FOURTH FIVE-YEAR REVIEW REPORT

NCR Corporation Superfund Site

Millsboro

Sussex County, Delaware

Prepared by:

U.S. Environmental Protection Agency

Region III

Philadelphia, Pennsylvania

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6 30 2015 Date

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List of Acronyms

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
AS/SVE	Air sparging and soil vapor extraction
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
Cis-DCE	Cis-1, 2 Dichloroethene
COCs	Contaminants of Concern
DE ODW	Office of Drinking Water (State of Delaware)
DNREC	Department of Natural Resources and Environmental Control (State of Delaware)
EDC	Ethylene Dichloride (1,2-Dichloroethane; 1,2DCA)
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Differences
FYR	Five-Year Review
GCS	Groundwater Collection System
GMID	Insufficient Data to determine contaminated Groundwater Migration Control Status
GMUC	Groundwater Mitigation Under Control
GMZ	Groundwater Management Zone
GPRA	Government Performance Review Act
HEUC	Human Exposure Under Control
MCL	Maximum Contaminant Level
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System

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National Priorities List
Operation and Maintenance
Operable Unit
Perfluorooctanoic acid
Perfluorooctane sulfonate
Parts per billion
Parts per million
Pump and Treat
Perfluorooctanoic acid
Perfluorooctane sulfonate
Polyvinyl Chloride
Remedial Action
Remedial Action Objective
Risk Based Concentration
Remedial Investigation/Feasibility Study
Record of Decision
Remedial Project Manager
Reservoir
Superfund Amendments and Reauthorization Act
Safe Drinking Water Act
Site-Wide Ready for Anticipated Use
Trichloroethylene
Micrograms per Liter (equivalent to parts per billion)
Vinyl Chloride
Vapor Intrusion

WWTP

Waste Water Treatment Plant

Executive Summary

The NCR Corporation Superfund Site in Millsboro, Delaware remedy consists of groundwater pump and treat (P&T) system. The remedy was selected by EPA and is described in the August 12, 1991 Record of Decision (ROD). Groundwater contaminants of concern are Trichloroethene (TCE) and chromium. TCE and chromium contamination, along with TCEs natural breakdown products Cis-1, 2 Dichloroethene (cis-DCE), and Vinyl Chloride (VC), are found in the shallow Columbia Aquifer. Contaminated groundwater is pumped from the aquifer and treated by an air stripper to remove volatile organic compounds (VOCs). Treatment of chromium was determined by EPA to not be necessary. Treated water is re-injected into infiltration galleries up gradient of the groundwater contaminant plume. Cleanup levels are Maximum Contaminant Levels (MCLs) and non-zero Maximum Contaminant Level Goals (MCLGs) specified in the Safe Drinking Water Act (SDWA) at the time the remedy was selected. These are: TCE - 5 ppb, Chromium – 100 ppb, Cis-1,2 DCE - 70 ppb, VC - 2 ppb.

The remedy for the Site is being performed by the NCR Corporation (NCR), with oversight by EPA and Delaware Department of Natural Resources and Environmental Control (DNREC). The Site has been divided by EP into two areas for project management purposes: the Phase I and Phase II Areas (Figure 1). The Phase I area originally included three extraction wells. Currently only one extraction well is in operation. EPA modified the remedy in two Explanation of Significant Differences (ESDs) by adding air sparging and soil vapor extraction (AS/SVE) to the remedy in the Phase II area (1996 ESD) and Phase I area (1998 ESD). NCR first employed AS/SVE in the Phase II area. AS/SVE has also been expanded into the Phase I area. AS/SVE in both the Phase I and II areas has been completed and resulted in a significant decrease in plume area. Currently only isolated hot spots of contaminated groundwater remain. These hot spots are being addressed by the pump and treat system and by implementation of in situ (i.e., in place) enhanced biological and abiotic reductive dechlorination. In-situ remedial actions are being performed voluntarily by NCR.

Construction completion at the Site was reached with the signing by EPA of the Preliminary Close Out Report on September 27, 1996. EPA also selected deed restrictions in the ROD to prevent the installation of wells in the vicinity of groundwater contamination. The State of Delaware established a Ground Water Management Zone (GMZ) in 1999 to prevent the installation of wells in the vicinity of Site-related groundwater contamination (Figure 1). EPA acknowledged the GMZ was more protective than deed restrictions in a 2001 Non-Significant Change to the ROD. A 2003 vapor intrusion (VI) assessment by EPA found no unacceptable risk for an onsite commercial building or for a hypothetical residential structure in the Phase II area. EPA re-evaluated the vapor intrusion exposure pathway in 2010 and confirmed the findings of the onsite commercial building. This assessment, however, did find there may a potential risk of concern via this pathway in the Phase II Area in the event that a commercial or residential building is constructed and occupied while groundwater restoration is still in progress. EPA recommended in the third Five-Year Review (FYR) that potential future buildings be evaluated for VI as necessary.

EPA revisited the 2003 and 2010 VI evaluations in 2014 and found them to be fundamentally valid. However, these evaluations were qualitative. Due to the lack of analytical data, EPA requested the NCR conduct a VI investigation, including sampling, of the onsite commercial building. Paired subslab and indoor air samples were taken in March 2015. Results of the VI Study indicate that TCE is the only Site related contaminant detected in subslab samples. No Cis-1,2 DCE or VC were detected in the subslab. All subslab TCE concentrations were below EPAs cancer subslab screening levels and non-cancer subslab screening level for a Hazard Index of 1. Vapor intrusion is not an issue at the Site.

Perfluorooctane sulfonate (PFOS) and Perfluorooctanoic acid (PFOA) are emerging contaminants historically used in metal fabrication and electronics manufacturing. EPA requested NCR evaluate groundwater for the presence of PFOA/PFOS. The potential presence of these contaminants in groundwater was also evaluated in the March 2015. PFOA/PFOS were detected in groundwater at one of the three wells sampled. Concentrations of both PFOA/PFOS in this well were one order of magnitude below EPAs Health Advisory concentrations.

This is the fourth Five-Year Review Report for the Site. The trigger for this Five-Year Review is the third Five-Year Review Report signed on July 1, 2010. The assessment of this Five-Year review found that the remedy continues to be implemented in accordance with the requirements of the ROD and ESDs. The remedy is functioning as designed and is expected to be protective when groundwater cleanup goals are achieved.

EPA considers the remedy protective of human health and the environment in the shortterm. Monitoring indicates contaminated groundwater in the Phase I plume is captured by the pump and treat system. Voluntary periodic injections of fermentable carbon and zero valent iron are also being utilized to enhance the in-situ treatment of the remaining groundwater contamination by the biologic and abiotic processes in both the Phase I and II areas. Institutional controls in the form of a GMZ prevent exposure to contaminated groundwater. Operation of the groundwater pump and treat system, and monitoring of groundwater will continue until cleanup goals are met.

Long-term protectiveness will be achieved when the groundwater contaminant plume is completely remediated.

EPA recommends that potential future buildings be evaluated for VI as necessary, and that EPA incorporate the voluntary in-situ work into a decision document.

Government Performance Review Act (GPRA) Measure Review

GPRA measures have been reviewed as part of this Five-Year Review. GPRA measures and their status are provided as follows:

Environmental Indicators

Human Health: Current Human Exposure Under Control (HEUC) Groundwater Migration: Groundwater Migration Under Control (GMUC)

Site-Wide RAU

The Site achieved Sitewide Ready for Anticipated Use (SWRAU) on June 26, 2006.

