RCRA Post-Closure Permit Application

Colonels Island
Symrise Inc.
Brunswick, GA

December 2021

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List of Abbreviations

amsl	above mean seal level
AOC	area of concern
AST	above-ground storage tank
bgs	below ground surface
BTU	British thermal unit
CAP	corrective action plan
cis-1,2-DCE	cis-1,2-dichloroethene
COC	constituent of concern
cVOC	chlorinated volatile organic compound
EPD	Georgia Environmental Protection Division
FEMA	Federal Emergency Management Agency
ft	feet
HWMA	Georgia Hazardous Waste Management Act
GPA	Georgia Port Authority
LNAPL	light non-aqueous phase liquid
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
MW	monitoring well
NPDES	National Pollutant Discharge Elimination System
PCE	tetrachloroethene
PID	photoionization detector
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
SAP	Sampling and Analysis Plan
SVOC	semivolatile organic compound
TCE	trichloroethene
Topo	topographic
TW	temporary well
TB	temporary boring
trans-1,2-DCE	trans-1,2-dichloroethene
ug/L	micrograms per liter
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VC	vinyl chloride
VOC	volatile organic compound
WWTS	wastewater treatment system

Technical Certification

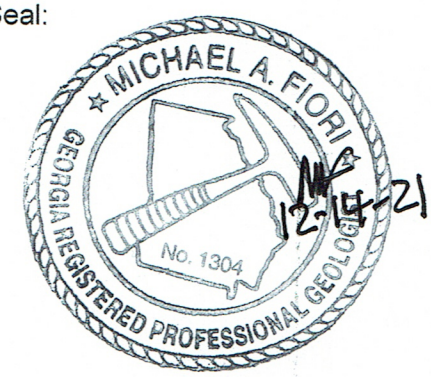
I certify that I am a qualified environmental professional who has received a baccalaureate or post-graduate degree in natural sciences or engineering, and have sufficient training and experience in groundwater hydrology, engineering, and related fields, as demonstrated by state registration and completion of accredited advanced university courses, that enable me to make sound professional judgments regarding groundwater monitoring and contaminant fate and transport. I further certify that this RCRA post-closure permit application was prepared by myself and appropriate qualified subordinates working under my direction.

Signature: _____ Date: 12-14-21

Printed Name: Michael Fiori

Georgia Registration Number: 1304

Seal:



1.0 Pre-Site Narrative Material

1.1 Completion Checklist

The checklist is provided following this page and identifies the items required in the application per the regulations, the section where each required item is presented, and provides a place for the reviewer's comments regarding completeness of the presented information.

1.2 Signature and Certification

Responsible Agent of the Facility as defined in 40 CFR 270.11 (b)(1)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I further certify, to the best of my knowledge and belief that this document meets the objectives and requirements of the Consent Decree entered among GAEPD, EPA, and Symrise in connection with Civil Action No. 2: 14-cv-185 in the United States District Court for the Southern District of Georgia, Brunswick Division. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature _____

Site Owner/Operator

Name: James Carson

Title: Director of Plant, Colonels Island Site, Symrise Inc.

Date: 12/14/2021

Note: This checklist may be used for review of a permit application for a postclosure facility with no active hazardous waste management units. It provides a guideline to the basic requirements of a Part B postclosure permit application. Optional elements (contingency plan and personnel training) are indicated by italics. If a postclosure unit is present at a facility seeking a permit for active hazardous waste management units, the postclosure unit must be incorporated in the permit application like an operating unit in all appropriate sections. For elements that may repeat for both operating units and postclosure units, this checklist references elements of the general checklist in parenthesis.

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION P. POST-CLOSURE FACILITY REQUIREMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
P-1	General Part A Information Requirements		(Section A)	1.3	
P-1a	Description of Activities Conducted which Require Facility to Obtain a Permit under the Resource Conservation and Recovery Act (RCRA) and Brief Description of Nature of the Business	270.13(a),(m)	(A-1)	2.2	
P-1b	Name, Mailing Address, and Location of Facility for which the Application is Submitted, including a Topographic Map	270.13(b),(l)	(A-2)	1.3; Fig 2-4	
P-1c	Up to four Standard Industrial Classification Codes which Best Reflect the Products or Services Provided by the Facility	270.13(c)	(A-3)	1.3	
P-1d	Operator/Owner's Name, Address, Telephone Number, and Ownership Status	270.13(d),(e)	(A-4) Ownership status must include status as federal, state, private, public, or other entity.	1.3	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
P-1e	Facility is New, Existing, or Located on Indian Lands	270.13(f),(g)	(A-5) Description must include information on whether this is a first or revised application with date of last signed permit application.	1.3	
P-1f	Description of Processes to be Used for Treating, Storing, and Disposing of Hazardous Waste	270.13(i)	(A-6) Description must include design capacity for these items.	N/A: 1.3	
P-1g	Specification of the Hazardous Wastes Listed or Designated Under 261	270.13(j)	(A-7) Specifications must include estimate on quantity of waste to be treated, stored, or disposed of.	N/A: 1.3	
P-1h	Listing of all Permits or Construction Approvals Received or Applied for	270.13(k)	(A-8) Permits include the following programs: Hazardous Waste Management under RCRA; Underground Injection Control under Solid Waste Disposal Act; Prevention of Significant Deterioration, Nonattainment Program, and National Emissions Standards for Hazardous Pollutants under the Clean Air Act; ocean dumping permits under the Marine Protection Research and Sanctuaries Act; dredge and fill permits under Section 404 of the Clean Water Act; or other relevant environmental permits including state permits.	1.3	
P-2	Part B General Description	270.14(b)(1)	(Section B)	2.0	
P-3	General Requirements	270.14	(B-1)		

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
P-3a	Topographic Map	270.14(b)(19)	(B-2a) Show distance of 1,000 feet around unit at a scale of 1 inch to not more than 200 feet (multiple maps may be submitted at this scale), and should be similar to Part A topographic map.	Fig 2-4	
	Scale and Date	270.14(b)(19)(i)	Other scales may be used if justified.	Fig 2-4	
	The 100-Year Flood Plain Area	270.14(b)(19)(ii)		2.3.2; Fig 2-4	
	Surface Waters	270.14(b)(19)(iii)		Fig 2-4; 2-6	
	Surrounding Land Use	270.14(b)(19)(iv)		2-4; Fig 2-3	
	Wind Rose	270.14(b)(19)(v)		2.5, App A	
	Map Orientation	270.14(b)(19)(vi)		All Figures	
	Legal Boundaries	270.14(b)(19)(vii)		Fig 2-3; Fig 2-4	
	Access Control	270.14(b)(19)(viii)		2.6; Fig 2-8	
	Injection and Withdrawal Wells (on site and off site)	270.14(b)(19)(ix)		2.7; Fig 2-7	
	Buildings and Other Structures	270.14(b)(19)(x)		2.2; Fig 2-2	
	Drainage and Flood Control Barriers	270.14(b)(19)(xi)		2.3.3; Fig 2-6	
P-3b	Additional Information on the Topographic Map for Land Disposal Facilities	270.14(c)(3)	(B-2b)	N/A	
	Uppermost Aquifer and Hydraulically Connected Aquifers Beneath Facility Property	270.14(c)(2)		4.1	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
	Groundwater Flow Direction	270.14(c)(2)		4.3; Fig 4-2	
	Waste Management Areas	270.14(c)(3)		3.0; Fig 3-1	
	Property Boundaries	270.14(c)(3)		Fig 2-3	
	Location of Groundwater Monitoring Wells	270.14(c)(3); 264.97		Fig 6-1	
	Extent of any Groundwater Contaminant Plume	270.14(c)(4)(i)		Figs 6-3 - 6.6	
P-3c	Facility Location Information	270.14(b)(11); 264.18	(B-3)	2.1	
P-3c(1)	Political Jurisdiction in which Facility is Located	270.14(b)(11)(i)	(B-3a)	2.1	
P-3c(2)	Flood Plain Requirements	270.14(b)(11)(iii), (iv); 264.18(b)	(B-3b) Flood plain requirements applicable if facility is located in 100-year flood plain.	2.3.2	
	Copy of Federal Insurance Administration or other Flood Map	270.14(b)(11)(iii)	Reference source used to determine whether facility is located in 100-year flood plain.	Fig 2-5	
	Concentration of Hazardous Constituents Remaining in the Unit that Would Potentially Affect Surface Waters as a Result of Washout	270.14(b)(11); 264.18(b)(ii)(B)	Flood plain requirements applicable if facility is located in 100-year flood plain.	N/A	
	Impact of such Concentration on Current or Potential uses of, and Water Quality Standards Established for, the Affected Surface Waters	270.14(b)(11); 264.18(b)(ii)(C)	Flood plain requirements applicable if facility is located in 100-year flood plain.	N/A	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
	Impact of Hazardous Constituents on the Sediments of Affected Surface Waters, or the Soils of the 100-Year Flood Plain, that could Result from Washout	270.14(b)(11); 264.18(b)(ii)(D)	Flood plain requirements applicable if facility is located in 100-year flood plain.	N/A	
	Plan and Schedule for Future Compliance	270.14(b)(11)(v)	Flood plain requirements applicable if facility is located in 100-year flood plain and not in compliance with 264.18(b).	N/A	
P-4a	*Chemical and Physical Analyses*	*270.14(b)(2); 264.13(a)*	*(C-1) Data generated by testing the waste, published data on the waste, or data gathered from similar processes may be used.*	N/A	
P-4b	*Waste Analysis Plan*	*270.14(b)(3); 264.13(b),(c) 266.102(a)(2)(ii); 266.104(a); (2), 268.7*	*(C-2) Address how for closed units/facilities, a waste analysis plan is not applicable. Discuss previous waste stream and/or current management of the waste, if applicable. Discuss whether or not leachate or runoff collection and analysis are necessary.*	N/A	
P-5	General Hydrogeologic Information	270.14(c)(2)	(E-3) Include description of the regional and site-specific geologic and hydrogeological setting.	4.1	
P-5a	Topographic Map Requirements	270.14(c)(2), (3), (4)(i)	(E-4)	Fig 2-4	
P-5b	Contaminant Plume Description	270.14(c)(2), (4), (7); Part 261,	(E-5) In some cases, contaminant plumes may be defined under groundwater quality	4.4	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
		Appendix VIII	assessment programs carried out during the interim status period which may not address the complete list of Appendix VIII constituents as required under 270.14(c)(4). Additional monitoring may be required to identify the concentration of each Appendix VIII constituent in the plume.	4.4	
P-5c	General Monitoring Program Requirements	270.14(c)(5); 264.90(b)(4); 264.97	(E-6) Describe the monitoring to be conducted during the post-closure care period, including as applicable, the procedures for conducting the following operations and evaluating the data gathered: groundwater monitoring; and leachate collection/detection and removal.	6.3.1	
P-5d	Description of Wells	270.14(c)(6)(ii); 264.97(a), (b), (c)	(E-6a) Identify the number, location, and depth of each well, and describe the well construction materials to be used.	6.3.2; Table 4-1	
P-5e	Proposed Sampling and Statistical Analysis Procedures for Groundwater Data	270.14(c)(7)(vi); 264.97(d), (e), (f); 264.99(c) - (g)	(E-6b)	6.3.6	
P-5f	Corrective Action Program	270.14(c)(8); 264.99(j); 264.100	(E-a) If hazardous constituents have been detected in the groundwater, an owner or operator must submit sufficient information, supporting data, etc., to establish a corrective action program that meets the requirements of 264.100.	6.0	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
P-5g	Characterization of Contaminated Groundwater	270.14(c)(8)(i)	(E-9a) For each well at point of compliance and for each background well, provide concentrations of each constituent in 261 Appendix VIII, major cations and anions, and constituents listed in Table 1 of 264.94, if not already determined by the above.	4.4	
P-5h	Concentration Limits	270.14(c)(8)(ii); 264.94; 264.100(a)(2)	(E-9b) Specify the proposed concentration limits for each hazardous constituent in groundwater.	6.3.4; Table 6-5	
P-5i	Alternate Concentration Limits	270.14(c)(8)(ii); 264.94(b); 264.100(a)(2)	(E-9c) Provide a justification for establishing alternate concentration limits. This justification must address each of the following two factors.	N/A	
P-5j	Corrective Action Plan	270.14(c)(8)(iii); 264.100(b); 264.101	(E-9d) Provide detailed plans on the corrective actions proposed for the facility, including maps of engineered structures, construction details, plans for removing waste, description of treatment technologies, effectiveness of correction program, operation and maintenance plans, closure and post-closure plans, and a schedule for corrective action requirements. Also, include plan for corrective action at solid waste management units (SWMU).	6.0	
P-6	Security	270.14(b)(4);	(F-1) Indicate whether hazardous waste	2.8	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
		264.14	remains exposed after completion of partial or final closure or access by the public or domestic livestock may pose a hazard to human health. Demonstrate that this type of property post-closure use must never be allowed to disturb the integrity of the final cover, liner(s), or any other components of the containment system, or the function of the facility's monitoring system.	2.8	
P-6a	Security Procedures and Equipment	270.14(b)(4); 264.14	(F-1a) Unless waiver is granted, facility must have surveillance system or barrier or other means to control entry.	2.8	
P-6a(1)	Warning Signs	270.14(b)(4); 264.14(c)	(F-1a(3)) Signs in English must be posted at each entrance, and be legible from 25 feet.	2.8	
P-6b	Inspection Schedule	270.14(b)(5); 264.15	(F-2) Include where applicable, as part of the post-closure inspection schedule, specific requirements for each type of treatment, storage, and disposal facility. These specific requirements and the schedule should be included as part of the post-closure plan.	2.9	
P-6b(1)	General Inspection Requirements	270.14(b)(5); 264.15(a), (b); 264.33	(F-2a) Describe the inspections to be conducted during the post-closure care period, their frequency, the inspection procedure, and the logs to be kept. Inspection is required for monitoring	2.9	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
			equipment, safety emergency equipment, communication and alarm systems, decontamination equipment, security devices, and operating and structural equipment. Should be included as part of post-closure plan.	2.9	
	Types of Problems	270.14(b)(5); 264.15(b)(3)	Inspection checklist should be included as part of post-closure plan and must identify types of problem.	2.9	
	Frequency of Inspections	270.14(b)(5); 264.15(b)(4)	The rationale for determining the length of time between inspections should be provided as part of the post-closure plan.	2.9	
	Schedule of Remedial Action	264.15(c)	Owner/operator must immediately remedy any deterioration or malfunction of equipment or structures to ensure problem does not lead to environmental or human health hazard.	2.9	
	Inspection Log	264.15(d)	Provide example log or summary. Should be included as part of the post-closure plan.	Attachment F	
P-7a	Waiver or Documentation of Preparedness and Prevention Requirements	270.14(b)(6) 264.32(a) - (d)	(F-3) Facility must submit justification for any waiver to requirements of this section.	2.10	
P-7b	Emergency Equipment	270.14(a); 264.32(c)	(F-3(a)(3)) Demonstrate that portable fire extinguishers, fire control equipment, spill control equipment, and decontamination equipment are available.	N/A	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
P-7c	Water and Fire Control	270.14(a); 264.32(d)	(F-3(a)(4)) Demonstrate facility has adequate fire control systems, water volume and pressure, foaming equipment, automatic sprinklers, etc.	N/A	
P-7d	Testing and Maintenance of Equipment	270.14(a); 264.33	(F-3(a)(5)) Demonstrate communication, alarm, fire control equipment, spill control equipment, and decontamination equipment are tested and maintained.	N/A	
P-7e	Documentation of Arrangements with Emergency Agencies	270.14(a); 264.37	(F-3(c)) Owner/operator must make arrangements, as appropriate, with type of waste and hazard potential, for the potential need for services.	N/A	
P-7f	Document Agreement Refusal	270.14(a); 264.37(b)	(F-3(c)(4)) Document refusal to enter into a coordination agreement.	N/A	
P-7g	Equipment and Power Failure	270.14(b)(8)(iv)	(F-4(d)) Describe procedure used to mitigate the effects of equipment failure and power outages.	N/A	
P-8	*Contingency Plan General Information*	*270.14(b)(7); 264.52*	*(G-1) Provide facility name and location, operator, site plan, and describe facility operations.*	N/A	
	Actions to Take in Case of Emergency	*270.14(b)(7); 264.52(a)*	*(G-4(d)) Describe actions to be taken in response to any unplanned release of hazardous waste to air, soil, or surface water.*	N/A	
P-8a	*Emergency Coordinators*	*270.14(b)(7); 264.52(d);*	*(G-2) There must at least be one primary emergency coordinator available at all*	N/A	

