residual DNAPL in the soils. In September 1993, six soil samples were tested using a hydrophobic dye. The soil samples were collected from the area of the Site containing the highest soil concentrations of 1,2-DCA identified in the June 1993 RI report. The result of the hydrophobic dye test on these six soil samples indicate that 1,2-DCA does not exist as a free liquid in the soils at the Site. These six samples were also chemically analyzed. The data is present below:

Sample	Depth Sample Was collected	Concentration of 1,2-DCA micrograms per kilogram (µg/kg)
20A-6-8	6-8 feet	190,000
20A-8-10	8-10 feet	60,000
20A-10-12	10-12 feet	95,000
20A-14-16	14-16 feet	4,300
20A-18-20	18-20 feet	27,000

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TABLE 2 VOLATILE ORGANIC COMPOUNDS IN AREA 2 SOILS

```
   SBA2-01          SBA2-02         SBA2-02         SBA2-03      SBA2-04         SBA2-05        SBA2-06         SBA2-06 SBA2-06
COMPOUND NAME    2-4 ft           0-2 ft          2-4 ft          4-6 ft       2-4 ft          20-22 ft        4-6 ft         8-10 ft20-22 ft
  12/06/92         12/06/92        12/06/92        12/19/92     12/19/92         12/19/92       12/20/92        12/20/9212/20/92

Acetone 93 13 U           330 D260          650  120           650170    69 J
2-Butanone          3 J 13 U 129 J         70 U 13 U          76 U            66 U      31
Chloroform          6 U  6 U6 U7 U         35 U  7 U           9 J            33 U     6 U
1,2-Dichloroethane         34,000 D   26         8,300 D          240 D     17,000 D  7 U       29,000 D         4,100 D      95
Methylene chloride  6 U  6 U6 U7 U         35 U  7 U          22 J            33 U    13 U
Tetrachloroethene   6 J  6 U6 U7 U         35 U  7 U          38 U            33 U     6 U
Toluene6 U  6 U6 U7 U         35 U  7 U52            33 U     6 U
Vinyl chloride     12 U 13 U            12 U            13 U         32 J 13 U            190            66 U    13 U

   SBA2-07          SBA2-07         SBA2-07         SBA2-08      SBA2-08         SBA2-08         SEA2-09         SBA2-09SEA2-09
COMPOUND NAME   8-10 ft          18-20 ft        20-22 ft         0-2 ft       2-4 ft          18-20 ft        12-14 ft        14-16 ft            16-18 ft
  12/21/92         12/21/92        12/21/92        12/21/92     12/21/92         12/21/92        12/22/92        12/22/92            12/22/92

Acetone           180 J65 UJ           14 UJ           42 UJ        55 UJ12 UJ          15 UJ           24 UJ  18 UJ
2-Butanone         16 U 14 U            14 U            14 U         17 U 14 U 17 18     12
          6 U
Chloroform          8 U  7 U7 U7 U          8 U  6 U2 J6 U  120 U
1,2-Dichloroethane110 U410 D          740 D           380 D          330           570 DJ        53,000 D170    6 U
Toluene8 U  7 U7 U7 U          8 U  6 U3 J6 U    6 U
1,1,2-Trichloroethane            8 U  7 U7 U7 U          8 U  6 U 176 U
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TABLE 2   VOLATILE ORGANIC COMPOUNDS IN AREA 2 SOILS

COMPOUND NAME	SBA2-10 6-8 ft 01/19/93	SBA2-11 4-6 ft 01/19/93	SBA2-11 6-8 ft 01/19/93	SBA2-15 4-6 ft 01/20/93	SBA2-16 2-4 ft 01/20/93	SBA2-18 12-14 ft 01/20/93	SBA2-19 12-14 ft 01/22/93	SBA2-20 4-6 ft 01/22/93	SBA2-20 8-10 ft 01/22/93
Acetone	240	4,000 D	220	15 U	230	150	3,000 U	1,900 U	1,100 U
2-Butanone	10 J	9 J	9 J	15 U	13 U	13	1,600 U	1,900 U	1,600 U
1,2-Dichloroethane	2 J	3 J	2 J	6 J	540 D	4 J	3,700	1,600,000 D	290,000 D
Methylene chloride	54	40	40	37	24	22	790 U	930 U	800 U
Styrene	6 U	6 U	6 U	7 U	6 U	6 U	790 U	930 U	280 J
Tetrachloroethene	6 U	6 U	6 U	7 U	6 U	6 U	790 U	930 U	160 J
Toluene	6 U	6 U	6 U	7 U	6 U	1 J	790 U	3,100	2,900

Concentrations in ppb.
D - Compound analyzed at a secondary dilution.
J - Compound detected but below the quantitation limit; value estimated.
E - Concentration reported from outside of standard calibration curve.
Shaded areas ( ) depicts positive detection.

TABLE 3 VOLATILE ORGANIC COMPOUNDS IN SOIL SAMPLES FROM WASTEWATER TREATMENT LAGOON AREA

SBLA-01	SBLA-01	SBLA-01	SBLA-020-	SBLA-02	SBLA-02	SBLA-03	SBLA-03	SBLA-03	
COMPOUND NAME	2-4 ft	4-6 ft	6-8 ft	2 ft	2-4 ft	4-6 ft	2-4 ft	4-6 ft	6-8 ft
12/07/92	12/07/92	12/07/92	12/07/92	12/07/92	12/07/92	12/08/92	12/08/92	12/08/92	
Acetone	660 D	660 D	130	3,500 DJ	230	140	150	130 J	130 J
Bromodichloromethane	7 U	7 U	6 U	7 U7 U	7 U	7 U	7 U	18	
2-Butanone	6 J	7 J	17	17 27	14 U	21	10 J	42 J	
Chloroform	7 U	7 U	6 U	2 J2 J	3 J	7 U	7 U	66	
Dibromochloromethane	7 U	7 U	6 U	7 U7 U	7 U	7 U	7 U	3 J	
1,2-Dichloroethane	50	49	65	2 J7 U	7 U	7 U	7 U	23	
Methylene chloride	7 U	7 U	21	7 U7 U	7 U	7 U	7 U	9 U	
Toluene7 U	7 U	6 U	7 U7 U	7 U	8	7 U	7 U		

SBLA-04	SBLA-04	SBLA-04	SBLA-05	SBLA-05	SBLA-05	SBLA-06	SBLA-06	SBLA-07	
COMPOUND NAME	0-2 ft	2-4 ft	10-12 ft	2-4 ft	4-6 ft	6-8 ft	6-8 ft	8-10 ft	6-8 ft
12/08/92	12/08/92	12/08/92	12/08/92	12/08/92	12/08/92	12/08/92	12/08/92	12/09/92	
Acetone	1,000 DJ	1,100 DJ	71 U	230 J	86 J	79 J	51	32	22 J
Bromodichloromethane	6 U	7 U	220	6 U6 U	6 U	7 U	14	1 J	
2-Butanone	25	19	71 U	28 J5 J	3 J	32	23	8 J	
Chloroform	6 U	2 J	900	2 J2 J	6 U	7 U	58	5 J	
Dibromochloromethane	6 U	7 U	31 J	6 U6 U	6 U	7 U	2 J	6 U	
1,2-Dichloroethane	6 U	7 U	36 U	6 U6 U	6 U	7 U	180 D	6 U	
Methylene chloride	6 U	7 U	30 J	6 U6 U	6 U	7 U	7 U	6 U	
Toluene4 J	10	8 J	6 U6 U	6 U	7 U	7 U	6 U		

TABLE 3 VOLATILE ORGANIC COMPOUNDS IN SOIL SAMPLES FROM WASTEWATER TREATMENT LAGOON AREA

SBLA-07	SBLA-08	SBLA-08	SBLA-09	SBLA-10	SBLA-10	SBLA-11	SBLA-11		
COMPOUND NAME	8-10 ft	0-2 ft	4-6 ft	2-4 ft	6-8 ft	16-18 ft	12-14 ft	16-18 ft	
12/09/92	12/15/92	12/15/92	12/15/92	12/16/92	12/16/92	12/16/92	12/16/92		
Acetone	24 J	2,200 D	130 J	130 J	1,100 DJ	29 J	48 J	230 J	----
Bromodichloromethane6 U		6 U	9 U	4 J53	7 U	7 U	18	----	
2-Butanone	8 J	11 U	19 U	14 U	13 U	15 U	14 U	13 U	----
Chloroform	3 J	5 J	18 240	3 J	7 U	72	----		
Dibromochloromethane6 U		6 U	9 U	7 U 9	7 U	7 U	3 J	----	
1,2-Dichloroethane	36	3 J	9 U	2 J13	7 U	3 J	7	----	
Methylene chloride	6 U	9 U	16 U	7 U	19 U	49	8 U	10 U	----
Toluene6 U	1 J	9 U	7 U7 U	7 U	7 U	7 U	----		

SBLA-12	SBLA-12	SBLA-13	SBLA-14	SBLA-14	SBLA-18	SBLA-22	SBLA-23	SBLA-24	
COMPOUND NAME	8-10 ft	10-12 ft	10-12 ft	0-2 ft	2-4 ft	6-8 ft	4-6 ft	2-4 ft	6-8 ft
01/06/93	01/06/93	01/06/93	01/07/93	01/07/93	01/07/93	01/08/93	01/09/93	01/09/93	
Acetone	17 U	18 U	20 U	10 U	12 U	130	12 U	57 U	18 U
2-Butanone	2 J	11 U	14 U	13 U	18 U	14 U	12 U	2 J	13 U
1,2-Dichloroethane	150	11	16,000 D	15 290	19000 D	5 J	6 U	3 J	
Methylene chloride30 UJ		21 UJ	7 U	18 UJ	23 UH	43 J	16 UJ	16 UJ	6 UJ
Tetrachloroethene	7 U	6 U	7 U	6 U9 U	2 J	6 U	6 U	6 U	
Toluene7 U	6 U	7 U	6 U9 U	5 J	2 J	6 U	2 J		
Total xylenes	7 U	21 UJ	7 U	6 U9 U	1 J	6 U	6 U	6 U	
1,1,2-Trichloroethane		7 U	6 U	7 U	6 U9 U	11	6 U	6 U	6 U
Trichloroethene	7 U	6 U	7 U	6 U9 U	3 J	6 U	6 U	6 U	

Concentrations in ppb. J - Compound detected but below the quantitation limit; value estimated.
E - Concentration reported from outside of standard calibration curve. D - Compound analyzed at a secondary dilution.
Shaded areas ( ) depicts positive detection.

TABLE 4 CONCENTRATIONS OF INORGANIC ANALYTES IN SOIL CONTAMINATION CHARACTERIZATION SAMPLES

COMPOUND/ANALYTE	SE-12 (Background)	SBA2CC-06 4-6 ft	SBA2CC-06 8-10 ft	SBA2CC-09 12-14 ft	SBA2CC-09 14-16 ft	SBA2CC-20 4-6 ft	SBA2CC-20 8-10 ft	SBALCC-18 6-8 ft
SEMIVOLATILE ORGANICS								
Delta-BHC	ND	22 U	11 U	11 U	11 U	11 U	10 U	22
Bis(2-ethylhexyl)phthalate	ND	230 J	92 J	940 U	940 U	890 U	870 U	930 U
INORGANICS								
Antimony	7.6 J	5.5 J	5.1 J	8.1 J	8.2 J	6.8 J	3.6 U	3.9 U
Arsenic	1.9	1.6	2.9 J	0.92 J	0.83 J	2.75	0.53 J	0.68 J
Barium	88.4	61.7	33.3	103	198	57.7	39.6	165
Beryllium	0.98	0.56 J	0.58 J	0.65 J	0.58 J	0.68	0.52 J	0.24 J
Cadmium	0.65 U	0.63 U	0.68 U	0.69 U	0.62 U	0.60 U	0.66 U	
Chromium	36.5	75 J	33.9 J	49.8 J	29.2 J	97.9 J	10 J	58.4 J
Cobalt	28	48.4	21.1	65.5	58.9	74.1	13.7	50.6
Copper	48.4	119 J	47 J	135 J	161 J	55.3 J	46.7 J	96.7 J
Cyanide	1.3 U	1.2 U	1.4 U	1.4 U	2.5 J	1.2 U	21.9 J	
Lead	15.1	7.6 J	2.9 J	7.2 J	2.3 J	9.4 J	1.3 J	3.1 J
Manganese	1,020	712	523	1660	2540	2610	382	1120
Mercury	0.06	0.03 U	0.03 U	0.04 U	0.03 U	0.05 U	0.02 U	0.03 U
Nickel	10.3	22.9	8.5	20.7	21.5	7.7	4.9	42.6
Selenium	0.88 J	0.52 U	0.25 U	0.55 UJ	1.4 UJ	1.2 UJ	1.2 UJ	1.3 UJ
Thallium	0.38	0.26 U	0.25 U	0.27 U	0.27 U	0.25 J	0.26 U	0.26 U
Vanadium	146	225	207	242	288	379	127	71.6
Zinc	48.5 J	36.9 J	25.3 J	50 J	37.5 J	25.1 J	19.7 J	30.7 J

Concentrations are in milligrams per kilogram (mg/kg) or parts per million (ppm).
J - Concentration is estimated. U - Undetected. Shaded areas ( ) depicts positive detection.

After reviewing the data presented in Table 1 and reviewing the history of the chemicals used at the NSCC facility, it becomes apparent that a few of the compounds listed in Table 1 were not used at the facility. These include chloroethane and vinyl chloride. Their presence at the Site indicates that some of the contaminants are being transformed by agents within the environment. Currently, the identity of these agents is unknown; however, they are believed to biological and not chemical.

5.2 GROUNDWATER

The nearest private potable wells are approximately 400 feet north of the NSCC property line, which is approximately 2,100 feet from Area 2. These wells are approximately 2,100 feet from the edge of the plume and 2,400 feet from the lateral extent of the contaminated soil. These private potable wells are completed in the bedrock formation.

The saprolite and bedrock zones of the aquifer have also been adversely impacted by activities at the Site. Contaminants detected in the groundwater include VOCs, SVOCs, one pesticide, metals, and cyanide. Table 1 provides a complete list of contaminants detected in the groundwater along with the frequency of detections and the range of concentrations detected. The greatest concentrations of organic contaminants in the groundwater were found underneath and north of Area 2 and north of the lagoon area. In Area 2, contamination can be found throughout the entire aquifer. In the lagoon area, the highest concentrations detected were in the bedrock zone of the aquifer.

A total of 61 groundwater samples were collected from 52 different locations. All of the groundwater samples were analyzed for VOCs. Only groundwater samples collected from permanent monitoring wells were analyzed for the full analytical analyses. To summarize the analytical results, a total of 16 different VOCs, three (3) SVOCs, one (1) pesticide, 14 metals, and cyanide were detected in the groundwater. VOCs detected in concentrations that exceed either Federal Maximum Contaminant Levels (MCLs) or State groundwater quality standards include (listed alphabetically) acetone, 1,2-dichloroethane, chloroethane, trichloroethene, and vinyl chloride. The three SVOCs detected in the groundwater belong to family of organic compounds called phthalates. Numerous metals were also detected in the groundwater. The inorganics that were detected at concentrations exceeding two times the concentration found in the background groundwater samples included: arsenic, barium, beryllium, chromium, cobalt, copper, cyanide, lead, manganese, nickel, vanadium, and zinc.

Two plumes of contamination in the groundwater in the saprolite zone were delineated. One is emanating from Area 2 and the other one originates in the lagoon area. Both plumes have migrated approximately 400-500 feet from their source in a northerly direction. The concentrations detected in the lagoon area are greater in the groundwater than in the unsaturated soils. This indicates that the contaminants are being flushed out of the unsaturated soils through the natural processes of precipitation and percolation.

The highest total concentration of volatiles and the greatest variety of volatiles were found in the groundwater in the bedrock zone just downgradient of the wastewater treatment lagoons. This finding also supports the conclusion that contaminants are being flushed out of the unsaturated soils through the natural processes of precipitation and percolation in this area of the Site.

5.3 SURFACE WATER AND SEDIMENT

A total of 33 surface water and sediment samples have been collected from the Northeast Tributary. The first samples were collected in March 1987 and the most recent samples were collected in January 1993. All the samples collected were analyzed for VOCs. In addition to being analyzed for VOCs, two of the samples were also analyzed for SVOCs and metals. Each sampling event has shown contamination to be present in the surface water and sediment of this tributary directly adjacent to Area 2. To date, only two (2) VOCs, acetone and 1,2-DCA, have been detected in this stream. As in the other environmental media samples, metals were also detected but these metals occur naturally. Two metals were detected at concentrations at least two times greater than the background concentration. They are manganese in the surface water and copper in the sediment. It was the continuous detection of 1,2-DCA in this stream that led to the initiation of OU #3.

No contaminants were detected downstream of the plant prior to the stream leaving the NSCC property which indicates that under normal weather conditions, no contamination is leaving the Site via the Northeast Tributary.

5.4 HYDROGEOLOGICAL SETTING

The groundwater beneath the NSCC property is designated as Class GA in accordance with North Carolina's water classification system and Class IIA under USEPA Groundwater Classification Guidelines (December 1986). The Class GA classifications means that the groundwater is an existing or potential source of drinking water supply for humans as specified under North Carolina Administrative Code, Title 15, Subchapter 2L (NCAC 15-2L.02). EPA classifies the groundwater as Class IIA since the aquifer is currently being used as a source of drinking water in the vicinity of the NSCC facility. Therefore, the groundwater needs to be remediated to a level protective of public health and the environment as specified in Federal and State regulations governing the quality and use of drinking water.

At the NSCC site, a thick mantle of residual soil extends from the ground surface to the bedrock. This mantle, the saprolite, is composed of clay-rich residual soils which range from silty to sandy clays. The saprolite is derived from the intense chemical weathering of the crystalline bedrock and has retained the structural fabric of the parent materials below the oxidation profile. These residual soils exhibit increasing amounts of sand-sized relict mineral grains below the oxidation horizon and closer to the bedrock. There appears to be a complete gradation from saprolite/friable weathered bedrock, to fractured bedrock/sparsely fractured bedrock. The depth to bedrock ranges from 10 to 100 feet below ground surface. The deepest bedrock was encountered was in the vicinity of the Northeast Tributary. Figure 11 shows the orientation of the hydrogeological cross-section of the Site which is displayed in Figure 12.

Soil fissures near the water table are filled with geothite, presumably derived from the weathering of the iron-bearing minerals present in the parent rock. There appears to be no confining layer between the saprolite and bedrock. Therefore these two lithologic units are hydraulically interconnected, and there is little or no impedance between these two zones.

The lithology of the soils underlying the Site was determined from drilling logs. The thickness of the soil mantle varies across the Site. It appears that Area 2 occupies a structural high and that the bedrock surface slopes steeply away from this area to the east and more gently to the north. Rock core records show that the upper 10 to 15 feet of bedrock is deeply weathered and friable. Bedrock begins to appear nonfriable and fresh 15 to 25 feet below the bedrock/saprolite interface. However, fractures continue to be frequent and fracture surfaces often exhibit oxidation staining to depths of 40 to 100 feet below the bedrock/saprolite interface. Fracture frequency diminishes downward from the bedrock/saprolite interface. It has been estimated that the bedrock becomes competent approximately 200 feet below ground surface.

Water level measurements from the water table/saprolite zone of the aquifer indicate that hydraulic heads decrease from both the east and west towards the Northeast Tributary and towards the north along the stream. This data indicates that the Northeast Tributary acts as a groundwater divide for the saprolite zone of the aquifer and receives groundwater discharge along its entire reach. This explains the presence of contaminants being detected in the surface water and sediment of this tributary. Additional data needs to be collected during the RD to determine where groundwater in the bedrock zone of the aquifer is discharging.

The hydraulic conductivity of the saprolite materials and the bedrock ranges from 0.72 to 3.35 feet per day (ft/day) and 0.01 to 1.13 ft/day, respectively. Based of the above information, the horizontal flow of groundwater in the saprolite was estimated to have a velocity of 80 feet/year (ft/yr) in the lagoon area and 27 ft/yr in Area 2.

6.0 SUMMARY OF SITE RISKS

In order to assess the current and future risks from the NSCC Site, a baseline risk assessment was conducted in conjunction with the RI. This section of the ROD summaries the findings concerning the impact to human health and the environment if contaminated media (i.e., the soils) at the Site were not remediated. The baseline risk assessment is incorporated into the June 1993 RI report which can be found in the NSCC Administrative Record.

An exposure pathway is the route or mechanism by which a chemical agent goes from a source to an individual or population (i.e., the receptor). Each exposure pathway must include (1) a source or mechanism of chemical release to the environment, (2) a transport medium (e.g., soil, groundwater, air, etc.), (3) an exposure point (where a receptor will contact the medium), and (4) an exposure route (i.e., ingestion, inhalation, or dermal contact). A pathway is considered complete when all of these elements are present.

Since use of the land surrounding the NSCC facility is a mixture of residential and commercial, two scenarios were evaluated in the baseline risk assessment. The first is where the property remains as a commercial area in the future and secondly, the property is transformed into a residential area in the future.