Five-Year Review Summary Form

			SITE I	DENTIFICATION
Site Name:	NCR Co	rporation	Superfun	d Site
EPA ID:	DED043	958388		
Region: 3		State: D	E	City/County: Millsboro / Sussex County
			SI	TE STATUS
NPL Status:	Final			
Multiple OUs No	?		Has the Yes	e site achieved construction completion?
			REV	IEW STATUS
Lead agency: EPA If "Other Federal Agency" was selected above, enter Agency name:				
Author name (Federal or State Project Manager): Bruce Rundell				
Author affiliation: US EPA Region 3				
Review period: 7/1/2014 – 7/1/2015				
Date of site inspection: December 2 -3, 2014				
Type of review: Statutory				
Review number: 4				
Triggering action date: 7/1/2010				
Due date (five years after triggering action date): 7/1/2015				

Issues/Recommendations

Issues and Recommendations Identified in the Five-Year Review:				
OU(s):	Issue Category:	Monitoring		
Groundwater / Vapor	Issue: Potential vapor Intrusion to potential future buildings.			uildings.
Intrusion	Intrusion Recommendation: Re-evaluate for vapor intrusion in the event construction is planned.			in the event
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date

No	Yes	PRP	EPA	N/A	
OU(s):	Issue Category:	Issue Category: No Issue			
Groundwater /	Issue: Voluntary	Issue: Voluntary In-situ injections are not part of official remedy.			
	Recommendation: EPA will incorporate the in-situ activity into a decision document.				
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date	
No	No	EPA	EPA/State	N/A	

Protectiveness Statement(s)

Operable	Unit:
N/A	

Protectiveness Determination: Short-term Protective Addendum Due Date (if applicable): N/A

Protectiveness Statement:

EPA considers the remedy protective of human health and the environment in the short-term. Monitoring indicates contaminated groundwater in the Phase I plume is captured by the pump and treat system. Voluntary periodic injections of fermentable carbon and zero valent iron are also being utilized to enhance the in-situ treatment of the remaining groundwater contamination by the biologic and abiotic processes in both the Phase I and II areas. Institutional controls in the form of a GMZ prevent exposure to contaminated groundwater. VI evaluations since 2003 for the onsite commercial bank building indicate this building is not being adversely impacted by this potential contaminant migration pathway. Paired sampling of subslab and indoor air samples were collected in March 2015. Sampling for PFOA/PFOS was also completed in March 2015. Results of the VI Study indicated that the migration of contaminant vapors from the subsurface are not adversely impacting the indoor air of the bank building. PFOA/PFOS were detected in groundwater at one of the three wells sampled. Concentrations of both PFOA/PFOS in this well were one order of magnitude below EPAs Health Advisory concentrations.

Sitewide Protectiveness Statement (if applicable)

Protectiveness Determination: Short-term Protective

Protectiveness Statement:

Overall the Site is protective of human health and the environment in the short-term. Long-term protectiveness will be made when groundwater contaminant plume is remediated.

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NCR Millsboro Superfund Site Sussex County, Delaware Fourth Five-Year Review Report

I. Introduction

The purpose of a Five-Year Review (FYR) is to determine whether the remedy at a site is protective of human health and the environment. EPA's methods, findings, and conclusions of reviews are documented in FYR reports. In addition, FYR reports identify issues found during the review, if any, and recommendations to address them.

The United states Environmental Protection Agency (EPA) is preparing this FYR report pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 (c) states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

EPA Region 3 has conducted this FYR of the remedial actions implemented at the NCR Corporation Superfund Site in Millsboro, DE. This review was conducted from 7/1/2014 through 7/1/2015. This report documents the results of the review.

This is the fourth FYR for the NCR Site. The triggering action for this review is the date of the third FYR, July 1, 2010. FYRs are required at this Site because hazardous substances, pollutants, or contaminants currently remain on-site above levels that allow for unlimited use and unrestricted exposure.

II. Site Chronology

Table 1 lists the chronology of events for the NCR Site.

Date	Event
1965-1966	Dennis Mitchell Industries purchases property and build facility to manufacture shopping carts, children's car seats and strollers.
1967-1975	National Cash Register (NCR) purchases property and manufactured mechanical cash registers.
1975-1980	NCR manufactured electronic terminal equipment.
1981 – Present	First Omni Bank, National Association later known as First National Bank of Maryland (now "M&T Bank") purchases property and modifies manufacturing facility to conducts commercial banking operations.
07/01/1981	Initial discovery of problem or contamination
8/1981	NCR cleanout cement lined sludge pits and excavates on- site waste disposal pits on western side of property. Disposes of waste off-site following Resource Conservation and Recovery Act (RCRA) regulations, with DNREC oversight
1983	Trichloroethene (TCE) detected in groundwater.
04/10/1985	Site proposed for inclusion on National Priority List (NPL)
07/22/1987	Site finalized on NPL
03/1988	Administrative Order of Consent (AOC) signed w/ Delaware Department of Natural Resources and Environmental Control (DNREC) to conduct Remedial Investigation and Feasibility Study (RI/FS), and to preform Interim Remedial Measure (IRM)
07/1988	NCR installs groundwater recovery well and air stripper as part of IRM
08/12/1991	RI/FS completed
08/12/1991	Record of Decision (ROD) calls for P&T system in Phase I and in Phase II
03/31/1992	Unilateral Administrative Order (UAO) issued by EPA requiring NCR and First Omni Bank (now "M&T Bank") to preform Remedial Design and Remedial Action (RD/RA)
08/04/1992	Remedial design start for Phase I area
07/26/1994	Remedial design start for Phase II area
09/16/1994	Remedial design completed for Phase I area
02/10/1995	Remedial action start for Phase I area
10/1995	Construction completed for Phase I area
03/27/1996	ESD signed, selecting an Air Sparging/Soil Vapor Extraction (AS/SVE) as the remedy in Phase II area

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04/10/1996	Remedial design completed for Phase II area
06/17/1996	Remedial action start for Phase II area AS/SVE
09/27/1996	Construction completed for Phase II area AS/SVE
09/27/1996	Site wide construction completion date
09/29/1998	ESD signed adding AS/SVE to Phase I area
01/1999	Construction completed for Phase I area AS/SVE enhancement
03/21/2000	Non-significant change signed eliminating the need for deed restrictions due to the presence of a Groundwater Management Zone (GMZ)
02/28/2002	Cost Recovery Consent Decree (CD) between The United States, State of Delaware, NCR and Allfirst Financial (now "M&T Bank") entered by District Court permitting recovery of expended funds
06/04/2002	Annual Report for NCR Millsboro, DE NPL Site April 2001-Aprill 2002 submitted
07/07/2003	Annual Report for NCR Millsboro, DE NPL Site April 2002-April 2003 submitted
05/07/2003	Supplemental Subsurface Investigation of the Phase I Parcel at the Millsboro, DE NPL Site submitted
06/26/2003	Review of TCE Subsurface Vapor Intrusion for Millsboro, DE NPL Site, internal memo
08/20/2003	TCE Subsurface Vapor Intrusion- MCR Millsboro, internal email
10/31/2003	July 2003, Semiannual report of Groundwater Monitoring and Performance of Phase I and Phase II Systems NCR Millsboro, DE NPL Site submitted
06/03/2004	January 2004, Semiannual report of Groundwater Monitoring and Performance of Phase I and Phase II Systems NCR Millsboro, DE NPL Site submitted
07/26/2004	Potassium Permanganate In-Situ Chemical Oxidation Pilot Test Report, Millsboro, DE, NPL Site submitted
11/17/2004	Annual Report for NCR Millsboro, DE NPL Site April 2003-April 2004 submitted
11/18/2004	July 2004, Semiannual report of Groundwater Monitoring and Performance of Phase I and Phase II Systems NCR Millsboro, DE NPL Site submitted
01/2005	Additional sub-surface investigations in Phase I and Phase II Areas
04/24/2005	Tetra Tech EMI, Draft Trip Report for Millsboro NCR Site
	January 2005, Semiannual report of Groundwater
05/05/2005	Monitoring and Performance of Phase I and Phase II Systems NCR Millsboro, DE NPL Site submitted