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Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
		264.55	*times.*		
P-8b	*Implementation*	*270.14(b)(7); 264.52(a); 264.56(d)*	*(G-3) Emergency coordinator to determine that facility has had a release, fire, or explosion that could threaten human health or the environment outside facility.*	N/A	
P-8c	*Emergency Actions*	*270.14(b)(7); 264.56*	*(G-4)*	N/A	
P-8c(1)	*Notification*	*270.14(b)(7); 264.56(a)*	*(G-4a) Describe the method for immediate notification of facility personnel and necessary state and local agencies.*	N/A	
P-8c(2)	*Identification of Hazardous Materials*	*270.14(b)(7); 264.56(b)*	*(G-4b) Observation, records or manifest, or chemical analysis may be used by emergency coordinator.*	N/A	
P-8c(3)	*Assessment*	*270.14(b)(7); 264.56(c),(d)*	*(G-4c) Direct and indirect effects must be considered.*	N/A	
P-8c(4)	*Control Procedures*	*270.14(b)(7); 264.52(a)*	*(G-4d) Contingency plan must describe actions facility personnel must take in response to fires, explosions, or any unplanned release of hazardous waste to air, soil, or surface water.*	N/A	
P-8c(5)	*Storage, Treatment, and Disposal of Released Material*	*270.14(b)(7); 264.56(g)*	*(G-4f) After emergency, emergency coordinator must provide for treating, storing, and disposing of recovered waste.*	N/A	
P-8c(6)	*Incompatible Waste*	*270.14(b)(7); 264.56(h)(1)*	*(G-4g) Until cleanup is complete, assure that incompatible waste is not stored together.*	N/A	

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P-8c(7)	*Post-Emergency Equipment Management*	*270.14(b)(7); 264.56(h)(2)*	*(G-4h) Decontamination is required for emergency equipment.*	N/A	
P-8d	*Evacuation Plan for Facility Personnel*	*270.14(b)(7); 264.52(f)*	*Evacuation plans must include evacuation signals and primary and alternate evacuation routes.*	N/A	
P-8e	*Notification of federal, State and Local Authorities before Resuming Post-Closure Care*	*270.14(b)(7); 264.56(i)*	*Federal or state authorities must be notified within 15 days of occurrence.*	N/A	
P-8f	*Notification Reports*	*270.14(b)(7); 264.196(d)*	*Demonstrate that any release to the environment will be reported to regional administrator within 24 hours of detection.*	N/A	
P-9	*Outline of Introductory and Continuing Training Programs*	*270.14(b)(12); 264.16(a)(1)*	*(H-1) Facility personnel must successfully complete classroom or on-the-job training which will allow them to responsibly perform in their positions for post-closure care. The training program is limited to post-closure activities.*	N/A	
P-9a	*Job Title/Job Description*	*270.14(b)(12); 264.16(d)1), (d)(2)*	*(H-1a) Owner or operator must maintain records of job titles, names of employees, job descriptions, and types and amounts of training given to employees.*	N/A	
P-9b	*Description of How Training will be Designed to Meet Actual Job Tasks*	*270.14(b)(12); 264.16(c),(d)(3)*	*(H-1b) Training must be conducted by a qualified person; there must also be an annual review of the training.*	N/A	
P-9c	*Training Director*	*270.14(b)(12); 264.16(a)(2)*	*(H-1c) Program must be directed by person trained in hazardous waste procedures.*	N/A	

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P-9d	*Relevance of Training to Job Position*	*270.14(b)(12); 264.16(a)(2)*	*(H-1d) Training must include instruction on hazardous waste procedures relevant to each employee's position.*	N/A	
P-9e	*Training for Emergency Response*	*270.14(b)(12); 264.16(a)(3)*	*(H-1e) Personnel must minimally be familiar with emergency procedures, emergency equipment, and emergency systems.*	N/A	
P-9f	*Maintenance of Training Records/Copy of Personnel Training Documents*	*270.14(b)(12); 264.16(b),(d)(4),(e)*	*(H-1f) Training records on current personnel must be kept until the post-closure care period is completed. Training must be completed within 6 months after date of employment or assignment to the facility, whichever is later.*	N/A	
P-10	Closure Plans	270.14(b)(13); 264.112(a)(1),(2)	(I-1) Include an approved closure plan consistent with the requirements of 264.112. This plan is included for post-closure facilities as a description of how the facility was closed.	5.1	
P-11	Post-Closure Plan	270.14(b)(13)	(I-2) Submit a copy of the approved post-closure plan.	5.2	
P-11a	Post-Closure Care Contact	270.14(b)(13); 264.118(b)(3)	(I-2g) Provide the name, address, and phone number of the person or office to contact about the hazardous waste disposal unit or facility during the post-closure care period.	5.3	
P-12	Notices Required for Disposal Facilities	270.14(b)(14)	(I-3a through d) Provide a certification of closure, a survey plat, and a post-closure	N/A	

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			certification. Also include a statement that the post-closure notices required by 270.149(b)(14) will be filed and submitted appropriately.	N/A	
P-13	Post-Closure Cost Estimate	270.14(b)(16) 264.144	(I-6) Provide a copy of the most recent post-closure cost estimate, calculated to cover the cost, in current dollars, of post-closure monitoring and maintenance of the facility in accordance with the applicable post-closure plan. Estimate must be based on third party performing the post-closure activities. The cost estimate must be adjusted annually for inflation pursuant to 264.144(b).	7.0	
P-14	Financial Assurance Mechanism for Post-Closure Care	270.14(b)(16); 264.145; 264.151	(I-7) Provide a copy of the established financial assurance mechanism for post-closure care of the facility. The mechanism must be one of the following: • trust fund • surety bond • letter of credit • insurance • financial test and corporate guarantee for post-closure care • use of multiple financial mechanisms • use of financial mechanism for multiple facilities.	7.0	
P-15	Use of State Required Mechanisms	270.14(b)(18);	(I-9) When state has regulations equivalent	N/A	

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		264.149	or greater liability requirements for financial assurance for closure post-closure submit copy of state-required financial mechanism.	N/A	
P-16	State Assumption of Responsibility	270.14(b)(18); 264.150	(I-9b) If state assumes legal responsibility for compliance with closure, post-closure, or liability requirements there must be a letter submitted from state specifying assumption of responsibilities and amounts of liability coverage assured by state.	N/A	
P-17	SWMUs	270.14(d)(1); 264.101	(J-1) Identify all SWMUs at the facility including hazardous and nonhazardous waste units, as well as active and inactive units, if known.	3.0	
P-17a	Characterize the SWMU	270.14(d)(1)	(J-1) Submit SWMU information including: type of each unit; location on a topographic map; engineering drawings, if available, dimensions; dates of operation; description of wastes in each unit; and quantity or volume of waste, if known.	3.0	
P-17b	No SWMUs		(J-1) Describe methodology used to determine that no existing or former SWMUs exist at the facility.	N/A	
P-17c	Releases	270.14(d)(2)	(J-2)	3.0	
P-17c(1)	Characterize Releases	270.14(d)(3)	(J-2) Provide following information concerning releases: date of release; type, quantity, and nature of release;	3.0	

CHECKLIST FOR REVIEW OF FEDERAL RCRA PERMIT APPLICATIONS

SECTION P. POST-CLOSURE FACILITY REQUIREMENTS

Section and Requirement		Federal Regulation	Review Consideration[a]	Location in Application[b]	See Attached Comment Number[c]
			groundwater monitoring and other analytical data; physical evidence of stressed vegetation; historical evidence of releases; any state, local, or federal enforcement action that may address releases; any public citizen complaints that indicate a release; and any other information showing the migration of the release.	3.0	
P-17c(2)	No Releases		(J-1) Describe methodology used to determine that releases from SWMUs are not present.	N/A	
P-18	Part B Certification	270.11	(L-1)	1.2	
P-19	Information on the Potential for the Public to be Exposed to Releases. At a Minimum, this must include: • reasonably foreseeable potential releases • potential pathways of human exposure • potential magnitude and nature of exposure	270.10(j)	(Q-1) The federal requirement is for surface impoundments and land disposal units.	N/A	

Notes:

[a] Considerations in addition to the requirements presented in the regulations.