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Based on the information collected during the RI, the following pathways were considered in the baseline risk assessment:

- Potential current exposure under current land use conditions outside plant operations area to contaminants in surface water and sediment and springs through incidental ingestion and dermal contact, and inhalation;

- Potential current exposure under current land use conditions inside plant operations area to contaminants in surface water and sediment, surface soil, and springs through incidental ingestion and dermal contact, and inhalation;

- Potential future exposure under future land use conditions inside plant operations area to contaminants in surface water and sediment, surface soil, and springs;

- Future exposure of onsite residents to contaminants in the surface water and sediment, surface soil, subsurface soils, groundwater, and springs through ingestion, inhalation, and direct contact; and

- Future exposure of potential onsite construction workers to contaminants in soil(surface and subsurface) through incidental ingestion and direct contact; and to contaminants in groundwater, surface water, and sediment through direct contact.

The baseline risk assessment indicated that there were no unacceptable current risks from direct soil exposure. Future use of the Site as a residential area was also considered with no unacceptable risks resulting from direct contact to surface soil. Future risks for children exposed to subsurface soils that become surface soil without dilution of the contaminant (1,2-DCA) concentration in Area 2 were 2 x 10-4 (2 in 10,000), just outside EPA's acceptable risk range of 1 x 10-4 to 1 x 10-6. However, the risk manager considers this scenario so unlikely that it will not be a basis for the remedial decision. The remedial decision will be based on protection of groundwater.

7.0 REMEDIAL ACTION OBJECTIVES

Section 5.0 defined the extent and characterized the contamination and the environmental setting. Section 6.0 highlighted the human health and environmental risks posed by the Site. This Section specifies the remedial action objectives to protect human health and the environment. Protection of human health may be achieved by either reducing exposure or reducing contaminant levels. Protection of the environment includes the protection of natural resources for future uses.

The specific remedial action objectives and general response actions for the contaminated soils at the Site are:

- For Human Health -- Prevent release of contaminants from soil that could result in contaminant levels in excess of groundwater cleanup objectives specified in the OU #3 ROD

- For Environmental Protection -- Continue containment of contamination

7.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

Section 121 (d) of CERCLA, as amended by Superfund Amendments and Reauthorization Act of 1986 (SARA), requires that remedial actions comply with requirements or standards set forth under Federal and State environmental laws. The requirements that must be complied with are those laws that are applicable or relevant and appropriate (ARAR) to the (1) remedial action(s), (2) location, and (3) media-specific contaminations at the Site.

Applicable requirements defined in 40 C.F.R. § 300.400(g)(1) are those requirements applicable to the release or IRA contemplated based upon an objective determination of whether the requirements specifically addresses a hazardous substance, pollutant, contaminant, RA, location, or other circumstance found at a CERCLA site. These requirements would have to be met under any circumstance. Relevant and appropriate requirements defined in 40 C.F.R. § 300.400(g)(2) are those requirements that address problems or situations sufficiently similar to the circumstances of the release or removal action contemplated, and whether the requirement is well suited to the Site. The action-specific and location-specific ARARs for the selected and contingent remedial alternatives are listed in Table 5. The chemical-specific ARAR is discussed in Section 7.2 PERFORMANCE STANDARDS.

7.2 PERFORMANCE STANDARDS

Currently, there are no Federal or State ARARs that govern the cleanup for the contaminants present in the OU #4 soils if the contaminated soils are not excavated. The following soil performance standard (cleanup goal) for 1,2-DCA is based on 1,2-DCA leaching into the underlying groundwater. The concentration of 1,2-DCA that could be left in the soil without increasing the concentration of 1,2-DCA in groundwater above the most stringent groundwater quality concentration (NCAC 15-2L.0202) for 1,2-DCA was estimated to be 169 µg/kg. This concentration was based on comparing the TCL analytical results for 1,2-DCA in soil to the corresponding TCLP concentration using a least squares linear regression.

7.3 EXTENT OF CONTAMINATION

Figures 4, 6, 7, 8, 9, and 10 reveal the lateral and vertical extent of soil contamination in Area 2 and the wastewater treatment lagoon area. These soil contamination delineations are based on contamination levels detected in the soil as well as where there were no detections of contaminants in the soil.

The estimated volume of soil contaminated above 169 µg/kg is over 231,300 cubic yards. The quantity of contaminated groundwater in one pore volume of the aquifer beneath Area 2 and the wastewater treatment lagoon area is estimated to be 131 million gallons (OU #3 ROD).

8.0 DESCRIPTION OF ALTERNATIVES

Table 6 inventories those technologies that passed the initial screening for remediating contaminated soil. In the initial screening, process options and entire technologies were eliminated from consideration if they were difficult to implement due to Site constraints or contaminant characteristics, or if the technology had not been proven to effectively control the contaminants of concern. Table 7 presents the results of the final screening of the soil remediation technologies. Effectiveness, implementability, and relative capital and operation and maintenance costs are the criteria used for evaluating the technologies and process options in the final screening. The process options that were retained for further evaluation are boxed in by a bold line. This table provides the rationale as to why certain technologies were not retained for the detailed comparison.

The four (4) soil remediation alternatives retained to address the estimated 231,300 cubic yards of contaminated soil are described below.

8.1 REMEDIAL ALTERNATIVES TO ADDRESS SOIL CONTAMINATION

Alternative S1: No Action

Alternative S2: Natural Degradation & Institutional Controls

Alternative S3: Soil Vapor Extraction with Fume Incineration and Activated Carbon Filter to Control Emissions

Alternative S4: Soil Vapor Extraction with Activated Carbon Filter to Control Emissions

The cost information below represents the estimated Total Present Worth of each alternative. Total present worth was calculated by combining the capital cost plus the present worth of the annual operating and maintenance costs. Capital cost includes construction, engineering and design, equipment, and site development. Operating costs were calculated for activities that continue after completion of construction, such as routine operation and maintenance of treatment equipment, and monitoring. The present worth of an alternative is the amount of capital required to be deposited at the present time at a given interest rate to yield the total amount necessary to pay for initial construction costs and future expenditures, including operation and maintenance (O&M) and future replacement of capital equipment. A 7 percent discount rate was used to calculate the Present Worth Operation & Maintenance Costs.

TABLE 5 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

LOCATION	REQUIREMENT(S)	PREREQUISITE(S)	CITATION	COMMENTS	Aa	RAb	TBc
LOCATION-SPECIFIC ARARs							
Hazardous waste site	Actions to limit worker exposure to hazardous wastes or hazardous substances, including training and monitoring.	Construction, operation, and maintenance, or other activities with potential worker exposure.	29 CFR 1910.120		S2 S3		
ACTION-SPECIFIC ARARs							
On-site Container Storage	Containers of hazardous waste must be: Maintained to good condition Compalible with hazardous waste to be stored Closed during storage (except to add or remove waste)	RCRA hazardous waste (listed or characteristic) held for a temporary period before treatment, disposal, or storage elsewhere. (40 CFR 264.10) in a container (i.e., any portable device in which a material is stored, transported, disposed of, or handled).	40 CFR 264.171 [15A NCAC 13A.0009(j)] 40 CFR 264.172 [15A NCAC 13A.0009(j)] 40 CFR 264.173 [15A NCAC I3A.0009(j)]	These requirements are applicable or relevant and appropriate for any contaminated soil or treatment system waste that might be containerized and stored on site prior to treatment or final disposal. Soil containing a listed waste must be managed as if it were a hazardous waste so long as it contains the listed waste.			
	Inspect container storage areas weekly for deterioration.		40 CFR 264.174 [15A NCAC 13A.0009(j)]		S3		
	Place containers on sloped, crack-free base, and protect from contact with accumulaled liquid. Provide containment system with a capacity of 10 percent of the volume of containers of free liquids.		40 CFR 264.175 [15A NCAC 13A.0009(j)]		S3		
	Remove spilled or leaked waste in a timely manner to prevent overflow of the containment system.						
	Keep compatible materials separate. Separate incompatible materials stored near each other by a dike or other barrier.		40 CFR 264.177 [15A NCAC 13A.0009(j)]		S3		
Soil Sampling and Testing	Any non-waste material (e.g., groundwater or soil) that contains a hazardous waste must be managed as if it were a hazardous waste.	Non-waste material containing listed hazardous waste	RCRA "contained in" principle		S3		

TABLE 5 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

LOCATION	REQUIREMENT(S)	PREREQUISITE(S)	CITATION	COMMENTS	Aa	RAb	TBCc
All Off-Site Shipment Requirements for Hazardous Waste Per RCRA and Department of Transportation (DOT) Regulations Will Be Met by the OU #4 Site (Generator) and Transporter	The off-site shipment of hazardous waste requires that all RCRA and DOT requirements for manifesting and shipping papers as needed, marking, labeling, placarding, and special requirements based or type of carriage (i.e., rail, aircraft, public highway, etc.) be met.	Generating site to ship waste off site.	40 CFR 262 15A NCAC 13A.0007 40 CFR 263 15A NCAC 13A.0008 40 CFR 171 through 179	NC: Generator must keep inspection records for 3 years D, F, H, & I on NC manifest must be completed.	S3		
Closure No Post-closure Care (e.g., Clean Closure)	General performance standard requires elimination of need for further maintenance and control; elimination of post-closure escape of hazardous waste, hazardous constituents, hazardous waste decomposition products.	Applicable to land-based unit containing hazardous waste. Applicable to RCRA hazardous waste (listed or characteristic) placed at Site after the effective date of the requirements, or disposed only before the effective date of the requirements, or if treated in situ, or consolidated within area of contamination. Designed for cleanup that will not require long-term management. Designed for cleanup to health-based standards.	40 CFR 264.111 [15A NCAC 13A.0009(h)]		S2 S3		
	Disposal or decontamination of equipment, and structures.	May apply to piping and container or tank liners and hazardous waste residues.	40 CFR 264.178 [15A NCAC 13A.0009(j)] 40 CFR 264.111 [15A NCAC 13A.0009(k)]		S3		
	Removal or decontamination of all waste residues, contaminated containment system components (e.g., liners, dikes), and structures and equipment contaminated with waste.						

TABLE 5 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

LOCATION	REQUIREMENT(S)	PREREQUISITE(S)	CITATION	COMMENTS	Aa	RAb	TBCc
	Treatment of wastes subject top ban on land disposal must attain levels achievable by Best Demonstrated Treatment Technologies for each hazardous constituent in each listed waste. 1,2-DCA (U077) non-wastewater 7.2 mg/kg total	Treatment of LDR waste	40 CFR 268.43 - Table CCW [15A NCAC 13A.0012(c)]	The substantive portions of these requirements are to be considered in the disposal of any OU #4 site waste that is a restricted hazardous waste.	S3		
RCRA Treatment, Storage, and Disposal Facility (TSDF) Permitting	A regulated RCRA TSDF must submit an application for a permit (including both Parts A and B).	Regulated RCRA TSDF	40 CFR 270.10 through 270.65	Though NPL sites are exempt from the permitting process, all substantive requirements of the permitting process must be met.	S2 S3		
Operation of Air Pollution Source	Registration of Air Pollution Sources	Emission of air pollution	15A NCAC 20.0202	The director may require the owner or operator of a source of air pollution to register that source. Must submit a "G" sheet.	S3		
Toxic Emission (Chemical: 1,2-(DCA)	Clean Air Act (CAA) as Amended in 1990	Emission of 1,2-DCA	Section 112(a)(1) Section 112(g)	Because it appears that NSCC is a major source of Hazardous Air Pollutants (HAPs) pursuant to Section 112(a)(1) of the CAA, the venting or incineration of 1,2-DCA or any HAP may also trigger the requirements of Section 112(g) of the CAA. The proposed Section 112(g) rule will apply to a major source/facility which emits a HAP in exceedance of the corresponding de minimis level (once promulgated). This provision applies only in a state where a 40 CFR Part 70 operating permit program has been delegated or where a 40 CFR Part 71 operating permit program (yet to be proposed) is effective. The 112(g) trigger will require the development of a case-by-case maximum achievable control technology determination for the venting process or the incinerator. (Note: A HAP source is considered to be major if it emits or has the potential to emit 10 tons of any one HAP or 25 tons of any combination of HAPs.)		S3	

TABLE 5 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

LOCATION	REQUIREMENT(S)	PREREQUISITE(S)	CITATION	COMMENTS	Aa	RAb	TBCc
	Toxic Air Pollutant Guidelines.	Emission ol 1,2-DCA	15A NCAC 2D.1100		S3		
	Permit Requirements for Toxic Air Pollutants.	Emission of 1,2-DCA	15A NCAC 2H.0610	De minimis for permitting requirements for 1,2-DCA is 260 lbs/yr. NSCC emitted approximately 58,956 lb/year. Permit will be required.	S3		
	Applicabilily - 2H.0610(a)		North Carolina Toxic Air Pollutant Control Regulations, A Summary of the requirements, July 31, 1991	A toxics review is required for existing facilities that begin permitted construction of a new source of any amount of any listed toxic pollutant after April 30, 1990. This will require computer air dispersion modelling for a predicted maximum annual average concentration at the property line to compare with the acceptable (AAL) of 3.8 æg/m3	S3		
Emitting in Attainment of Unclassifiable Area for any Criteria Pollutant (1,2-DCA)	Prevention of Significant Deterioration (PSD) Review	Emitting in Rowan County, which is designated attainment or Unclassifiable for all regulated pollutants.	CAA Section 107	Proposed new and modified sources in Rowan County are potentially subject to PSD review. NSCC is classified as an existing major stationary source. Addition of a SVE system is a modification, therefore, must check for significant emissions increase of any pollutant subject to regulalion under CAA (i.e., VOCs) PSD de minimis = 40 tons per year increase; compare this to projected 1,2-DCA emissions after SVE system addition to determine if PSD review is required.	S3		

a - Applicable Requirements for Alternatives as noted.
b - Relevant and Appropriate Requirements for Alternatives as noted.
c - Criteria "To Be Considered" for Alternatives as noted.

Note: All parenthetical citations are from North Carolina Hazardous Waste Management Regulations, North Carolina Administrative Code, Title 15A, Chapter 13 - Solid Waste Management, Subchapter 13A - Hazardous Waste Management.

8.1.1 ALTERNATIVE S1: No action

The No Action alternative is included, as required by CERCLA, to establish a baseline for comparing the benefits achieved by the other soil remediation alternatives. Under this alternative, no cleanup activities would be implemented to remediate the adversely impacted soils at the Site (i.e., the Site is left "as is"). Because these alternatives do not entail contaminant removal or destruction, hazardous materials would remain on Site requiring a review of the Site remedy every five years in accordance with CERCLA Section 121(c). This review process will continue every five years until the performance standard (cleanup goal) for the identified contaminants in the soil are achieved. The implementation of this remedy could begin immediately and would have no negative impact on future remedial actions.

If no action is taken migration of contaminants from the soil into the underlying aquifer in the vicinity of the wastewater treatment lagoon area will continue. This migration results from the natural movement of precipitation (e.g., rain and melted snow) moving through the soils and carrying the contamination downward as the precipitation recharges the aquifer. This migration force does not exist in Area 2 as this area is covered with concrete building foundations and asphalt driveways. These structures prohibit precipitation from percolating into the underlying soils. Therefore, all precipitation becomes surface runoff which is controlled by the slope of the asphalt driveways and the curbs built around the asphalt driveways. Surface runoff is directed into sumps where the water is pumped to the wastewater treatment lagoons. Although Alternative S1 does not actively reduce or eliminate soil contamination, it is anticipated that the levels of 1,2-dichloroethane will decrease over time due to the process of natural degradation.

There are no initial capital costs for Alternative S1. Annual operating costs are based on conducting periodic monitoring of the soil in order to prepare the five year review every five years for a period of 30 years. As part of the five year review, soil samples will be collected for chemical analyses once every five years in both areas, Area 2 and the wastewater treatment lagoon area.

Capital Costs: $ 0
Annual O&M Costs
   First Year: $ 16,000
   Second Year: $ 0
   Third Year and Later: $ 0
Present Worth O&M Costs: $ 199,000
Total Present Worth Costs for 30 Years: $ 199,000
Time to Design: None
Construction Time: None
Duration to Achieve Clean-up: Over 30 years

8.1.2 ALTERNATIVE S2: Natural Degradation & Institutional Controls

Natural degradation relies on natural processes to destroy the contaminants present. The most common degradation process is the result of microorganisms (bacteria, fungus, etc.) present in the soil using the contaminants as an energy (food) source; thereby, destroying the contaminant. The presence of two chemicals at the Site, chloroethane and vinyl chloride, neither of which were reportedly used at this NSCC facility, is a strong indication that 1,2-DCA is being transformed via natural degradation process(es). The rate and effectiveness of the natural degradation process is dependent on a number of environmental factors, such as nutrient availability, soil moisture content, presence or absence of oxygen in the soil, etc.

Using a published half-life of two (2) years for 1,2-DCA in the environment under anaerobic conditions, the following degradation rates were estimated: in less than 10 years, the concentration of 1,2-DCA should decrease a concentration of 7 mg/kg; in less than 21 years the concentration of 1,2-DCA should decrease to 169 μg/kg, the concentration that can remain in the soil but not adversely impact the quality of the underlying groundwater above the performance standard for 1,2-DCA; and in approximately 35 years, the concentration of 1,2-DCA in the soil should reach a concentration of 1 mg/kg. It was estimated over 130 years of pumping the groundwater will be require to remediate the groundwater to the specified ARAR of 1 μg/I, as specified in the OU #3 ROD.

As part of this alternative, a biodegradative study will be conducted. This study will be designed to (1) confirm or refute that natural degradation in the soil is occurring in the area of OU #4, (2) if confirmed, locate where in the subsurface environment biodegradation is occurring, and (3) ascertain if biodegradation will reduce the soil contamination within a reasonable timeframe to a level which will protect groundwater and will not cause an exceedance of the OU #3 groundwater cleanup goal for potential breakdown products (such as vinyl chloride). In the event that natural degradation is occurring at an acceptable rate, then the data from the biodegradation study will be used in the CERCLA Section 121(c) required 5-year review. With the completion of the overhead pipeline in February 1994, no additional contamination should be entering the soils beneath the Area 2 building. Based on the degradation discussion above, a substantial decrease in the concentration of 1,2-DCA in the soil should be observed over the next several years. In the event that the concentration of 1,2-DCA in the soil does not decrease as anticipated, a contingent remedy consisting of an active soil remediation technology (as described in Alternative S3 below) shall be implemented to achieve the reduction of contaminant levels that would be protective of the quality of the underlying groundwater.

As this alternative is not a "No Action" alternative it is important to recognize the need for continued monitoring of the Site. The biodegradative processes are subject to numerous outside influences that may change over time (e.g., precipitation, infiltration, soil/nutrient chemistry, etc.). Therefore, should the decision be made to remain with natural degradation, a long term monitoring plan will be prepared which shall govern monitoring until the performance standards are met. The monitoring parameters will include those that pertain to the biodegradative processes (e.g., soil gases/degradation products/ nutrients) as well as direct measures of contaminants in question. The biodegradative study is to accomplish the goals specified above and the long term soil monitoring is to provide data that substantiates that natural degradation is continuing to occur in the adversely impacted soils of OU #4.

Institutional controls include using various controls and deed restrictions. The specific institutional controls considered for this alternative are 1) using and maintaining the existing fence around the plant operations area to limit access to the contaminated areas; 2) repair and sealing of all cracks, seams, and other points of infiltration through the paved or built-over areas, 3) periodic inspection and maintenance of paved areas around Area 2 to insure the integrity of the cap over this area, and 4) a deed restriction to control future land use of the NSCC property. The deed restriction will contain language to accomplish the following four objectives: 1) to inform any potential buyer of the property of the contamination present, 2) restrict future land use which would decrease the likelihood of human exposure to contaminated soils, 3) to prevent the installation of a potable well at the Site until the levels of contamination in the groundwater under the Site are deemed safe, and 4) to prevent excavation in contaminated soils without sufficient personal protection for the workers. The suitable deed restriction shall be recorded in the appropriate county registrar's office.

Capital Costs:$196,000
Annual O&M Costs
    First Year: $ 4,000
    Second Year:$ 0

Third Year and Later: $ 0
Present Worth O&M Costs: $ 50,000
Total Present Worth Costs for 30 Years: $246,000
Time to Design: 3 months
Construction Time: 1 month
Duration to Achieve Clean-up: Over 30 years

* The Total Present Worth Cost is approximate and was developed without regard for long term monitoring, therefore, Total Present Worth Cost may be slightly higher than that presented.

8.1.3 ALTERNATIVE S3: Soil Vapor Extraction with Fume Incineration and Activated Carbon Filter to Control Emissions

This alternative will remove volatile organic contaminants by means of vapor extraction wells installed in the soil above the water table. A preliminary design for Area 2 suggests a system of 10 horizontal soil vapor extraction wells drilled underneath the buildings and driveways. These 10 extraction wells will remove a total of 1,300 cubic feet per minute of contaminated air. The preliminary design for the wastewater treatment lagoon area suggests a system of seven vertical extraction wells removing a total of 20 cubic feet per minute of contaminated air. The extracted contaminated air from Area 2 would be treated using fume incineration to destroy the volatile organics prior to the air stream being released into the atmosphere and the extracted contaminated air from the lagoon area would be treated using vapor-phase activated carbon adsorption filters to remove the volatile organics prior to the air stream being released into the atmosphere. The contaminants captured by the vapor-phase carbon filters would be destroyed through the thermal regeneration of the used activated carbon at an off-site, commercial regeneration facility. The incineration of chlorinated organics in the fume incinerator will create hydrochloric acid gas that will require a scrubber. The scrubber water will require treatment and disposal.