07/01/2005	Subsurface Investigation Report Phase I & II Parcels
05/04/2006	Remediation of the W-28 Hot Spot documented
06/16/2006	January 2006, Semiannual report of Groundwater Monitoring and Performance of Phase I and Phase II Systems NCR Millsboro, DE NPL Site submitted
06/2006	Project Memorandum – Work Plan for Additional Groundwater Remediation
10/23/2006	Annual Report for NCR Millsboro, DE NPL Site May 2005-April 2006 submitted
10/24/2006	July 2006, Semiannual Report of Groundwater Monitoring and Performance of Phase I and Phase II Systems NCR Millsboro, DE NPL Site submitted
11/13/2006	Remedial Action and Monitoring Program Modification Proposal submitted
12/20/2006	Letter from EPA accepting proposed modifications to monitoring plan (could not be located and reviewed for the 4 th FYR) New letter reaffirming acceptance sent 4/20/2015
4/17/2007	Project Memorandum NCR Millsboro, DE NPL Site Phase I Remediation submitted
11/2007	Annual Report for NCR Millsboro, DE NPL Site May 2006-April 2007 submitted
09/22/2008	Annual Report for NCR Millsboro, DE NPL Site May 2007-April 2008 submitted
03/2009	Request to Modify the Sampling, Analysis and Reporting Schedule accepted
10/28/2009	Semiannual Report for NCR Millsboro, DE NPL Site, August 2008 – April 2009 submitted
04/16/2010	Semiannual Report for the NCR Millsboro, DE, NPL Site, May 2009 – October 2009 submitted
08/12/2010	Semiannual Report for NCR Millsboro, DE NPL Site, November 2009 – April 2010 submitted
12/16/2010	Response to USEPA Nov. 2010 Request for Information submitted
01/19/2010	Response to USEPA Jan. 2011 Request for Information submitted
01/20/2011	Semiannual Report for the NCR Millsboro, DE, NPL Site, May 2010 – October 2010 submitted
09/13/2011	Semiannual Report for NCR Millsboro, DE NPL Site, November 2010 – April 2011 submitted
03/16/2012	Semiannual Report for the Millsboro, DE, NPL Site, May 2011 – October 2011 submitted
08/29/2012	Semiannual Report for NCR Millsboro, DE NPL Site, November 2011 – April 2012 submitted

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02/28/2013	Semiannual Report for the NCR Millsboro, DE, NPL Site, May 2012 – October 2012 submitted
03/12/2013	Investigation and Remediation to Address Rebound in concentration of TCE in Groundwater in OB-5, OB-6 and W29A and Modification to Monitoring Plan submitted.
07/29/2013	Semiannual Report for NCR Millsboro, DE NPL Site, November 2012 – April 2013 submitted
03/20/2014	Investigation and Remediation to Address Rebound in concentration of TCE in Groundwater in OB-5, OB-6 and W29A and Modification to Monitoring Plan accepted
03/28/2014	Semiannual Report for NCR Millsboro, DE NPL Site, May 2013 – October 2013 submitted
02/03/20015	Semiannual Report for NCR Millsboro, DE NPL Site, November – April 2014 submitted
02/17/2015	Subslab Vapor and Indoor Air Sampling Work Plan NCR Corporation NPL Site, Millsboro, DE, submitted
4/20/2015	EPA reaffirms acceptance of NCRs 2006 proposed changes to monitoring plan
4/22/15	VI Study Data Submitted
5/11/2015	PFOA/PFOS results submitted

III. Background

Physical Characteristics

The NCR Corporation Superfund Site (the Site) is located approximately one-quarter of a mile southeast of the intersection of Routes 113 and 24, in the town of Millsboro, Sussex County, Delaware (Figure 1). Groundwater contaminated with Trichloroethene (TCE), chromium and the TCE breakdown products cis-Dichloroethene (DCE) and Vinyl Chloride (VC) are the major concerns at the Site. The Site includes a 58-acre parcel of land currently owned by M&T Bank (formerly known as First National Bank of Maryland) and two adjacent parcels owned by NCR Corp of unused agricultural land. Together these parcels comprise approximately 80 acres. Railroad tracks separate the bank and NCR parcels. An M&T Bank data record center currently occupies the former manufacturing building on the bank parcel. For project management purposes, EPA has divided the site into two areas: a Phase I Area which is west of the railroad tracks and includes the bank building, and a Phase II Area which lies primarily east of the railroad tracks (Figure 1). A small stream, Iron Branch, borders the Site to the north and northeast while another small stream, Whartons Branch, borders the Site to the east. Mitchell Street forms the western boundary. These borders form the boundary of a Groundwater Management Zones (GMZ) created by the State of Delaware. The GMZ forbids the drilling of public or domestic wells in the Columbia aquifer within the area of the GMZ. Other types of wells are permitted in the Columbia and deeper aquifers following review by the State of Delaware. There are several residences and a mobile home dealership to the south and southeast of the Site

Predominant surface water features in the vicinity of the Site are Iron Branch, Whartons Branch and the Indian River. Iron Branch and Wharton's Branch join east of the Site and then flow into the Indian River

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estuary approximately 4,500 feet (ft.) east of the Site (Figure 1). Groundwater from the Site discharges to Iron Branch. Residences with domestic wells are located on the opposite side of Iron Branch approximately 4,000 ft. from the bank building at the Site. These residences are on a small peninsula located between Iron Branch and the Indian River, northeast of the Site. Public drinking water in the area is supplied by groundwater wells. The public supply wells are located several miles north of the Site. No domestic or public wells or surface water bodies have been adversely impacted by Site-related contaminants.

Land and Resource Use

The Site consisted of undeveloped woodlands before 1965.

Dennis Mitchell Industries (DMI) acquired a 58-acre, portion (Phase I area) of the Site in 1965, constructed a plant, and manufactured shopping carts, children's car seats and strollers until 1966.

The Phase I Area located west of the railroad tracks now consists of a large parking lot; an open field; a single story commercial structure; a large communications tower; a water tower; and a groundwater treatment system and associated infrastructure, including an air stripper tower.

The Phase II Area located east of the railroad tracks consists of a large field surrounded on the north and east by woodlands that line Iron Branch Creek.

History of Contamination

Dennis Mitchell Industries (DMI) manufactured shopping carts, child car seats and strollers at the Site from 1965 to 1966. The manufacturing of these items included degreasing operations and metal plating process. Wastewater sludge generated during this process were stored in on-site concrete basins.

National Cash Register, later known as NCR Corporation (NCR), purchased the 58-acre parcel and DMI plant in 1967. NCR manufactured mechanical cash registers at the facility from 1967 to 1975, and electronic terminal equipment from 1975 to 1980. Electroplating, heat treating, enameling and degreasing operations were conducted from 1967 to approximately 1977. These operations were the primary source of hazardous waste generated at the NCR plant.