[b] For each requirement, this column must indicate one of the following: NA for not applicable, IM for information missing, or the exact location of the information in the application.

[c] If application is deficient in an area, prepare a comment describing the deficiency, attach it to the checklist, and reference the comment in this column.

1.3 Part A Application

The required Part A permit application follows this page. The Part A application requires the following items that are satisfied as listed:

- Map – Figure 2-3 satisfies the requirements for this information.
- Facility drawing – Figure 2-2 satisfies this requirement.
- Photographs – Figure 3-2 satisfies this requirement.

GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

Richard E. Dunn, Director

Land Protection Branch
2 Martin Luther King, Jr. Drive
Suite 1054, East Tower
Atlanta, Georgia 30334
404-656-7802

HAZARDOUS WASTE PERMIT PART A FORM

EPA ID Number | G | A | D | 9 | 8 | 0 | 8 | 4 | 7 | 3 | 3 | 9 |

1. Facility Name

Symrise Inc.

2. Reason for Submittal

- (●) First-Time Applicant
- ( ) Modification (Check one)
  - ☐ Class 1 not requiring approval
  - ☐ Class 1 requiring approval
  - ☐ Class 2
  - ☐ Class 3
- ( ) Renewal

3. Facility Existence Date (mm/dd/yyyy)

/ / 1981

4. Facility Status (Check all that apply)

- ☐ Operating TSD
- ☑ Post-Closure
- ☐ HSWA Corrective Action

5. Facility Location Address

Street Address 209 SCM Road			
City Brunswick	**County** Glynn	**State** Georgia	**Zip Code** 31523
Latitude 31 06 029 (ddmmsss)		**Longitude** -81 32 059 (ddmmsss)	

Land Type: ( ) Private ( ) Municipal ( ) County ( ) State ( ) Federal ( ) Other

6. Facility Mailing Address ☐ Same as Location Address

Street Address 209 SCM Road		
City Brunswick	**State** Georgia	**Zip Code** 31523

7. Facility Permit Contact

Full Name James Carson	**Title** Director of Plant	
Phone 912-261-3314	**Fax** 912-265-4722	**Email** james.carson@symrise.com

8. Facility Permit Contact Mailing Address ☐ Same as Location Address

Street Address 209 SCM Road		
City Brunswick	**State** Georgia	**Zip Code** 31523

9. Legal Owner and Operator of the Facility

Does the Facility have multiple owners and/or operators? If yes, please use Attachment 1. ○ Yes ◉ No

A. Name of Facility's Legal Owner ☐ Same as Location Address

Full Name	Date Became Owner
Symrise Inc.	10/01/2016

Are there any previous owners of this Facility? If yes, please list in an attachment. ◉ Yes ○ No

Owner Type ◉ Private ○ Municipal ○ County ○ State ○ Federal ○ Other

Street Address 300 North Street		
City Teterboro		
State New Jersey	**Country** USA	**Zip Code** 07608
Phone 201-288-3200	**Fax**	**Email**

B. Name of Facility's Legal Operator ☐ Same as Facility's Legal Owner

Full Name	Date Became Operator
Symrise Inc.	10/01/2016

Are there any previous operators of this Facility? If yes, please list in an attachment. ◉ Yes ○ No

Operator Type ◉ Private ○ Municipal ○ County ○ State ○ Federal ○ Other

Street Address 209 SCM Road		
City Brunswick		
State Georgia	**Country** USA	**Zip Code** 31523
Phone 912-261-3310	**Fax** 912-265-4722	**Email**

10. North American Industry Classification System (NAICS) Code(s) for the Facility (at least 5-digit codes)

A. (Primary) 325199	C.
B.	D.

11. Nature of Business

NAICS Code Description: All other basic organic chemical manufacturing.

Brief Description of Business at Facility Site: The facility produces Geraniol, Nerol, Linalool, para-Menthane, paraMenthane Hydroperoxide, Pinanyl Hydroperoxide, Dihydromyrcene, and Dihydromyrcenol from desulfurized alpha-Pinene.The major operations conducted at the Site consists of chemical processing and support operations (receiving & processing bulk alpha-pinene, materials storage, packaging, wastewater treatment/management, basic utility generation, and ancillary operations). Note that the manufacturing processes and associated auxilliary operations are not subject to RCRA permitting.

12. Other Environmental Permits

A. Permit Type	B. Permit Number	C. Description
N	GA0050016	NPDES Discharge Permit
P	28691270006V07	40 CFR Part 70 Operating Permit
S	0630014	Groundwater Withdrawal Permit
S	GAJ01519	Land Application System

13. Process Information

Line No.	A. Process Code	B. Process Design Capacity		C. Process Total Number of Units	D. Unit Name
		(1) Amount	(2) Unit of Measure		
					See comments - section 20

14. Description of Hazardous Wastes

Line No.	A. EPA Hazardous Waste Code	B. Estimated Annual Qty of Waste	C. Unit of Measure	D. Processes	
				(1) Process Codes	(2) Process Description (if code is not entered in 14.D1)
					see comments -section 20

15. Clean Closed Hazardous Waste Management Units (Do not include current Post-Closure Units)

Unit Name	Dates of Operation			Date of Clean Closure Certification, if applicable	Date of Clean Closure Equivalency Demonstration, if applicable
Aeration Basin (Former)		to	12/2014	08/2016	
		to			
		to			
		to			

16. Map

Attach to this application a topographical map, or other equivalent map, of the area extending to at least one mile beyond property boundaries. The map must show the outline of the entire facility, the location of each of its existing intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids under- ground. Include all springs, rivers, and other surface water bodies in this map area. Include drinking water wells listed in public records or otherwise known to the applicant within ¼ mile of the facility property boundary. USGS 7.5-minute series topographic or orthophotographic maps are available for all areas of the state.

17. Facility Drawing

All existing facilities must include a scale drawing of the facility showing the location of all past, present, and proposed treatment, storage, and disposal areas, including but not limited to solid waste management units and areas of concern.

18. Photographs

All existing facilities must include dated photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment, and disposal areas; and sites of future storage, treatment, or disposal areas. Use the process codes listed in item 14 to indicate the location of all storage, treatment, and disposal areas.

19. List of Affected Governments

Full Name Cornell L. Harvey	**Title** Mayor	
Street Address 601 Gloucester Street		
City Brunswick	**State** Georgia	**Zip Code** 31520

Full Name Randy Mobley	**Title** Fire Chief	
Street Address 1201 Glocester Street		
City Brunswick	**State** Georgia	**Zip Code** 31520

Full Name Sammy Tostensen	**Title** Commissioner, District 1	
Street Address 157 Public Safety Blvd.		
City Brunswick	**State** Georgia	**Zip Code** 31525

Full Name	**Title**	
Street Address		
City	**State**	**Zip Code**

Full Name	**Title**	
Street Address		
City	**State**	**Zip Code**

Full Name	**Title**	
Street Address		
City	**State**	**Zip Code**

20. Comments (include item number for each comment)

Items 9A and 9B - Please refer to the Part B Application Sections 1.4 and 2.1.

Items 13 and 14 - There are no processes currently at the site which generate hazardous wastes. Therefore, 13 and 14 have not been completed as they do not represent the current Site conditions. This is a post-closure care permit only. D001 Waste Flammable solids were generated during the closure of the Wet Well and First Flush Basins. Manifest copies are included in Appendix E of the Closure Report.

Items 16 to 18 - Please refer to the Part B Application for additional information.

21. Certification I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. **Note: For the RCRA Hazardous Waste Part A permit Application, all owners and operators must sign (see 40CFR 270.10(b) and 270.11)**.

Signature of legal owner, operator or authorized representative	Date (mm/dd/yyyy)
James E. Carson	11/15/2021
Printed Name (First, Middle Initial, Last)	Title
James E. Carson	Director of Plant

Signature of legal owner, operator or authorized representative	Date (mm/dd/yyyy)
Printed Name (First, Middle Initial, Last)	Title

1.4 Introduction to Permit Application

Symrise Inc. (Symrise) is submitting this application for a Resource Conservation and Recovery Act (RCRA) post-closure care permit for segments of the Former Wastewater Treatment System (WWTS) area at the Symrise facility ("Site"). This permit is required by the consent decree between Renessenz, LLC, the US Environmental Protection Agency (USEPA), and the Georgia Environmental Protection Division (EPD) signed in December 2014 ("Consent Decree," Civil Action No. 2:14-cv-185).

On August 19 and September 8, 2008, the USEPA conducted a RCRA compliance evaluation inspection at the Millennium Specialty Chemical Facility (a LyondellBassell Flavors and Fragrances company) located in Brunswick, GA. On or about December 22, 2010, LB Flavors was acquired by Pinova Holdings, Inc. pursuant to a membership interest purchase agreement by and between Pinova Holdings, Inc. and LyondellBasell F&F Holdco, LLC, dated December 13, 2010. After such acquisition, the name of LB Flavors, as a wholly owned subsidiary of Pinova Holdings, Inc. was changed to Renessenz, LLC.

Symrise is wholly owned by Symrise Holding Inc. On or about January 7, 2016, Symrise Holding, Inc. acquired all the shares of Pinova Holdings, Inc. Symrise and Pinova Holdings, Inc. thus were sister subsidiaries wholly owned by Symrise Holding, Inc. Accordingly, at that time, Renessenz, LLC became an affiliate of Symrise because Renessenz, LLC and Symrise both were wholly owned by Symrise Holding, Inc. Later that year, on or about October 1, 2016, Renessenz, LLC merged with and into Symrise Inc.

In correspondence dated October 13, 2015, Renessenz notified USEPA and EPD that under the purchase agreement with Symrise and TorQuest Partners for the sale of Pinova Holdings, Inc. (the parent company of Renessenz), Blue Jay Environmental, Inc. would be responsible for the completion of the obligations of the Consent Decree. To fulfill that responsibility, Blue Jay will act on behalf of Symrise as a contractor to direct remediation activities, oversee permitting and reporting obligations, and provide the financial assurance mechanism. Symrise will be the owner and operator as defined by RCRA and the Georgia Hazardous Waste Management Act (HWMA) and has ultimate responsibility for compliance.