Remediation of the soil in Area 2 and the wastewater treatment lagoon area is expected to be completed within 4 to 7 years and 1 to 2 years, respectively. A review/assessment in accordance to CERCLA Section 121 (c) would be performed to verify that the soil vapor extraction system is proceeding as anticipated or accomplished the specified cleanup goals that will be stipulated in the Record of Decision.

Capital Costs: $2,887,000
Annual O&M Costs
First Year: $ 507,000
Second Year: $ 416,000
Third Year and Later: $ 416,000
Present Worth O&M Costs: $2,394,000
Total Present Worth Costs for 7 Years: $5,281,000
Time to Design:9 months
Construction Time: 3 months
Duration to Achieve Clean-up: Over 7 years

8.1.4 ALTERNATIVE S4: Soil Vapor Extraction with Activated Carbon Filter to Control Emissions

This alternative is identical to Alternative S3 with the exception that the extracted contaminated air from both areas would be treated using vapor-phase activated carbon adsorption filters to remove the volatile organics prior to the air stream being released into the atmosphere. As before, the contaminants captured by the vapor-phase carbon filters would be destroyed at an off-site, commercial regeneration facility.

Capital Costs: $2,918,000
Annual O&M Costs
    First Year: $3,353,000
    Second Year: $1,566,000
    Third Year and Later: $ 475,000
Present Worth O&M Costs: $6,270,000
Total Present Worth Costs for 7 Years: $9,188,000
Time to Design:9 months
Construction Time: 3 months
Duration to Achieve Clean-up: Over 7 years

9.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 8.0 describes the remedial alternatives that were evaluated in the detailed analysis of alternatives set forth in the June 20, 1994 OU #4 Feasibility Study Report. This section summarizes the detailed evaluation of the soil remediation alternatives in accordance with the nine (9) criteria specified in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Section 300.430(e)(9)(iii).

9.1 THRESHOLD CRITERIA

In order for an alternative to be eligible for selection, it must be protective of both human health and the environment and comply with ARARs; however, the requirement to comply with ARARs can be waived in accordance to 40 CFR Section 300.430(f)(1)(ii)(C).

General Response Action	Technology Type	Process Option Assessment- Technical Implementability	Comments
No Action	N/A	N/A	
Institutional Action	Access Restrictions	Deed Restrictions	
		Fencing, Signs	Fence already in place.
Containment	Capping	Clay/Soil	
		Concrete	
In Situ Treatment	In Situ Treatment	Soil Flushing	Cannot capture prior to groundwater table.
		Soil Vapor Extraction	
		Steam/Air Stripping	
		Oxidation	Innovative technology; 1,2-DCA not easily oxidized
		Vitrification	Not applicable for volatile organic contaminants.
		Inorganic Stabilization	Not applicable for volatile organic contaminants
		Radio Frequency Heating	Innovative, commercially unproven technology.
		Bioventing	
Removal/Disposal	Excavation	Conventional Excavation	Plant area is mostly inaccessible; Excavation could damage lagoon structure
	Off-site Disposal	Non-RCRA Landfill	
		RCRA Facility	
	On-Site Disposal	Non-RCRA Landfill	No Such facility exists.
		RCRA Facility	No such facility exists.

TABLE 6 INITIAL SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS FOR SOIL REMEDIATION

General Response Action	Technology Type	Process Option Assessment- Technical Implementability	Comments
Removal/Disposal	Excavation	Conventional Excavation	Plan area is mostly inaccessible; Excavation could damage lagoon structure
	Physical Treatment	Soil Washing	
	Chemical Treatment	Oxidation	Innovative technology
		Photolysis	Innovative technology
	Stabilization	Inorganic-Based	Not applicable for organic contaminants.
		Vitrification	Not applicable for organic contaminants.
	Thermal Treatment	Thermal Desportation	
		Incineration	
	Biotreatment	Land Farming	
		Soil Pile	
	Off-Site Disposal	Non-RCRA Landfill	
		RCRA Facility	
	On-Site Disposal	Non-RCRA Landfill	No such facility exists.
		RCRA Facility	No such facility exists.

<IMG SRC 0495189L> - Technology or process option that has been screened out.

TABLE 6 INITIAL SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS FOR SOIL REMEDIATION

General Response Action	Technology Type	Process Option	Institutional Implementability	Effectiveness In Meeting RAOs	Cost
No Action	N/A	N/A	Easily Implementable	Not Effective	Low
Institutional Action	Access Restrictions	Deed Restrictions	Easily Implementable	Somewhat Effective	Low
		Fencing, Signs	Easily Implementable	Somewhat Effective	Low
Containment	Capping	Clay Soil	Implementable with Difficulty	Somewhat Effective	Low
		Concrete	Implementable with Difficulty	Somewhat Effective	Low
In Situ Treatment	In Situ Treatment	Soil Vapor Extraction	Easily Implementable	Effective	Moderate
		Steam/Air Stripping	Implementable with Difficulty	Effective	High
		Bioventing	Easily Implementable	Somewhat Effective	Moderate to High

<IMG SRC 0495189M> - Process Option Retained

TABLE 7 SECOND/FINAL SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS FOR SOIL REMEDIATION

9.1.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

This criterion assesses the alternatives to determine whether they can adequately protect human health and the environment from unacceptable risks posed by the contamination at the Site. This assessment considers both the short-term and long-term time frames.

As stated in Section 6.0, under current conditions the Site does not pose an unacceptable risk to human health or the environment. Future use of the Site as a residential area was also considered with no unacceptable risks resulting from direct contact to surface soil. Future risks for children exposed to subsurface soils that become surface soil without dilution of 1,2-DCA in Area 2 were just outside EPA's acceptable risk range. However, this scenario is so unlikely that it was not a basis for the remedial decision. The remedial decision was based on protecting groundwater.

All four alternatives, S1, S2, S3, and S4 are expected to provide long-term protection for human health and the environment in conjunction with the OU #3 remedial action. However, Alternatives S2, S3, and S4 will provide protection, more quickly, from exposures to contaminated subsurface soils. Of these three alternatives, Alternatives S3 and S4 will afford the greatest protection to human health as they substantially reduce the contaminants in the soil within 4-7 years of initiation of the alternatives. Under Alternatives S1 and S2, contaminant levels are anticipated to decrease as a result of natural degradation. Alternatives S3 and S4 protect the environment by removing contaminants from the soil, thereby eliminating the potential for migration of contaminants to groundwater. In conjunction with the OU #3 groundwater remedial action, Alternatives S1 and S2, will also be protective of the environment. This protection stems from the following factors: 1) all contaminated soils are within the groundwater plume to be remediated by OU #3, 2) the OU #3 remediation will prevent the spread of contaminants and remove contaminants from the groundwater, and 3) soil contaminants should be reduced by natural processes within the timeframe required to complete the OU #3 groundwater remediation. Alternative S1 does not provide short term protection for human health, however, as discussed previously, the Site does not pose an unacceptable risk under the current use scenario.

9.1.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

This criterion assesses the alternatives to determine whether they attain ARARs under federal and state environmental laws, or provide justification for waiving an ARAR. Site action and location specific ARARs are identified in Table 5.

As long as the soils are left in place (i.e., not excavated), no Federal or State ARARs for contaminants found in the OU #4 soils are triggered. Alternatives S3 and S4 will comply with action-specific and location-specific ARARs which include operations at a hazardous waste site, disposal of used activated carbon as solid waste, and air emission controls. Alternative S2 will comply with the location-specific ARAR related to operations at a hazardous waste site and there are no action-specific ARARs that apply to this alternative. No ARARs were identified for Alternative S1 as no action is being taken.

9.2 PRIMARY BALANCING CRITERIA

Five criteria are used to evaluate the overall effectiveness of a particular remedial alternative.

9.2.1 LONG-TERM EFFECTIVENESS AND PERMANENCE

This criterion assesses the long-term effectiveness and permanence an alternative will afford as well as the degree of certainty to which the alternative will prove successful.

Alternatives S3 and S4 will provide effective and permanent solutions for the contaminated soil. The chemicals of concern will be removed from the soil by the soil vapor extraction system and destroyed. Neither alternative will leave any treatment residuals on Site. The reliability of both Alternatives S3 and S4 is high because they rely on proven and applicable technologies and the extent of the contamination is relatively well defined. The reliability of Alternative S4 is higher than Alternative S3 because of the maintenance problems associated with the fume incinerator. Alternatives S1 and S2 do not directly remove, treat, or isolate subsurface contaminants; therefore, they are comparable to one another in terms of reducing potential residual risks. However, contaminant levels should gradually decrease to levels that would be protective of groundwater quality due to natural degradation processes. The time required to reach this concentration falls well within the OU #3 groundwater remediation timeframe (estimated to be 130 years). Alternative S2 involves long-term institutional controls to prevent future exposures to subsurface soils as well as the use of the contaminated groundwater beneath the NSCC facility. The projected adequacy and reliability of these controls depends on land use, but should be relatively high because the impacted area is small, within the plant boundaries, and land use is not expected to change. Soil monitoring and periodic reviews at five-year intervals will be required for all four alternatives, but the duration of performing such reviews for Alternatives S1 and S2 is expected to be much longer. The long term effectiveness and permanence of Alternatives S1 and S2 are dependent on the rate of degradation and effectiveness of the OU #3 remedial action.

9.2.2 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME

This criterion assesses the degree to which the alternative employs recycling or treatment to reduce the toxicity, mobility, or volume (TMV) of the contaminants present at the Site.

Both Alternatives S3 and S4 actively reduce the toxicity and mass of contaminants in the soil. This is accomplished through the removal of the contaminants from the soil via the soil vapor extraction system followed by fume incinerator or the thermal destruction of contaminants trapped on the carbon filter. Neither Alternative S1 nor S2 directly reduce the toxicity, mobility, or volume of contaminants through an engineered treatment process, but reduction due to natural processes is expected to occur well within the time period required for, and in conjunction with the OU #3 groundwater remediation.

9.2.3 SHORT-TERM EFFECTIVENESS

This criterion assesses the short-term impact of an alternative to human health and the environment. The impact during the actual implementation of the remedial action is usually centered under this criterion.

There are no short-time risks posed to site workers, the general public, or the environment associated with either Alternative S1 or S2. There are minimal short-term risks associated with Alternative S4 which are primarily due to general safety issues associated with the construction of the soil vapor extraction and air emissions treatment systems. In addition to risks associated with Alternative S4, Alterative S3 as two additional risks, maintenance problems associated with the fume incinerator and the handling of hydrochloric acid generated by the scrubber associated with the incinerator. Potential risks could also exist during the operating period, especially workers exposure to fugitive vapors. If either the carbon adsorption or fume incinerator/scrubber systems malfunction, temporary volatile organic emissions would be controlled and minimized through properly installed monitoring and control processes. Surface runoff during construction, as for any construction project, would be controlled to protect nearby surface waters.

9.2.4 IMPLEMENTABILITY

This criterion assesses the ease or difficulty of implementing the alternative in terms of technical and administrative feasibility and the availability of services and materials.

Alternative S1 requires no implementation. Alternative S2 will be easy to implement because minimal construction activities are required. Both Alternatives S3 and S4 are projected to require approximately 12 months to design and construct, and approximately 4 to 7 years of operation.

9.2.5 COST

This criterion assesses the cost of an alternative in terms of total present worth cost. Total present worth was calculated by combining the capital cost plus the total present worth of the annual O&M costs. Capital cost includes engineering and design, mobilization, Site development, equipment, construction, demobilization, utilities, and sampling/analyses. Operating costs were calculated for activities that continue after completion of construction, such as routine operation and maintenance of treatment equipment, and soil monitoring. The present owrht (PW) of an alternative is the amount of capital required to be deposited at the present time at a given interest rate to yield the total amount necessary to pay for initial construction costs and future expenditures, including O&M and future replacement of capital equipment.

More detailed information on the development of the total present worth costs for each alternative can be found in Section 8.

Alternative S1 - No Action: $ 199,000

Alternative S2 - Natural Degradation and Institutional Controls: $ 246,000

Alternative S3 - Soil Vapor Extraction with Fume Incineration and Activated Carbon Filter to Control Emissions: $5,281,000

Alternative S4 - Soil Vapor Extraction with Activated Carbon Filter to Control Emissions: $9,188,000

9.3 MODIFYING CRITERIA

State and community acceptance are modifying criteria that shall be considered in selecting the remedial action.

9.3.1 STATE OF NORTH CAROLINA ACCEPTANCE

The State of North Carolina has reviewed and provided EPA with comments on the reports and data from the RI and the FS. North Carolina Division of Solid Waste Management (NCDSWM) has also reviewed the Proposed Plan and EPA's preferred alternative and concurs with the selected remedy as described in Section 10. The State's correspondence providing concurrence can be found in Appendix A.

9.3.2 COMMUNITY ACCEPTANCE

The Proposed Plan Fact Sheet was distributed to interested residents, to local newspapers and radio and television stations, and to local, State, and Federal officials on July 8, 1994. The Proposed Plan public meeting was held in the evening of July 26, 1994. The public comment period on the Proposed Plan began July 12, 1994 and closed on September 9, 1994.

Written comments were received from one citizen, the City of Salisbury, and NSCC during the public comment period. The questions asked during the July 26, 1994 public meeting and the Agency's response to the written comments are summarized in the Responsiveness Summary, Appendix A. Minimal input was received from the community at large.

10.0 DESCRIPTION OF THE SELECTED REMEDY

This is a contingency ROD. Alternative S2 is selected for addressing the contaminated soils at the Site with the contingency remedy being Alternative S3. Briefly, the selected remedy (Alternative S2) for this Site is:

- Perform a "Biodegradative Study" to (1) substantiate that natural degradation of contaminants of concern is occurring in the OU #4 area, (2) identify where in the subsurface of the OU #4 area degradation is occurring, (3) determine the rate of degradation, and (4) develop and implement a for long term monitoring plan (refer to Section 8.1.2) to monitor the biodegradative process until the performance standards have been achieved. The collection of this data will begin after this ROD.

- In the event that the "Biodegradative Study" cannot substantiate the occurrence of significant natural degradation of 1,2-DCA and other contaminants of concern, or the study shows that degradation products increase the site risk, the contingent remedy (Alterative S3) shall be implemented. For the purposes of this ROD, "significant biodegradation" is defined as a statistically significant decrease in levels of contaminants of concern (particularly 1,2-DCA) that is coupled with multiple indicators of biological activity, which includes the appearance of degradation products such as, but not limited to, chloroethane, ethane, vinyl chloride, ethene, carbon dioxide, hydrogen sulfide, methane, and soluble iron(II)) and the depletion of electron acceptors (including oxygen, nitrate, iron, sulfates, or others). This decision will be made by EPA two years after the signing of this ROD.

- If, at any time, the Biodegradative Study or long term monitoring indicates that Site risks are increasing due to incomplete biotransformation of contaminants of concern (transformation to vinyl chloride which do not continue to ethene as an end product). The contingency remedy may be implemented.

- The institutional controls to be implemented are deed restrictions and maintenance of both the existing fence around the plant operations area and the paved areas around Area 2. A deed restriction will be recorded in the appropriate county registrar's office to prohibit any owner of the Site from utilizing the groundwater as potable water until such time as the contaminated plume meets drinking water standards. A plan will also be developed by NSCC, as needed, to protect workers in the event that the contaminated soils are to be excavated prior to the levels of 1,2-dichloroethane reaching the appropriate direct contact health based risk concentration (i.e., 7 ppm). NSCC will provide EPA written confirmation that the worker(s) read and understood the plan.

- Five year reviews/assessments, in accordance with CERCLA Section 121(c), will be performed until the specified performance standard for 1,2-DCA in the soil is achieved (i.e., concentration of 169 ppb).

The contingency remedy, Alternative S3, includes the following activities:

- Volatile organic contaminants will be removed from the soils by means of vapor extraction systems installed in the soil above the water table. The extracted contaminated air from Area 2 will initially be treated using fume incineration to destroy the volatile organics prior to the air stream being released into the atmosphere. After concentrations of contaminants decrease in the extracted air, this contaminated vapor will be treated via vapor-phase activated carbon adsorption filters. The extracted contaminated air from the lagoon area will be treated using vapor-phase activated carbon adsorption filters to remove the volatile organics prior to the air stream being released into the atmosphere. The contaminants captured by the vapor-phase carbon filters will be destroyed through the thermal regeneration of the used activated carbon at an off-site, commercial regeneration facility.

- A review/assessment in accordance to CERCLA Section 121(c) will be performed to verify that the soil vapor extraction system is proceeding as anticipated or has accomplished the specified cleanup goals that will be stipulated in the Record of Decision.

10.1 PERFORMANCE STANDARDS TO BE ATTAINED

Table 5 lists the action-specific and location-specific Site ARARs.

Performance standards include any applicable or relevant and appropriate standards/requirements, cleanup levels, or remediation levels to be achieved by the remedial action. The performance standard for 1,2-DCA in the soils to be met/attained by the NSCC OU #4 RA is 169 µg/kg or ppb. This is the anticipated concentration that will protect the quality of the underlying aquifer of being adversely impacted above the remediation goal established for 1,2-DCA in the OU #3 ROD.

10.2 SOIL REMEDIATION

The RA shall comply with all ARARs listed in Table 5. The presence of contamination in the soils will require deed restrictions to document their presence and could limit future use of the area known to be affected by the contaminated soils.

10.3 BIODEGRADATION STUDY

A Work Plan to implement and govern the "Biodegradative Study" will be developed for EPA approval as soon as possible after the signing of this ROD. The objectives of this Biodegradative Study Work Plan are: (1) confirm or refute that natural degradation in the soil is occurring in the area of OU #4, (2) if confirmed, locate where in the subsurface environment biodegradation is occurring, and (3) ascertain if biodegradation will reduce the soil contamination within a reasonable timeframe to a level which will protect groundwater and will not cause an exceedance of the OU #3 groundwater cleanup goal for potential breakdown products.

10.4 COST

The total present worth costs for 30 years for the selected alternative is $246,000 and $5,281,000 for the contingency remedy.

The break down of these costs are specified below. The present worth (PW) cost components are:

Selected Remedy -- Alternative S2

Capital Costs	$ 196,000
TOTAL PW O&M COSTS (at annual PW O&M Costs of $4,000)	$ 50,000
TOTAL PRESENT WORTH COST	$ 246,000

Contingency Remedy -- Alternative S3

Capital Costs $2,887,000
TOTAL PW O&M COSTS (at annual PW O&M Costs of $416,000) $2,394,000
TOTAL PRESENT WORTH COST $5,281,000

11.0 STATUTORY DETERMINATION

Based on available information, both the selected and contingent remedies satisfy the requirements of Section 121 of CERCLA, as amended by SARA, and the NCP. Both remedies provides protection of human health and the environment, are cost-effective, utilize permanent solutions to the maximum extent practicable, and satisfy the statutory preference for remedies involving treatment technologies.

11.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

In conjunction with the OU #3 RA, both the selected and contingent remedy will protect human health and the environment. The potential for exposure to Site contaminants via dermal, ingestion, and inhalation pathways will be greatly reduced.

11.2 COMPLIANCE WITH ARARS

The selected remedy will be designed to meet all Federal or more stringent State environmental laws. A complete list of the action and location-specific ARARs which are to be attained is included in Table 5. No waivers of Federal or State requirements are anticipated for OU #4.

11.3 COST-EFFECTIVENESS

The selected soil remediation technology is more cost-effective than the other acceptable alternatives considered. The selected remedy will provide greater benefit for the cost as it is anticipated to permanently remove the contaminants from the impacted soils. In the event the selected remedy is not effective in attaining the specified performance standard, the contingent remedy is a proven technology for removing and destroying VOCs in soils.

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

The selected remedy represents the maximum extent to which permanent solutions and treatment can be practicably utilized for this action. Of the alternatives that are protective of human health and the environment and comply with ARARs, EPA and the State have determined that the selected remedy provides the best balance of trade-offs in terms of: long-term effectiveness and permanence; reduction in mobility, toxicity, or volume achieved through treatment; short-term effectiveness, implementability, and cost; State and community acceptance; and the statutory preference for treatment as a principal element. The contingent remedy will satisfactorily fulfill the above parameters as well.

11.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The preference for the treatment of contaminated soil is satisfied by the use ofemploying indigenous microorganisms to degrade the volatile contaminants in the soil at the Site. It is anticipated that the principal threats at the Site will be eliminated by use of this treatment technology. In the event that the selected remedy will not achieve the specified performance standard within an acceptable timeframe, the contingent remedy also satisfies the preference for treatment.