TCE was used in the vapor degreasing process to remove cutting oils from metal parts manufactured at the Site. TCE was delivered by railcar and stored in an above-ground, outdoor tank behind the manufacturing plant. TCE was piped to the degreasing units in the process plant. Degreasing units were housed in concrete sumps. In 1976, after plating operations ceased, the sumps were cleaned, filled, and covered with concrete. Groundwater contamination at the Site is attributable to the release of TCE during plant operations.

NCR, under the direction of the DNREC, conducted investigations of Site-related contamination from 1981 to 1987. The purpose of the investigation was to determine the extent of contamination in soils, groundwater and the surface water of Iron Branch Creek.

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Potential contaminants of concern included chromium and other metals and volatile organic compounds (VOCs). Chromium, TCE and several halogenated VOCs were detected in soils and groundwater. TCE and other halogenated VOCs were found in surface water samples.

Plating sludge, which had been disposed of in the pit on the eastern property boundary, was excavated and sampled in September 1981. The sludge contained chromium and other metals used in the plating process. Approximately 315 cubic yards of sludge and wastes in the concrete lagoons and pit were excavated and disposed of off-site by NCR in accordance with Resource Conservation and Recovery Act (RCRA) regulations. NCR sold the 58-acre parcel and plant to the First Omni Bank, National Association (subsequently known as First National Bank of Maryland, and now known as M&T Bank) in November of 1981.

EPA placed the Site on the National Priorities List (NPL) in July 1987.

Initial Response Activities

NCR entered into a Consent Order with DNREC in March 1988 to conduct a Remedial Investigation and Feasibility Study (RI/FS), and to implement an interim remedial measure (IRM). The IRM was designed to prevent migration of contaminated ground water beyond the NCR property boundary. NCR installed a groundwater recovery well and an air stripper in the Phase I Area as part of the IRM in July 1988. EPA incorporated these measures into the 1991 ROD.

Basis for Taking Action

Past operation resulted in contamination of the Site. The primary contaminant of concern at the Site is TCE. Elevated levels of chromium are also a concern. The highest historic concentration of TCE (490,000 parts per billion [ppb]) was detected in wells behind the northwest corner of the bank building. Elevated total chromium concentrations (533 ppb) were limited to the former plating sludge disposal area. Media of concern and contaminants identified and evaluated by the RI are summarized below.

Surface Water

- Trihalomethanes (Chloroform, Bromodichloromethane, Bromoform, and Dibromochloromethane);
- Trans-1,2-Dichloroethene (Trans-1,2-DCE)
- Trichloroethene (TCE)

Stream Sediments

- TCE
- Chromium

Soils

- TCE
- Chromium

Groundwater

- TCE
- Chromium

- Trans-1,2-DCE
- Chloroform
- Tetrachloroethene (PCE)

Air

• Volatile Organic Compounds (VOCs); primarily TCE

IV. Remedial Actions

Remedy Selection

Based on findings presented in the RI/FS and administrative record, EPA Region III issued a ROD on August 12, 1991. The selected remedial action included a phased approach to groundwater restoration. The first phase required installing additional groundwater recovery wells in the Phase I Area, and an additional investigation of the downgradient Phase II Area. The ROD also required installing recovery wells and groundwater treatment system in the Phase II Area, if determined to be necessary by EPA. The area of TCE contamination in 1991 is illustrated in Figure 2. The ROD also required groundwater treatment to remove chromium and/or treatment of air emissions from the air stripper, if determined necessary by EPA.

EPA determined it was necessary to remediate groundwater in the Phase II Area of the Site in July 1994. EPA issued an Explanation of Significant Differences (ESD) on March 27, 1996 allowing AS/SVE in lieu of a groundwater pump and treat system for the Phase II Area. Groundwater cleanup levels for both areas are Maximum Contaminant Levels (MCLs) and non-zero Maximum Contaminant Level Goals (MCLGs) specified in the Safe Drinking Water Act (SDWA) at the time the remedy was selected.

Remedy Implementation

Groundwater

NCR installed the Phase I Area pump and treat system in 1988 as an interim remedial action pursuant to March 1988 Consent Order with DNREC. This system consisted of one recovery well (R-1) and an air stripper. EPA issued a Unilateral Administrative Order (UAO) on March 31, 1992 directing NCR and First Omni Bank (now M&T Bank) to implement the remedial action selected in the 1991. Two additional recovery wells (R-2 and R-3) were installed in the Phase I area pursuant to the ROD. The Phase I Area pump and treat system has been operating since 1988. Emissions from the air stripping tower were consistently below permitted levels of TCE. Treated groundwater is recirculated back into the ground using on-site infiltration galleries located west of the bank building, upgradient of the contaminated areas. R-1 and R-3 ceased operation and were abandoned with EPA's concurrence in April 2008, after meeting the clean-up criteria.

Construction of the Phase II Area AS/SVE system was completed in September 1996. The system was successful in reducing the TCE concentrations in Phase II Area groundwater by approximately 92% in the first year of operation. The Phase II Area AS/SVE system operated from September 1996 until April 2001. The system was dismantled with EPAs concurrence between July and October 2007.

The success of the Phase II Area AS/SVE system led NCR, in March 1998, to propose that the Phase I Area pump and treat system be augmented with an AS/SVE system. EPA issued a second ESD on September

29, 1998 to allow for this remedy enhancement. The Phase I Area AS/SVE system started operation in March 1999 and was dismantled in 2007, with EPAs approval.

Isolated areas of recalcitrant groundwater contamination were identified during operation of the groundwater pump and treat and AS/SVE systems (Figure 3). Voluntary potassium permanganate injections were performed by NCR in August 2003 in two areas. One area was in the vicinity of well MW-21(W-21) located near the NW side of the bank building in the Phase I area. The second area was near well MW-29 (W-29) located in the Phase II area.

Warm air injections with SVE were conducted in the vadose zone near well W-28 in 2005. W-28 is located upgradient of MW-29 on the western side of the railroad tracks. Soil tilling with lime conditioning was used to supplement this SVE system. Two injections of a dilute solution of sodium lactate were conducted in this area in November 2005 and May 2006. Sodium lactate is a soluble, fast reacting fermentable carbon source used to feed and increase the population of dechlorinating bacteria. These bacterial are capable of biologically degrading chlorinated compounds to CO₂. This process is known as enhance biologic reductive dechlorination.

Additional sodium lactate injections were voluntarily done by NCR along the NE side of the bank building in November 2005, May 2006 and June 2007. These injections were performed to treat hot spots near OB-1 and WP-20. Sodium lactate was also injected upgradient of MW-29 in November 2005 and May 2006.

Five temporary monitoring points were installed in the bank building near the NE side of the building in 2006 as part of the Phase 1 hot spot investigation. TCE was detected in one of these monitoring points at 19 ppb (GP-121). No other detection of Site related compounds were found. Two injection wells (IW-105, IW106) were then drilled inside the bank building near GP-121 and GP-123. Two rounds of lactate injection were completed in these wells in 2006. The need for the second injection was due to rebound observed in wells both inside and outside the bank building. IW-105 was last sampled in 2008. IW-105 contaminant concentrations in 2008 were 5 ppb and 11 ppb for TCE and Cis-1,2 DCE, respectively.

Zero-valent iron (ZVI) along with lactate and vegetable oil were injected voluntarily by NCR in October 2008 in four small hot spot areas that had previously been addressed. These were near OB-1R, WP-20, OB-201R/OB-202, and MW-29. The addition of ZVI was to enhance abiotic dechlorination. Vegetable oil was added to enhance the longevity of the organic material used by native dechlorinating bacteria.

