Letter Health Consultation

Evaluation of Potential Exposures to Contaminants from the

CRISTEX DRUM NPL SITE

OXFORD, GRANVILLE COUNTY, NORTH CAROLINA

EPA FACILITY ID: NC0001606250

Prepared by
North Carolina Department of Health and Human Services

JANUARY 8, 2016

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Community Health Investigations
Atlanta, Georgia 30333

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LETTER HEALTH CONSULTATION

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North Carolina Department of Health and Human Services
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U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

January 8, 2016

Beverly Stepter
Site Project Manager
U.S. EPA
61 Forsyth Street S.W.
Atlanta, GA 30303

Dear Ms. Stepter,

The Health Assessment, Consultation and Education (HACE) Program in the N.C. Division of Public Health (DPH) prepared this evaluation of the Cristex Drum National Priorities List (NPL) site as requested by the U.S. Environmental Protection Agency (EPA) as part of the site listing on their National Priorities List (NPL) in December 2013. The Cristex Drum NPL site (EPA ID:) was added to the NPL in December 2013. The HACE Program has reviewed the available data for the site to determine if people living near the site are being exposed to levels of contaminants that may cause negative health effects. HACE concludes that contaminants from the Cristex Drum NPL site are not expected to harm people's health because there is no current exposure to contaminants associated with the site. With the exception of groundwater, the contamination is located on the site property, and is either enclosed within an 8-foot locked fence or in areas that are difficult to reach due to heavy overgrowth. The building is currently condemned and there are no businesses operating on the site. EPA contractors are currently conducting a remedial investigation at the site to determine the nature and extent of contamination prior to remediation and reuse. Future exposure pathways are unlikely, as the site is expected to be remediated before future use for commercial or industrial purposes. Groundwater contaminated with TCE and PCE extends under a down-gradient apartment complex located east of the Cristex Drum NPL property. These apartments do not use the groundwater for any purpose, and a 2013 vapor intrusion study showed no NPL site-related chemicals in indoor air (AECOM 2014b).

The HACE Program recommends the following actions:

- The EPA sample the shallow monitoring well located on the property of Oak Ridge Apartments (CMMW-23) on a semi-annual basis for TCE and PCE.
- EPA conducts a follow-up vapor intrusion study if TCE or PCE concentrations increase in this well.
- EPA includes an analysis for all 209 PCB congeners in future sampling of on-site environmental media rather than Aroclor-based quantitation. This will allow for increased analytical sensitivity and more accurate risk identification.

The remainder of this letter will describe our assessment process and how we arrived at our conclusions and recommendations.

Background and Statement of Issues

The Cristex Drum NPL site (EPA ID:) is located on a 22-acre parcel at 500 West Industry Drive in Oxford, Granville County, North Carolina (Figure 1). It is in a primarily industrial area. The U.S. EPA is in the process of starting the Remedial Investigation for the site. The closest residential property is Oak Ridge Apartments, a complex of approximately 200 residents located approximately 1,350 feet east of the site.

Cristex was operated as a warp knit fabric manufacturing and dyeing facility from 1966 to 1986. Liquid wastes from the facility's processes were deposited in an onsite waste lagoon northeast of the building. This lagoon held approximately 800,000 gallons of water. In 1998, the lagoon was partially breached by a Cristex contractor, releasing approximately 400,000 gallons of lagoon water to the wetland and eventually to a nearby stream [MAA 2002]. In 2001, the remaining water in the lagoon was drained to the City of Oxford wastewater system. Later site visits have determined that rainwater has accumulated in the lagoon, but this area of the property is highly inaccessible due to overgrowth observed over multiple HACE staff visits. The lagoon berms have been graded to prevent overland flow from the lagoon into the wetland [MAA 2002].

In 1997, discarded and partially buried drums were discovered on the property [EPA 1997a]. The drums contained fuel oil sludge, printing ink and ink solvents [EPA 1997b]. EPA removed the drums and underlying soil. Other sources of contamination on the site were two #6 fuel oil aboveground storage tanks (removed in 2001) and a 500-750 gallon oil/water separator (removed in 1998) [MAA 2002]. Contaminated soils surrounding these sources were excavated and disposed of in permitted landfills. Impacted soils remain in the area next to the southeast drum storage pad, as well as under the building and at the northeast corner of the building (Figure 1). These areas are all within the 8-foot fence, which is kept locked.