12.0 SIGNIFICANT CHANGES

The July 1994 Proposed Plan Fact Sheet for OU 84 identified two potential alternatives as the contingent alternative in the event that natural degradation could not be substantiated. The two alternatives were Alternative S3 Soil Vapor Extraction with Fume Incineration and Activated Carbon Filter to Control Emissions at an estimated cost of $5,281,000 and Alternative S4 Soil Vapor Extraction with Activated Carbon Filter to Control Emissions at an estimated cost of $9,188,000. The emphasis of the Proposed Plan Fact Sheet was to stress the fact that an active remedial action alternative would be implemented if natural degradation was not occurring. This ROD selected Alternative S3 as the contingent alternative as this alternative is more cost effective than Alternative S4.

APPENDIX A

CONCURRENCE LETTER FROM THE STATE OF NORTH CAROLINA

State of North Carolina <IMG SRC 0495189N>
Department of Environment,
Health and Natural Resources
Division of Solid Waste Monagement

James B. Hunt, Jr., Governor
Jonathan B. Howes, Secretary
William L. Meyer, Director

September 29, 1994

Mr. Curt Fehn, Chief
NC Remedial Section
U.S. EPA Region IV
345 Courtland Street, N.E.
Atlanta, GA 30365

Subj: Conditional Concurrence with the Record of Decision for OU4
National Starch and Chemical Company NPL Site
Salisbury, Rowan County, NC

Dear Mr. Fehn:

The Division of Solid Waste Management (DSWM) has completed review of the attached Revised Record of Decision for Operable Unit 4 (OU4) and concurs with the selected remedy subject to the following conditions.

1. The DSWM is aware that institutional controls are subject to uncertainties regarding enforceability. Our concurrence is with the understanding that EPA shall attempt to reach an enforceable agreement with the responsible party regarding stipulated penalties which the responsible party will incur if the property is sold. We request that we be notified prior to entering these negotiations so that we may provide EPA with information and input regarding this issue.

2. DSWM concurrence on this Record of Decision and the selected remedy for the site is based solely on the information contained in the attached Record of Decision. Should DSWM receive new or additional information which signicantly affects the conclusions or remedy selection contained in the Record of Decision, it may modify or withdraw this concurrence with written notice to EPA Region IV.

3. DSWM concurrence on this Record of Decision in no way binds the State to concur in future decisions nor commits the State to participate, financially or otherwise, in the clean up of the site. The State reserves the right to review, comment, and make independent assessments of all future work relating to this site.

4. The responsible party for this site is undergoing a review of its compliance with the North Carolina Hazardous Waste Management Rules. Concurrence on this Record of Decision in no way affects or alters the compliance requirements or enforcement of the North Carolina Hazardous Waste Rules which are administered by the Hazardous Waste Section of DSWM.

The DSWM appreciates the opportunity to comment on the Revised Draft Record of Decision for OU4 for the subject site, and we look forward to working with EPA on the final remedy. If you have any questions concerning these comments please contact Bruce Nicholson or me at (919)733-2801.

Sincerely,

Jack Butler, PE
Head, Remediation Branch

cc: Michael Kelly
Bruce Nicholson
Jon Bornholm

Attachment

APPENDIX B

PROPOSED PLAN FACT SHEET

<IMG SRC 04951890>

SUPERFUND PROPOSED PLAN FACT SHEET
OPERABLE UNIT #4 SOIL REMEDIATION IN PLANT
OPERATIONS AND TREATMENT LAGOON AREAS
NATIONAL STARCH & CHEMICAL COMPANY

July 1994

Salisbury, Rowan County, North Carolina

Terms in bold face print are defined in a glossary located at the end of this publication. This fact sheet is not to be considered a technical document but has been prepared to provide a better understanding to the public.

INTRODUCTION

This Proposed Plan summarizes the June 20, 1994 Operable Unit #4 (OU #4) Feasibility Study and identifies the preferred cleanup option for addressing the contaminated soil associated with Area 2 and the wastewater treatment lagoon area at the National Starch & Chemical Company (NSCC) Superfund Site in Salisbury, North Carolina. The term "Operable Unit" is used when individual actions are taken as a part of an overall site cleanup. A number of operable units can be used in the course of a site cleanup. This Fourth Operable Unit is anticipated to be the last operable Unit for the NSCC site. The Proposed Plan Fact Sheet for Operable Unit #3 (OU #3), which addressed the contaminated groundwater underlying these same areas of the NSCC property, was distributed to the public in July 1993.

The Environmental Protection Agency (EPA), lead Agency for Site activities, prepared this Proposed Plan with the assistance of the North Carolina Department of Environment, Health and Natural Resources (NCDEHNR), the support agency. The data and information presented in the Remedial Investigation for OU #3 also supported the OU #4 Feasibility Study. EPA, in consultation with NCDEHNR, will select a remedy for OU #4 only after the public comment period ends and all information submitted to EPA during this time has been reviewed and considered.

EPA is issuing this Proposed Plan as part of its public participation responsibilities in accordance with Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), also known as Superfund. This Proposed Plan Fact Sheet summarizes information presented in the June 1993 OU #3 Remedial Investigation Report, which includes the Baseline Risk Assessment, and the June 20, 1994 OU #4 Feasibility Study document, and other documents contained in the Information Repository/Administrative Record for this Site. EPA and the State encourage the public to review these documents to better understand the Site and the Superfund activities conducted. The Administrative Record is available for public review locally at the Rowan Public Library at 201 West Fisher Street, Salisbury, North Carolina.

EPA, in consultation with NCDEHNR, may modify the preferred alternative or select another response action presented in this Plan and the Remedial Investigation and the Feasibility Study Reports based on new information and/or public comments. Therefore, the public is encouraged to reivew and comment on all alternatives discussed below. This Proposed Plan:

1. Includes a brief background of the Site and the principle findings of OU #3 Site Remedial Investigation and the recent hydrophobic dye test;

2. Presents the remedial (cleanup) alternatives for OU #4 considered by EPA;

3. Outlines the evaluation criteria used to recommend a remedial alternative;

4. Summarizes the analysis based on the evaluation criteria;

5. Presents EPA's rationale for its recommended remedial alternative; and

6. Explains the opportunities for the public to comment on the remedial alternatives and become involved in the process.

PROPOSED PLAN PUBLIC MEETING
DATE: July 26, 1994
<IMG SRC 0495189P> LOCATION: Agricultural Extension Center <IMG SRC 0495189Q>
2727 Old Concord Road
Salisbury, North Carolina
TIME: 7:00 PM - 9:00 PM
PUBLIC COMMENT PERIOD: July 12, 1994 - August 11, 1994

SITE BACKGROUND

The NSCC facility occupies approximately 465 acres on Cedar Springs Road five miles south of the City of Salisbury, North Carolina (refer to Figure 1). Presently, land use immediately adjacent to the Site is a mixture of residential and industrial developments. East and south of the Site are industrial parks consisting primarily of light industrial operations. The west and north sides of the NSCC property are bordered by residential developments. Refer to the Figure 2 for Site location.

A surface stream on the NSCC property, referred to as the Northeast Tributary, flows parallel to Cedar Springs Road and passes within 50 yards of the manufacturing area of the facility (refer to Figure 2). Surface water runoff from the eastern side of the facility discharges into this tributary. The primary objective of Operable Units #3 and #4 was to determine the source, nature, and extent of the contamination being continuously detected in this stream on the NSCC property.

Primarily, NSCC manufactures textile-finishing chemicals and custom specialty chemicals. Volatile and semi-volatile organic chemicals are used in the production process along with acidic and alkaline solutions. Acidic and alkaline solutions are also used in the cleaning processes. The waste stream from the manufacturing process includes wash and rinse solutions.

Operable Units #3 and #4 focus on the areas of the facility referred to as Area 2 and the wastewater treatment lagoons (refer to Figure 3). Area 2 consists of the following operations: Area 2 Reactor Room, the Tank Room, Raw Material Bulk Storage, and the Warehouse. The lagoon area includes three lagoons. A fourth lagoon was installed in 1992 as part of the treatment system built to treat the contaminated groundwater being extracted from the aquifer as part of the Operable Unit #1 (OU #1) Remedial Action.

OU #3 Groundwater in Area 2 and the wastewater treatment lagoon area; surface water/sediments in the Northeast Tributary

OU #4 Soils in Area 2 and the wastewater treatment lagoon area

REASULTS OF THE OU #3 REMEDIAL INVESTIGATION USED FOR OU #4 FEASIBILITY STUDY

As reported in previous Fact Sheets, contaminants have been found in the soils, groundwater, and surface water/sediment on the NSCC property. This contamination can be traced back to past chemical handling and disposal practices of the NSCC facility. The sources of the contamination were identified. The types and concentrations of the contaminants have been verified. The extent of contamination in the vadose soil zone has been defined. The vadose zone is comprised of subsurface soil that is not saturated with water. The interface between the vadose zone and the saturated zone is commonly referred to as the water table. Fourteen different volatile organic compounds, one sime-volatile organic compound, and one pesticide were detected in the vadose soils.

The primary sources of contamination in Area 2 were a buried, leaking terra-cotta (fired clay) pipeline and a solvent recovery system. The terra-cotta pipeline transported liquid waste from Area 2 to the wastewater treatment lagoons. Replacement of the terra-cotta pipeline with an overhead stainless steel pipeline was completed in February 1994. Therefore, the terra-cotta pipeline is no longer in use. Spills associated with operating the solvent recovery system have been contained since 1988 when a concrete containment structure was constructed around the solvent recovery system. Prior to this, material containing 1,2-dichloroethane was spilled directly onto the ground. The source of the contaminants detected in the wastewater treatment lagoon area is the soil under

As in Operable Units #1, #2, and #3, the work performed for OU #4 was financed by NSCC, the Potentially Responsible Party.

The NSCC site was proposed for inclusion on the National Priorities List in April 1985 and finalized on the list in October 1989. The Site had a Hazardous Ranking System score of 46.51. Only Sites with a Hazardous Ranking System score of 28.5 or higher are eligible to be placed on the National Priorites List.

SCOPE AND ROLE OF OPERABLE UNIT WITHIN SITE STRATEGY

As with many Superfund sites, the NSCC site is complex. Consequently, EPA divided the work into four manageable components called Operable Units (OU); they are:

OU #1   Groundwater in the western portion of the NSCC property

OU #2   Trench Area soils and surface water/sediments in the Northeast Tributary

<IMG SRC 0495189R>
<IMG SRC 0495189S>

and around the lagoons which were contaminated prior to the lagoons being lined with concrete.

The primary contaminant is 1,2-dichloroethane which is a chlorinated organic compound that is typically used as a solvent. 1,2-Dichloroethane volatilizes readily and is classified as a probable human carcinogen. A carcinogen is any substance that can cause or contribute to the development of cancer.

Other organic chemicals were detected. The chemicals of potential concern at the Site are (listed alphabetically): acetone, bis (2-chloroethyl) ether, bis (2-ethylhexyl) phthalate, 2-butanone, cadmium, carbon disulfide, chloroform, chloroethane, delta-BHC, 1,2-dichloroethene, di-n-butyl phthalate, di-n-octyl phthalate, ethyl benzene, methylene chloride, styrene, tetrachloroethene, toluene, 1,1,2-trichloroethane, trichloroethene, vinyl chloride and total xylene. The following inorganics were also detected: aluminum, antimony, arsenic, barium, beryllium, chromium, cobalt, copper, cyanide, lead, manganese, mercury, nickel, selenium, thallium, vanadium, and zinc.

The only field work performed to support OU #4 activities in addition to the field investigation conducted as part of OU #3 was a hydrophobic dye test. The hydrophobic dye test was conducted to determine if 1,2-dichloroethane existed as a liquid in the subsurface soils at the Site. 1,2-Dichloroethane belongs to the family of chemicals that if sufficient quantities of 1,2-dichloroethane are present, then the 1,2-dichloroethane will consolidate in the subsurface environment and form pools of 1,2-dichloroethane. It was important to determine if 1,2-dichloroethane existed as a liquid in the subsurface environment as the Agency has found through experiences at other Superfund sites that the presence of such a pool of contamination will act as a continuous source of contamination for many, many years. Consequently, the presence of such a pool of contamination would control the success or failure of the Site's cleanup as well as the cost of the cleanup. Once in the subsurface, it is difficult if not impossible, to recover all of the trapped pooled containment from the ground.

In a hydrophobic dye test, a soil or groundwater sample is mixed in a glass container that contains a solution of water and a dye that will attach itself to 1,2-dichloroethane. If no dye is found clining to the sides of the glass container, then 1,2-dichloroethane does not exist as a free liquid in the sample tested. To insure the most useful information was obtained, the six soil samples used in the hydrophobic dye test were collected from the area of the Site containing the highest soil concentrations of 1,2-dichloroethane. The results of the hydrophobic dye test (September 1993) on these six samples indicate that 1,2-dichloroethane does not exist as a free liquid in the soils at the Site.

Replacement of the terra-cotta pipeline with an overhead stainless steel pipeline eliminated the release of 1,2-dichloroethane to the soils beneath Area 2 and, ultimately, to the underlying groundwater. The concrete flooring of the building (i.e., the foundation) and the asphalt driveway that surrounds the building act as an impervious cap. By replacing the leaking terra-cotta pipeline with the overhead pipeline, two goals were achieved. First, the source of contamination was eliminated. Second, water leaking from the terra cotta pipe comprised a driving force for the downward migration of 1,2-dichloroethane, and this driving force was also eliminated. Therefore, it is not expected that contaminants present in the soil will adversely impact groundwater.

All the metals (inorganics) detected in the soil are naturally occurring. The difference in concentrations between the background sediment sample and on-site soil samples indicate the Site has not working on the Site. The risk scenarios developed in the Baseline Risk Assessment for future conditions including a resident living on the NSCC property and using a well installed in the contaminated groundwater as their source of potable water (i.e., water used for drinking, cooking, bathing, etc.). In conducting this assessment EPA focuses on the adverse human health effects that could result from long-term daily, direct exposure as a result of ingestion, inhalation, or dermal contact to carcinogenic chemicals (cancer causing) as well as the adverse health effects that could result from long-term exposure to non-carcinogenic chemicals present at the Site.

EPA's goal at Superfund sites is to reduce the excess lifetime cancer risk due to chemicals present at the Site. This means that the chance of contracting cancer is between one in ten thousand and one in one million.

In the exposure assessment, EPA considered ingestion of soil, inhalation of soil vapor and/or particulates, and direct contact as the likely exposure pathways for the human receptors.

EPA concluded that under current conditions, the soil contamination associated with OU #4 does not pose and unacceptable current risk to human health. There is no current unacceptable risk because there is no complete exposure pathway for the contaminants to reach the public at large. However, three future risk scenarios were identified which could lead to unacceptable future risks as a result of being exposed to the chemical contamination at the Site. The first scenario involves residents living in homes built on or near the Site and using the contaminated groundwater as their source for potable water. The key exposure pathway in this scenario is the use of the contaminated groundwater as a potable source. The second scenario that could result in another unacceptable future risk is the exposure of a child to the surface water, sediment, and spring water. Currently, the potential for exposure through this pathway is significantly reduced because access to that portion of the stream where elevated concentrations of contaminants are present is encompassed within the fenced area of the NSCC property. The third, potential unacceptable future risk involves exposing individuals to contaminated subsurface soil. This risk exists for both workers on-site as well as future residents living on-site and digging into the subsurface soils. The worker risks can be greatly reduced by providing adequate personal protection.

released inorganic contaminants into the environment.

SUMMARY OF SITE RISKS

A goal of the Remedial Investigation/Feasibility Study process is to analyze and estimate the human health and environmental problems that could result if the contamination is not cleaned up. This analysis is called a Baseline Risk Assessment. In calculating risks to a population if no remedial action is taken, EPA evaluates the reasonable maximum exposure levels under current and potential future exposure scenarios to Site contaminants. The risk scenarios evaluated in the Baseline Risk Assessment under current conditions included trespassers on the NSCC Site as well as employees

REMEDIAL ACTION OBJECTIVES

The main goal of Remedial Action Objectives is to protect human health and the environment by preventing exposures to concentrations of contaminants above risk-based human health or environmental standards. Protecting human health may be achieved by either reducing exposure or reducing contaminant levels. Protection of the environment includes protection of natural resources for future uses.

In identifying the Remedial Action Objectives, the findings of the Baseline Risk Assessment were used as well as an examination of all potential federal and state environmental Applicable or Relevant and Appropriate Requirements (ARARs). ARARs can be categorized as chemical-specific, location-specific, or action-specific. Chemical-specific ARARs are acceptable exposure levels to particular chemicals and is the limit that must be met for that contaminant within an environmental medium (i.e., water, soil, or air) at a specific compliance point. Location-specific ARARs address site-specific aspects such as critical habitat upon which endangered species or threatened species depends, the presence of a wetland, or historically significant features. Action-specific requirements are controls or restrictions for particular activities related to the implementation of the proposed remedial alternative. In summary, the Remedial Action Objectives for soils in Area 2 and the wastewater treatment lagoon area are:

For Human Health: Prevent direct contact with soils having levels resulting in cancer risks above acceptable limits

For Human Health: Prevent release of contaminants from soil that could result in contaminant levels in excess of groundwater cleanup objectives specified in the OU #3 Record of Decision

For Environmental Protection: Continue containment of contamination.

The objective of a Superfund Site cleanup is to reduce the contamination to concentrations specified by "ARARs" or that is protective of human health. There are no Federal or State ARARs that govern the cleanup of contaminated soils that are not excavated. The following soil performance standards (cleanup goals) for 1,2-dichloroethane were based on (1) direct contact exposure and (2) leaching of 1,2-dichloroethane into the underlying groundwater.

Risk-based concentrations for 1,2-dichloroethane were calculated for the following exposure scenarios: a worker exposed to contaminated soil and a future resident exposed to contaminated soil. The concentration protective of a worker is 63 milligrams per kilogram and for a future resident, 7 milligrams per kilogram. Based on the data collected, no surface soils at the Site exceeded the risk-based value of 7 milligrams per kilogram for 1,2-dichloroethane. Therefore, surface soils do not pose an unacceptable risk to human health under current or future exposure scenarios.

However, subsurface soils underneath Area 2 and the wastewater concentration of 1,2-dichloroethane in groundwater above the most stringent groundwater quality concentration (NCAC 15-2L.0202) for 1,2-dichloroethane is 169 micrograms per kilogram.

Based on the risk-based value of 7 milligrams per kilogram, the estimated volume of soil contaminated above this concentration is 35,940 cubic yards. The estimated volume of soil contaminated above 169 micrograms per kilogram is over 231,300 cubic yards.

SUMMARY OF REMEDIAL ALTERNATIVES

The following section summarizes the cleanup technologies and alternatives developed in the OU #4 Feasibility Study document for addressing the soil contamination in Area 2 and the wastewater treatment lagoon area. Descriptions of the clean-up alternatives are summarized below.

The cost information below represents the estimated total present worth of each alternative. Total present worth was calculated by combining the capital cost plus the present worth of the annual operating and maintenance costs. Capital cost includes construction, engineering and design, equipment, and site development. Operating costs were calculated for activities that continue after completion of construction, such as routine operation and maintenance of treatment equipment, and monitoring. The present worth of an alternative is the amount of capital required to be deposited at the present time at a given interest rate to yield the total amount necessary to pay for initial construction costs and future expenditures, including operation and maintenance and future replacement of capital equipment.

For more information about the Remedial Action Objectives and alternatives for OU #4, please refer to the June 20, 1994 Feasibility Study document and other documents available in the information repository in the Rowan Public Library.

REMEDIAL ALTERNATIVES TO ADDRESS SOIL CONTAMINATION

The four alternatives for addressing contaminated soils include:

Alternative S1: No Action

Alternative S2: Natural Degradation & Institutional Controls treatment lagoon area have 1,2-dichloroethane concentrations of 1,600 milligrams per kilogram and 19 milligrams per kilogram respectively, both exceeding 7 milligrams per kilogram. If these soils should be exposed under a future residential scenarios (i.e., during digging or construction), they would pose an unacceptable health risk.

The next step in establishing Site cleanup goals is to develop soil cleanup levels to protect groundwater. EPA determines what concentration of contaminant can remain in the soil without leaching to groundwater in quantities that would be above a protective level for the groundwater. The estimated concentration of 1,2-dichloroethane that could be left in the soil without increasing the

Alternative S3: Soil Vapor Extraction with Fume Incineration and Activated Carbon Filter to Control Emissions

Alternative S4: Soil Vapor Extraction with Activated Carbon Filter to Control Emissions

A description of each alternative follows:

ALTERNATIVE S1: NO ACTION

Capital Costs:	$ 0
Annual Operating & Maintenance Costs	
First Year:	$ 16,000
Second Year:	$ 0
Third Year and Later:	$ 0
Present Worth Operating & Maintenance Costs:	$199,000
Total Present Worth Costs for 30 Years:	$199,000
Time to Design:	None
Construction Time:	None
Duration to Achieve Clean-up:	Over 30 years

CERCLA requires that the "No Action" alternative be evaluated at every Superfund Site to establish a baseline for comparison. No further activities would be conducted with Site soils under this alternative (i.e., the Site is left "as is"). Because this alternative neither removes nor destroys the contamination (i.e., contamination) is left on-site), a review of the remedy will need to be conducted every five years in accordance with CERCLA Section 121(c). This review process will continue every five years until the cleanup goals for the identified contaminants in the soil are achieved.