The Consent Decree required that certain segments of the Site's Former WWTS be closed and replaced. The affected components of the Former WWTS comprised of the First Flush Basin, the Process Wet Well, the aeration basin, and auxiliary equipment, which includes the associated Former Underground Wastewater Lines. Beginning in 2011, prior to the issuance of the Consent Decree, Renessenz began designing an upgraded WWTS in preparation for closure of the Process Wet Well and First Flush Basin. In accordance with the Consent Decree, a closure plan was prepared for the Former WWTS in 2014. All the waste from the WWTS units was removed and the WWTS units were closed with no waste remaining in place by December 2015 (EA 2017). Since the completion of closure activities, Blue Jay has engaged in groundwater monitoring, additional delineation efforts, and a pilot groundwater injection test around the First Flush and Wet Well area. The aeration basin was clean closed and thus does not require post-closure care and is not included in this application (Attachment A). USEPA and EPD, upon review of the Closure Report, identified the need for post closure care for the Former Wet Well, Former First Flush Basin, and the associated Former Underground Wastewater Lines due to shallow groundwater contamination.

In addition, the Consent Decree requires that the permit include requirements for facility wide corrective action by addressing any other Known Areas of Concern at the Site. At the time of the EPA inspection, the Site was subject to Consent Order HW-1046 (1993) which covers the

portion of the Site downgradient from the Former Tetrachloroethylene (PCE) Drum Area, due to the presence of chlorinated solvents in groundwater.

In order to determine if any other AOCs were present, the facility completed some additional Site sampling, based on historical knowledge of the Site activities, and the EPD completed an RFA. Three additional AOCs were identified: the current and former sprayfields, the cooling tower blowdown area, and the boiler cleanout area. It was determined by EPD that these AOCs require no further action.

This permit application reviews Site processes, which are not subject to permitting, in Section 2.0. Areas where solid waste was handled and potentially released (the Former Wastewater Treatment System) are reviewed in Section 3.0. Findings related to constituents in the groundwater at the Site are summarized in Section 4.0. Closure activities are summarized, and the post-closure plan presented in Section 5.0. Section 6.0 presents the corrective action plan to address the constituents remaining on Site in shallow groundwater.

2.0 Facility Description

2.1 Site Description

The Site is located on the southwest portion of Colonels Island in Brunswick, Glynn County, Georgia (Figure 2-1). The Site has been operational since 1981 and is an active manufacturing plant that processes alpha-pinene into flavor and fragrance compounds (USEPA 1993). The Site includes an administrative building, an engineering office, storage buildings, a central control room, aboveground piping, electrical lines, numerous tanks, process distillation towers and reactors, pyrolysis furnaces, boilers and other utilities, and a wastewater treatment plant (Figure 2-2).

The Site occupies 192 acres, with the central active portion of the Site covering approximately 25 acres. There is only one access point to the Site via SCM Road. Figure 2-3 shows the plant boundaries and surrounding land use.

The Site was first developed in 1981 by SCM Glidden Company as an extension of its Jacksonville crude sulfate turpentine fractionation and terpene processing and refining facility to produce flavor and fragrance precursors. In 1997, the facility changed its name to Millennium Specialty Chemicals Inc. as part of an initiative by its parent, Millennium Chemicals, Inc., which had formed in 1996. In 2004, Lyondell Chemical Company merged with Millennium Chemicals, Inc. In 2007, Basell Polyolefins merged with Lyondell Chemical Company to form LyondellBasell Industries, and the facility was renamed LyondellBasell Flavors and Fragrances LLC (LBFF) in 2010. Pinova Holdings Inc. acquired the Site in 2011 and renamed it Renessenz LLC. In 2015, Symrise purchased Pinova Holdings. In 2016, Pinova Holdings was merged into Symrise. Symrise is the current owner of the Site.

2.2 Process Descriptions

The Site receives alpha-pinene from Symrise's manufacturing site in Jacksonville, Florida and processes it into geraniol, linalool, pinanols, and other terpenoids that are used in food flavorings and fragrances (Brown and Caldwell 2016). Most products from the Site are shipped back to the Jacksonville site for final processing. The major operations conducted at the Site consists of chemical processing and support operations, as described in more detail below. The manufacturing processes and associated auxiliary operations are not subject to RCRA permitting.

- Receiving: Incoming alpha-pinene by truck from Symrise's Jacksonville site and transferred to aboveground storage tanks.

- Manufacturing: The operation of the facility is for production of geraniol, nerol, linalool, para-menthane, para-menthane hydroperoxide, pinanyl hydroperoxide, dihydromyrcene, and dihydromyrcenol from desulfurized alpha-pinene.

- Materials Storage: The Site maintains numerous aboveground storage tanks (ASTs) for the storage of liquid raw materials, production intermediates, and final products. These tanks range in size from approximately 1,500 gallons up to 203,000 gallons.

- Packaging: The majority of the products generated at the Site are shipped back to the Symrise facility in Jacksonville. Some of the products can be shipped via truck to customers. No drum or tote packaging occurs at the Site.

- Wastewater Treatment and Management: Symrise operates a wastewater treatment system in the western portion of the Site. Process effluents, along with storm water contacting operational areas, are transferred via above-ground piping to the on-site wastewater treatment system. The treatment system comprises two clarifiers for the removal of oil, a small equalization tank, a secondary clarifier, an aeration tank, a sludge centrifuge, and a 20-acre land application spray field. The former sludge drying beds are currently out of service. Former land application sprayfields are also located at the Site. The current WWTS is not subject to RCRA permitting.

- Basic Utility Generation: The Site has the capability to self-generate a portion of its utility needs. The primary fuel source, natural gas, is supplemented with production distillate/co-product with high BTU[1] value in the two on-site boiler units. There are two diesel-fired generators for emergency shutdown purposes in the event of a power failure. A nitrogen gas plant for purging oxidation reactors is present on-site, with cryogenic back-up during peak usage. Hydrogen gas is produced on-site by catalytically reforming natural gas. Process water is derived from three groundwater production wells developed on-site, one of which is presently inactive and maintained on standby for emergency back-up needs.

- Ancillary Operations: The Site performs shipping/receiving, laboratory, and administrative operations, none of which involve the use of significant quantities of chemicals. Other ancillary operations conducted at the Site include general building, mobile equipment, and machinery maintenance. The Site operates several types of mobile equipment to support operations.

The primary raw material used at the Site is alpha-pinene. Other significant chemicals used at the Site include:

[1] BTU = British thermal unit and is defined as the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit.

- Ammonia
- Nickel Catalyst
- Caustic soda
- Borate
- Phosphoric acid
- Potassium hydroxide
- Sulfuric Acid
- Isobutyl alcohol
- Diesel Fuel

None of the ongoing operations are subject to RCRA permitting, as the Site is a small quantity generator for hazardous waste. Symrise holds several other permits for the Site, which are listed below.

- Land Application System Permit No. GAJ01519 (EPD)
- Title V Air Permit No. 2869-127-0006-V-07-0 (EPD)
- NPDES Permit No. GA0050016 (EPD)
- Groundwater Withdrawal Permit No. 063-0014 (EPD)

Additionally, the Site has two open consent orders with EPD. Consent Order HW-1046 was issued in 1993 and required a Site-wide investigation of the integrity of the underground wastewater lines, LNAPL recovery, and semi-annual groundwater monitoring. A second Consent Order, HW-1535, was issued in 2003 related to the maintenance of monitoring wells at the Site. It is anticipated that both Consent Orders will be terminated upon issuance of a RCRA permit. The Consent Decree will also terminate upon issuance of a final, enforceable, and non-appealable post-closure permit by EPD.

2.3 Topographic Map Requirements

The Site occupies 192 acres in Brunswick, Glynn County, Georgia. The Site is located on a peninsula of land surrounded by marsh and other industrial properties. The vicinity map (Figure 2-3) shows surrounding property use is commercial/industrial.

The Site conditions are represented on a series of maps as required by the USEPA regulations to present the required information. A description of the content of these maps follows.

2.3.1 Topographic Map Details

The plant topographic (topo) map (Figure 2-4) is at a scale of 1-inch equals 1,400 feet, and extends one mile beyond the Site property line, which is also depicted on the map. The topo map shows elevations across the Site ranging from a high of 10 feet to a low of 5 feet above mean sea level (AMSL).

2.3.2 100-Year Floodplain

The 100-year floodplain is delineated on the plant topo map (Figure 2-5) and is based on the Federal Emergency Management Agency (FEMA) Flood Insurance map. Almost all of Colonels Island lies within the 100-year floodplain. However, since the First Flush Basin, Process Wet Well, and Former Underground Wastewater Lines have all been taken out of service and closed, there is no potential for releases as a result of flooding and therefore no demonstration of compliance is required for flooding or washout measures. Additionally, the PCE drum has been removed from the Site, thus there is no potential for release from flooding or washout.

2.3.3 Surface Drainage

Surface water drainage is principally governed by surface topography and a series of storm water ditches at the Site. Surface drainage patterns are shown on Figure 2-6. Generally, storm water in the Former First Flush Basin and Process Wet Well area flows south/southeast towards the drainage ditches north of Area 5, which discharge into the plant's concrete storm water basin prior to discharge under the plant's NPDES permit.

The Former PCE Drum Area is within the containment area for the Area 5 process, and any storm water collected within Area 5 is transported to the plant's WWTS. Any surface runoff from the field behind Area 5 will flow into the drainage ditch and then to the marsh areas to the south.

There is no soil contamination or waste present in the Former First Flush Basin, Process Wet Well Former PCE Drum Areas and therefore there is no impacted surface water runoff.

2.4 Surrounding Land Use

The Site boundaries and surrounding property use are shown on the Vicinity Map (Figure 2-3). Adjoining land on the Colonels Island peninsula is owned by the Georgia Port Authority (GPA). The majority of Colonels Island is utilized by GPA as a staging area for new cars after they are off-loaded from the port terminal north of US Highway 17. Immediately north of the plant property is Allied Universal Corporation, which manufactures sodium hypochlorite, sodium bisulfite, chlorine, and several other water treatment products (https://www.allieduniversal.com/). The remainder of Colonels Island is forested and undeveloped.

2.5 Wind Rose

Wind roses from the Brunswick-Golden Isles Airport for each month of the year are shown in Appendix A. The wind roses show monthly wind direction and speed based on weather data from 1973 through 2016 (Iowa State 2016). In general, winds are out of the west/northwest in the winter and south/southwest in the summer.

2.6 Plant Access Control

The Site's process area is in the center of the property and is completely secured with chain-link fencing topped with barbed wire and restricted entry. There is one vehicular entry point to the Site, which is manned 24-hours a day for seven days per week by an on-site security guard. In addition to the main gate, there is a pedestrian gate adjacent to the guard station, and the administration building also serves as an entrance to the plant. Both the pedestrian gate and administration gate are equipped with electronic access controls and locked 24-hours a day and seven days a week. The main plant gate is kept closed and locked from 4:30pm until 5:00am and only opened for deliveries during that time period. The main gate is open from 5:00am to 4:30pm to allow for delivery of alpha-pinene from the Jacksonville plant or shipments of finished product from the Site.

2.7 Extraction and Injection Wells

<u>On-site Wells</u>

There are three water supply wells at the plant (Figure 2-7). Two of the supply wells are screened in the Floridan aquifer and the third is screened in the Miocene aquifer. Well number 1 is 825 feet deep and is used as firewater for the plant. A new well was installed in 2017 to

replace well number 2 and is 805 feet deep. Well number 3 is shallower in depth and is screened in the Miocene aquifer. Well number three has historically been used to supplement the two deeper wells; however, this well has been inactive for several years (Brown and Caldwell 2016). Wells 1 and 2 extract approximately 360,000 gallons of water per day, on average.