The Cristex groundwater plume mixes with the plume of chlorinated solvent-contaminated groundwater originating from the JFD Electronics/Channel Master NPL site next door. A pump and treat system has been in operation as part of the JFD groundwater remediation plan since 2000, and it is likely that the pumping wells are capturing at least some of the Cristex groundwater contamination [N.C. DENR 2012]. The system discharges treated groundwater to the City of Oxford wastewater treatment plant.

Soil, surface water, sediment, and groundwater samples have been collected at this site over a number of sampling events occurring between 1997 and 2010 [NC DENR 2012, MAA 2002, NC DENR 1999, NC DENR 2003, TN&A 2008]. Additional groundwater samples are being collected twice a year as part of the groundwater remediation monitoring for the JFD Electronics/Channel Master NPL site. Sampling for the Cristex Remedial Investigation and Feasibility Study (RI/FS) began in 2015 [B&V 2015].

The N.C. Department of Health and Human Services (DHHS) Division of Public Health (DPH) uses the best available science to safeguard public health. The HACE program within DPH used

site information and historical data to evaluate potential public health effects of exposure to contaminants from the Cristex Drum NPL site.

Discussion

Exposure Assessment

The exposure pathway (how people may come into contact with contaminants in their environment) is evaluated to determine if people have come into contact with site contaminants, or if they may in the future. An exposure pathway is one that contains:

- a source of contamination, the movement of the contaminant through environmental media such as groundwater,
- a point of exposure where people come in contact with the contaminated media such as drinking water,
- a route of exposure like drinking contaminated well water,
- and people that can come in contact with the contaminants.

Surface soil located near the Cristex building is known to be contaminated with zinc, copper, cobalt, cadmium, vanadium, chromium, and polychlorinated biphenyls (PCBs). The highest metal concentrations measured in surface soil on-site were below all relevant screening levels (Table 1). Additionally, the contaminated areas are confined within the locked fence and inaccessible. The building has been condemned and a notice of condemnation posted as of August 2014. There are no indications of a current public health risk from exposure to surface soil on-site because there is no known usage of the property at this time, and therefore no exposure.

Sediments in the on-site lagoon are contaminated with zinc, copper, chromium, cadmium, antimony, and PCBs (Table 1). Sediment samples collected from a wetland located on the Cristex property have elevated levels of TCE, copper, antimony, arsenic, chromium, vanadium, and PCBs. For most metals, the highest metal concentrations measured in sediments on site were below all relevant screening levels (Table 1). While the lagoon and wetland are located outside of the fence, the area is covered with heavy vegetation and is in all practical purposes inaccessible. Site visits did not reveal any indication that this area of the property was being accessed, and does not pose a public health risk as long as the area remains inaccessible. Off-site sampling of the surface water pathway (water and sediment samples) did not detect any site-related contaminants, and there are no known drinking water intakes for more than 15 miles downstream from the surface water pathway.

Table 1. Maximum measured concentrations of compounds of concern in on-site surface soil, lagoon sediments, and wetland sediments, compared to screening values. A total of 26 surface soil samples, 15 lagoon sediment samples, and 21 wetland sediment samples were analyzed.

Chemical	Maximum Detected concentration (mg/kg)			Screening value (mg/kg)	Screening value type
	Surface soil	Lagoon Sediments	Wetland sediments		
Aroclor 1254	1.36	1.5	5.3	1 (child)	Chronic EMEG
				14 (adult)	
Antimony	--	1,670	--	20 (child)	RMEG
				280 (adult)	
Arsenic	2.5	--	5.03	15 (child)	Chronic EMEG
				210 (adult)	
				0.47	CREG
Cadmium	2.3	6.75	--	5 (child)	Chronic EMEG
				70 (adult)	
Chromium	350	133	2,420	75,000 (child)	RMEG for trivalent chromium
				1,100,000 (adult)	
Cobalt	81	--	--	500 (child)	Intermediate EMEG
				7,000 (adult)	
Copper	55	362	92	500 (child)	Intermediate EMEG
				7,000 (adult)	
Vanadium	92	--	186	500 (child)	Intermediate EMEG
				7,000 (adult)	
Zinc	890	1,490	280	15,000 (child)	Chronic EMEG
				210,000 (adult)	

Notes: mg/kg = milligram of contaminant per kilogram of soil or sediments
EMEG = Environmental Media Evaluation Guideline
CREG = Cancer Risk Evaluation Guideline
RMEG = Reference Dose Media Evaluation Guideline