If no action is taken migration of contaminants from the soil into the underlying aquifer in the vicinity of the wastewater treatment lagoon area will continue. This migration results from the natural movement of precipitation (e.g, rain and melted snow) moving through the soils and carrying the contamination downward as the precipitation recharges the aquifer. This migration force does not exist in Area 2 as this area is covered with concrete building foundations and asphalt driveways. These structures prohibit precipitation from percolating into the underlying soils. Therefore, all precipitation becomes surface runoff which is controlled by the slope of the asphalt driveways and the curbs built around the asphalt driveways. Surface runoff is directed into sumps where the water is pumped to the wastewater treatment lagoons. Although Alternative S1 does not actively reduce or eliminate soil contamination, it is anticipated that the levels of 1,2-dichloroethane will decrease over time due to the process of natural degradation.

There are no initial capital costs for Alternativge S1. Annual operating costs are based on conducting periodic monitoring of the soil in order to prepare the five year review every five years for a period of 30 years. As part of the five year review, soil samples will be

ALTERNATIVE S2: NATURAL DEGRADATION AND INSTITUTIONAL CONTROLS

Capital Costs:	$196,000
Annual Operating & Maintenance Costs	
First Year:	$ 4,000
Second Year:	$ 0
Third Year and Later:	$ 0
Present Worth Operating & Maintenance Costs:	$ 50,000
Total Present Worth Costs for 30 Years:	$246,000
Time to Design:	3 months
Construction Time:	1 month
Duration to Achieve Clean-up:	Over 30 years

Natural degradation relies on natural processes to destroy the contaminants present. The most common degradation process is the result of microorganisms (bacteria, fungus, etc.) present in the soil using the contaminants as an energy (food) source; thereby, destroying the contaminant. The presence of 2 chemicals at the Site, chloroethane and vinyl chloride, neither ofwhich were used at this NSCC facility, is a strong indication that 1,2-dichloroethane is being transformed via natural degradation process(es). The rate and effectiveness of the natural degradation process is dependent on a number of environmental factors, such as nutrient availability, soil moisture content, presence or absence of oxygen in the soil, etc.

Using published information, the following degradation rates were estimated: in less than 10 years, the concentration of 1,2-dichloroethane should decrease to the direct contact health based risk concentration of 7 milligrams per kilogram; in less than 21 years the concentration of 1,2-dichloroethane should decrease to 169 micrograms per kilogram, the concentration that can remain in the soil but not adversely impact the quality of the underlying groundwater above the performance standard for 1,2-dichloroethane; and in approximately 35 years, the concentration of 1,2-dichloroethane in the soil should reach a concentration of 1 microgram per kilogram. It estimated that it will require over 130 years of pumping the groundwater, as required by OU #3, to remediate the groundwater to the specified ARAR of 1 microgram per liter.

As part of this alternative, a biodegradative study will be conducted. This study will (1) confirm that natural degradation in the soil is occurring and (2) ascertain if biodegradation will reduce the soil contamination during remediation of OU #3 groundwater to a level collected for chemical analyses once every five years in both areas, Area 2 and the wastewater treatment lagoon area.

that will not cause an exceedance of the OU #3 groundwater cleanup goal. In the event that natural degradation is occurring at an acceptable rate, then the data from the biodegradation study will be used in the CERCLA Section 121(c) required 5-year review. With the completion of the overhead pipeline in February 1994, no additional contamination should be entering the soils beneath the Area 2 building. Based on the degradation discussion above, a substantial decrease in the concentration of 1,2-dichloroethane in the soil should be observed over the next several years. In the event that the concentration of 1,2-dichloroethane in the soil does not decrease as anticipated, a contingent remedy consisting of an active soil remediation technology (such as described in Alternative S3 or S4 below) shall be implemented to achieve the reduction of contaminant levels that would be protective of the quality of the underlying groundwater.

Institutional controls include using various controls and deed restrictions. The specific institutional controls considered for this alternative are 1) using and maintaining the existing fence around the plant operations area to limit access to the contaminated areas; 2) periodic inspection and maintenance of paved areas around Area 2 to insure the integrity of the cap over this area, and 3) restriction to control future land use of the NSCC property. The deed restriction will contain language to accomplish the following four objectives: 1) to inform any potential buyer of the property of the contamination present, 2) restrict future land use which would decrease the likelihood of human exposure to contaminated soils, 3) to prevent the installation of a potable well at the Site until the levels of contamination in the groundwater under the Site are deemed safe, and 4) to prevent excavation in contaminated soils without sufficient personal protection for the workers. The suitable deed restriction shall be recorded in the appropriate county registrar's office.

ALTERNATIVE S3: SOIL VAPOR EXTRACTION WITH FUME INCINERATION AND ACTIVATED CARBON FILTER TO CONTROL EMISSIONS

Capital Costs:	$2,887,000
Annual Operating & Maintenance Costs	
First Year:	$ 507,000
Second Year:	$ 416,000
Third Year and Later:	$ 416,000
Present Worth Operating & Maintenance Costs:	$2,394,000
Total Present Worth Costs for 7 Years:	$5,281,000
Time to Design:	9 months
Construction Time:	3 month
Duration to Achieve Clean-up:	Over 7 years

This alternative will remove volatile organic contaminants by means of vapor extraction wells installed in the soil above the water table. A preliminary design for Area 2 suggests a system of 10 horizontal soil vapor extraction wells drilled underneath the buildings and driveways. These 10 extraction wells will remove a total of 1,300 cubic feet per minute of contaminated air. The preliminary design for the wastewater treatment lagoon area suggests a system of seven vertical extraction wells removing a total of 20 cubic feet per minute of contaminated air. The extracted contaminated air from Area 2 would be treated using fume incineration to destroy the volatile goals that will be stipulated in the Record of Decision.

ALTERNATIVE S4: SOIL VAPOR EXTRACTION WITH ACTIVATED CARBON FILTER TO CONTROL EMISSIONS

Capital Costs:	$2,918,000
Annual Operating & Maintenance Costs	
First Year:	$3,353,000
Second Year:	$1,566,000
Third Year and Later:	$ 475,000
Present Worth Operating & Maintenance Costs:	$6,270,000
Total Present Worth Costs for 7 Years:	$9,188,000
Time to Design:	9 months
Construction Time:	3 months
Duration to Achieve Clean-up:	Over 7 years

This alternative is identical to Alternative S3 with the exception that the extracted contaminated air from both areas would be treated using vapor-phase activated carbon adsorption filters to remove the volatile organics prior to the air stream being released into the atmosphere. As before, the contaminants captured by the vapor-phase carbon filters would be destroyed at an off-site, commercial regeneration facility.

CRITERIA FOR EVALUATING REMEDIAL ALTERNATIVES

The selection of the preferred cleanup alternative for the NSCC OU #4, as described in this Proposed Plan, is the result of a comprehensive screening and evaluation process. The Feasibility Study for OU #4 was conducted to identify and analyze the alternatives considered for addressing contamination in Area 2 and the wastewater treatment lagoon area. The Feasibility Study and other documents for the NSCC OU #4 site describe in detail the alternatives considered, as well as the process and criteria EPA used to narrow the list of the potential remedial alternatives to address the soil contamination in this portion of the NSCC facility. As stated previously, all of these documents are available for public review in the information repository/administrative record.

Alternative S5 - Bioventing was not retained for the detailed analysis because this alternative does not provide any appreciable improvement in reduction of risk or other performance measurement over either Alternative S3 or S4.

organics prior to the air stream being released into the atmosphere and the extracted contaminated air from the lagoon area would be treated using vapor-phase activated carbon adsorption filters to remove the volatile organics prior to the air stream being released into the atmosphere. The contaminants captured by the vapor-phase carbon filters would be destroyed through the thermal regeneration of the used activated carbon at an off-site, commercial regeneration facility. Remediation of the soil in Area 2 and the wastewater treatment lagoon area is expected to be completed within 4 to 7 years and 1 to 2 years, respectively. A review/assessment in accordance to CERCLA Section 121(c) would be performed to verify that the soil vapor extraction system is proceeding as anticipated or accomplished the specified cleanup

EPA always uses the following nine criteria to evaluate alternatives identified in the Feasibility Study. The remedial alternative selected for a Superfund site must achieve the two threshold criteria as well as attain the best balance among the five evaluation criteria. The nine criteria are as follows:

THRESHOLD CRITERIA

1. Overall protection of human health and the environment. The degree to which each alternative eliminates, reduces, or controls threats to public health and the environment through treatment, engineering methods or institutional controls.

2. Compliance With Applicable or Relevant and Appropriate Requirements (ARARs): The alternatives are evaluated for compliance with all state and federal environmental and public health laws and requirements that apply or are relevant and appropriate to the site conditions.

EVALUATING CRITERIA

3. Cost: The benefits of implementing a particular remedial alternative are weighed against the cost of implementation. Costs include the capital (up-front) cost of implementing an alternative over the long term, and the net present worth of both capital and operation and maintenance costs.

4. Implementability: EPA considers the technical feasibility (e.g., how difficult the alternative is to construct and operate) and administrative ease (e.g., the amount of coordination with other government agencies that is needed) of a remedy, including the availability of necessary materials and services.

5. Short-term effectiveness: The length of time needed to implement each alternative is considered, and EPA assesses the risks that may be posed to workers and nearby residents during construction and implementation.

6. Long-term effectiveness: The alternatives are evaluated based on their ability to maintain reliable protection of public health and the environment over time once the cleanup goals have been met.

7. Reduction of contaminant toxicity, mobility, and volume: EPA evaluates each alternative based on how it reduces (1) the harmful nature of the contaminants, (2) their ability to move through the environment, and (3) the volume or amount of contamination at the site.

MODIFYING CRITERIA

8. State acceptance: EPA requests state comments on the Remedial Investigation and Feasibility Study Reports, as well as the Proposed Plan, and must take into consideration whether the state concurs with, opposes, or has no comment on EPA's preferred alternative.

environment in conjunction with the OU #3 remedial action. However, Alternatives S2, S3, and S4 will provide protection, more quickly, from exposures to contaminated subsurface soils. Of these three alternatives, Alternatives S3 and S4 will afford the greatest protection to human health as they substantially reduce the contaminants in the soil within 4-7 years of initiation of the alternatives. Under Alternatives S1 and S2, contaminant levels are anticipated to decrease as a result of natural degradation. Alternatives S3 and S4 protect the environment by removing contaminants from the soil, thereby eliminating the potential for migration of contaminants to groundwater. In conjunction with the OU #3 groundwater remedial action, Alternatives S1 and S2 will also be protective of the environment. This protection stems from the following factors: 1) all contaminated soils are within the groundwater plume being remediated by OU #3, 2) the OU #3 remediation will prevent the spread of contaminants and remove contaminants from the groundwater, and 3) soil contaminants should be reduced by natural processes within the timeframe required to complete the OU #3 groundwater remediation. Alternative S1 does not provide short term protection for human health, however, as discussed previously, the Site does not pose an unacceptable risk under the current use scenario.

Compliance with ARARs: As long as the soils are left in place (i.e., not excavated), no Federal or State ARARs for contaminants in soils are triggered. Alternatives S3 and S4 will comply with action-specific and location-specific ARARs which include operations at a hazardous waste site, disposal of used activated carbon as solid waste, and air emission controls. Alternative S2 will comply with the location-specific ARAR related to operations at a hazardous waste site and there are no action-specific ARARs that apply to this alternative. No ARARs were identified for Alternative S1 as no action is being taken.

Long-term Effectiveness and Permanence: Alternatives S3 and S4 will provide effective and permanent solutions for the contaminated soil. The chemicals of concern will be removed from the soil by the soil vapor extraction system and destroyed. Neither alternative will leave any treatment residuals on Site. The reliability of both Alternatives S3 and S4 is high because the rely on proven and applicable technologies and the extend of the contamination is relatively well defined. The reliability of Alternative S4 is higher than Alternative S3 because of the maintenance problems associated with the fume incinerator. Alternatives S1 and S2 do not directly remove

9. Community acceptance:
adequate opportunity to provide input, EPA holds a public comment period and considers and responds to all comments received from the community prior to the final selection of a remedial action.

EVALUATION OF ALTERNATIVES

The following summary profiles the comparative analysis of the four alternatives in terms of the nine evaluation criteria:

Overall Protection: All four alternatives, S1, S2, S3, and S4 are expected to provide long-term protection for human health and the treat, or isolate subsurface contaminants; therefore, they are comparable in terms of reducing potential residual risks. However, contaminant levels should gradually decrease to levels that would be protective of groundwater quality due to natural degradation processes. The time required to reach this concentration falls well within the OU #3 groundwater remediation timeframe (estimated to be 130 years). Alternative S2 involves long-term institutional controls to prevent future exposures to subsurface soils as well as the use of the contaminated groundwater beneath the NSCC facility. The projected adequacy and reliability of these controls depends on land use, but should be relatively high because the impacted area is small, within the plant boundaries, and land use is not expected to change. Soil monitoring and periodic reviews at five-year intervals will be required for all three alternatives t the duration of performing such reviews for Alternatives S1 and S2 is expected to be much longer. The long term effectiveness and permanence of Alternatives S1 and S2 are dependent on the rate of degradation and effectiveness of the OU #3 remedial action.

Reduction of Toxicity, Mobility or Volume: Both Alternatives S3 and S4 actively reduce the toxicity and mass of contaminants in the soil. This is accomplished through the removal of the contaminants from the soil via the soil vapor extraction system followed by fume incinerator or the thermal destruction of contaminants trapped on the carbon filter. Neither Alternative S1 nor S2 directly reduce the toxicity, mobility, or volume of contaminants through an engineered treatment process, but reduction due to natural processes is expected to occur well within the time period required for, and in conjunction with the OU #3 groundwater remediation.

Short-term Effectiveness: There are no short-time risks posed to site workers, the general public, or the environment associated with either Alternative S1 or S2. There are minimal short-term risks associated with Alternative S4 which are primarily due to general safety issues associated with the construction of the soil vapor extraction and air emissions treatment systems. In addition to risks associated with Alternative S4, Alternative S3 as two additional risks, maintenance problems associated with the fume incinerator and the handling of hydrochloric acid generated by the scrubber associated with the incinerator. Potential risks could also exist during the operating period, especially workers exposure to fugitive vapors. If either the carbon adsorption or fume incinerator/scrubber systems malfunction, temporary volatile organic emissions would be controlled and minimized through properly installed monitoring and control processes. Surface runoff during construction, as for any construction project, would be controlled to protect nearby surface waters.

Implementability: Alternative S1 requires no implementation. Alternative S2 will be easy to implement because little to no construction is required. Both Alternatives S3 and S4 are projected to require approximately 12 months to design and construct, and approximately 4 to 7 years of operation.

Cost: Total present worth costs for the soils alternatives are presented below:

Alternative S1 - No Action:	$ 199,000
Alternative S2 - Natural Degradation and Institutional Controls:	$ 246,000
Alternative S3 - Soil Vapor Extraction with Fume Incineration and Activated Carbon Filter to Control Emissions:	$5,281,000
Alternative S4 - Soil Vapor Extraction with Activated Carbon Filter to Control Emissions:	$9,188,000

EPA'S PREFERRED ALTERNATIVE

After conducting the above detailed analysis, EPA is proposing the following alternative to address the contaminated soil in Area 2 and the wastewater treatment lagoon area. The EPA preferred soil remediation alternative is:

ALTERNATIVE S2: NATURAL DEGRADATION AND INSTITUTIONAL CONTROLS

Based on current information, this alternative appears to provide the best balance of trade-offs with respect to the nine criteria that EPA uses to evaluate alternatives. EPA believes the preferred alternative will satisfay the statutory requirement of Section 121(b) of CERCLA, 42 USC 962(b), which provides that the selected alternative be protective of human health and the environment, comply with ARARs, be cost effective, and utilize permanent solutions and treatments to the maximum extent practicable. The selection of the above alternative is preliminary and could change in response to public comments.

As this alternative relies on natural degradation to clean the soils, NSCC will be required to substantiate that natural degradation is occurring, identify where in the subsurface the degradation is occurring, and determine the rate of degradation. The collection of this data via the biodegradative study will begin after Record of Decision for OU #4 is signed.

In the event that the biodegradative study data cannot substantiate the occurrence of natural degradation a contingency remedy, such as Alternative S3 or S4, will be implemented. It is anticipated that this decision will be made within two years of the signing of the OU#4 Record of Decision.

The institutional controls to be implemented are deed restrictions and maintenance of both the existing fence around the plant operations area and the paved areas around Area 2. NSCC will record, in the appropriate county registrar's office, a deed restriction in which NSCC, and any subsequent owner of the Site, would be prohibited from utilizing the groundwater for drinkingwater purposes until such time as the contaminated plume meets drinking water standards. NSCC will also develop a plan that will protect any worker in the event that the contaminated soils need to be dug into prior to the levels of 1, 2- dichloroethane reach the appropriate direct contact health based risk concentration. Maintaining the fence will reduce the liklihood of trespassers gaining access to the contaminated areas, and repairing cracks in the paved area will help prevent 1,2-dichloroethane from leaching from the soils into the underlying groundwater.

RESPONSIVENESS SUMMARY
FOR THE PROPOSED REMEDIAL ACTION
FOR OPERABLE UNIT #4
NATIONAL STARCH & CHEMICAL COMPANY SUPERFUND SITE
SALISBURY, ROWAN COUNTY, NORTH CAROLINA

Based on Public Comment Period July 12 through September 9, 1994
Which Includes July 26, 1994 Public Meeting Held In Agricultural Extension Center, Salisbury, North Carolina

Prepared by:
U.S. Environmental Protection Agency, Region IV
September 1994

COMMUNITY PARTICIPATION

EPA has developed a community relations program as mandated by Congress under Superfund to respond to citizen's concerns and needs for information, and to enable residents and public officials to participate in the decision-making process. Public involvement activities undertaken at Superfund sites consist of interviews with local residents and elected officials, a community relations plan for each site, fact sheets, availability sessions, public meetings, public comment periods, newspaper advertisements, site visits, and Technical Assistance Grants, and any other actions needed to keep the community informed and involved.

EPA is conducting a 30-day public comment period from July 12, 1994 to August 11, 1994, to provide an opportunity for public involvement in selecting the final cleanup method for this Site. Public input on all alternatives, and on the information that supports the alternatives is an important contribution to the remedy selection process. During this comment period, the public is invited to attend a public meeting on August 3, 1993, at the Agricultural Extension Center Auditorium, 2727 Old Concord Road, Salisbury, North Carolina beginning at 7:00 p.m. and at which EPA will present the Remedial Investigation/Feasibility Study and Proposed Plan describing the preferred alternative for treatment of the contaminated soil at the NSCC Superfund Site and to answer any questions. Because this Proposed Plan Fact Sheet provides only a summary description of the cleanup alternatives being considered, the public is encouraged to consult the information repository for a more detailed explanation.

During this 30-day comment period, the public is invited to review all site-related documents housed at the information repository located at the Rowan County Public Library, 201 West Fisher Street, Salisbury, North Carolina and offer comments to EPA either orally at the public meeting or in written form during this time period. The actual remedial action could be different from the preferred alternative, depending upon new information or statements EPA may receive as a result of public comments. If you prefer to submit written comments, please mail them postmarked no later than midnight August 11, 1994 to:

Diane Barrett
NC Community Relations Coordinator
U.S.E.P.A., Region 4
North Remedial Superfund Branch
345 Courtland Street, NE
Atlanta, GA 30365

All comments will be reviewed and a response prepared in making the final determination of the most appropriate alternative for cleanup/treatment of the Site. EPA's final choice of a remedy will be issued in a Record of Decision (ROD). A document called a Responsiveness Summary summarizing EPA's response to all public comments will also be issued with the ROD. Once the ROD is signed by the Regional Administrator it will become part of the Administrative Record (located at the Library) which contains all documents used by EPA in making a final determination of the best cleanup/treatment for the Site. Once the ROD has been approved, EPA will begin negotiations with the Potentially Responsible Parties to allow them the opportunity to design, implement and absorb all costs of the remedy determined in the ROD in accordance with EPA guidance and protocol. If negotiations do not result in a settlement, EPA may conduct the remedial activity using Superfund Trust monies, and sue for reimbursement of its costs with the assistance of the Department of Justice. Or EPA may issue a unilateral administrative order or directly file suit to force NSCC to conduct the remedial activity. Once an agreement has been reached, the design of the selected remedy will be developed and implementation of the remedy can begin. The preceding actions are the standard procedures utilized during the Superfund process.