Vapor Intrusion

A vapor intrusion assessment for the Site was conducted in 2003 by EPA using available information and guidance at that time. EPA used the Johnson and Ettinger Vapor Intrusion Model for this assessment. The model was run for the bank building using 2002 vapor concentrations from the four nearest AS/VE well points. The modeled indoor air concentrations were below the TCE Risk Based Concentration (RBC) value. A second model run was for a hypothetical residence located in the Phase II area near W-29A. All other wells in the Phase II area had concentrations of approximately 1 ppb. The Phase II assessment found potential risks were within the acceptable risk range for a hypothetical residence. Phase II area is owned by NRC Corp., zoned commercial, and there are no plans to build any structures on the property.

EPA further assessed the vapor intrusion pathway in 2010. The Johnson and Ettinger Vapor Intrusion Models were updated with more current data. Evaluation of the bank building used water table groundwater concentrations taken using temporary wells beneath the bank building. No significant risk associated with contaminant vapors in the bank building were projected. This assessment, however, did find there may a potential risk of concern via this pathway in the Phase II Area in the event that a commercial or residential building is constructed and occupied while groundwater restoration is still in progress. EPA determined that if a residence were built near W-29A that vapor intrusion sampling should be performed.

The 1991 ROD included quarterly groundwater monitoring and annual monitoring of the surface water and sediments of Iron Branch. The human health risk assessment for fish consumption conducted during the RI calculated an estimated cancer risk of 1E-06 and a hazard index of 0.02. The ROD concluded that "adverse public health effects are not likely, even under the upper bound assumptions associated with the fish injection pathway". Ecological risk assessment of Iron branch sediments were evaluated in a series of elution bioassays. The ROD also concluded, "Acute bioassays and chronic reproduction bioassay results indicated that stream sediment samples were not toxic to freshwater or marine species". Human health or ecological risks due to surface water or sediments were not included in the Summary of Site Risks included in the ROD. When the ROD was issued. Site contaminated groundwater discharged to Iron Branch Creek. In 2005, in support of the second FYR for the Site, EPA tasked its contractor Tetra Tech EMI to conduct surface water and sediment sampling, as well as, residential well sampling on the opposite side of Iron Branch Creek from the Site. The report concluded, "None of the sample results exceeded EPA Region III ERGs for any sample matrix or EPA MCLs for sediment, surface water or drinking water". NCR Corp in November 2006, submitted to EPA a document entitled "Remedial Action and Monitoring Program Modification". This document recommended and provided justification for the discontinuance of sediment and surface water and residential well sampling. and to reduce groundwater monitoring to semi-annually. No adverse human health or ecological impacts were ever documented. EPA and DNREC approved the requested changes to the Site monitoring program in a letter to the NCR dated December 20, 2006. The PRPs now conduct onsite groundwater monitoring on a semiannual basis. Residential well sampling and surface water and sediment sampling are no longer collected. As part of this FYR, EPA was not able to locate a copy of EPA's December 20, 2006 approval letter. Therefore, a new letter to NCR reaffirming EPA's acceptance of the monitoring changes was sent to NCR on April 20, 2015.

NCR continues to monitor the groundwater in both the Phase I and Phase II Areas on a semi-annual basis. Phase I Area wells monitored at this time are extraction well R-2 and monitoring wells OB-1R, WP-20, and WP-06. Phase II Area wells monitored at this time include monitoring wells OB-201, OB-202, and W-29A.

Maximum 2014 concentrations were as follows: TCE - 260 ppb (W-29), Cis-1,2 DCE - 340 ppb (WP-20), and VC - 2.9 ppb (WP-20). Chromium concentration for both total and dissolved have been below 10 ppb since 2003 and 2005, respectively. Sampling for chromium ended in December 2006.

The ROD also required deed restrictions as institutional controls to prevent the use of contaminated groundwater at the Site until clean up levels are achieved. The State of Delaware established a Groundwater Management Zone (GMZ) at the Site which prevents installing water supply wells in the vicinity of the contaminated groundwater in October 1999. EPA issued a Non-Significant Change to the ROD on March 21, 2000, which stated that this GMZ negated the need for deed restrictions.

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Systems Operations/Operation & Maintenance

Currently only one extraction well (R-2) is being used. R-1 and R-3 have achieved the performance standards selected in the ROD and no longer pumped. NCR perform Operation and Maintenance (O&M) activities for the pump and treat systems in accordance with an approved O&M plan. The systems are regulated with a series of alarms that shut down the systems and contact an O&M contractor in the event of a malfunction. Air emissions from the air stripper tower of the treatment system have consistently been below permitted levels, and the treated groundwater discharge into the on-site infiltration galleries is monitored and in compliance with the DNREC Underground Injection Control (UIC) program. EPA has no information regarding the cost of these ongoing O&M activities.

V. Progress Since the Last Five-Year Review

A vapor intrusion investigation was conducted in March 2015 to confirm the previous VI modeling exercises. The bank building footprint is approximately 7 acres. Ceilings in the building are approximately 30 feet high. The building is mostly open, but there are some more enclosed areas. The study area is located in the NE side of the building near the Phase 1 area hot spot and includes the building maintenance area and the first row of office cubicles closest to the northeast wall. This investigation included eight paired subslab and indoor air sample locations. TCE is the only Site related contaminant detected in subslab samples. No Cis-1,2 DCE or VC were detected in the subslab samples. Groundwater concentrations of Cis-1,2 DCE and VC are significantly higher than TCE concentrations. TCE subslab concentrations ranged from 2.3 to 17.5 ug/m³. Seven of the eight TCE subslab concentrations were at or below 5.5 ug/m³. All subslab TCE concentrations were below EPA's cancer subslab screening levels for a one in a million risk (30 ug/m³) and non-cancer subslab screening level for a Hazard Index of 1 (88 ug/m³) under a commercial exposure scenario. TCE was detected in the indoor air samples at concentrations ranging from 1.7 to 4 ug/m³. These concentrations are just above the indoor air cancer screening level for a one in a million risk (3 ug/m³) and below the indoor air screening level for a Hazard Index of 1 (8.8 ug/m³) under a commercial exposure scenario. The slightly elevated cancer risk is within EPA's acceptable risk range (one in a million to one in 10,000). The indoor air and subslab concentrations are very similar. EPA uses a conservative 10% dilution factor when comparing subslab and indoor air concentrations. The delusion factor takes into account the dilution of the subslab gas concentrations as they migrate into and are diluted by the larger volume of air inside the building. This 10% dilution factor is designed for residential structures. A 10% dilution factor is low considering the greater dilution anticipated by the size and openness of the bank building. Dilution from subslab concentration into the larger indoor air building space was not observed. This indicates that TCE vapors from the subslab are not the cause of TCE concentrations seen inside the building. This evaluation is supported by the groundwater samples collected downgradient of the VI study area inside the building between 2006 and 2008, current groundwater data and knowledge of historic manufacturing operations. These data indicates that there is no Site-related groundwater contamination beneath the building that would contribute to the vapor intrusion in the building. A source of TCE inside the building, not related to the Site, is likely the cause of indoor air TCE.

Polyfuorinated compounds are a class of chemical of increasing concern to EPA. They historically have been used in electronic manufacturing and metal plating, as well as other industries. EPA requested NCR evaluate the groundwater for the presence of these compound due to the Site's historic manufacturing activities.

Groundwater was sampled in three wells, WP-20, W-29A, and W-30A and analyzed for perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) in March 2015. PFOA/PFOS were detected in groundwater in only the W-29A sample. PFOA was detected at 0.0375 ug/l and PFOS was detected at 0.141(J) ug/l. The (J) data qualifier means that the detected PFOS value was estimated. These are both below EPAs Health Advisory concentrations for PFOA and PFOS of 0.4 ug/l and 0.2 ug/l, respectively.

