Explanation of Significant Differences Cristex Drum Superfund Site

United States Environmental Protection Agency

Site Name:	**Cristex Drum Superfund Site**
CERCLA ID #:	**NC0001606250**
Site Location:	**500 W. Industry Drive, Oxford, North Carolina 27565**
Lead Agency:	**EPA, Region 4**
Support Agency:	**North Carolina Department of Environmental Quality**

I. Introduction and Statement of Purpose

This decision document presents an Explanation of Significant Differences (ESD) for the Cristex Drum Superfund Site (Site), located in Oxford, Granville County, North Carolina. This ESD has been prepared by the U.S. Environmental Protection Agency to briefly summarize the significant changes to the September 2017 Record of Decision (ROD). Issues addressed within this ESD are grouped as follows:

- Revise the subsurface soil cleanup level for tetrachloroethene (PCE) based onsite-specific factors for protection of groundwater.
- Expand the scope of the demolition activities to address the full Site building.
- The EK-ISCO and bio-barrier, as described in the September 2017 ROD, were overly prescriptive for the pre-design stage of the remedy. Details of the remedy components are currently being developed in the Remedial Design; at which time the EPA will determine the exact number of injection wells. This will not change the type of treatment, scope or performance of the remedy nor will it add to the overall site costs.

The U.S. EPA prepares an ESD when it is determined by the Agency that changes to the original selected remedy are significant, but do not fundamentally alter the remedy selected in the ROD with respect to scope, performance or cost.

This ESD is issued in accordance with § 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C.§ 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR § 300.435(c)(2)(i). The Director of the Superfund Division has been delegated the authority to sign this ESD.

This ESD will become part of the Administrative Record for the Cristex Drum Superfund Site (40 CFR § 300.825(a)(2)), which has developed in accordance with § 113(k) of CERCLA, 42 U.S.C.§ 9613(k).

The Administrative Record is available for review at the Richard H. Thornton Library, 210 Main Street, Oxford, North Carolina 27565 and at U.S. EPA Region 4, 9th Floor Library, 61 Forsyth Street SW, Atlanta, Georgia 30303, Monday – Friday, 8:00 a.m. to 4:30 p.m.

II. Site History and Contamination

The Site is a former textile plant in a predominantly industrial, commercial, and undeveloped area with limited residential development. The property is located at 500 West Industry Drive, Oxford, North Carolina 27565.

The Site originally comprised two parcels of wooded farmland (11.13 and 11.28 acres). These parcels were purchased by Steinfield Mills in 1965. Steinfield Mills constructed a 150,000 ft^2 building and 0.5-acre lagoon on the property. Steinfield Mills changed its name to IMI Knits, Inc. in 1971 and to Cristex Corporation in 1981. From 1966 to 1986, Cristex operated as a warp knit fabric mill that knitted, dyed and finished nylon acetate tricot. Natural gas and fuel oil chemicals were stored mostly on the east side of the building. Dyes, dyeing assistants, and cellulosic and synthetic yarns were used in the manufacturing process. The dyeing process used metals such as zinc, copper and chromium. Chlorinated solvents were used to clean equipment and dry clean fabric as part of the dyeing process. Industrial wastewater was discharged to an onsite lagoon. The facility was connected to the city sewer system.

The Cristex building was used as a Revlon warehouse from about 1991-1996 and, in 2000, as a warehouse for CVS Pharmacies. The latter stored packaged merchandise for sale in their stores; no hazardous materials were stored at the property while CVS occupied the Cristex building. For an undetermined time between 2000 and 2006, the property was used as a warehouse to cure tobacco. Jomar Ventures, LLC, purchased the Site in 2006. For an unknown time in 2010, the front of the building was used by Habitat for Humanity as a Re-Store. The property was subsequently leased by Stutts Truck Tires, which operated a pre-cure tire retreading operation in the manufacturing portion of the building. Stutts Truck Tires ceased operations in 2015 and the building has been abandoned since that time.

Cristex operated under an air quality permit but did not have National Pollutant Discharge Elimination System permit or Resource Conservation and Recovery Act (RCRA) permit. The facility received a wastewater discharge permit in 1984 allowing discharge to the Oxford public owned treatment works.

In April 2002, Cristex joined North Carolina's Registered Environmental Consultant Program under an Administrative Order on Consent. They submitted data collected under the program to NCDENR. Cristex withdrew from the program in September 2004. Data collected by the State of North Carolina, the EPA, and Cristex and their consultants were used to develop a Hazard Ranking System Documentation Record for the Site. The Site was proposed for the NPL on May 24, 2013, and the Site was finalized on the NPL on December 12, 2013.