As part of the Superfund program, EPA provides affected communities by a Superfund site with the opportunity to apply for a Technical Assistance Grant (TAG). This grant of up to $50,000 enables the group to hire a technical advisor or consultant to assist them in interpreting or commenting on site findings and proposed remedial action plans.

For more information concerning this grand program, please contact: Ms. Rosemary Patton, Coordinator
NC Technical Assistance Grants
Waste Management Division
U.S.E.P.A., Region 4
345 Courtland Street, NE
Atlanta, GA 30365
(404) 347-2234

INFORMATION REPOSITORY LOCATION:

Rowan County Public Library
201 West Fisher Street
Salisbury, North Carolina 28144
Phone: (704) 633-5578
Hours: Monday - Friday 8:00 a.m. - 9:00 p.m.
Saturday 9:00 a.m. - 5:00 p.m.

FOR MORE INFORMATION ABOUT SITE ACTIVITIES, PLEASE CONTACT:

Mr. Jon Bornholm, Remedial Project Manager or
Ms. Diane Barrett, NC Community Relations Coordinator
North Superfund Remedial Branch
Waste Management Division
U.S. Environmental Protection Agency, Region IV
345 Courtland Street, NE
Atlanta, Ga 30365
Toll Free No: 1-800-435-9233

MAILING LIST ADDITIONS

If you are not already on our mailing list and would like to be placed on the list to receive future information on the National Starch & Chemical Company Superfund Site, please complete this form and return to Diane Barrett, Community Relations Coordinator at the above address:

NAME:

ADDRESS:

CITY, STATE, ZIP CODE:

PHONE NUMBER:

GLOSSARY OF TERMS USED IN THIS FACT SHEET

Aquifer: An underground geological formation, or group of formations, containing usable amounts of groundwater that can supply wells and springs.

Administrative Record: A file which is maintained and contains all information used by the lead agency to make its decision on the selection of a method to be utilized to clean up/treat contamination at a Superfund site. This file is held in the information repository for public review.

Applicable or Relevant and Appropriate Requirements (ARARs): The federal and state requirements that a selected remedy must attain. These requirements may vary among sites and various alternatives.

Baseline Risk Assessment: A means of estimating the amount of damage a Superfund site could cause to human health and the environment. Objectives of a risk assessment are to: help determine the need for action; help determine the levels of chemicals that can remain on the site after cleanup and still protect health and the environment; and provide a basis for comparing different cleanup methods.

Carcinogen: Any substance that can cause or contribute to the production of cancer; cancer-producing.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA): A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The Acts created a special tax paid by producers of various chemicals and oil products that goes into a Trust Fund, commonly known as Superfund. These Acts give EPA the authority to investigate and clean up abandoned or uncontrolled hazardous waste sites utilizing money from the Superfund Trust or by taking legal action to force parties responsible for the contamination to pay for and clean up the site.

Feasibility Study: Refer to Remedial Investigation/Feasibility Study.

Groundwater: Water found beneath the earth's surface that fills pores between materials such as sand, soil, or gravel (usually in aquifers) which is often used for supplying wells and springs. Because groundwater is a major source of drinking water there is growing concern over areas where agricultural and industrial pollutants or substances are getting into groundwater.

Hazardous Ranking System (HRS): The principle screening tool used by EPA to evaluate risks to public health and the environment associated with hazardous waste sites. The HRS calculates a score based on the potential of hazardous substances spreading from the site through the air, surface water, or groundwater and on other factors such as nearby population. This score is the primary factor in deciding if the site should be on the National Priorities List and, if so, what ranking it should have compared to other sites on the list.

Information Repository: A file containing accurate up-to-date information, technical reports, reference documents, information about the Technical Assistance Grant, and any other materials pertinent to the site. This file is usually located in a public building such as a library, city hall or school, that is accessible for local residents.

National Pollutant Discharge Elimination System (NPDES): A provision of the Clean Water Act which prohibits the discharge of pollutants into waters of the linked States unless a special permit is issued by EPA, a state or (where delegated) a tribal government on an Indian reservation allowing a controlled discharge of liquid after it has undergone treatment.

National Priorities List (NPL): EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under Superfund. A site must be on the NPL to received money from the Trust Fund for remedial action. The list is based primarily on the score a site receives from the Hazard Ranking System (HRS). EPA is required to update the NPL at least once a year.

Operable Unit: Term for each of a number of separate activities undertaken as part of an overall Superfund site cleanup.

Potentially Responsible Parties (PRP): Any individual or company - including owners, operators, transporters, or generators - potentially responsible for, or contributing to, the contamination problems at a Superfund site. Whenever possible, EPA requires Potentially Responsible Parties, through administrative and legal actions, to clean up hazardous waste sites Potentially Responsible Parties have contaminated.

Remedial Action Objectives: These are specific objectives which are identified to protect both human health and the environment that take into consideration the environmental media contaminated (i.e., groundwater, soil, surface water, sediment, or air) and the contaminants present in each medium. The main goal of the objectives is to prevent exposure to contaminants in groundwater, soil, surface water, sediment, or air in excess of risk-based human health or environmental standards.

Remedial Investigation/Feasibility Study (RI/FS): The Remedial Investigation is an in-depth, extensive sampling and analytical study to gather data necessary to determine the nature and extent of contamination at a Superfund site; to establish criteria for cleaning up the site; a description and analysis of the potential cleanup alternatives for remedial actions; and support the technical and cost analyses of the alternatives. The Feasibility study also usually recommends selection of a cost-effective alternative.

Record of Decision (ROD): A public document that announces and explains which method has been selected by the Agency to be used at a Superfund site to clean up the contamination.

Responsiveness Summary: A summary of oral and written public comments received by EPA during a public comment period and EPA's responses to those comments. The responsiveness summary is a key part of the Record of Decision.

Semi-Volatile Organic Compounds (SVOCs): Carbon-containing chemical compounds that, at a relatively low temperature, fluctuate between a vapor state (a gas) and a liquid state.

Vadose Soil Zone: Is the unsaturated zone of soil starting at the surface and ending at the water table (i.e., the space between the soil particles contains both water and air).

Volatile Organic Compounds (VOCS): Any organic compound that evaporates readily into the air at room temperature.

Water Table: The level below which the soil or rock is saturated with water, sometimes referred to as the upper surface of the saturated zone. The level of groundwater.

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U.S. Environmental Protection Agency
North Superfund Remedial Branch
345 Courtland Street, N.E.
Diane Barrett, Community Relations Coordinator
Atlanta, Georgia 30365
Jon Bornholm, Remedial Project Manager

Region 4

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APPENDIX C

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY
OPERABLE UNIT #4 PROPOSED PLAN
NATIONAL STARCH & CHEMICAL COMPANY SUPERFUND SITE

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ATTACHMENTS

Attachment A - Transcript of Public Meeting

1.0 OVERVIEW

The development of this Responsiveness Summary is in accordance to the requirement set forth in 40 CFR 300.430(f)(3)(i)(F). This community relations Responsiveness Summary is divided into the following sections:

Section 2.0 BACKGROUND This section discusses the Environmental Protection Agency's preferred alternative for remedial action, provides a brief history of community interest, and highlights the concerns raised during the remedial planning for Operable Unit #4 (OU #4, OU#4, or OU4) at the National Starch & Chemical Company (NSCC or NSC) Superfund Site.

Section 3.0 SUMMARY OF MAJOR ISSUES/CONCERNS/QUESTIONS/STATEMENTS VOICED DURING PROPOSED PLAN PUBLIC MEETING This section provides a summary of issues/concerns and questions/comments voiced by the local community and responded to by the Agency during the Proposed Plan public meeting. "Local community" may include local homeowners, businesses, the municipality, and not infrequently, potentially responsible parties.

Section 4.0 SUMMARY OF MAJOR ISSUES/CONCERNS/QUESTIONS/STATEMENTS VOICED DURING PUBLIC COMMENT PERIOD This section provides a comprehensive response to all significant written comments received by the Agency and is comprised primarily of the specific legal and technical questions raised during the public comment period.

2.0 BACKGROUND

The Environmental Protection Agency (EPA) conveyed its preferred remedial alternative for OU #4 NSCC Superfund Site, located in Salisbury, North Carolina in the Proposed Plan Fact Sheet mailed to the public on July 8, 1994, and through an ad in The Salisbury Post newspaper. The ad was published in the July 12, 1994 edition of this newspaper. The public meeting was held on July 26, 1994 at the Agricultural Extension Center in Salisbury, North Carolina. The purpose of the meeting was to present and discuss the findings of the OU #4 Remedial Investigation/Feasibility Study (RI/FS), to apprise meeting participants of EPA's preferred remedial alternative for OU #4, to respond to any questions or address any concerns expressed during the public meeting, and to take their comments and make them a part of the official record. A copy of the transcript from the July 26 public meeting was placed in the Information Repository for public reading. The Proposed Plan Fact Sheet and the newspaper ad informed the public that the 30-day public comment period would run from July 12 to August 11, 1994. However, a request was made for a 30-day extension to the public comment period. Consequently, the public comment period was extended to September 9, 1994.

Community interest and concern about the NSCC Site has fluctuated from moderate to high over the past two decades. Awareness of and concern about the NSCC "Plant", not the Superfund related hazardous wastes, were very high in the communities which are adjacent to and nearby the "Plant". NSCC received considerable news media attention when its Lumber Street Plant, which is also located in Salisbury, North Carolina, experienced an explosion which destroyed a section of the plant. In 1984, at the NSCC Cedar Springs Road Plant where the Superfund Site is located, a production process reportedly boiled over releasing a vapor cloud containing acetic acid. The vapor cloud reportedly injured vegetation for up to 1.5 miles from the plant.

A 1985 newspaper article indicated there were mixed feelings in the communities surrounding the plant. Some of the residents believe that NSCC is a responsible company with an excellent record and that NSCC will work with EPA and cleanup the dump. Other residents were concerned about the effects on their health and believe their community has borne the brunt of living near to NSCC. As stated above, the community has maintained a high level of awareness and concern regarding NSCC as a result of the incidents reported in the media.

The following provides details on the accumulative community relations efforts conducted by the Agency. A Community Relations Plan identifying a positive public outreach strategy was completed in September 1986. As part of this initiative, Information Repositories including the Administrative Record, were established at the Rowan County Public Library and in EPA, Region IV Information Center in Atlanta, Georgia to house the Administrative Record for the Site. The Information Repository and Administrative Record are available for public review during normal working hours.

Fact sheets and public meetings were the primary vehicles for disseminating information to the public. EPA sponsored a number of public meetings and released several fact sheets to keep the public apprised of current activities, to help the community understand the Superfund program and the public's role in the process, and to share information regarding the direction and technical objectives of data collection activities at the Site. Only a few individuals from the community attended the Proposed Plan public meeting. In addition to these individuals, one representative from the news media, representatives from NSCC, and representatives from various government agencies also attended the meeting.

3.0 SUMMARY OF MAJOR ISSUES/CONCERNS/QUESTIONS/STATEMENTS VOICED DURING PROPOSED PLAN PUBLIC MEETING AND RESPONSES

This section summarizes the major issues and concerns expressed during the Proposed Plan public meeting. Five questions were asked during the public meeting. They related to:

- Is it possible that the OU #1 groundwater extraction system is adversely effecting off-site potable wells?
- How loud is the noise associated with the soil vapor extraction system?
- Will the proposed deed restrictions pertain to off-site property?
- Why was the 30 year OU #3 RA duration revised to 120 years?
- Is the analytical data from sampling private potable wells in July-August 1992 available?

A recount of the questions summarized above, the discussion that revolved around the questions asked, and the Agency's response can be found on pages 16-48 of the transcript of the Proposed Plan public meeting (Attachment A).

3.1 0U #1 GROUNDWATER EXTRACTION SYSTEM

This issue had several facets, but to focus the following discussion, the question is summarized as follows:

Q: Can the OU #1 groundwater extraction system, which is now extracting approximately 130,00 gallons per day, cause the water table off-site to drop and if so, who is responsible for any adverse impact on off-site private potable wells?

A: Based on the data presented in the "Quarterly Report - First Quarter 1994 - Operable Units One and Two", dated July 1994, the cone of influence created by the extraction wells extends down to the Southwest Tributary but does not extend beyond the stream. Since the wells are completed in fractured bedrock, it is possible, due to preferred fracture flow, that the extractions wells are influencing the off-site private, potable well. However, the potential is remote. The first information to review are the construction details of the wells involved. If a connection was determine, then the Agency or NSCC will need to consider taking actions to alleviate the situation.

3.2 NOISE LEVEL ASSOCIATED WITH THE SOIL VAPOR EXTRACTION SYSTEM

Q: Will the noise created by the soil vapor extraction system be objectionable to homes 1,500 feet away?

A: Insufficient information was available to give a direct response to this question.

3.3 DEED RESTRICTION

Q: Will the proposed deed restrictions pertain to adjacent land?

A: The deed restrictions will only focus on the soils in those areas of Area 2 and the wastewater treatment lagoon area that are contaminated (i.e., only to certain parcels of the NSCC property).

3.4 REVISION OF OU #3 GROUNDWATER REMEDIATION TIMEFRAME

Q: Why was the timeframe for the operation of the OU #3 groundwater extraction and treatment systems revised from 30 years to 120 years?

A: The 30 years was based on remediating the contaminated groundwater to the maximum contaminant level (MCL) for 1,2-dichloroethane (1,2-DCA) which is 5 parts per billion (ppb). The 120 years is the estimated timeframe to obtain the performance standard of 1 ppb specified in the OU #3 ROD. The 1 ppb is based on the State of North Carolina's groundwater protection regulations.

3.5 AVAILABILITY OF JULY-AUGUST 1992 DRINKING WATER DATA

Q: Will the Agency send a copy of it's analytical data for the samples collected from private, potable wells sampled in July-August 1992 to the well owners?

A: If available, yes. The State will also be requested to provide any analytical data the State may have for the groundwater samples collected in July-August 1992.

4.0 SUMMARY OF MAJOR ISSUES/CONCERNS/QUESTIONS/STATEMENTS VOICED DURING PUBLIC COMMENT PERIOD

This section summarizes the major issues and concerns expressed during the Proposed Plan public comment period. The major issues and concerns on the proposed remedy for OU #4 NSCC Site can be grouped into the following areas:

- Discontent with the selection of Alternative S2;
- Partial versus full operation of NSCC wastewater treatment system;
- Elimination of the need for Institutional Controls;
- Intrinsic Bioactivity;
- Anaerobic/Aerobic Bioactivity; and
- Point of Compliance.

Below is each written comment received and the Agency's corresponding response in italicized print.

4.1 DISCONTENT WITH SELECTION OF ALTERNATIVE S2 AS THE PREFERRED ALTERNATIVE

COMMENT #1: A citizen voiced disapproval with the selection of Alterative S2 but did not identify a preferred alternative.

RESPONSE: Of the four alternatives that remained after the screening and evaluation process incorporated into the Feasibility Study, Alternative S2 is the most cost effective approach that will ultimately achieve a reduction in the toxicity, mobility, and volume of contamination present at the Site. However, this approach relies on natural degradation which has not been substantially demonstrated as occurring at Site. It as been assumed natural degradation is occurring at the Site due to the presence of two chemicals in the groundwater and soils that reportedly were never used at the facility. The process of natural degradation would result in the formation of these chemicals. To prevent drawn out discussions in the future, a contingency was incorporated into the ROD in the event that the process of natural degradation cannot be substantiated within two years. If the bioremediation treatability study fails to demonstrate that natural degradation is occurring at an acceptable rate, then an active remediation alternative (Alternative S3)will be implemented.

4.2 CONCERN EXPRESSED ABOUT POTENTIAL ADVERSE IMPACT ON GRANT CREEK WASTEWATER TREATMENT PLANT IF COMBINED WATER TREATMENT NOT FULLY ON-LINE

COMMENT #2: Concern was expressed about the circumstances surrounding the combined operation of all the operable units and the impact on NSCC's pretreatment system, and thereby the Grant Creek Wastewater Treatment Plant and meeting its NPDES requirements.

RESPONSE: The Agency is aware of the City of Salisbury concern and has relayed that concern on to NCDEHNR.

4.3 ELIMINATION OF THE NEED FOR INSTITUTIONAL CONTROLS

COMMENT #3: In addition to the institutional controls already in place (i.e., the existing fence around the plant operations area and the paved areas around Area 2), NSC is currently, voluntarily placing deed restrictions on those portions of the property affected under OU#1, OU#2, OU#3, and OU#4. Such deed restrictions will (a) prevent the utilization of groundwater for drinking water purposes until the contaminated plumes meet drinking water standards, and (b) prevent future use of such property for residential purposes until such time as the CERCLA remedial activities conducted at the Site have rendered those portions of the property safe for such purposes. NSC anticipates that such deed restrictions will be in place by October 15, 1994.

Inasmuch as this is new information that was not available to EPA during their selection of the preferred remedial alternative, NSC recommends that EPA change the preferred remedial altemative to NO ACTION. This revision is warranted due to the lack of any current or future risk to human health under the scenarios defined in the OU#4 Feasibility Study, once the above deed restrictions are in place.

RESPONSE: Inasmuch NSCC has voluntarily initiated placing deed restrictions on those portions of the property affected under OU #1, OU #2, Ou #3, and OU #4, the deed restrictions will not be in place at the anticipated signing date for the OU #4 ROD. In addition, neither the Agency nor NCDEHNR has had an opportunity to review the language of the proposed deed restriction clauses. Other questions need to be addressed: What entity will enforce the restrictions? Where does the authority come from for enforcing these deed restrictions? What will be the penalties, if any, if the restrictions are not adhered to? In addition to the argument stated above, the institutional controls as described in Section 10.0 incorporates other activities in addition to deed restrictions. Consequently, the Agency does not feel it is warranted to select the No Action alternative by removing the requirement for institutional controls from the selected remedy.

4.4 INTRINSIC BIOACTIVITY

COMMENT #4: Recent industry experience with intrinsic bioactivity of chlorinated aliphatics indicates that it is an effective means of removing contamination from both soil and groundwater. Field experience has also indicated that the success of intrinsic bioactivity is a strong function of the ability to deliver nutrients to the target microbes in an manner that provides the microbes with a relatively constant supply. The ability to control the effectiveness of the delivery can be impacted by any of a number of factors, but the rate and direction of groundwater flow is a significant consideration. The existing data base indicates that the constituents of concern are not likely to significantly migrate towards any potential receptors during the time interval required for evaluation of intrinsic bioactivity applicability. It is therefore recommended that the design for the Groundwater Treatment System (GWT) identified in the ROD for OU#3 be developed to incorporate any relevant data developed during the assessment of ongoing biodegradation in OU#4. Inclusion of the data to be developed during the conduct of an intrinsic bioactivity precursor study into the design of a GWT for OU#3 is expected to yield significant benefits as the system could be designed to augment and supplement the intrinsic bioactivity at OU#4.

RESPONSE: The Agency concurs with the statement that the success of intrinsic bioactivity is strongly associated with parameters identified in the comment. It is the Agency's opinion that additional field work will be necessary to support the OU #3 groundwater extraction system design (i.e., better delineation of the extent of contamination in the bedrock zone of the aquifer). The Agency envisioned that the assessment of ongoing biodegradation will be initiated with this OU #3 RD field work.

4.4 ANAEROBIC/AEROBIC BIOACTIVITY

COMMENT #5: NSC notes that there are differing processes of intrinsic bioactivity of chlorinated aliphatics. One process utilizes aerobic microbiological populations to remediate constituents while a second is based on anaerobic processes. Based on discussions with various organizations having experience in these areas, we have discovered that each process is most successful when appropriately applied. Aerobic processes appear to be restricted to remediation of impacted areas located above the water table (i.e., in the vadose zone). As there is significant data indicating that a large portion of the constituents of interest at this site are located in the saturated zone, it is unclear whether the Biodegradation Study Proposal presented in the FS for OU#4 is the optimum approach. NSC recommends that EPA permit further evaluation of the various biological processes to ensure selection of the most appropriate method (i.e., aerobic or anaerobic).

RESPONSE: The Biodegradation Study Proposal was just that, a proposal. The Agency is anticipating that a work plan along with the accompanying supporting documents (e.g., Sampling Analysis Plan, etc.) will be developed to direct this initiative on verifying and substantiating intrinsic bioactivity.

4.5 POINT OF COMPLIANCE

COMMENT #6: Based on the ROD for OU3, a cleanup level of 1 ppb for 1,2-DCA must be met throughout the groundwater plume. As we have previously commented, it is doubtful that this cleanup level could ever be achieved, given the track record of pump and treat remedies in a fractured bedrock media and fate and transport modeling. In response to our comments, EPA cited 40 CFR 300.430(a)(1)(iii)(F) that states "EPA expects to return usable groundwater to their beneficial uses wherever practicable, within a time frame that is reasonable given the particular circumstances of the site." Based on the groundwater modeling presented in the OU3 FS report, it appears that the time required to reduce the level of contamination in groundwater to 1 ppb is approximately 150 to 200 years (optimistically). As we have indicated in earlier comments, we believe that a more realistic and practicable ARAR for OU #3 of 5 ppb (which is the federal standard adopted by EPA pursuant to the Safe Drinking Water Act) should be adopted instead of 1 ppb in light of the time required to meet 1 ppb. In any case, if the requirement cited by EPA for beneficial uses implies reducing contaminants to the ARAR throughout the contaminant plume, then the time frame is neither reasonable nor practicable. We believe that it is much more practicable to maintain a cleanup goal of 1 ppb at the plume boundary than by attempting to achieve a cleanup goal throughout the plume. As noted by EPA, the source of contamination has been eliminated, and it is not expected that contaminants present in the soil will adversely impact groundwater.