The current area of TCE contamination is illustrated in Figure 4. Recovery well R-2 continues to pump at approximately 42 gallons per minute (gpm). Air stripper influent concentrations in April 2014 were:

TCE:96 ppbCis-1,2 DCE:280 ppbVC:Non detect (<1 ppb)</td>

Currently, 43 pounds of Total VOCs are removed per year. The current cost to remove VOCs from the groundwater based on the cost of electricity is \$269/pound.

VI. Five-Year Review Process

Administrative Components

The Review Team for the fourth Five-Year Review was led by Bruce Rundell (EPA Remedial Project Manager (RPM)), with EPA technical support staff Bill McKenty (Hydrogeologist), Dawn Ioven (Toxicologist), and Carrie Deitzel (Community Involvement Coordinator (CIC)). Robert Asreen, DNREC Project Officer, assisted in the review as the representative of the support agency.

Community Involvement and Interviews

A notice announcing that EPA was conducting the fourth Five-Year Review for the Site was published in the Sussex County Post on April 16, 2015. EPA RPM, hydrogeologist and toxicologist met with the Building Administrator for M&T Bank, which currently owns and occupies the commercial building at the Site on December 3rd & 4th, 2014. In addition, on March 13, 2015, the EPA CIC spoke with the Director of Public Works for the Town of Millsboro and to the Town Hall clerk regarding the Site. Neither indicated any community concerns regarding the Site and both appeared satisfied with the progress of remediation of the Site.

Document Review

Attachment 1 presents a complete list of documents reviewed by the Site Team. Documents reviewed in the process of conducting this FYR includes the Third FYR, the ROD, two ESDs, a non-significant change to the ROD, annual and semi-annual monitoring and operations reports, and all other reporting over the last five years. The Applicable or Relevant and Appropriate Requirements (ARARs) listed in the 1991 ROD were also reviewed.

Data Compilation and Review

The monitoring data, operations and maintenance data and investigation data generated over the last five years were reviewed. Monitoring results for well OB-1 (and its replacement, well OB-1R) near the bank building indicates that the in-situ reductive dechlorination measures implemented between 2005 and 2008 have substantially reduced TCE and 1,2-DCE concentrations (Figure 5). No rebound in contaminant concentrations have been noted. TCE concentrations in monitoring well WP-20 have remained below or just above the MCL of 5 ppb since 2010 (Figure 6). Concentrations of TCE daughter products Cis-1,2 DCE and VC, however, remain significantly elevated. Both of these wells are upgradient of extraction well R-2, which capture all contaminated groundwater in this area. R2 Cis-1,2 DCE concentrations have fluctuated between 98 and 170 ppb since 2010 (Figure 7). R2 TCE concentration levels have fluctuated between 28 and 73 ppb since 2010. Further monitoring of these three wells is needed to assess if additional injections are needed and if changes to the pumping strategy of groundwater in the Phase I Area is warranted.

TCE and Cis-1,2-DCE concentrations in well OB-201 (and its replacement, well OB-201R) at the Phase I/II area boundary have been below the detection limit of 1ppb since July 2008 (Figure 8).

Substantial reduction in TCE and 1,2-DCE concentrations in well W-29A in the Phase II Area occurred following the 2008 injections. However, contaminant level rebound in this well began in November 2010 (Figure 9). Contaminant concentrations have declined since 2010, but still remain above the clean-up goals. Additional injection of a fermentable carbon source and zero valent iron near W-29A were conducted in December 2014. Monitoring of this well is needed to assess the longer term effect of the in-situ dechlorination measures.

Site Inspection

A Five-Year Review Site Inspection was conducted on December 3rd & 4th, 2014. The EPA RPM met onsite with a representative hired by NCR to perform remedial activities. The onsite groundwater pump and treat system was operating and in fair condition (the treatment building and air stripper tower are 27 years old). Existing monitoring wells were locked and in good condition. Land use on and immediately around the Site did not appear to have changed since the last FYR. With the exception of the commercial bank building, property over or near contaminated groundwater plume remains vacant and there are no known plans to develop this property.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

Yes.

The remedy is functioning as intended by the 1991 ROD as amended by the 1996 and 1998 ESDs and the March 2000 Non-Significant Change. The system, along with voluntary in-situ action by NCR, is still expected to ultimately achieve cleanup goals.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Individual questions responsive to this topic are answered below.

Have standards identified in the ROD been revised, and does this call into question the protectiveness of the remedy?

Groundwater at the site is contaminated with VOCs (primarily TCE) and to a lesser extent chromium. The performance standards identified in the ROD are maximum contaminant levels (MCLs) and non-zero Maximum contaminant level goals (MCLGs). For the primary contaminants of concern the standards are: TCE - 5 ug/L (ppb) and Chromium - 100 ug/L (ppb).

Fermentable carbon substrates and zero-valent iron are being injected into the groundwater to facilitate the natural biologic and abiotic degradation of TCE. These processes result in the formation and then destruction of daughter products. Biologic daughter products of TCE are Cis-1,2 DCE and VC. The MCLs for the daughter products are: Cis-1,2 DCE – 70 ug/l (ppb) and VC – 2 ug/L (ppb).

The remedy is still protective because MCLs were selected as the groundwater clean-up standards in the ROD. Once MCLs have been achieved for contaminants at the Site, potential residual risks will be assessed to ensure protectiveness.

Do newly promulgated standards call into question the protectiveness of the remedy?

No. At the time when the ROD was signed EPA considered both Federal and State MCLs as ARARs. ARARs are frozen when the ROD is signed. The State Of Delaware lowered its MCL for TCE and VC to 1 ppb in 2013. This does not affect the protectiveness of the remedy, because potential residual risks will be assessed when the clean-up goals are reached to ensure protectiveness.

Have TBCs changed, and could this affect the protectiveness of the remedy?

No.

Has land use or expected land use on or near the Site changed?

No. The Site is still occupied by a bank records center and two adjacent parcels of unused agricultural land. Significant changes from previous years have not been reported.

Have human health or ecological routes of exposure or receptors been newly identified or changed in a way that could affect the protectiveness of the remedy?

No.

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Are there newly identified contaminants or contaminant sources?

No.

PFOA/PFOS are potential contaminants that have been associated with electronics and metals manufacturing. These contaminants were sampled for in March 2015. PFOA/PFOS were detected in groundwater at one of the three wells samples. Concentrations of both PFOA/PFOS were one order of magnitude below EPAs Health Advisory concentrations.

Are there unanticipated toxic byproducts of the remedy not previously addressed by the decision documents?

No.

Have physical site conditions or the understanding of these conditions changed in a way that could affect the protectiveness of the remedy?

No.

Have toxicity factors for contaminants of concern at the site changed in a way that could affect the protectiveness of the remedy?

Toxicity values for some of the COCs at the Site have been changed since the ROD was issued. These changes do not impact the protectiveness of the remedy because potential residual risks will be assessed when the clean-up goals are reached to ensure protectiveness.

Have other contaminant characteristics changed in a way that could affect the protectiveness of the remedy?

No.

Have standardized risk assessment methodologies changed in a way that could affect the protectiveness of the remedy?

There have been significant changes in EPA's risk assessment guidance since the 1991 ROD. These include changes in dermal guidance, inhalation methodologies, vapor intrusion, exposure factors, identification and assessment of mutagenic mode of action (MOA) contaminants and a change in the way early-life exposure is assessed for vinyl chloride. However, the ROD standards are still protective. Similarly, air emissions from the stripper do not pose an unacceptable risk, based on estimates from current information.