None of the extracted water is used for potable purposes.

Nearby Wells

Water wells intended for extraction of groundwater for beneficial use in the vicinity are shown on Figure 2-7. These wells were determined from searching several databases, including Georgia Department of Public Health, U.S. Geological Survey (USGS) National Water Information System, and Georgia EPD's Watershed Protection Branch. The search covered a one-mile radius outside of the plant property line.

There is only one off-site water supply well, which belongs to Allied Universal, a water treatment product company located adjacent to the Site to the north/northwest. The Allied well is 500 to 600 feet deep with an approximate pumping rate of 2,000 gallons per day. This well is used as a source of drinking water as well as utility consumption at the Allied Universal facility. (Brown and Caldwell 2016); however, this well is upgradient of the Site.

There are no injection wells within a one-mile radius of the Site.

2.8 Security and Plant Access Control

Security Procedures and Equipment

The Symrise plant is situated on approximately 190 acres of land. There is one single entry point to the Site, via US Highway 17 and SCM Road. A Site plan showing security barrier (fences) and the access point is shown on Figure 2-8. Normal business hours for the plant are 8:00am to 4:00pm Monday through Friday; however, the plant is in operation 24 hours a day, 7 days a week.

Barrier and Access Control

The operational section of the Site is enclosed by a six-foot high chain-link fence topped with three rows of barbed wire. A guard station is located adjacent to the main gate and is manned 24 hours a day, 7 days a week by contractor security personnel. Photo identification is required for entry, and visitors must be accompanied by a Symrise employee at all times. Contractors and truck drivers must present appropriate credentials related to their work at the Site.

The entry gate is kept closed and locked unless a tanker truck is on-site or expected. Additionally, the entry gate is always locked whenever the security guard is away from their post. Security personnel routinely inspect the fence line to ensure the fence is in satisfactory condition and conduct periodic patrols of the paved portion of the Site during each shift. The control room and all operators at the Site are equipped with hand-held two-way radios.

Other than the main gate, there are two other entry points to the Site. The administration building entrance is off of the main parking lot, is kept locked 24 hours a day / 7 days a week and controlled via electronic card access. A pedestrian access gate is located between the administration building and the main gate/guard shack. The pedestrian gate is the main entry point for plant personnel. The pedestrian gate is locked 24 hours a day / 7 days a week and controlled via electronic card access. Personal vehicles are not allowed inside the gated facility. Contractor work vehicles must be approved for entry at the front gate and are subject to search.

In addition to the front gate vehicle and pedestrian gate, there are five other 12-foot gates at the Site which are locked at all times. These include a gate for railcar access near the main entry point. This gate is maintained and monitored by security personnel and kept locked at all times. The rail lines at the plant are no longer in use. The other three gates are located in forested and/or marsh portions of the property and are not readily accessible.

Warning Signs

Warning signs have been posted at the main plant entrance and all gates that read “Restricted Area No Trespassing”. In addition, the main entrance is also posted with “STOP, All Visitors Check In At Security Office, Vehicles Are Subject To Inspection”.

2.9 Inspection Schedule

The Former First Flush, Wet Well, and underground lines have all been removed from service, and closed by removal of residual constituents (liquids, and solids) pressure washing, rinsing, inspection, rinsate sampling, and filled in with concrete or grout. The Former First Flush and Wet Well do not function as a cap or cover for any waste. Groundwater monitoring has indicated that there are no ongoing releases. Therefore, no inspections are required for these units. The PCE raw material drum in Area 5 was removed from the Site in 2017., and waste material was never stored on the pad. The underlying corroded concrete has been repaired and sealed. Therefore, the Former PCE Drum pad does not require inspection

2.10 Preparedness and Prevention

In accordance with 40 CFR §264 Subpart C, Preparedness and Prevention is not applicable to the Site.

3.0 Waste Management Units and Area of Concern

The Consent Decree identified three closed waste management units (the Former First Flush Basin, the Former Process Wet Well, and the Former Underground Wastewater Lines) and one AOC (the Former PCE Drum Area). Additionally, EPD conducted a RCRA Facility Assessment (RFA) of the Site in June 2020. The RFA included the four areas identified in the Consent Decree as well as four SWMUs/AOCs requiring no further action. The following sections describes the three closed waste management units and the AOC identified at the Site. The discussion provides a description of the unit/area, the unit/area process or function, investigations conducted to identify releases, and the unit/area status. All areas discussed below are shown on Figure 3-1 and photographs of the Former First Flush Basin, Former Process Wet Well, and Former PCE Drum Area are provided in Figure 3-2. The RFA is provided as Attachment B. A RFI was not recommended following completion of the RFA (EPD 2020).

3.1 Former First Flush Basin

Unit Description

The Former First Flush Basin was a concrete structure designed for the purpose of handling wastewater at the Site. The basin was an in-ground formed concrete structure designed to accumulate wastewater from the underground wastewater lines prior to the transfer via overhead lines to the equalization tank and aeration basin.

The First Flush Basin received process wastewater and storm water from several process areas at the plant (Figure 3-3). This included trench drains, pump pads, and truck loading and unloading areas. The basin provided capacity for storage of approximately one inch of storm water from the plant trenches and containment areas, hence the term First Flush. The basin was equipped with an oil-phase capture weir, which served to continuously remove product oils and return them to the process. From the First Flush Basin, process wastewater and storm water was pumped via overhead line to the wastewater equalization tank.

Potential Historical Releases

There is no potential for ongoing releases from the Former First Flush Basin.

During the closure process, cracks were identified in the First Flush Basin. Groundwater was seeping through one crack from outside the basin, while the ten other cracks were narrow and vertical. No groundwater seepage was observed from the narrow cracks (EA 2017). The First Flush Basin has been filled in with stone and capped with concrete. Detailed information on the closure of the First Flush Basin is in Section 5.1 and Attachment C. Following closure of the Former First Flush Basin, individual area sumps are now pumped directly to aboveground wastewater tanks.

3.2 Former Process Wet Well

Unit Description

The Process Wet Well was also in-ground formed concrete structure designed for the purpose of handling wastewater from the underground wastewater lines prior to the transfer via overhead lines to the equalization tank and aeration basin. The Process Wet Well collected water streams that were separated from product in various process units (Figure 3-2). These wastewater streams did not typically contain solids. The process wastewater was pumped via overhead line to the wastewater equalization tanks.

Potential Historical Releases

There is no potential for ongoing releases from the Former Process Wet Well. Shallow groundwater does not exceed groundwater quality standards. No breaches of underground lines were identified in the vicinity of the Wet Well during closure. Soil samples collected above the saturated zone during the closure of the Wet Well were analyzed for VOCs and semivolatile organic compounds (SVOCs). There were no exceedances of the US EPA Residential Soil Screening Levels.

Vertical cracks were noted at the midpoint of both long walls of the Wet Well, although these were not believed to be leak points (EA 2017). The Wet Well has been filled in with a concrete mix. Detailed information on the closure of the process Wet Well is in Section 5.1 and Attachment C.

The Former Process Wet Well is a candidate for clean closure status: as the surrounding wells meet the groundwater protection standards. No further groundwater monitoring is required in this area.

3.3 Auxiliary Equipment – Former Underground Wastewater Lines

Unit Description

Wastewater was transported to the First Flush Basin and Process Wet Well via a series of underground wastewater lines (Figure 3-2). These former lines were constructed of vitrified clay with cemented joins. Vitrified pipe is made from a blend of clay and shale that has been subject to high temperature to produce a hard, inert ceramic. Vitrified clay was historically used in both domestic and industrial gravity-flow sewer piping due to its inertness to most commonly discharged materials and sewer gasses.

Potential Historical Releases

There is no potential for ongoing releases from the Former Underground Wastewater Lines.

Cracks and breaches were observed in the underground wastewater lines via a camera inspection conducted during the closure process. Both spiral and horizontal cracking was observed along the underground pipelines but no visual evidence of leaking at these locations was observed. Soil samples were collected during the closure process at the locations of line breaches, and there were no detections above screening levels from these samples (EA 2017). Most of the Former Underground Wastewater Lines are inaccessible to soil sample since they are within active operations areas and may be beneath active above-ground process line pipe racks and/or closely bordered by storage and process area containment structures. All underground lines have been cleaned and all entry, exit, or cleanout points have been grouted and sealed. Detailed information on the closure of the underground lines is in Section 5.1 and Attachment C.

3.4 Former PCE Drum Area

Area Description

The Former PCE Drum Storage Area is considered an AOC.[2] The AOC covers the area where the Former PCE Drum was stored within the active operations footprint of Area 5 and the field downgradient from the drum storage area (Figure 3-4).

[2] AOC refers to any geographic area that has experienced a probable release of a hazardous waste,

The Former PCE Drum Area is located within Area 5 of the plant. Hydrogenation of alpha-pinene is conducted in Area 5. In the process, alpha-pinene is reacted with high pressure hydrogen in the presence of a metal catalyst to produce cis-pinane. Other by-products, such as trans-pinane, can also be produced during this reaction. The desired ratio of cis-pinane to other byproducts is controlled by catalyst selectivity. Since the 1990s, PCE has been used as needed to enhance the catalyst selectivity. A small amount of PCE, typically 0.1 to 1 gallon, is added to the reactor as needed by drawing it from a one-gallon container into the circulation sample port.

Historically, PCE was stored on a drum dolly within the process' concrete containment area. PCE can easily migrate through concrete and corrosion of the concrete was visible in the area of the PCE drum. Prior to 2010, the drum was stored on an open metal drum dolly. In 2010, the dolly was replaced with a plastic containment dolly. Operators would pour a gallon or less of PCE from the drum into a one-gallon transfer container as needed. Due to the infrequent usage of PCE and to reduce the potential for leaks or spills during transfer, the plant discontinued handling PCE in drums in May 2017 and now purchased PCE in individual one-gallon containers. The corroded concrete in the PCE drum area has been repaired and sealed.

Waters discharged from the reactor are recovered for reuse or discharged directly to a stainless-steel wastewater sump. From the sump, the wastewater is pumped through an overhead line to the wastewater equalization tank.

Potential Release Status

There have been no documented releases or spills of PCE at the Site. However, as corrosion in the concrete in the PCE drum area was observed by Site personnel in October 2015, it is possible that small amounts of PCE may have been released during historical materials handling practices. In October 2015, soil samples were collected beneath the concrete slab in the PCE drum storage area. Samples were collected at one-foot intervals from the bottom of the slab to the top of the water table. Soils from each interval were screened with a photoionization detector (PID), and the interval with the highest PID reading was analyzed for VOCs. The sample collected from the first foot below the slab contained PCE at a concentration of 26 mg/kg, and PCE was the only VOC detected in the samples (Brown and Caldwell 2016). This area is located within the active operations of Area 5 and the subsurface soils are not accessible. The PCE drum was removed from the Site in 2017 and replaced with individual one- gallon containers.

The chlorinated solvents, primarily cis-1,2-dichloroethylene, detected in groundwater within the AOC are not currently used at the Site, nor have they been previously used. Thus, it is likely these compounds are present due to the reductive dechlorination of PCE (Figure 3-5).