Current Site Status

The Site parcel is presently listed on the tax rolls as owned by Granville County. The Site primarily consists of the 150,000 ft^2 Cristex plant building and facility operations area and undeveloped wooded land. A former AST area, OWS area, and drum storage pad area are located east of the building in the facility operations area; the AST and OWS have been removed. A small (0.5-acre), unlined lagoon is located northeast of the building.

The contaminants of concern (COCs) to be addressed by the ROD include:

- PCE in subsurface soil,
- Benzo(a)pyrene (BaP) toxicity equivalent (TEQ), 1,4-dichlorobenzene (1,4-DCB), benzene, cis-1,2-dichloroethene (cDCE), PCE, trichloroethene (TCE), and vinyl chloride (VC) in groundwater, and
- 1,4-DCB, benzene, carbon tetrachloride, PCE, TCE and VC in indoor air.

III. Remedial Action Objectives and Selected Remedy

Remedial Action Objectives

Remedial Action Objectives (RAOs) were developed for the Cristex Drum Site to protect human health and the environment (HH&E). The objectives address the contaminants and media of concern, the exposure route(s) and receptor(s), and the acceptable contaminant levels or range of levels for each exposure route. Remedial Action Objectives for the Site are:

- Prevent future residential exposure to contaminated soils and groundwater above acceptable risk levels.
- Prevent intrusion of vapor contaminated above risk levels into the existing building by reducing dense non-aqueous phase liquid (DNAPL) and absorbed phase COCs and groundwater by treating these constituents in the unsaturated zone (UZ) and saturated source zone (SSZ) media zones.
- Reduce or eliminate the leaching of soil COCs into groundwater to levels that are protective of HH&E.
- Prevent the migration of COCs into the lagoon basin sediments from adjacent building area to levels that are protective of HH&E.
- Prevent down-gradient migration of contaminated groundwater within the transition zone and bedrock aquifer.
- Restore groundwater quality to meet NCDEQ groundwater standards throughout the plume, based on the classification of the aquifers as a potential source of drinking water [Class GA or Class GSA] under 15A NCAC 02L.0201.

In the Feasibility Study (FS), soil and groundwater contamination at the Site were classified into three contaminated media zones (CMZs), that were the basis for remedial alternative screening and remedy selection. A CMZ represents a portion of the Site contamination which has a characteristic that defines the optimal remediation approach. The CMZs were generally described as follows:

- Unsaturated Zone (UZ): The UZ encompasses contaminated surface and subsurface soils (above the groundwater table from 0-20 ft. bgs) with significant leachable chlorinated volatile organic compounds (CVOCs) in the suspected source area on the eastern side of the Cristex building near the former drum storage pad area and extending towards the lagoon. The unsaturated soil impacted with CVOCs, primarily PCE, and trace levels of petroleum compounds presents an ongoing threat of release of contaminants into the groundwater from soil leachate. Remediation of this zone is focused on addressing the adsorbed phase COCs or residual DNAPL, if present, and reducing or eliminating the leaching of soil PCE into groundwater.
- Saturated Source Zone (SSZ): The SSZ encompasses the contaminated soil beneath the former drum storage pad and downgradient toward the lagoon from the water table at approximately 20 ft. bgs to bedrock at a depth ranging from 60-90 ft. bgs. Remediation of the SSZ zone includes treating an approximately 70 ft. thick zone of saturated soil and groundwater beneath the suspected source areas (between approximately 20-90 ft. bgs). This zone is impacted with CVOCs and petroleum hydro-carbons in groundwater.
- Dilute Plume (DP): The DP comprises the wider band of dissolved contamination in the bedrock and regolith aquifers (saprolite and the partially weathered bedrock transition zone) adjacent to the SSZ. Remediation of this zone is focused on preventing the further vertical and horizontal migration of contaminated groundwater. Dissolved contamination in the saprolite portion of the DP is principally addressed through the down-gradient biobarrier walls or bio-remediation recirculation scheme for the SSZ remedies.

Selected Remedy in 2017 ROD

The selected remedy for the site by contaminated media is: Unsaturated zone (UZ): Soil Excavation; Saturated source zone (SSZ): Electrokinetics-Situ Chemical Oxidation (EK-ISCO) with Biobarriers; and Dissolved plume (DP): Enhanced In-Situ Bioremediation (EISB) Biobarriers.