RESPONSE: Technically, the source of contamination to the soil has reportedly been eliminated, however, the same cannot be said for the groundwater. As long as contamination remains in the soil, this contamination can be termed a source of contamination for the groundwater. The selection of 1 ppb as the performance standard for 1,2-DCA in groundwater was not arrived at arbitrarily. As stated in the Responsiveness Summary for OU #3 ROD, 40 CFR 300.400(g)(4) states, "Only those state standards that are promulgated, are identified by the State in a timely manner, and are more stringent than federal requirements may be applicable or relevant and appropriate". The state groundwater quality standard for 1,2-DCA, as specified in the North Carolina Administrative Code (NCAC) 15-2L.0202(g), is 0.38 µg/l. This is a more stringent standard than what is specified for 1,2-DCA in the Safe Drinking Water Act. However, NCAC 15-2L.O202(b)(1) allows the state groundwater quality standard to be raised to the detectable concentration. Consequently, the Agency raised the groundwater performance standard for 1,2-DCA from 0.38 µg/l to 1.0 µg/l as 1.0 µg/l is the detection limit for 1,2-DCA under the drinking water analytical protocols, EPA method 524.2. Based on the Superfund Analytical Methods for Low Concentrations Water for Organic Analysis for the Contract Laboratory Program, dated June 1991, the quantitation limit for 1,2-DCA is set at 1 µg/l.

40 CFR 300.430(f)(1)(ii)(C) provides the grounds for invoking a waiver. Based on the Agency's evaluation on the request for a waiver to the State's groundwater quality standard (NCAC 15-2L.0202), the Agency concluded that the request does not satisfy any of the specified grounds for invoking a waiver.

ATTACHMENT A

TRANSCRIPT OF PUBLIC MEETING

NATIONAL STARCH AND CHEMICAL COMPANY
SUPERFUND SITE

7:09 P.M.
July 26, 1994
Salisbury, North Carolina

Agricultural Extension Center
2727 Old Concord Road
Salisbury, North Carolina

PROPOSED PLAN MEETING
OPERABLE UNIT #4

COPY

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MS. BARRETT:

Thank you, Gentlemen, for coming. We appreciate your time. I'm Diane Barrett; I'm the community relations coordinator and Jon Bornholm is the remedial project manager for this site. And I think just about everybody in here has been to all the other meetings; right? Okay. So we should have a lot of information. I will -- let's see. The city -- city and county people, we welcome you, Mr. Vest and Mr. Lasa- -- Lasater, is that correct, and everybody else? Okay.

The purpose of tonight's meeting is to discuss the National Starch and Chemical Company operable unit 4 soil remediation project. Thus far we've had four proposed planned public meetings. One in '88, in 1990 and '93 and tonight. Each public meeting has had a public comment period; usually that's thirty days and has been extended sometimes to sixty days. We have displayed -- had display ads published in our local news -- in your local newspaper advertising this meeting as well as mailing out fact sheets. I hope you all received these in the mail or either if you didn't in the mail, you can pick them up outside. And, also, please sign in if you didn't. I think most everybody has. These are just some of the ways that we keep people informed through the community relations effort.

At -- at the present time we are in step number 5, public comment period, for operable unit 4. All of the other items that are on the screen here have been fulfilled through the community relations efforts and will continue to be updated.

Tonight there will also be a transcript made of the meeting. Our court reporter here is -- this is an official meeting, so the transcript, once it has been completed, will be available in our information repository. And for those of you that don't know, but I'm sure you all do know, the repository is located at the Rowan County Public Library at the reference center.

The public comment period time for this operable unit 4 phase is July the 12th through August the 11th. That is the standard thirty-day public comment period. And if the public requests, a thirty-day extension can be given and will be given if -- if the time is needed.

That, I believe, will pretty mach complete my section of the meeting, since most of you are familiar with our process and have participated in previous meetings. I do hope -- we do appreciate your time and if -- if at any time that you need assistance, we have a 1-800 number which is on page twelve of the fact sheet. Also, if you don't want to look, it's 1-800-435-9233. So we will be glad to receive your calls at any time. Feel free to call us. Thank you for your attention. Now I will turn the meeting over to Jon.

* * * * * * * *

MR. BORNHOLM:

Our branch has got into the 21st century; we now have voice-mail and my -- my extension number is 4106 and Diane's is 4111, so it keeps you from going through the alphabet and pushing a lot more dials to get to us if you need us.

One of the handouts on the -- in the front, the thick one, is basically just a -- a copy of the overheads I will be going through tonight. As most of you are familiar with the site, I'll probably go -- I'll be going through the first couple ones relatively quickly. Basically, the plant operations started back in approximately 1970 and then have been going on since.

The site was first proposed for the national superfund site or national priorities list in April of '85 and it was finalized on the last in October of '89, and the hazardous ranking scoring was 46.51 and basically we -- we use 28.5 as our cutoff score. Anything below that does not -- is not listed on the map in the priorities last.

Now, Just to briefly look at the site, we are working on operable unit number 4. I'll just go through, because the next couple of sheets talk about the other operable units as well. Operable unit 3 deals with the contamination associated with the trench area and the contaminating ground water emanating from the trench area that flows in a westerly direction, meaning the remediation of that ground water is basically operable unit number 1. The soils in the trench area are operable unit number 2. Operable unit 3 and 4 deal with plant area 2 which is right here (indicating on screen) in the lagoon area. Operable unit 3 deals with the ground water in this area which is basically flowing in -- in this direction. The operable unit 4, which I'm discussing tonight, deals with the contaminated soils associated with area 2 of the -- or the plant operations area and the lagoon area. And, again, just to summarize what operable unit was -- 1 was, it's deal with the contamination which they found on the site. This record decision associated with this operable unit split the site into what we call operable units, which are just basically segregating the site into different manageable areas.

As a result of requiring a -- well, as a result of splitting the site into a second operable unit, National Starch initiated additional studies of the site and looked at the trench soils and then the record decision for operable unit 2 was signed September of -- of '90 and this -- because of continuing contamination being found in the northeast tributary, the base team, with -- along with the State, again split the site into an additional operable unit to try to identify the source of that contamination.

For operable unit 3 which we proposed to the public back in July, September, August of last year, identified the same alternative for the contaminated ground water and again we split the site into a -- a fourth, appropriate, final operable unit and that fourth operable unit, again, as I mentioned before is dealing with the contaminated soils.

So basically we're here tonight with the proposed planned public meeting. After the thirty-day public comment period, if it's not extended, we'll end in -- August 13th?

MS. BARRETT:

August 11th.

MR. BORNHOLM:

-- Aug- -- August 11th, and we anticipate having the record of decision signed for this operable unit sometime late September. And then, just to, again, just to identify the areas we're talking about, area 2 is the plant area and it contains the reactor room, the tank room, the raw material storage area and warehouse and includes the terra cotta pipeline that led from tile production area to the lagoons and the solvent recovery operations. And just to point them out here (indicating on screen), again, this is area 2, terra cotta -- terra cotta pipelines basically ran like this (indicating on diagram) and solvent recovery area was located up in this area (indicating on diagram).

And then for the lagoons, this overhead basically identifies the history of the lagoons that were constructed back in the early seventies. They were re- -- well, they were excavated and lined with concrete back in '84 and basically the contamination found associated with those lagoons results from the contaminated soil that -- from the contamination entering the soil up to '84, before they were excavated and lined with concrete.

Okay. Operable unit 4 feasibility studies built on the operable unit number 3 remedial investigation. There was suf- -- there was sufficient data generated during that remedial investigation to be used as part of -- or to be used as the feasibility study for operable unit 4. There was one additional piece of fieldwork done as part of operable unit 4 and that was a hy- -- hydrophobic dye test, basically to answer the question whether or not we have a dense aqueous liquid or what we term a Dinaphthol at the site.

The primary contaminant which has been found throughout the site in all the operable units and one that operable unit 4 also concentrates on is the 1,2-Dichloroethane or 1,2-DCA, and basically this is a list of organics detected in the soils and the -- the range of concentrations and the frequency of the number of times we encountered it in our samples.

Using this data, National Starch contoured the concentrations of 1,2-Dichloroethane and this overhead shows the -- again, area 2, the plant production area, and then the contours. Here's the most heavily contaminated area (indicating on screen). And then this area down here is associated with the terra cotta pipeline and then plant operations. And then the next overhead depicts the soil contamination of 1,2-Dichloroethane associated with the lagoon area. Again, it's very localized.

Okay. As part of the remedial investigation and feasibility study effort, a risk assessment was performed and basically that's looking at the types of contaminants, the concentration of contaminants present and determining what risk the site poses to both the public and the environment. Basically, it briefly identifies, first, in order to be -- in order for a risk to be there, first you have to have a pathway for that contaminant to get to the public, and secondly, the chemicals there have to be at a sufficient concentration to have some degree of toxicity to cause a health problem. And under superfund for carcinogenic compounds, anything with -- any risk greater than a 1 through -4, which is one out of every ten thousand people or a hazard index of one, which really doesn't equate to a ratio of one out of ten thousand.

And, again, this is -- this is based on the data generated from operable unit 3, remedial investigation. There is no current risk posed by the site and there is no current risk because there is no complete pathway for contaminants, but there are three, what we -- as part of that risk assessment, we look at future risk scenarios and there are three unacceptable future risks, which means if site conditions change, these are -- these are possibilities. And then these are the risks associated with those scenarios and the greatest risk would be using the ground water as drinkable water. And, again, the key term here is an on-site resident. Right now, again, there's -- the site doesn't cause -- there is no unacceptable risk or current risk associated with the site, but if site conditions change and some people build homes on there, then that risk changes and we would look at that. But, again, that's -- that' s a future potential risk.

Also as part of the risk assessment or risks -- risk process, we come up with cleanup goals or performance standards. For this site we looked up three situations: one, to protect the workers on site; second one, to protect potential future -- again, potential future residents, and the last one is to be protective of the quality of the ground water. And the agency has selected the more -- the most stringent one, a cleanup goal, as the goal for operable unit number 4 as our cleanup goal for the soils or as our target for the soils for 1,2-Dichloroethane at 169 parts per billion.

And using that concentration, the next two overheads depict the extent of soil contamination, lateral soil -- extent of soil contamination using that concentration. Again, this is associated with area 2, the plant operations.

MR. PARADOWSKI:

That's not included, Jon.

MR. BORNHOLM:

What' s that?

MR. STURDEVANT:

It's the last two.

MR. PARADOWSKI:

Oh, I'm sorry.

MR. BORNHOLM:

I'm sorry.

MR. PARADOWSKI:

I didn't catch it.

MR. BORNHOLM:

And then the next -- the next figure shows the lateral extent of the contamination associated with the lagoons that surpassed the -- that performance standard.

Okay. Using this information, we'll go into the feasibility study and basically the feasibility study is built on the process of elimination, starting with a broad base of technologies, and as you eliminat- -- eliminate those technologies due to either implementability, effectiveness or cost on the initial sweep through those technologies, we start to narrow them down to a more manageable number of technologies that we can do a detailed evaluation on.

So the first step is to screen all -- all technologies using basically those three criteria. The next step is try to put those technology -- technologies together to form remedial alternatives, and once we've done that, again, we use -- then we use these three criteria to do an initial screening of those remedial alternatives, again, try to eliminate those that are either duplicative of one another or don't meet the needs of these criterias. And after that process, then we take what's remaining and perform a detailed evaluation using basically these seven criteria, the threshold criteria and the evaluating criteria. The alternatives must pass the threshold criteria and then these other evaluating criteria are used to evaluate the alternatives against one another.

And then the last two are -- is based on what the community -- the public comment period's about, at least for the community's acceptance, as well as -- and the -- and the

State's been involved all throughout the process.

These are the four alternatives that made it through that screening process. By law, we're required to keep the no action alternative, and that gives us a base line to measure the other alternatives. On -- the next alternative is S2, natural degradation and institutional controls and the associated cost. Alternative 3S is soil vapor extraction with fume incineration in the initial phase of that process when you're pulling out large quantities of -- of contaminants, and then as that rate of -- of removal decreases, then we change the filtering method from fume incineration to activated carbon filters to control the -- the emissions from the process -- from the soil vapor extraction process. Then alternative S4 basically eliminates the fume incinerator and we just use activated carbon. And the reason it's so much more expensive is because you're going to be using a lot of activated carbon in the initial start-up of the soil vapor extraction system.

And then what the agency has proposed, and the State has given concurrence with same reservations, the agency is proposing alternative S2, natural degradation with institutional controls. Just the key points I want to make to support the selection of this remedy is, one, if we go back to the map of the site, most of the contamination with the lagoons is -- is in this area and the majority of -- of contamination has already been -- has already migrated into the ground water here (indicating on screen). As far as area two, most of -- most of this area is already capped with an impervious layer, either the building itself or the macadam driveway surrounding the area. So we're not anticipating the contamination to migrate from the soil down to the ground water in this area because of that impervious cap.

The other -- the second point is National Starch has proposed that based on published literature, 1,2-Dichloroethane degrades with a half-life of two years, which means that every two years the concentration of 1,2-Dichloroethane should decrease by one-half. And based on those -- on that rate of degradation, it's anticipated in less than ten years that the concentration will fall to the 7,000 parts per million level which -- where is that? Where is the overhead? Here it is -- which is -- which would -- would be protective of -- of the public from germal contact. And then in less than twenty-one years, we would -- the concentration would degrade down to this concentration. And this -- this process, the natural degradation process, is accomplished through the -- the activities of -- of bac- -- of bacteria microorganisms found in the soil.

And then the other points I want to -- other points -- other facts to point out which -- let's put this one back up here. Operable unit 3 is -- to extract contaminating ground water, there will be extraction wells located in this area (indicating on screen), general area, to extract the contaminated ground water. So if there is any migration of the contaminates from the soil down into the ground water, we will be protecting both the environment and public health through the use of those extraction wells.

And then the last point to make out is, again, in this area (indicating on screen) there is no current unacceptable risk posed by the contamination presented in this area because there is no direct link or exposure pathway.

Okay. This is going to be a contingency ROD, which basically means that if natural degradation does not pan out as anticipated, we are going to require National Starch to go in and use an active remediation to remove the volatile organics from the soil, which would be either alternative S3 or S4, and basically we'd put a time frame to that and propose a plan of two years from the signing of the ROD to be able to show that natural degradation is occurring and the rationale behind that is basically contamination has been there, let's say, prior to 1980. If it's going to -- if natural degradation is occurring, we should see it now because the last source of contamination was eliminated back in February of -- of this year when they completed the removal of that terra cotta -- terra cotta pipeline. So we feel that within two years we should see substantial decreases in contamination.

And that ends my prepared presentation. We will -- I'm happy to answer any questions that you may have. I first ask that you please give your name -- is that all?

MS. BARRETT:

(Nods head affirmatively)

MR. BORNHOLM:

That you give your name prior to asking a question. Yes, sir.

MR. BARE:

Odell Bare. How much water are you pumping over there now?

MR. BORNHOLM:

Mike?

MR. STURDEVANT:

About 130,000 gallons a day.

MR. BARE:

Well, we got a well across the creek that's going dry. The water level is below the pump we put in there. The -- the bill usually runs about fifteen to twenty dollars; it's seventy, eighty dollars.

MR. BORNHOLM:

Okay.

MR. BARE:

The pump is below -- the water is pulled below the well.

MR. BORNHOLM:

I -- National Starch just submitted a --

MR. STURDEVANT:

Quarterly report.

MR. BORNHOLM:

-- monitoring and a quarterly report that depicts the contours of their cone of influence. I have not -- it was submitted -- I got it Monday, so I have not looked at it. But I talked to Mike and from what Mr. Sturdevant said, the cone of depression does not go or reaches the stream, does it not?

MR. STURDEVANT:

I think the cone of influence is approximately at the southwest tributary. It runs on the backside of the property.

MR. BARE:

Is it down to the branch?

MR. STURDEVANT:

It's -- it's approximately down to the branch, in there.

MR. BORNHOLM:

I don't know where you're --

MR. BARE:

Is it across from the bridge?

MR. STURDEVANT:

Not that -- not that we're aware of. In fact, one's a downgradient monitoring well and I believe it's NS-32 is artesian, and that's the one that's closest to the -- where you're talking about, as far as the -- the wells.

MR. BARE:

Well, see -- that' s what they -- it's lowering the water level there; you're pulling the water out from under that well and lowering the ground water there.

MR. STURDEVANT:

What I'm saying -- what I'm saying --

MR. BARE:

That well when it was put in, twenty-five feet was water level, and that's below the well, --

MR. STURDEVANT:

What I'm saying is --

MR. BARE:

-- below the pump.

MR. STURDEVANT:

What I'm saying is the monitoring well that is closest to your -- the area that you're referring to is artesian, whereas it has a head that is pushing water out of the well. The water table elevation is actually above --

above the well.

MR. BORNHOLM:

Is that down at the branch?

MR. STURDEVANT:

Yes.

MR. BORNHOLM:

And that -- that's still artesian?

MR. STURDEVANT:

That's still artesian.

MR. BARE:

Is it running all the time?

MR. PARADOWSKI:

But that's a monitoring well, not a pumping well.

MR. STURDEVANT:

No; no. I know but I guess they're monitoring the condition on that side of the creek.

MR. PARADOWSKI:

Right.

MR. STURDEVANT:

And it's an artesian creek well --

MR. BARE:

Is that running all the time?

MS. BARRETT:

Excuse me. Excuse me. Just say your name for the record, please.

MR. PARADOWSKI:

I'm sorry.

MS. BARRETT:

Say your name for the record.

MR. PARADOWSKI:

I'm sorry. I'm Ray Paradowski from National Starch. But just to clarify that particular artesian well, that's a monitoring well and there's no pump in that well. There's no water being taken out of it.

MR. BARE:

Is it pumping water out all the time?

MR. PARADOWSKI:

Ya- --well, except it's capped.

MR. BARE:

Well, that's probably lower than the well up on the hill that we're talking about.

MR. PARADOWSKI:

As I said, no water is being taken out of that well. It's strictly there as a test hole.

MR. BARE:

What about the other one? You drilled two down there, didn't you?

MR. PARADOWSKI:

Yeah, but those are -- neither of those wells are being used for pumping water.

MR. BORNHOLM:

But are they --

MR. PARADOWSKI:

We're not pumping any water right now.

MR. BORNHOLM:

But are they showing drawdown, though?

MR. PARADOWSKI:

Pardon me?

MR. BORNHOLM:

Are they showing drawdown?

MR. STURDEVANT:

The -- the extraction wells are upgradient from the monitoring wells, which are down close to the creek. If we had a map -- I don't know if they've got a map over there.

MR. BORNHOLM:

I don't.

MR. STURDEVANT:

I can sketch it.

MR. PARADOWSKI:

Let's see the report.

MR. BORNHOLM:

I'm not sure if the report goes into -- but I guess the point to be made or to reemphasize right now, based on the information that National Starch has, the cone of influence reaches the stream.

MR. BARE:

What's that? Were you talking to me?

MR. BORNHOLM:

Yeah. The -- the extraction wells that they installed on -- on their property, the influence on the groundwater based -- from the extraction of that -- of the water in -- through those wells has reached the stream. I -- and I don't -- do not know where your well is located, so I can't --

MR. BARE:

It's probably, what, three hundred feet, four hundred feet?

MR. BORNHOLM:

Is it a -- is it drilled into bedrock or is it -- is it drilled into bedrock?

MR. BARE:

The well?

MR. BORNHOLM:

Your well.

MR. BARE:

Yeah.

MR. BORNHOLM:

It's in hard rock?

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MR. STURDEVANT:

If you have a -- a marker, I could draw a little map up on the board there.

MR. BORNHOLM:

What type of marker is this? Erasable marker?

MR. BARRETT:

Okay.

(WHEREUPON, Mr. Sturdevant prepared a diagram on the board.)

MR. STURDEVANT:

This is the trench area (indicating on diagram). This is the southwest tributary down in this area. I believe where you're talking about is the Little Acres; right?

MR. BARE:

Yes, sir.

MR. STURDEVANT:

You're over here. I'm not sure whereabout in this property that you have your well located, but from here down to the stream, what would you say that is, approximately?

MR. BARE:

I'm not -- I don't know exactly. I'd say four hundred feet.