Groundwater contaminants of concern include PCE, TCE, cis-1,2-dichloroethene (DCE), manganese, cadmium, vinyl chloride, benzene, methylene chloride, 1,1,2-trichlorethane, and carbon tetrachloride (Table 2). A survey conducted in December 2014 determined that there are no private drinking water wells affected by groundwater contaminated by the Cristex property [AECOM 2015]. A study of indoor air and groundwater at the Oak Ridge Apartment complex did not indicate current vapor intrusion [AECOM 2014b], but groundwater plume migration may create a future exposure pathway. The down gradient recovery well, PW-4, does not appear to be capturing the entire plume near Oak Ridge Apartments. Semi-annual groundwater sampling for the nearby JFD Electronics/Channel Master NPL site indicates that TCE and PCE levels are increasing in the monitoring well just up-gradient of the apartment complex [AECOM 2014a]. Additional investigation activities are currently being conducted on the JFD Electronics/Channel Master NPL site in order to optimize the groundwater extraction system and provide complete capture of the groundwater contaminant plumes originating at both sites. If TCE and PCE

concentrations in the groundwater immediately up-gradient of the apartment complex continue to increase, residents may be at risk of future exposure via the vapor intrusion pathway.

Table 2. Maximum measured concentrations of compounds of concern in Cristex groundwater samples, compared to screening values. 42 groundwater samples were collected in total.

Chemical	Maximum Detected Concentration (µg/L)	Screening value (µg/L)	Screening value type
1,1,2-Trichlorethane	1	40 (child)	RMEG
		140(adult)	
		0.61	CREG
Benzene	58	5 (child)	Chronic EMEG
		18 (adult)	
		0.64	CREG
Cadmium	1.8	1 (child)	Chronic EMEG
		3.5 (adult)	
Carbon Tetrachloride	4.7	40 (child)	RMEG
		140(adult)	
		0.5	CREG
Cis-1,2-dichloroethene	2800	20 (child)	RMEG
		70 (adult)	
Manganese	1200	500 (child)	RMEG
		1,800 (adult)	
Methylene Chloride	54.8	600 (child)	Chronic EMEG
		2,100 (adult)	
		18	CREG
Tetrachloroethylene	7100	80 (child)	Chronic EMEG
		280 (adult)	
		17	CREG
Trichloroethylene	527.1	5 (child)	Chronic EMEG
		280 (adult)	
		0.76	CREG
Vinyl Chloride	119.6	30 (child)	Chronic EMEG
		110 (adult)	
		0.025	CREG

Notes: µg/L = microgram of contaminant per liter of water
EMEG = Environmental Media Evaluation Guideline
CREG = Cancer Risk Evaluation Guideline
RMEG = Reference Dose Media Evaluation Guideline

Samples collected in the past were analyzed for Aroclors to detect PCBs. Aroclors were commercial PCB mixtures that were made up of unique combinations of generally 50-100 of the 209 distinct, yet chemically-related PCB congeners. Due to the difference in number and location of attached chlorine atoms, each of the 209 PCB congeners has unique chemical,

toxicological, and environmental fate properties. As a result, each congener interacts with and moves through the environment differently. When a mixture of PCB congeners (Aroclors) is released into the environment, each PCB congener is altered ("weathered") to various degrees within each environmental medium. The U.S. EPA advises that accurately characterizing and quantifying a weathered PCB release requires looking for each of the 209 congeners [EPA 2013]. This can be done using U.S. EPA Method 1668A or B and this analysis is recommended for additional samples collected at this site.

Conclusions

The N.C. DPH concludes contaminants from the Cristex Drum NPL site will not harm people's health at this time based on the available data. There are no current completed exposure pathways, as contaminants on the Cristex property are inaccessible due to either the 8 foot fence or heavy vegetation. Groundwater contamination has migrated off-site, but does not currently impact any drinking water wells in the area. Vapor intrusion is not currently occurring at the Oak Ridge Apartment complex, but may pose a risk in the future.

Recommendations

N.C. DPH recommends the following actions:

- The EPA sample the shallow monitoring well located on the property of Oak Ridge Apartments (CMMW-23) on a semi-annual basis for TCE and PCE.
- EPA conducts a follow-up vapor intrusion study if TCE or PCE concentrations increase in this well.
- EPA includes analysis for all 209 PCB congeners in future sampling of on-site environmental media rather than Aroclor-based quantitation. This will allow for increased analytical sensitivity and more accurate risk identification.

Next Steps

N.C. DPH will:

- Re-evaluate the site for public health risk if it is redeveloped or if new data indicates that a complete exposure pathway exists.
- Continue to work with EPA and N.C. DENR to ensure the community living and working near the Cristex Drum NPL site are not being exposed to hazardous levels of contaminants—now or in the future.

Please do not hesitate to contact me at (919) 707-5900 if you have any questions regarding this letter.