The major components of the selected remedy from the 2017 ROD are listed below and are in order of their expected implementation during construction:

- Demolish the former drum storage pad and a portion of the Site building (and slab) to accommodate work in the soils below.
- Demolition debris will be characterized, temporarily staged, and transported off-site for disposal at a RCRA permitted landfill. Excavate approximately 12,400 bank cubic yards (bcy) of contaminated soils (16,800 square feet to a depth of 20 ft.).
- Excavated soil will be characterized, temporarily staged, then transported off-site for disposal at a permitted RCRA Subtitle C or D landfill. Soil considered RCRA hazardous waste may require treatment off-site prior to disposal.
- Backfill 12,400 bcy with clean soil into the excavated area.
- Construct the Electrokinetics In-Situ Chemical Oxidation (EK-ISCO) well network into the saprolite and transition zones (28 ISCO injection wells plus 32 electrode wells) and complete injection of ISCO amendments. Complete one additional injection event as needed to counteract potential rebound of chemicals of concern (COCs).
- Install 27 biobarrier wells in two transects into the saprolite and transition zones. Batch mix the carbon substrate solution on site and inject the substrate, a hydrogen ion concentration (pH) buffer, and a bioaugmentation culture.
- Install 16 biobarrier wells in one transect into the fractured bedrock. Batch mix the carbon substrate solution on site and inject the substrate, a pH buffer, and a bioaugmentation culture.
- Install 20 shallow direct push technology borings to assess soil contamination around the treated SSZ and DP area. Conduct quarterly groundwater sampling of the SSZ for five years and annual sampling of the DP for 20 years in accordance with a monitoring plan which will be developed and implemented as part of the Remedial Action.
- Restrict access to the Site by installing a fence.
- The property owner will implement institutional controls (ICs) to limit the use of groundwater in the Site vicinity and future land use to those uses compatible with industrial/commercial purposes.

This Selected Remedy will be completed in a phased approach that will allow the EPA to mitigate more immediate site-specific threats, while concurrently collecting additional characterization data, to determine if all three phases of the remedy will be necessary to attain long-term remedial objectives. The phases are anticipated as follows:

- Part 1:
  - Phase 1: Demolish site structures and excavate and replace soils in the UZ.
  - Phase 2: Excavate and replace soils in the UZ.
- Part 2: Phase 3: ISCO in SSZ.
  - Target Zone 1: Install monitoring well network and conduct baseline sampling.
  - Target Zone 1: Adjust design as needed.
  - Target Zone 1: Operate EK-ISCO to deliver oxidant. (Estimate is 8 months.)
  - Quarterly performance monitoring (includes EISB parameters).
  - Target Zone 2: Adjust design as needed.
  - Target Zone 2: Operate EK-ISCO to deliver oxidant. (Estimate is 10 months)
  - Quarterly performance monitoring (includes EISB parameters).
- Part 3: Phase 4: EISB in the SSZ and DP.
  - Conduct baseline sampling.

- Adjust design as needed.
- Install injection wells for EISB biobarriers.
- Operate EISB injections.
- Quarterly performance monitoring (includes EISB parameters).

IV. Description of Significant Differences and Basis for the ESD

Remedy modifications addressed within this ESD are grouped as follows:

- Revise the subsurface soil cleanup level for tetrachloroethene (PCE) based on site-specific factors for protection of groundwater.
- Expand the scope of the demolition activities to address the full Site building which can satisfy the RAO related to vapor intrusion.
- The EK-ISCO and bio-barrier as described in the September 2017 ROD were overly prescriptive for the pre-design stage of the remedy. Details of the remedy components are currently being developed in the Remedial Design (RD). Changes to the remedy based on the RD site investigation for the SSZ including whether the EISB bio-barriers phase of the remedy is needed will be documented in a memo to file, another ESD, or a ROD Amendment depending on the significance of the modifications to the remedy.

Revise the subsurface cleanup level for PCE

An ESD is necessary to revise the subsurface soil cleanup level for PCE to include site-specific factors for protection of groundwater. The September 2017 ROD determined the PCE soil cleanup level as 0.0023 mg/kg, which is the default maximum contaminant level (MCL) based soil screening level (SSL) value from the EPA regional screening level (RSL) summary table. Since the MCL-based SSL value does not consider site specific factors, the EPA further evaluated site conditions through the implementation of a sampling design consisting of 77 paired soil PCE analysis and synthetic precipitation leaching procedure (SPLP) analysis.