MR. STURDEVANT:

Yeah, I would say about four to five hundred feet there, directly here. We have monitoring wells 29, 30, 31, and I think 32 is somewhere in this location. What we're seeing in these monitoring wells is that we have a cone of influence -- we have these two extraction wells working all the time. Extraction well -- this is extraction well 2; this is extraction well 3. These are the two extraction wells that are pumping water. We see --

MR. BARE:

Are they pumped twenty-four hours a day?

MR. STURDEVANT:

That's right; that's right. The normal hydraulic gradient across this area, of course, is down -- right down to the stream. When you have these wells operating, you see a cone of influence something like this (indicating on diagram). And what that means is that you're actually having an influence of ground water in the downgradient direction, actually reversing back towards these extraction wells but at a limited distance. We're only affecting out in this area, oh, about a hundred feet away from the well in the downgradient direction. Okay. We're seeing decreases in concentrations of contaminants in the moni- -- downgradient monitoring wells.

This particular monitoring well right here, NS-32, the most downgradient well and closest to your property, is what we refer to as an artesian condition. That means that the hydraulic gradient is actually pushing up in this region so that once you tap into the bedrock aquifer at this point, into the -- into the aquifer at this -- at this location, you have a head of water that is above the surface water, above -- above the surface elevation.

MR. BARE:

Is that across the creek from the plant?

MR. STURDEVANT:

Here's your -- here's your creek right here (indicating on diagram). This is the southwest tributary. Okay. So it's across the creek.

MR. BARE:

Is that contaminated over there?

MR. STURDEVANT:

No, never has been. It continually registers non-detect. So your -- your well is probably, if I was to -- to estimate, I would say it's at least fifteen hundred feet, maybe two thousand feet away from this cone of influence over here on the property.

MR. BARE:

Well, they built that high-rise prison over there and they pump water like --

MR. STURDEVANT:

Well, that could be --

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MR. BARE:

-- it's going out of style. Now the water is below the pump.

MR. STURDEVANT:

That could be your problem. If they're withdrawing huge quantities of water from the prison, they could be impacting the water in this area (indicating on diagram).

MR. BARE:

You see, they don't use it no more.

MR. STURDEVANT:

Oh, okay. Well, disregard what I said.

MR. BARE:

Well, it's got a couple of trailers on it, but it's going down below the -- the pump; where the pump was put in the ground, it was put down in -- way down in the water.

MR. BORNHOLM:

The other thing that we could look at if -- if you have information available, is look at the depth -- the depth of this well versus the depth of this well (indicating on diagram).

MR. BARE:

Okay; okay.

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MR. BORNHOLM:

And then if this well -- if these wells are above the depth of this well, there's no way that you have influence from that site.

MR. STURDEVANT:

Again, I'd like to point out, Odell, that the only place we're extracting ground water is out of the extraction wells, the EX-2 or the EX-3. The -- the monitoring well, NS-32, we're not extracting any water out of that well whatsoever; it's just monitoring the condition there.

MR. BORNHOLM:

Again, another thing we can look at is the depth of -- of this well (indicating of diagram), elevationwise, com- -- compared to sea level and these wells here that -- could -- will help answer any questions.

MR. BARE:

Well, that well sits higher than any of those -- that -- that's on pretty high ground.

MR. BORNHOLM:

You know, I don't know the terrain around there, so I can't respond to that.

MR. AREY:

My name is Javis Arey and I work with Mr. Odell Bare and Mr. June Goodman in Little Acres Mobile Home Park. We're responsible for the overall operation of the Little

Acres Mobile Home Park. We have numerous wells throughout the development. There are 157 families, 157 mobile homes in Little Acres tonight. Each of them are feeding different wells. My question is why, after eighteen months, thereabout, of just pumping 120,000 gallons, which is -- it'll go to 200,000, is that correct, per day? Will the volume increase to 200,000?

MR. STURDEVANT:

That's the maximum amount that -- that we have designed for. Yeah. Whether we need to pump 200,000, based on the results that we're seeing from our quarterly monitoring program, I doubt it will have go that high.

MR. AREY:

All right. Where is the ground water approximately eighteen months, speaking of today in relationship to this ground water table before these extractions started -- before you started -- started pumping a hundred thousand -- is the overall ground water table dropping?

MR. STURDEVANT:

In that area of influence that --

MR. AREY:

Yes; right.

MR. STURDEVANT:

-- I pointed out there?

MR. AREY:

If it's 120,000 -- 130,000, it's got to come from somewhere. Is it coming from --

MR. STURDEVANT:

Okay. All right.

MR. AREY:

Are you with me here?

MR. STURDEVANT:

Yeah. I sure am; I sure am. If I may again?

(WHEREUPON, Mr. Sturdevant approached the board.)

MR. STURDEVANT:

If you look at this whole region, the watershed area begins up here at the top of the hill and extends way back up, I guess, all the way up to Reynolds Aluminum plant factory. Okay.

MR. AREY:

Right. Highway 29.

MR. STURDEVANT:

So you've got this huge regional aquifer that's coming down through this area, through the southwest tributary, and you have water, of course, that's flowing down this direction from the top of the hill. So what you're -- what you're pulling out from these extraction walls is the water that's coming down from the top of the hill, under here and the water that's flowing down through this valley.

MR. AREY:

Yes, sir.

MR. STURDEVANT:

Okay. So that's where all this water's coming from that you're pulling out of the extraction wells right here (indicating on diagram). The water, I would -- I would assume that the water that you're seeing across here is coming from an area up here, looking at, again, the -- the topography in the area. It looks like the watershed for this zone is back up --

MR. BARE:

That well up there is about the peak of the hill.

MR. STURDEVANT:

Okay. So --

MR. BARE:

It's -- it's about the peak.

MR. STURDEVANT:

The crown?

MR. BARE:

Yeah.

MR. STURDEVANT:

So you're probably -- you're probably gathering water from up in this area and also the water that's, again, running down through this valley.

MR. AREY:

Is the water table itself dropping any?

MR. STURDEVANT:

The water table in this area, this cone of influence, we've seen it drop about -- I believe it's two feet --

MR. VEST:

That's not the point that he's asking, though, Mike.

MR. STURDEVANT:

-- right -- right around this well right here, these wells. That's all. It's just a -- a real shallow zone.

MR. VEST:

I just want to make a point for Mike to make. The point he's making is the four monitor wells, which are outside the cone of influence, have you got the standing --

MR. STURDEVANT:

Right.

MR. VEST:

-- you got the standing elevation of those to show that that has not changed --

MR. STURDEVANT:

That's right.

MR. VEST:

-- through the year --

MR. STURDEVANT:

That's right.

MR. VEST:

-- of pumping? That's his question.

MR. STURDEVANT:

These -- these wells down here, these -- these monitoring wells, the elevation of the water in those monitoring wells is has not changed from this pumping action here.

MR. VEST:

Which is on the other side of the creek where you are.

MR. STURDEVANT:

We haven't seen any depression of -- of the ground water down in this area (indicating on diagram) whatsoever. It hasn't been decreasing; the ground water elevation has not decreased with these wells operating.

MR. BARE:

Well, what is -- these wells that you're pumping, how deep are they?

MR. STURDEVANT:

Approximately -- let's see. I think -- I think they're 170 feet, I believe.

MR. BARE:
Do they go down into the rock --
MR. STURDEVANT:
Yes.
MR. BARE:
-- or do they just go down to the rock?
MR. STURDEVANT:
No. They go into the rock.
MR. BARE:
Into the rock?
MR. STURDEVANT:
That' s right. The rock begins in this area, (indicating on board) down near the X-02; the rock begins around five, ten feet below the surface. So most of the well is --
MR. BARE:
So you really -- you really latched onto an underground stream somewhere that you're pumping water off of, a vein somewhere.
MR. STURDEVANT:
These are all -- this is all fractured rock system down through here.
MR. BARE:
So you could be pumping off a vein of -- that runs right across that hill to that other well, because when --

I've drilled hundreds of wells; I know what I'm talking about. When you hit a vein, then the water comes. Then it -- then it -- the vein makes -- you don't know which way that vein is coming.

MR. STURDEVANT:

We have these monitoring wells at the same depth as the extraction wells (indicating on diagram).

MR. BARE:

Well, the surface water there wouldn't -- I mean, the water level there wouldn't necessarily lower, but you could -- you could still maintain that surface there and be pumping from another vein somewhere, pumping off another vein, pulling another vein down. You don't pull that -- the area you're pumping, you don't know where that water's coming from if you're down in the rock and not pumping surface water.

MR. STURDEVANT:

We're -- we're pretty sure that, based on our measurements, that we're not having an influence out in this area, that the only influence we're having is right around these two wells. That's all we see from all the data measurements we've collected.

MR. BARE:

Well, how is that contamination getting down into the rock? How deep is the well?

MR. STURDEVANT:

About 170 feet.

MR. BARE:

So you -- you hit rock at eight feet and it's got to go 160 feet through rock before you can get it?

MR. STURDEVANT:

No; no. What we're doing is we're pulling contaminants from the full depth of the contaminated aquifer. What we found is from our initial investigations here, is that the fractures in the rock pinch out, actually decrease, to a point that you can't even see them any longer after you get about 170 feet deep.

MR. AREY:

So, sir, you're saying that the actual ground water table has not changed any in the overall area of, like, two miles around Nation -- National Starch?

MR. STURDEVANT:

I couldn't say that. If there's been other wells placed in -- in the area, that's, you know, -- no; I can't say that, not two miles.

MR. AREY:

I'm not trying to put words in your mouth. I'm just --

MR. STURDEVANT:

Yeah; yeah. All I'm saying is locally right here where we have our extraction system, we know that we haven't seen any changes in these downgradient monitoring wells.

MR. BARE:

We had another well down on Sidney Drive there that went dry last summer, the people -- the -- the lot that we sold, and they -- they said their well was dry; there's not enough water in it. Now, what would cause that? It's been there --

MR. AREY:

Eighteen years.

MR. BARE:

Ten or fifteen years.

MR. AREY:

Our problem is -- our real question is if we had one well tonight in trouble due to lack of production and we have to -- have -- do we have -- are each of the other wells a candidate for being the same thing one year from tonight?

MR. BORNHOLM:

And to answer that the best that we have -- with the data that we have is we're not influencing that area. Again, the gentleman brought up a point that maybe there is a vein across that runs that way. We don't know. We don't know that.

MR. AREY:

Whose responsibility should it be to determine that?

MR. BORNHOLM:

It's going to have to fall on us. We're the -- the responsible parties. And, again, I think the first thing we need to look at would be the depths of -- of the wells themselves.

MR. AREY:

Okay. Thank you.

MR. BORNHOLM:

Are there any other questions?

MR. AREY:

Yes, sir, please, and I don't mean to be predominant. Again, Javis Arey, Little Acres Mobile Home Park. Question: in relationship to how much noise will these soil valve extractions make, will it be a terrific vibration running twenty-four hours a day? How far will that noise be extended?

MR. BORNHOLM:

You're going --

MR. STURDEVANT:

What's that ?

MR. BORNHOLM:

You're going up to where again that it --

MR. STURDEVANT:

Well, I think you're asking about the soil vapor extraction.

MR. AREY:

Yes, vapor extraction.

MR. STURDEVANT:

We're not proposing to put those wells in place.

MR. AREY:

You're not proposing to put them in?

MR. STURDEVANT:

That's right. The proposal is -- is institutional control and natural degradation.

MR. BORNHOLM:

If we need to take --

MR. STURDEVANT:

If -- yeah.

MR. BORNHOLM:

If we need to move on to that step, my -- my memory serves me, they're semi-loud.

MR. AREY:

All right. Would -- would you and your -- object for you and your family to live, just, say, about 1500 feet from it on a constant basis?

MR. BORNHOLM:

I can't --

MR. AREY:

You don' t know?

MR. BORNHOLM:

I -- I really can't answer that, 'cause I don't know. I don't know how loud they are. I 've never been around one. But the -- I'm assuming we might -- if -- if necessary, we'd have to muffle them somehow. I'm sure there's technology there. First of all, we'd have -- we're going to have to control the emissions coming off of the -- the blowers themselves to control the contaminants that we're pulling out. So it's -- it's going to be -- the sound's going to be dampened through that process anyway.

MR. AREY:

But that's strictly one of the potential possibilities down the road?

MR. BORNHOLM:

Yes. And that decision --

MR. AREY:

You're not going to meet it 'til it arises?

MR. BORNHOLM:

That decision will be made in two to three years, --

MR. AREY:

All right.

MR. BORNHOLM:

-- after we determine whether or not natural degradation is or is not working. If it is not working, that's where we're headed; yes.

MR. AREY:

Thank you. A third question and, again, I don't mean to be so predominant here, in the covenant restrictions as I've read here in the communication, we have a tract of land that is homogeneous with, common boundary line, with National Starch that we have had for sale approximately two and a half or three years. I read here that National Starch's property, if it is ever sold, the deed covenant restriction wall be placed in there that it cannot be developed or commercially produced. Now, are we going to have to abide by those rules? If we sold that property to you, sixty-two acres, and we get a --

MR. BORNHOLM:

Sold it to National Starch or --

MR. AREY:

Pardon me?

MR. BORNHOLM:

No; those covenants would -- would zero in on those areas that are -- are contaminated --

MR. AREY:

Okay.

MR. BORNHOLM:

-- are contaminated.

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MR. AREY:
Are we allowed to disturb the soil?
MR. BORNHOLM:
On your property?
MR. AREY:
Yes, sir.
MR. BORNHOLM:
As -- as far as I know you are. I mean, I -- I'm not sure where your property is, but I -- there's no reason for me to believe that it's even contaminated.
MR. AREY:
We have had different prospects for this tract of land and once a potential buyer sees in the environment there, speaking of National Starch, they don't become interested. It's a valuable tract of land.
MR. BORNHOLM:
We would not -- that covenant would not pers- -- pertain to that certain tract of property.
MR. AREY:
We could give a -- questions we could give a deed in fee simple?
MR. BORNHOLM:
Yes. We -- we don't have any say on your property.
* * * * * * * *

MR. AREY:

You have no command of the property, period?

MR. BORNHOLM:

Correct, on your --

MR. AREY:

Would -- would you have a command if once dirt started being moved around, road construction started, houses being built?

MR. BORNHOLM:

It does not pertain to the National Starch superfund site; no.

MR. AREY:

Okay.

MR. BORNHOLM:

And even on parts of -- even if National Starch went out of business and sold their property, that covenant would only pertain to those areas that are contaminated. So there are no -- and there -- those tracts of -- of National Starch property that's not contaminated and I don't think there'd be a problem with developing those as residences.

MR. PARADOWSKI:

Can we -- can we put that one slide up that you have, Jon, to -- to illustrate that?

MR. BORNHOLM:

The area -- the area we're talking about that --

this deed of restriction would be associated with the contamination around this area (indicating on screen) and around this area only.

MR. AREY:

Only?

MR. BORNHOLM:

Only. And there is -- again, --

MR. AREY:

The restrictions would be --

MR. BORNHOLM:

As far as I know, there's no contamination down here and -- and therefore there's no risk and therefore, you know, the public is protected as far as we're concerned. Now, what we'd say -- you know, we would probably prevent or the State would prevent construction of homes in this area until the concentrations in the soil drop to a protective level and then --

MR. AREY:

Which is only inside the fence?

MR. BORNHOLM:

Within the National Starch property, yes. Would -- I don't --

MR. AREY:

Repeat that. I'm sorry.

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MR. BORNHOLM:

The source -- the source contamination is all within the National Starch property.

MR. AREY:

Yes, sir.

MR. BORNHOLM:

You've got this area of contamination and this area of contamination in the soils (indicating on screen), --

MR. AREY:

All right.

MR. BORNHOLM:

-- which would prevent -- you know, I -- as a homeowner, I wouldn't want to build a house there until I was assured that there was no health associated with those areas -- health concerns associated with that area.

MR. AREY:

All right. Thank you. A fifth question, please, and I apologize for the for time, why did your organization go from a thirty-year plan to a 120-year plan on the cleanup -- or superfund plan? Pardon me.

MR. BORNHOLM:

The -- there's a miscommunication here. Well, not a miscommunication. It's been estimated to clean up the ground water in this area is going to take over a hundred years and basically the thrity-year estimate was based on a different cleanup criteria, was based on a perpetual cleanup number and we are forced to -- to use the most stringent number, which is the State's number, which requires more extraction. The -- the federal number is five parts per million.

MR. PARADOWSKI:

Per billion.

MR. BORNHOLM:

Per billion. Five parts per billion. That's the federal cleanup goal, called the MCL. And that -- and that's contained under the safe drinking water act. The State's cleanup number is .8 or something like that.

MR. PARADOWSKI:

Point 3.

MR. BORNHOLM:

But we had to raise it -- we had to raise it to one part per billion because we can't test, we can't detect below one part per billion. It's in the -- we just don't have technology now. So going from five parts per bill- -- per billion down to one part per billion increased the amount of water that needed to be pumped and, therefore, the length of time to clean up the ground water. So the estimate of cleanup this contaminated ground water is now approximately 120 years. That's where that 120 comes from.

MR. AREY:

But that could potentially, possibility, be extended again from 120 to 150?

MR. BORNHOLM:

In all likelihood, it will go on into infinity.

MR. AREY:

Thank you. And my last -- last question, please, as I touched base with you for the meeting, I was with your personnel and Raleigh's personnel on-site two years ago -- approximately two years ago. Water samples were taken; they were analyzed by National Starch Chemicals and Atlanta and Raleigh. Unfortunately, I have never received any communication pertaining to what those analyses were.

MR. BORNHOLM:

I sent it to your -- your partner. I sent that letter to Mr. Odell.

MR. AREY:

Oh, you sent it to him?

MR. BORNHOLM:

Yeah. I don't know if he got it, but -- and the -- the estimated time frame wes in July of '92 that those samples were --

MR. AREX:

Yes, sir, '92, An July.

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MR. BORNHOLM:

Okay. We need that to try to track that data down.

MR. AREY:

Thank you. Mr. -- Mr. Ray Paradowski did call me and said that as far as they, National Starch, everything was fine.

MR. BORNHOLM:

And is that about right, July of '92 --

MR. PARADOWSKI:

Yes.

MR. BORNHOLM:

-- were -- when the samples were collected?

MR. PARADOWSKI:

That's correct.

MR. BORNHOLM:

Like I said, I'll find out. I've had difficulty tracking --

MR. AREY:

We will get a report, then?

MR. BORNHOLM:

I will send you the data.

MR. AREY:

Thank you.

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MR. BORNHOLM:

Any other questions?

MR. PARADOWSKI:

Excuse me, Jon. Ray Paradowski. Could we get a copy of that data, too?

MR. BORNHOLM:

Yes.

MR. PARADOWSKI:

Is that okay?

MR. BORNHOLM:

You never got it documented? If I can find it. I've had difficulty looking, as I explained to the gentleman in the back.

MR. AREY:

Arey.

MR. BORNHOLM:

I've looked at both under type of ground water or type the sample was and the date and haven't found it yet.

MR. PARADOWSKI:

Mr. Arey said that National Starch's result, but actually that was a -- an outside certified laboratory. We didn't do it ourselves.

MR. AREY:

Well, thank you. I -- I thought you and your -- this is Javis Arey.

MR. PARADOWSKI:

We sent it off.

MR. GRAULICH:

We paid for it.

MR. PARADOWSKI:

We paid for it, but it was an outside certified laboratory that did the analysis.

MR. AREY:

Thank you.

MR. BORNHOLM:

Are there any other questions? Well, thank you for your -- your time and attending our meeting.

(WHEREUPON, the hearing was adjourned at 8:09 P.M.)

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STATE OF NORTH CAROLINA)
) C E R T I F I C A T E
COUNTY OF MECKLENBURG)

I, Michelle A. Mitchell, Notary Public, do hereby certify that the foregoing forty-nine (49) pages constitute a verbatim transcription of the said hearing. I do further certify that the persons were present as stated.

I do further certify that I am not of counsel for or in the employment of any of the parties to this action, nor do I have any interest in the result thereof.

IN WITNESS WHEREOF, I have hereunto subscribed my name, this 9th day of August, 1994.

Michelle A. Mitchell
Notary Public

My Commission Expires:

June 1, 1999.

PLEASE NOTE that unless otherwise specifically requested in writing, the tape for this transcript will be retained for thirty days from the date of this certificate..