Sincerely,

Beth Dittman, M.S.
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REPORT PREPARATION

This Letter Health Consultation for the Cristex Drum NPL site was prepared by the North Carolina Division of Public Health (N.C. DHHS) under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with the approved agency methods, policies, procedures existing at the date of publication. Editorial review was completed by the cooperative agreement partner. ATSDR has reviewed this document and concurs with its findings based on the information presented.

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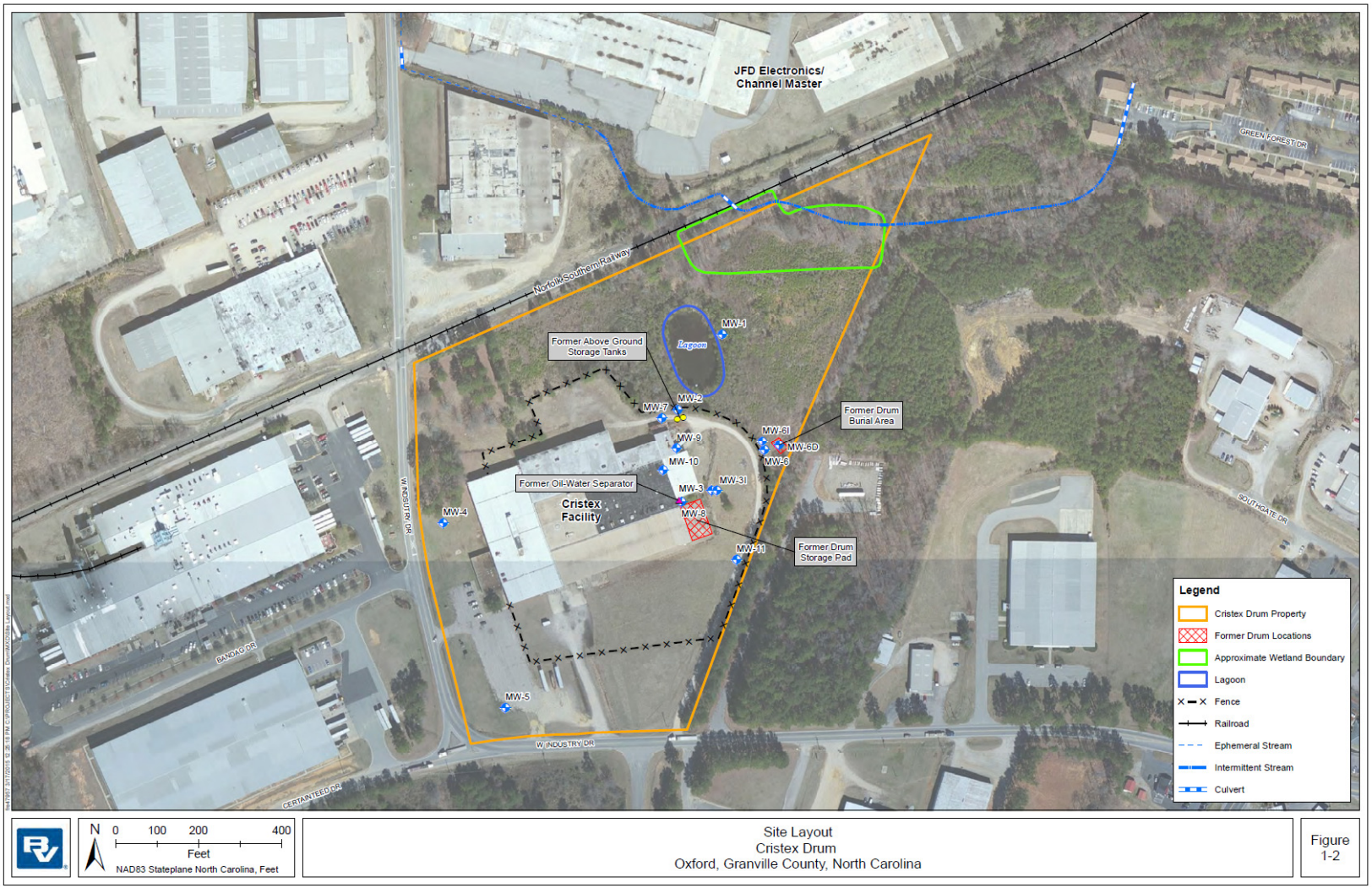

Figure 1. Cristex Drum NPL site layout. Oak Ridge Apartments are located N/NE of the Cristex facility on Green Forest Drive, visible in the upper right corner. Groundwater and surface water flows east.

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