The sample results were described by means of graphical representations and statistical measures for the entire data sets and on a location-specific and depth-specific basis. The EPA and NCDEQ evaluated various ways to derive a soil remediation goal based on the paired soil PCE/SPLP analysis. Based on this analysis the new soil cleanup level for PCE for protection of groundwater is being established in this ESD at 0.15 mg/kg. This analysis can be found in a July 20, 2021 Memorandum from SSS to the site RPM.

Expand the scope of the demolition activities

In the ROD Concurrence Memo, dated September 27, 2017, NCDEQ stated that one of the conditions of approval was that EPA expand the demolition of the former Cristex building, to allow for the full excavation of the presumed source area of soil contamination at the Site. This ESD modifies the ROD to allow for expanded, and possibly complete, demolition of the former Cristex building and foundation.

This change in scope of demolition from partial to complete will also eliminate the exposure pathway for vapor intrusion the former Cristex building, as there will no longer be a structure occupied by future workers, located above the source area beneath the foundation. Depending on the likelihood of future development in this area of contamination, ICs may be required to implement vapor intrusion mitigation in order to protect human health.

A determination will be made following sampling beneath the foundation as to the extent of the foundation that will be removed. This sampling will involve core samples taken through the foundation in conjunction with soil gas sampling to help target impacted soils lying underneath. Depending on the results of that investigation, further modifications to the selected remedy may be necessary and documented in a memo to file, an ESD or ROD

Amendment depending on the significance of the modifications to the remedy.

Determining locations and number of wells for EK-ISCO remedy component

The selected remedy for the SSZ in the ROD was very prescriptive in the number and location of wells needed for EK-ISCO. The ROD also described bio-barriers as part of the EK-ISCO remedy when they are likely to only be part of the DP remedy. This ESD is clarifying that the Remedial Design (RD) is being performed along with more investigation and will determine implementation details of the EK-ISCO remedy for the SSZ and whether bio-barriers will be needed (or not) as part of that remedy. Depending on the results of that site investigation, further modifications to the selected remedy may be necessary and documented in another ESD or ROD Amendment depending on the significance of the modifications to the remedy.

V. Support Agency Involvement

The EPA consulted with NCDEQ and provided the opportunity to comment on this ESD in accordance with NCP, 40 CFR §300.435 (c)(2) and § 300.435 (c)(2)(i) and CERCLA §121(f). NCDEQ concurred with the modified selected remedy described in this ESD in a concurrence letter dated May 18, 2022.

VI. Statutory Determinations

The EPA has determined that the modifications to the 2017 ROD selected remedy described in this ESD will continue to satisfy the statutory requirements of CERCLA § 121, 42 U.S.C. § 9621. These modifications are protective of human health and the environment, will comply with identified ARARs to the remedial action components, are cost-effective, and utilize permanent solutions and alternative treatment technologies to the maximum extent practicable.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, CERCLA 121(c) and the NCP at 40 C.F.R. Section § 300.430(f)(4)(ii) requires a review of the remedy(ies) no less often than each five years after the initiation of the remedial action(s) to ensure that the remedies are, or will be, protective of human health and the environment.

VII. Public Participation

The public participation requirements set out in the NCP, 40 CFR § 300.435(c)(2), have been met by making this ESD and supporting information available to the public in the Administrative Record and by publishing a notice summarizing the ESD in a major local newspaper.

For further information about this ESD, contact:

Jeff Crowley, Remedial Project Manager
U.S. Environmental Protection Agency
61 Forsyth Street, SW, MS 9T25
Atlanta, Georgia 30303
Telephone: 404-562-9587
E-mail: Crowley.Jeffery@EPA.gov

VIII. Authorizing Signature

I have determined the remedy for the Site, as modified by this ESD, is protective of human health and the environment, and will remain so provided the actions presented in this report are implemented as described above. This ESD documents the significant changes related to the remedy at the Site.