Changes in Standards and To Be Considered

The cleanup levels and RAOs used have not changed and are still valid. The Remedial Action Objective (RAO) of restoring groundwater to its beneficial use (as drinking water) is expected to be met once

cleanup is complete. The cleanup levels associated with this RAO are the Maximum Contaminant Levels (MCLs) and non-zero Maximum Contaminant Level Goals (MCLGs) specified in the Safe Drinking Water Act (SDWA), at the time the ROD was issued. These are: TCE - 5 ppb, Cis-1,2 DCE - 70 ppb, VC - 2 ppb, chromium - 100 ppb. These standards have not been changed.

At the time when the ROD was signed EPA considered both Federal and State MCLs as ARARs. ARARs are frozen when the ROD is signed. The State Of Delaware lowered its MCL for TCE and VC to 1 ppb in 2013. This does not affect the protectiveness of the remedy, because potential residual risks will be assessed when the clean-up goals are reached to ensure protectiveness.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No new information has been found that calls into question the protectiveness of the remedy in the short-term. Further assessment of the vapor intrusion pathway is recommended for the Phase II Area in the event construction is planned while groundwater restoration is still in progress.

Supplemental Discussion on Potential Impacts of Climate Change on Site

Remedial Action Carbon Dioxide Production

Currently, 43 pounds of Total VOCs are removed per year. The treatment system uses approximately 14,000 kilowatts hours of electricity per month. This electrical usage equates to roughly 178,137 pounds of CO₂ (89 tons), 380 pounds of sulfur dioxide, and 153 pounds of nitrogen dioxide per year. These calculation were done using EPAs Power Profiler (<u>http://oaspub.epa.gov/powpro/ept_pack.charts</u>).

Impacts of Sea level Rise on the Site Remedy

No negative impacts due to potential changes in sea level are expected. Site area topographic maps were compared to the State of Delaware's projected ranges of potential sea level rise (http://www.dnrec.delaware.gov/coastal/Pages/SLR/DelawareSLRVulnerabilityAssessment.aspx). The State projects a potential sea level rise by the year 2100 of between 1.6 and 4.9 ft.. The intermediate scenario was 3.3 ft. between now and the year 2100. The 1.6 ft. scenario is based on a "slightly higher than the current rate of sea level rise in Delaware and is partially based on low estimates for future global warming". The high estimate is "based on higher estimates of future global warming". The Site is mapped at between 20 and 25 ft. above mean sea level.

Technical Assessment Summary

There is no other information that calls into question the protectiveness of the remedy.

VIII. Issues from Previous Five Year Review

EPA conducted a vapor intrusion assessment in 2003 using the Johnson and Ettinger Model for vapor intrusion. No current potential risk via this pathway in the Site bank building was found. The model predicted that potential future risk was within the acceptable risk range for this pathway in the Phase II Area in the event a residential building is constructed over or near the contaminated groundwater before it is restored to cleanup levels. In 2010, EPA further assessed the vapor intrusion pathway using newly available information and guidance. Similar results to the 2003 evaluation were found for the bank building. This assessment, however, did find there may a potential risk of concern via this pathway in the Phase II Area in the event that a commercial or residential building is constructed and occupied while groundwater restoration is still in progress. The Phase II area is owned by NCR. Groundwater contamination in the Phase II area that potentially may cause vapor intrusion risks is limited to the area around well W-29A. This area is undergoing active in-situ remediation by NCR. A significant portion this area is in the railroad and power line right of way. NCR has no plans to build in the Phase II area. EPA recommended in the 2010 FYR that further assessment of the vapor intrusion pathway in the event that construction is planned while groundwater restoration is still in progress in the Phase II Area.

The table below identified issues identified during the third Five-Year Review at the NCR Site.

Table 2 - Issues

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Vapor intrusion may pose an unacceptable risk under future land use in the Phase II Area, if a building is constructed in the area of groundwater contamination.	N	Y

IX. Recommendations and Follow Up Actions

Two issues were identified in this 2015 FYR. The first is the continued concern for potential vapor intrusion risk in the event a building is planned or constructed over the remaining area of groundwater contamination in the Phase II area. This issued will be monitored until clean-up levels are achieved.

The second issue is administrative. The Site groundwater restoration strategy defined by EPA in the ROD and subsequent ESDs is pump and treat, and AS/SVE. There are currently two distinct plume areas. NCR has been conducting voluntary periodic injections of material to destroy the contamination in-situ in both

plumes. The plume behind the bank building is being addressed by these injections and the remaining extraction well. The plume in the Phase II area is outside the capture zone of the remaining extraction well, and is only be addressed by the voluntary injections. EPA recommends in this FYR that EPA incorporate the in-situ work into the official remedy in a decision document.

Issue	Recommendations / Follow-Up Actions	Party Responsible	Oversight Agency	Target Date	Affects Protectiveness? (Y/N)	
			-		Current	Future
Vapor intrusion may pose an unacceptable risk under future land use in the Phase II Area.	Further assess vapor intrusion pathway for Phase II Area in the event that construction is planned while groundwater restoration is still in progress.	NCR	EPA/DNREC	Next 5 Year Review	N	Y
Voluntary in- situ remedial work by NCR is not part of the official remedy	Decision document will be developed to incorporate this work into remedy.	EPA	EPA/DNREC	7/1/16	N	Y

Table 3 – Recommendations/Follow-Up Actions

X. Statement on Protectiveness

EPA considers the remedy protective of human health and the environment in the short-term. Monitoring indicates contaminated groundwater in the Phase I plume is captured by the pump and treat system. Voluntary periodic injections of fermentable carbon and zero valent iron are also being utilized to treat the remaining groundwater contamination in-situ by the biologic and abiotic processes in both the Phase I and II areas. Institutional controls in the form of a GMZ prevent exposure to contaminated groundwater. Operation of the groundwater pump and treat system, and monitoring of groundwater will continue until cleanup goals are met.

The remedy is expected to be protective in the long term when cleanup goals are met. Vapor intrusion evaluations for the onsite commercial building since 2003 indicate this building is not being adversely impacted

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by this migration pathway. The previously modeled findings were confirmed by sampling done in March 2015. Operation of the groundwater pump and treat system and monitoring of the groundwater pump and treat system and monitoring of groundwater will continue until cleanup goals are met.

XI. Next Five-Year Review

The next FYR for the NCR Millsboro Site is required by July 1, 2020, five years from the signature date of this review.

Figures

Figures 1 through 11 follow this page.

Figure 1 – Site Location







Figure 2 – 1991 Extent of Groundwater TCE Contamination



Figure 3 2006 Extent of Groundwater TCE Contamination



Figure 4 2014 Extent of Groundwater TCE Contamination

Figure 5 Semi-log Graph of VOC Contamination Well OB-1, OB-1R



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9/16/2014 1404 Graphs_log OB1

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Figure 6 Semi-log Graph of VOC Contamination Well WP 20



9/16/2014 1404 Graphs_log WP-20

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Figure 7 Semi-log Graph of VOC Contamination Well R-2



9/16/2014 1404 Graphs_log R2

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Figure 8 Semi-log Graph of VOC Contamination Well OB-201R



9/16/2014 1404 Graphs_log OB201

Figure 9 Semi-log Graph of VOC Contamination Well 29A



9/16/2014 1404 Graphs_log W29A

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Figure 10 Semi-log Graph of VOC Contamination Well OB-202



9/15/2014 1404 Graphs_log OB202

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Figure 11 Semi-log Graph of VOC Contamination Well WP-6



9/16/2014 1404 Graphs_log WP-6

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ATTACHMENT 1

List of Documents Reviewed

NCR Corporation Superfund Site Record of Decision. U.S. EPA Region III; August 12, 1991.