3.5 SWMUs/AOCs Requiring No Further Action

Former Aeration Basin

The Aeration Basin was a 100-foot by 250-foot concrete-lined impoundment used for the biological treatment of wastewater. Closure of the basin began in December 2014 with pumping of the remaining free liquids and biological solids from the aeration basin. Once the basin area was cleaned, two temporary groundwater monitoring wells were installed in the bottom of the basin. There were no exceedances of USEPA screening levels detected in any of the groundwater and/or rinsate samples collected from the aeration basin. Thus, the aeration basin has met the requirements for clean closure and no further action is required (EPD, 2020).

hazardous constituent, or hazardous waste constituent and that, while not from a Solid Waste Management Unit, has nevertheless been determined to pose a current or potential threat to human health or the environment

Current and Former Sprayfields

The current sprayfields at the Site are subject to a Land Application System (LAS) Permit No. GAJ010519. Under the conditions of the permit, the effluent is subject to monthly and quarterly monitoring requirements, which includes monitoring for nickel as it is used as a process catalyst. Additionally, the groundwater is monitored quarterly for several parameters including zinc, boron, nickel, and vanadium and soil samples are collected annually for nickel, zinc, and vanadium. All groundwater samples have been non-detect since 2017 and since 2010, nickel has only been detected in 26 out of 130 groundwater samples (17%) with a maximum detection of 0.0137 mg/L, well below any established screening levels.

The Former Sprayfields operated in a similar manner to the current sprayfields. Based on historical data and LAS permitting requirements, the constituent of potential concern is nickel. When the Former Sprayfields were taken out of service in 1992, Symrise sampled for nickel and found concentrations in the 0-6 inch interval ranging from 14 to 83 mg/kg (SCM, 1992). Nickel concentrations decreased dramatically with depth and reached background levels by 12-18 inches below ground, indicating that nickel in soils is primarily contained in the top six inches of the soil column and has not migrated through the soil column or to groundwater. Additionally, Symrise has several temporary borings and monitoring wells installed within the footprint of the Former Sprayfields and has found no impacts to groundwater for any potential constituent of concern related to the wastewater treatment system effluent.

This was re-confirmed through groundwater sampling in December 2019 which indicated through a non-detect result that nickel is not present in the groundwater in the vicinity of the Former Sprayfields. Historical and current monitoring data for the Former Sprayfields are provided in Attachment D.

Cooling Tower Area

Two cooling towers are located east of Area 5 and north of the surface water ditch. These units were not serviced by any of the Former Underground Wastewater Lines. Historically, blow down water from the cooling towards may have discharged to the drainage ditch; currently blow down water is discharged to a sump at the powerhouse in the northern portion of the plant via above-ground piping. Water from the powerhouse is pumped to a pond behind the powerhouse before being discharged to the surface water ditch. The location and condition of any former piping that may have discharged directly to the ditch is currently unknown (EPD 2020). There is no known recent use of chloroform in the cooling towers.

In May 2016, chloroform was detected above its MCL in a temporary groundwater sample (TB-50) east of Area 5 and immediately south of a cooling tower at a concentration of 13,000 ug/L in the 16-20 ft. bgs depth interval. Three additional temporary groundwater borings were installed in June 2017 to confirm the initial chloroform detection and delineate the extent of chloroform. A re-sample of TB-50 had a concentration of 14,000 ug/L for chloroform in the 16-20 ft. bgs interval. The step-out sample collected approximately 40 feet east of TB-50 had a maximum detection of chloroform at 22 ug/L, below the MCL, and the step-out sample collected approximately 90 feet north of TB-50 had a maximum detection of 1.2 ug/L, indicating that the chloroform is isolated.

A permanent monitoring well, MW-70, was installed in 2018 in the vicinity of TB-50 and screened at the same interval. Chloroform has not been detected above its tap water standard since 2018.

Boiler Cleanout Area

Two boilers are located in the northern portion of the plant area. The practices surrounding cleanout of the boilers were revised in 2019 and a concrete pad was installed around the boiler #2 cleanout area. As part of the pad installation, Symrise was required to excavate several inches of soils. While there is no evidence of routine or systematic releases in this area, soil samples were collected during the excavation process. The soil results were non-detect for hexavalent chromium and demonstrated no releases in the vicinity of the boiler area. Analytical data from the boiler area is provided in Attachment E.

4.0 Groundwater Conditions

The following sections describe the regional and Site hydrogeology, the current condition of groundwater at the Site, and the proposed groundwater monitoring plan for the Site.

4.1 Regional Hydrogeology

The Site is located in Glynn County, GA, which lies in the Lower Coastal Plain geologic province. The hydrogeologic units underlying the Site include the surficial aquifer, the upper confining unit, and the Floridan aquifer (Woodward-Clyde 1994a). These units are regionally significant and occur throughout the vicinity of the Site (Brown and Caldwell 2016). A general hydrogeologic cross-section for Brunswick is shown in Figure 4-1.

4.1.1 Vadose Zone and Surficial Aquifer

The surficial aquifer consists predominantly of unconsolidated, fine to very coarse-grained sand interbedded with layers of poorly sorted sand, clayey silt and fine to medium grained clayey sand. The thickness of the unconsolidated sediments at the Site is between 130 to 250 feet with a layer of stiff sandy clay observed at approximately 39 feet below ground surface (ft. bgs) during the installation of well MW-15 and later wells. According to previous reports and published literature, this sandy clay layer extends to 60 ft. bgs. A dense sandy and silty clay with some fine gravel occurs from 60 to 90 ft. bgs. The base of the aquifer becomes more clayey with depth and the top of the upper confining unit is marked by clay beds (Brown and Caldwell 2016). The upper 40 feet of sediment, based on lithological descriptions, appears to contain the most permeable material within the aquifer. Increasing clay content in the remainder of the aquifer decreases the permeability of the aquifer materials. Therefore, it is probable that near the 40-foot bgs depth, the groundwater vertical movement becomes more laterally oriented, and the vertical component is significantly decreased (EA 2017).

Generally, the water table is near land surface in low-lying areas, along streams, in marshes and swamps, and for most of Colonels Island. The surficial aquifer reportedly loses water by discharge to bays, streams, creeks, ditches, and marshes (Brown and Caldwell 2016).

Detections of VOCs in shallow soil indicate that VOCs were released at the ground surface or just below the ground surface. Therefore, the VOCs would be expected to migrate vertically, under the influence of gravity, with some horizontal spreading with depth through the unsaturated zone and into the saturated zone (Brown and Caldwell 2016).

4.1.2 Upper Confining Unit

The upper confining unit consists primarily of the Hawthorn Formation of the late and middle Miocene age. It is composed of all strata between the surficial aquifer and the Upper Floridan aquifer which includes clay of extremely low permeability and also sand beds of moderate permeability. The unit of middle Miocene age consists of interbedded, phosphatic sand, silt, clay, and sandy clay beds of low permeability. Based on previous reports, the thickness of the upper confining unit is approximately 450 feet (Woodward-Clyde 1992a; Woodward-Clyde 1994a).

The upper confining unit functions primarily to retard vertical movement between the surficial and Floridan aquifers. The overall lower permeable sediments of the unit combine as a series of beds to limit groundwater movement. The upper confining unit overlies all of the Floridan aquifer system at the Site (Brown and Caldwell 2016).

4.1.3 Floridan Aquifer

The Upper Floridan aquifer consists mainly of the Ocala Limestone and the Suwannee Limestone geologic units and is characterized as limestone and dolomitic limestone. This aquifer is the main water supply for the area and begins at a depth of approximately 450 ft bgs and extends to a depth of approximately 750 ft bgs. The Upper Floridan is separated from the Lower Floridan by the coastal region semi-confining unit, consisting of the upper part of the Avon Park formation. The Lower Floridan is encountered at a depth of approximately 800 ft bgs and extends to approximately 2,000 ft. bgs to the lower confining unit (USGS 2016).

4.2 Site Topography

The Site topography is relatively flat with elevations ranging from 5 to 10 feet amsl. The topographic map of the Site (Figure 2-4) indicates that the land slopes away from the central plant area, especially to the west and south towards the marsh.

4.3 Site Hydrogeology

Groundwater elevations in the surficial aquifer tend to conform to surface contours. This relationship is accentuated by the apparent mounding of groundwater beneath the Former First Flush and Wet Well area. Based on water level measurements from April 2020, groundwater was encountered in the surficial aquifer at elevations ranging from 4.78 to 8.3 ft. amsl (Figure 4-2). Table 4-1 contains well construction details and recent groundwater elevations measured at the Site. Based on the April 2020 potentiometric contours and previous water level monitoring events, the following generalizations can be made:

- There is year-round mounding of groundwater centered on the core of the process area, and flow is radially outward from this area, but primarily to the south/southeast.

- The horizontal hydraulic gradient across the Site is generally consistent and ranges from 0.0023 feet per feet (ft/ft) in March 2017 to 0.0045 ft/ft in April 2020.

- The groundwater flow velocity at the Site is derived from a combination of Darcy's law and the velocity equation of hydraulics and is expressed as $v=Ki/n_e$, where v is the flow velocity, K is hydraulic conductivity, i is the gradient, and n_e is effective porosity. Using the values provided in Tables 6-2 and 6-3 of this permit application (values are a combination of Site-specific and default), the average flow velocity is calculated to be approximately 0.7 feet per day.

In January 2017, five water level data loggers were installed in monitoring wells downgradient of the Former PCE Drum Area to track water levels over time. The data loggers measured the water level in each well in 10-minute intervals and the data were downloaded during the groundwater monitoring events. In May 2017, additional data loggers were installed around the Former First Flush Basin area within the benzene plume footprint and one data logger was installed in the surface water ditch south of Area 5. Water levels measured by the data loggers are shown in Figures 4-3 – 4-5. The water levels gathered by the data loggers show:

- Water levels in all wells, regardless of depth of well, show a nearly immediate response to rainfall events before gradually returning to baseline conditions,

- Water levels also vary with seasonality. Between late January and late May 2017, shallow groundwater levels south of Area 5 dropped by 1.5-2 feet in the 20 ft. bgs wells. Beginning in late May, the groundwater table began to gradually rise with the increasing frequency of rain events.

- Water levels rose significantly, close to four feet in some wells, during Hurricane Irma in September 2017. This rise in the water table may have re-saturated isolated pockets of materials in the vadose zone, resulting in a spike in concentrations observed in several monitoring wells, including the MW-55 boundary well on the southwest side of the benzene plume, in the September 2017 monitoring event. The elevated water table and spike in concentrations were a result of Hurricane Irma, which was an isolated event with rainfall of ten inches over a 48-hour period. Concentrations spiked post hurricane in the fall of 2017, decreased over the following year, and have been below applicable MCLs since the end of 2018. Therefore, this phenomenon has not impacted Site delineation.

- Data collected from the ditch and adjacent monitoring wells show that, with a few exceptions, the surface water ditch is a gaining stream, as the top of the water table at wells MW-65A and MW-68 is generally about 1 foot higher than the surface water elevation (Figure 4-6).

- However, there is no threat of contaminants migrating to the ditch, as both plumes are stable. Additionally, only the top 0.5-1 foot of the shallow aquifer intersects the bottom of the ditch. Nearby detections of cis-1,2-dichloroethylene (DCE) in MW-65A and MW-68 are at the 15-20 ft bgs interval, well below the bottom of the ditch. Additionally, borings TB-33 and TB-34 (collected near MW-65) and TB-36 (collected near MW-68) were non-detect for all VOCs in the 6-10 ft bgs depth interval in 2016, which is the depth range that is most representative of any groundwater that may flow into the ditch.