U.S. Environmental Protection Agency

By:

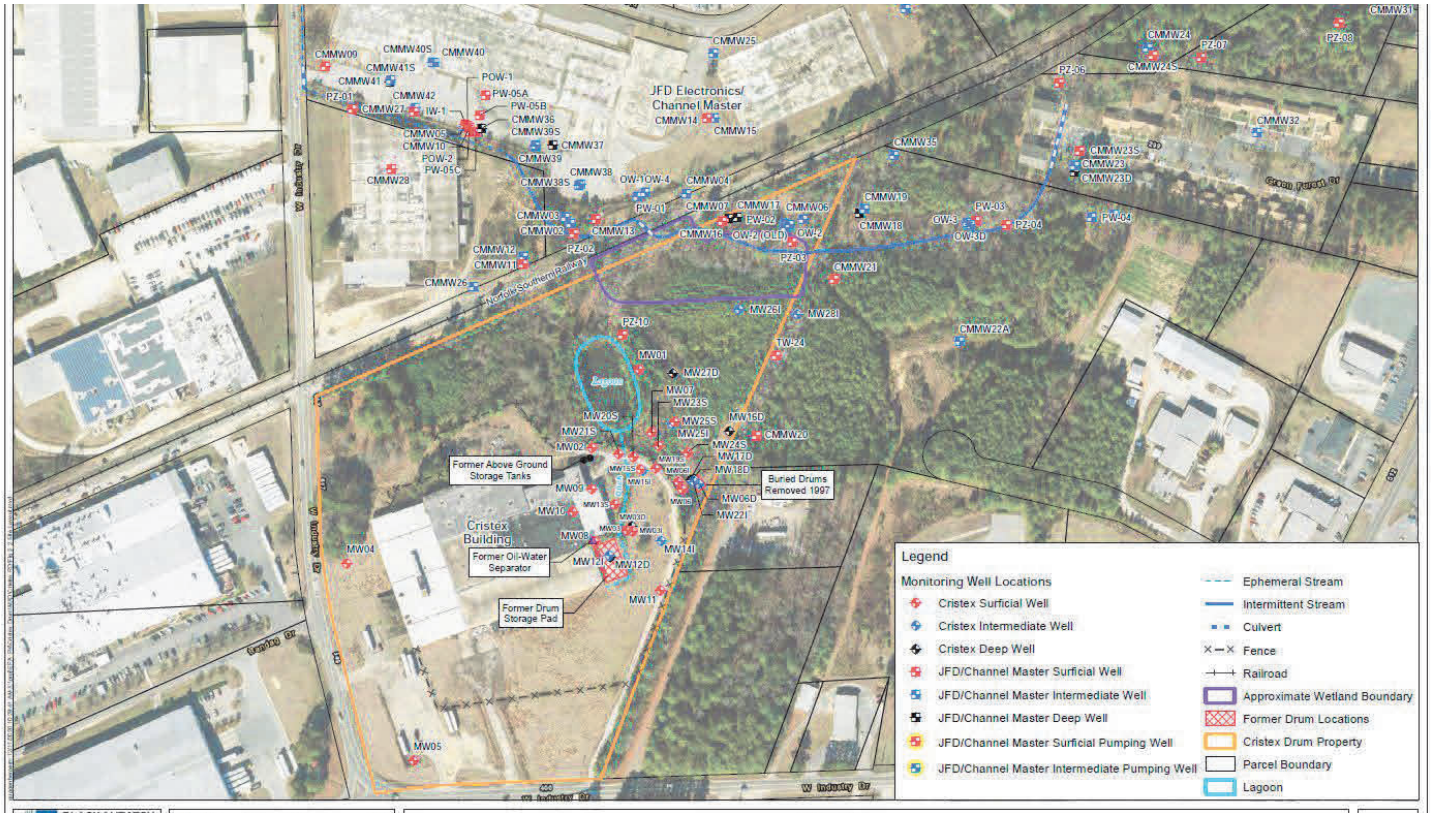
Chaffins, Randall

Digitally signed by Chaffins, Randall
Date: 2022.08.09 13:09:05 -04'00'

Carol J. Monell, Director
Superfund & Emergency Management Division

Date:

Cristex Drum Superfund Site Map



LIST OF ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Requirements
AST	Above-Ground Storage Tank
bls	below land surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code for Regulation
COC	Contaminants of Concern
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
ft.	feet
LLDPE	Linear Low-Density Polyethylene
MPE	Multi-phase Extraction
NAPL	Non-aqueous Phase Liquid
NCDEQ	North Carolina Department of Environmental Quality
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
PCE	tetrachloroethene
PCP	pentachlorophenol
ppt	parts per trillion
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
Site	Cristex Drums Superfund Site
SPLP	Synthetic Precipitation Leaching Procedure
U.S.C.	United States Code