- Administrative Order No. III-92-14-DC In The Matter Of: NCR Corporation (Millsboro Plant) Superfund Site; Millsboro, Sussex County, Delaware, NCR Corporation and First Omni Bank, NA Respondents. March 31, 1992. [As modified by Modifications No. 1-4.]
- Explanation of Significant Differences No.1 from Record of Decision, NCR Corporation Superfund Site, Millsboro, Sussex County, Delaware. U.S. EPA Region III; 1996.
- Explanation of Significant Differences No.2 from Record of Decision, NCR Corporation Superfund Site, Millsboro, Sussex County, Delaware. U.S. EPA Region III; 1998.
- Operations & Maintenance Plan for the [NCR] Millsboro, Delaware NPL Site, Revision 1.1. Environmental Strategies Corporation, June 7, 1999.
- Memorandum of Agreement, Department of Natural Resources and Environmental Control [Delaware], Between: Division of Air and Waste Management and Division of Water Resources, For: NCR Corporation Superfund Site, Millsboro, Sussex County, Delaware. October 1999.
- NCR Non-significant Change to 1991 Record of Decision. U.S. EPA Region III; March 21, 2000.
- Five-Year Review Report, NCR Corporation Superfund Site, Millsboro, Delaware. U.S. EPA Region III; March 31, 2000.
- Annual Report for the [NCR] Millsboro, Delaware, NPL Site; April 2001 April 2002. Environmental Strategies Corporation; June 4, 2002.
- Supplemental Subsurface Investigation of the Phase I Parcel at the Millsboro, DE NPL Site, 05/07/2003
- Memo from Patricia Flores Brown to Kate Lose; Subject: Review of TCE Vapor Intrusion for Millsboro, Delaware Superfund Site (Johnson & Ettenger Modeling), June 6, 2003
- Annual Report for the [NCR] Millsboro, Delaware, NPL Site; April 2002 April 2003. Environmental Strategies Corporation; July 7, 2003
- Email from Dawn Ioven to Kate Lose concerning risk calculations developed for Patricia Flores-Brown Vapor Intrusion Johnson and Ettenger Modeling Report, August 20, 2003
- July 2003 Semiannual Report of Groundwater Monitoring and Performance of the Phase I and II Systems at the [NCR] Millsboro, Delaware, NPL Site, Status Report No.47. Environmental Strategies Consultants, LLC; October 31, 2003.

- January 2004 Semiannual Report of Groundwater Monitoring and Performance of the Phase I and II Systems at the [NCR] Millsboro, Delaware, NPL Site, Status Report No.48. Environmental Strategies Consultants, LLC; June 3, 2004
- Potassium Permanganate In-Situ Chemical Oxidation Pilot Test Report, [NCR] Millsboro NPL Site, Millsboro, Delaware. Environmental Strategies Consulting, LLC; July 26, 2004.
- Annual Report for the [NCR] Millsboro, Delaware, NPL Site; April 2003 April 2004. Environmental Strategies Consultants, LLC; November 17, 2004.
- July 2004 Semiannual Report of Groundwater Monitoring and Performance of the Phase I and II Systems at the [NCR] Millsboro, Delaware, NPL Site, Status Report No.49. Environmental Strategies Consultants, LLC; November 18, 2004.
- Focused Subsurface Investigation Workplan: Dec 2004
- Supplemental Subsurface Investigation Phase I Property Workplan; Dec 2004
- January 2005 Semiannual Report of Groundwater Monitoring and Performance of the Phase I and II Systems, [NCR] Millsboro, Delaware, NPL Site, Status Report No.50. Environmental Strategies Consulting LLC; May 5, 2005.
- January 2005, Semiannual Report of Groundwater Monitoring and Performance of Phase I and Phase II Systems NCR Millsboro, DE NPL Site; May 05, 2005
- May 2005, Tetra Tech EMI, Draft Trip Report for Millsboro NCR Site
- Second Five-Year Review, 06/28/2005
- Subsurface Investigation Report Phase I & II Parcels; July 2005
- Documentation for the Remediation of the W-28 Hot Spot; May 2006
- Semiannual Report on the Groundwater Monitoring and Performance of the Phase I & Phase II Systems; June 2006-Jan 2006; June 16, 2006
- Project Memorandum Work Plan for Additional Groundwater Remediation; June 2006
- Annual Report for the NCR Millsboro, Delaware, NPL Site May 1, 2005 through April 30, 2006; October. 23, 2006
- July 2006, Semiannual report of Groundwater Monitoring and Performance of Phase I and Phase II Systems NCR Millsboro, DE NPL Site; October 24, 2006

Remedial Action and Monitoring Program Modification; November 13, 2006

Project Memorandum NCR Millsboro Delaware Site Phase I Remediation; April 17, 2007

- Annual Report for the NCR Millsboro, Delaware, NPL Site May 1, 2006 through July 31, 2007; November 2007
- Annual Report for the NCR Millsboro, Delaware NPL Site August 1, 2007 through July 31, 2008; September 22, 2008
- Request to Modify the Sampling, Analysis, and Reporting Schedule; March 2009
- Semiannual Report for the NCR Millsboro, Delaware, NPL Site August 1, 2008 through April 30, 2009; October 28, 2009
- Semiannual Report for the NCR Millsboro, DE, NPL Site, May 2009 October 2009; April 16, 2010
- Email from Patricia Flores-Brown to Darius Ostrauskas, Subject Vapor Intrusion Evaluation NCR Millsboro Superfund Site, updating Johnson & Ettenger VI modeling for residential risk; May 27, 2010
- Email from Dawn Ioven to Darius Ostrauskas, Subject Vapor Intrusion Evaluation for the NCR Millsboro Superfund Site (for the Five Year review), calculation of residential risk; June 1, 2010
- Third Five-Year Review; July 1, 2010
- Semiannual Report for NCR Millsboro, DE NPL Site, November 2009 April 2010; August 12, 2010
- Email from Patricia Flores-Brown to Darius Ostrauskas, Subject Vapor Intrusion Evaluation NCR Millsboro Superfund Site, updating Johnson & Ettenger VI modeling for commercial risk; September 4, 2010
- Response to USEPA Nov. 2010 Request for Information; December 16, 2010

Response to USEPA Jan. 2011 Request for Information; January 19, 2011

- Semiannual Report for the NCR Millsboro, DE, NPL Site, May 2010 October 2010; January 20, 2011
- Semiannual Report for NCR Millsboro, DE NPL Site, November 2010 April 2011; September 13, 2011
- Semiannual Report for the NCR Millsboro, DE, NPL Site, May 2011 October 2011; March 16, 2012
- Semiannual Report for NCR Millsboro, DE NPL Site, November 2011 April 2012; August 29, 2012

- Semiannual Report for the NCR Millsboro, DE, NPL Site, May 2012 October 2012; February 28, 2013
- Investigation and Remediation to Address Rebound in concentration of TCE in Groundwater in OB-5, OB-6 and W29A and Modification to Monitoring Plan; March 12, 2013
- Semiannual Report for NCR Millsboro, DE NPL Site, November 2012 April 2013; July 29, 2013
- Semiannual Report for NCR Millsboro, DE NPL Site, May 2013 October 2013; March 28, 2014

Semiannual Report for NCR Millsboro, DE NPL Site, November - April 2014