Table 4-1 – Well Construction Details and Groundwater Elevations

Monitoring Well ID	Northing (Feet - GA State Plane East Zone NAD 83)	Easting (Feet - GA State Plane East Zone NAD 83)	TOC Elevation (Feet)	Screen Interval (Feet bgs)	April 2020 Groundwater Elevation (ft)	October 2020 Groundwater Elevation (ft)
MW-1	849110.25	403207.4	12.97	5.72 - 10.72	7.48	6.85
MW-17	849017.4651	403064.634	14.9	2 – 7	7.4	6.6
MW-20	849193.6931	403069.1068	10.41	2 – 7	7.17	6.44
MW-30	849113.8839	403377.4126	13.65	2 – 12	8.05	7.32
MW-31	849094.6002	403397.0775	13.29	5.08 - 15.08	8.27	7.44
MW-36	849083.2571	403445.5644	14.18	2 – 12	8.27	7.44
MW-37	849118.4012	403453.7957	14.5	5.2 - 15.2	8.19	7.47
MW-38A	848995.8015	403357.1839	13.221	5.24 - 15.24	7.931	7.191
MW-38B	848993.5533	403359.1112	13.169	13.9 - 18.9	7.839	7.109
MW-38C	848998.0861	403354.5049	13.037	18.4 - 23.4	7.817	7.087
MW-38D	848991.4947	403361.2676	12.863	33.75 - 38.75	NM	6.323
MW-44	848941.5166	403336.0116	12.14	5.2 - 15.2	7.77	7
MW-45	848994.8106	403277.2688	12.62	5.2 - 15.2	NM	6.97
MW-47A	849060.0368	403288.5505	12.9	5.21 - 15.21	7.65	7
MW-47B	849056.9159	403290.4758	13.211	13.78 - 18.78	7.681	7.031
MW-47C	849061.1534	403292.9777	13.353	18.35 - 23.35	7.673	7.023
MW-47D	849064.1939	403295.6417	13.386	34.35 - 39.35	6.856	6.296
MW-48	848919.2064	403355.9273	12.763	5.3 - 15.3	7.773	7.003
MW-51R	849064.85	403251.52	12.133	2 – 12	7.633	6.933
MW-52	849151.5841	403270.8866	13.034	5.15 - 15.15	7.574	7.054
MW-53	849263.2634	403284.4125	12.415	2 – 12	7.385	7.055
MW-54	848863.787	403313.3914	13.982	2 – 12	7.602	6.902
MW-55	848874.6118	403265.3544	13.807	2 – 12	7.477	6.807

Table 4-1 – Well Construction Details and Groundwater Elevations

Monitoring Well ID	Northing (Feet - GA State Plane East Zone NAD 83)	Easting (Feet - GA State Plane East Zone NAD 83)	TOC Elevation (Feet)	Screen Interval (Feet bgs)	April 2020 Groundwater Elevation (ft)	October 2020 Groundwater Elevation (ft)
MW-57	849230.6889	403247.7994	12.331	2 – 12	7.221	6.901
MW-58	849317.7841	403282.0799	12.755	2 – 12	7.265	6.985
MW-62A	849114.6951	403061.7081	14.25	17.6 - 22.6	7.35	6.58
MW-62B	849112.1431	403066.7598	14.5	27.7 - 32.7	6.66	6.12
MW-63A	849027.6889	403012.8085	13.56	18.06 - 23.06	7.31	6.51
MW-63B	849033.4877	403010.3339	13.55	27.88 - 32.88	6.81	6.19
MW-64A	849126.438	403006.5571	13.5	18 – 23	7.25	6.48
MW-64B	849131.9713	403006.7595	13.46	27.8 - 32.8	6.61	6.09
MW-65A	849241.7987	402994.804	12.71	17.9 - 22.9	6.55	6.07
MW-65B	849245.8842	402994.9656	12.98	27.7 - 32.7	6.64	6.12
MW-66	848937.0949	402979.2215	13.33	17.75 - 22.75	7.08	6.32
MW-67	849116.488	402893.938	13.15	17.91 - 22.91	7.08	6.38
MW-68	849311.068	402913.8138	13.33	17.88 - 22.88	6.32	6
MW-69	848827.6	403217.99	14.483	8.1 - 18.1	7.203	6.653
MW-70	849334.07	403106.27	14.238	12.9 - 22.9	6.218	6.018
UP-1	848798.363	403895.676	11.86	7.5 - 17.5	NM	NM

NOTES:

NAD 83 = North American Datum 1983

TOC = Top of Casing

NM indicates Not Measured

4.4 Existing Groundwater Conditions

Benzene continues to be detected above its MCL in wells downgradient of the Former First Flush Basin, however concentrations have been steadily decreasing over time (Figure 4-7). The wells surrounding the Former Wet Well continue to be non-detect for benzene and other VOCs. Concentrations in wells further downgradient remain stable or are gradually decreasing (Figure 4-7). The benzene plume is bounded by non-detect wells on all sides.

At the request of the Georgia EPD, the groundwater sampling method was changed in the first quarter of 2018 from collecting the sample via a peristaltic pump to using a Teflon bailer to collect groundwater samples following purging and stabilization of groundwater parameters via a peristaltic pump. A significant increase was observed in the benzene levels at MW-34A following the change in sampling method. Subsequent comparison of sampling methodologies determined that this was related to the change in sampling methods and not a potential release or new source of benzene at the Site.

Chlorinated solvents, specifically cis-1,2-DCE, continue to be detected downgradient of the Former PCE Drum Area. The chlorinated solvent plume is stable, with wells showing either decreasing or stable concentration trends over time (Figure 4-8). The chlorinated volatile organic compounds (cVOCs) plume is bounded on all sides by wells that are at or near non-detect for the chlorinated VOCs. Ratios of the cVOCs detected in the monitoring wells show that very little PCE is detected in groundwater, cis-1,2-DCE is the primary cVOC detected, and concentrations of vinyl chloride are stable (Figures 4-9 – 4-10).

5.0 Closure and Post Closure

5.1 Closure

Closure activities are summarized below. The final Closure Report containing detailed descriptions of closure activities for the First Flush Basin, Process Wet Well, aeration basin, and underground sewer lines is included as Attachment C.

The Former First Flush Basin was approximately 35 ft. x 24 ft. and 6.5 feet in depth. The basin was made of concrete that was approximately 1 ft. thick and had two influent and two effluent lines. During closure activities, the fiberglass cover and other associated equipment were removed from the basin, cleaned, and disposed of off-site. Following a thorough pressure-cleaning of the concrete floor and walls, the basin was filled in with 202 cubic yards of stone and capped with concrete.

The Former Process Wet Well was approximately 14 ft. x 11.5 ft. and 11 ft. in depth. The Wet Well was made of concrete which was approximately 1 ft. thick and had four influent lines and two effluent lines. During closure activities, the concrete cover and associated equipment were removed from the well, cleaned, and disposed off-site. Following a thorough pressure cleaning of the concrete floor and walls, the Wet Well was filled in with 65.6 cubic yards of concrete.

The Former Underground Wastewater Lines conveyed wastewaters from the process areas to the First Flush or Wet Well basins. The lines were made of vitrified clay with cemented joints. Prior to the closure of the basins, all underground wastewater lines were flushed and process area drains were sealed with concrete grout. After completion of cleanout of the Wet Well and First Flush basins, the underground lines were cleaned using a water jet and vac truck and steam. Following cleaning and video inspection of the lines, at a minimum, the ends of the underground lines were grouted and plugged.

During closure activities, all remaining liquids and solids were removed from the aeration basin. The basin and its associated equipment were cleaned with a pressure washer and the underground lines associated with the basin were excavated and removed. After the basin was cleaned, two temporary groundwater wells were installed in the basin and four soil samples were collected from the earthen berm surrounding the basin. Additionally, five permanent monitoring wells were installed on each side of the aeration basin. There were no exceedances of USEPA residential soil screening levels, tap water screening levels, or ecological screening levels detected in any sample. All concrete was removed from the basin and the area has been backfilled and re- vegetated. Clean closure of the aeration basin was confirmed in a May 12, 2017 letter from Mike Elster with EPD. A copy of the May 12, 2017 letter is included in Attachment A.

Subsequent to clean closure of the Former Flush Basin and Former Process Wet Well, a 2018 survey was performed and a 2021 Environmental Covenant was signed. The survey shows the locations of the Former Flush Basin and Former Process Wet Well and the Environmental Covenant restricts the use of groundwater at the Site. The survey and covenant are provided in Attachment F. The Covenant has been signed and notarized by Symrise and submitted for agency signature.

5.2 Post-closure Plan

A post-closure plan addressing the requirements of the regulations follows.

5.2.1 Inspection Plan

A description of items to be inspected and the inspection procedures associated with the inspection items are discussed below.

Security Devices

The main entrance to the plant consists of the main gate and two electronic access points (the administration building and the pedestrian gate). These gates are used for Site and contractor personnel, vendors, deliveries, and product shipments. All gates are routinely checked by security personnel and any operational problems with these gates or security systems are promptly reported and repaired as part of the Site's standard operating procedures.

Well Condition

Wells surrounding the First Flush Basin and Process Wet Well and all wells in the PCE Drum Areas are in good condition. All monitoring wells are inspected for damage during each sampling event, and the condition of wells is documented on the monitoring well sampling records. An inspection checklist based on Georgia EPD's monitoring well maintenance guidance is included as Attachment G.

Monitoring Plan

Groundwater in the First Flush Basin and Process Wet Well and the PCE Drum Storage Area is currently being monitored. The monitoring proposed for these areas is detailed in Section 6.3.

5.2.2 Maintenance Plan

The First Flush and Wet Well Basins and Former Underground Lines have all been properly closed and filled in with concrete or grouted in, and do not serve to cap or cover any remaining waste. The PCE drum has been removed from the Site. There is no threat of release from the foregoing and therefore, no maintenance or inspections are necessary to monitor these locations for future releases.

On-site monitoring wells are inspected each time they are sampled or groundwater levels are measured. Any deficiency in well condition is noted and arrangements are made for well repair. Maintenance repairs include damages to well flush-mount installations, aboveground protective casings, concrete bases, and well caps. Damages to a well which would jeopardize the integrity of the well will be repaired or replaced within 60 days of the well inspection by a licensed environmental drilling contractor. Oversight will be conducted by Blue Jay's environmental consultant.

5.3 Post-closure Contact

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209 SCM Road
Brunswick, GA 31523
(912) 261-3314

6.0 Corrective Action

This section describes the Corrective Action Plan (CAP) and groundwater monitoring plan for the Site. This CAP documents the areas of application, the remedy to be employed and methods for their execution, including monitoring and determination of effectiveness.

6.1 Overview of Investigations and Monitoring

Groundwater characterization and monitoring began in 2005 following the completion of the LNAPL recovery program, as required by the 1993 Consent Order. Monitoring has focused on the portions of the Site with VOCs present in the shallow groundwater, as discussed below. In April 2016, EPD agreed to suspend sampling the existing monitoring wells downgradient of the Former PCE Drum Area pending completion of delineation activities and installation of monitoring wells at more representative depths (NewFields 2017). Monitoring resumed in this area in March 2017, and selected wells in the Former First Flush Basin and Process Wet Well area were sampled on a quarterly basis between 2016 and 2018. Groundwater analytical results are included in Appendix B. Monitoring well locations are shown on Figure 6-1 and temporary groundwater boring locations are shown on Figure 6-2. Previous investigations and remediation activities are summarized in Table 6-1.

Benzene

Benzene is present in shallow groundwater in the central portion of the Site, in the vicinity of the Former Wastewater Units (Figure 6-3). Monitoring wells surrounding the Former Process Wet Well indicate the Wet Well was not a source of benzene in groundwater. The extent of benzene in groundwater covers approximately 0.5 acres and the edge of the fully delineated plume is over 700 feet from the nearest Site boundary.

In 2005, benzene was detected in MW-9 at concentrations exceeding the maximum contaminant level (MCL). In 2006, additional samples were collected to assess the groundwater in the vicinity of MW-9; no VOCs, including benzene, were detected above MCLs from the well (URS 2006b). Groundwater samples from two temporary wells located north of MW-9 contained concentrations of benzene exceeding the MCL. EPD requested semi-annual sampling and monitoring of wells MW-1, MW-4, MW-5, MW-9, MW-10, and MW-13 to determine if the VOC contamination had attenuated or migrated (Brown and Caldwell 2016). At the time of closure of the First Flush and Wet Well Basins, benzene was non-detect in all of the historical wells.

During closure of the First Flush Basin, benzene was detected above the MCL in three wells (MW-21, MW-27, and MW-31). One of these wells, MW-31, is in the location of a breach in an underground wastewater line. Wells MW-21 and MW-27 are also located less than five feet from Former Underground Wastewater Lines. Additional step-out samples were collected to define the horizontal extent of the benzene detections, and three sets of paired wells were installed at depths of 15, 20, 30, and 45 feet bgs to define the vertical extent.

Between 2017-2020, benzene has been detected above its MCL with decreasing concentrations over time. All wells surrounding the Former Process Wet Well were non-detect for benzene. The horizontal extent of the plume is largely unchanged since routine Site-wide groundwater monitoring began in 2016.

Chlorinated Solvents

Chlorinated solvents, including PCE, trichloroethylene (TCE), cis-1,2-dichloroethylene (cis,1,2-DCE) and vinyl chloride (VC) are present above their respective MCLs south of the Former PCE Drum Area, with cis-1,2-DCE being the primary COC in the area (Figures 6-4 – 6-7). The

chlorinated solvent area covers approximately 0.8 acres and the edge of the fully delineated plume is approximately 800 feet from the nearest property boundary.

In April 2009, concentrations of cis-1,2-DCE and VC were detected above MCLs in monitoring well MW-5. Based on these detections, EPD requested that the Site continue to monitor wells MW-1, MW-4, MW-5, and MW-13 semi-annually for VOCs. In MW-5, cis-1,2-DCE and VC have been detected at concentrations above the MCLs. As a result, Renessenz conducted a soil and groundwater investigation in August 2012 to determine the horizontal and vertical extent of VOCs in the area around MW-5. Two temporary wells, TW-1 and TW-2 were installed near MW-5, and soil and groundwater samples were collected for VOC analysis. At the request of EPD, wells TW-1 and TW-2 were converted to permanent monitoring wells in May 2013 and renamed MW-14 and MW-15, respectively.

In November 2013, 15 temporary borings were advanced in the vicinity of monitoring well MW-5 during an additional soil and groundwater investigation. Eight of the temporary borings were further advanced into shallow groundwater and temporary wells installed. Only one well (TB-2) had groundwater containing detectable concentrations of VOCs. Temporary wells TB-3 and TB-8 through TB-10 were then converted to permanent monitoring wells in May 2014. Temporary well TB-2 was inadvertently destroyed prior to May 2014 and was therefore reinstalled as a permanent monitoring well in November 2014 (MW-16).

In July, September, and October 2015, additional investigation activities were completed to assess the feasibility of using enhanced in-situ anaerobic bioremediation to treat the groundwater downgradient of the Former PCE Drum Area. In July 2015, wells MW-40, MW-41, and MW-42 were installed northwest of MW-14 (MW-40) and to the south of the Area 5 process area (MW-41 and MW-42). Additionally, three soil borings, TB-16 through TB-18, were advanced to a total depth of 27 ft. bgs. Soil samples were collected from TB-16 and TB-17, and groundwater samples were collected from all three borings at depths of 20 feet and 27 ft. bgs. The soil samples were analyzed for total iron and total organic carbon, and the groundwater samples were analyzed for VOCs. Additional groundwater samples were collected from MW-1, MW-5, MW-14, and MW-16 and analyzed for geochemical parameters. Concentrations of PCE, TCE, cis-1,2-DCE, and/or VC were detected above MCLs in the three temporary borings (Brown and Caldwell 2016).

Based on the July 2015 groundwater results, EPD requested Renessenz complete additional borings and groundwater sampling at multiple depths within the solvent detections area to determine the vertical profile of VOCs, delineate the horizontal extent of VOCs at depths between 10 and 40 feet bgs, and confirm the presence of a continuous clay unit at approximately 39 to 41 feet bgs. In September 2015, three soil borings (TB-19, TB-21, and TB-23) were advanced to the top of the clay layer at approximately 42 feet bgs. The clay layer was encountered at depths ranging from 42 to 44 ft bgs, suggesting that the clay unit is continuous throughout the area. Six additional borings were completed for discrete groundwater sampling. Groundwater samples were collected from four intervals per boring: 6 to 10 ft bgs, 16 to 20 ft bgs, 26 to 30 ft bgs, and either 36 to 40 ft bgs or 38 to 42 ft bgs. The investigation confirmed that VOCs were present at depths deeper than the screened intervals of most of the shallow (7 ft. deep) monitoring wells. VOCs were detected above MCLs in four borings (TB-21, TB-22, TB-23, and TB-24).

In October 2015, one permanent monitoring well (MW-61) was installed adjacent to the TB-22 location, and five temporary groundwater borings were installed at the estimated downgradient edge of the plume. MW-61 was installed to a depth of 40 feet to confirm a low detection of PCE (9.1 ug/L) in the 38-42 ft. bgs interval. MW-61 has been sampled twice, and both times was non-detect for PCE. Groundwater samples were collected from the temporary groundwater borings from the same four sample intervals as listed above. VOCs were detected above MCLs in borings TB-25, TB-26, TB-27, and TB-29.

Between February and May 2016, 20 additional borings were conducted south of Area 5. Discrete groundwater samples were collected using the GeoProbe ® Screen Point Groundwater Samplers from the following intervals: 6 to 10 ft. bgs, 16 to 20 ft. bgs, and 26 to 30 ft. bgs. Fifty-nine of the 61 samples (97%) collected were non-detect or below MCLs for all chlorinated solvents. Vinyl chloride and cis-1,2-DCE were detected above their MCLs in sample TB-30 in the 16-20 ft bgs interval. Cis-1,2-DCE, TCE, and PCE were detected above their MCLs in TB-34 at the 16-20 ft bgs interval. All samples in the 6-10 ft bgs interval and deeper than 20 ft bgs were either non-detect or below MCLs for chlorinated solvents.

Additional monitoring wells were installed downgradient of the Former PCE Drum Area in January 2017 and have been regularly sampled since March 2017. The horizontal extent of the plume has not changed since the additional monitoring wells were installed in January 2017 and the plume conditions are stable.

A surface water ditch is located approximately 250 feet southeast of the Former PCE Drum Area. The surface water in the ditch, which is primarily discharge from the pond in the northern portion of the Site, was first sampled in April 2016 and has been monitored during each groundwater monitoring event since September 2017. All samples collected from the ditch have been non-detect for all VOCs, including the chlorinated solvents (NewFields 2017).

Appendix IX

The Appendix IX laboratory reports, previously submitted to EPD, are provided in Attachment H. The only constituents detected at concentrations greater than established regulatory criteria are those currently identified as constituents of concern at the Site (benzene, cis-1,2-dichloroethylene, and vinyl chloride). Well UP-1 was installed in November 2020 to provide information on background conditions relative to the Site. Only naturally occurring inorganic constituents were detected and all were below relevant regulatory criteria.

6.1.1 Past Corrective Actions

In July 2016, a pilot test was conducted at the Site to determine the feasibility of in-situ chemical oxidation (ISCO) to reduce contaminant concentrations in groundwater, primarily benzene. Between July 11 and July 22, 2016, a total of 28,339 gallons of 5.4% Catalyzed Hydrogen Peroxide (Fenton's Reagent) were injected throughout the benzene plume. The pilot study found that while a reaction may have occurred in the subsurface, benzene concentrations were largely unchanged (EA 2016).

Table 6-1 – Summary of Investigations and Corrective Actions

Date	Summary
1992 - 2002	LNAPL recovery system. Four monitoring wells installed in 1992; five additional wells installed in 1993; one additional recovery well installed in 1995. System operated from 1993-2002; LNAPL monitoring from 2002-2005 without detection. Recovery wells abandoned in 2006.
1993	Quarterly monitoring begins for LNAPL.
March 1994	Underground Sewer Integrity Test Report.
July 1994	Six additional monitoring wells installed along former underground sewer line.
1995	Area 2 - Area 9 sewer line abandoned and moved aboveground.
2005	Groundwater monitoring for VOCs begins; benzene detected in MW-9 above its MCL.

Date	Summary
2005	U-drains in Area 6/12 replaced.
2006	Additional delineation efforts conducted in vicinity of MW-9. EPD requests semi-annual sampling of six monitoring wells for VOCs.
2011 - 2015	Closure of former wastewater treatment plant and underground lines. All wastewater lines were moved aboveground.
2012	Soil and groundwater investigation to delineate extent of VOCs in vicinity of MW-5. Two temporary wells were installed and later converted to permanent monitoring wells.
November 2013	15 temporary borings installed in vicinity of MW-5.
July 2015	Additional investigation activities to assess the feasibility of using enhanced in-situ anaerobic bioremediation to treat the groundwater downgradient of the former PCE drum area.
September - October 2015	Additional delineation of VOCs downgradient of Former PCE Drum Area.
October 2015	A core soil sample was taken immediately beneath the concrete pad where the Former PCE Drum was stored, confirming that this was the plume source.
April 2016	EPD agreed to suspend sampling of the wells downgradient of the Former PCE Drum Area pending additional delineation activities.
2015 - 2017	Implemented PCE storage and handling improvements.
2016	Pilot injection test on benzene plume.
2016 - 2017	Delineation of VOCs in groundwater downgradient of Former First Flush and Wet Well Basins.
January 2017	Additional monitoring wells installed downgradient of Former PCE Drum Area.
June 2017	Temporary borings for chloroform in the vicinity of the cooling towers. One hit was identified and a permanent well (MW-70) was later installed at this location.
2017 - 2019	Quarterly monitoring for VOCs in groundwater; monitoring downgradient of F ormer PCE Drum Area resumes.
October 2018	Phytoremediation feasibility study downgradient of Former PCE Drum Area.
2019 - Present	Semi-annual monitoring for VOCs in groundwater.
December 2019	Boiler area soils were sampled for hexavalent chromium and were ND.
December 2019	Groundwater well in the former sprayfield area (MW-67) was sampled for nickel and found to be non-detect.
2020	Appendix IX sampling conducted to confirm VOCs are the only constituents of concern at the Site.
November 2020	25 wells abandoned and UP-1 background well installed (and sampled for appendix IX).

6.2 Conceptual Site Model

The following sections describe the Conceptual Site Model, including sources of contaminants, regional and Site hydrogeology, the current condition of groundwater at the Site, and the extent of impacts at the Site.

6.2.1 Source Overview

There are several historical potential sources of contamination at the Site, which are discussed below. All sources have been removed and/or closed, and there are currently no known active sources at the Site.

Benzene has never been used at the Site; however, it is a by-product of the pyrolysis of pinane. Based on past investigations and available data, the source of benzene in groundwater is the Former First Flush Basin and associated underground piping. During the closure process, cracks were identified in the First Flush Basin and at several locations along the Former Underground Wastewater Lines. Benzene has never been detected in groundwater surrounding the Former Process Wet Well, therefore the Wet- Well is not believed to be a source of benzene in groundwater.

In addition to benzene, several other minor groundwater constituents have been detected, in concentrations below the groundwater standards, in the wells around the Former First Flush Basin. These constituents are also incidental contaminants produced during the pyrolysis process and include 2-hexanone, cumene, xylenes, methyl ethyl ketone, methyl isobutyl ketone, and toluene. These constituents are also by-products of the pyrolysis process. As these constituents are all co-located with benzene and are all VOCs, the corrective action proposed for benzene will also address these minor constituents.

Tetrachloroethylene (PCE) has only been used in the Area 5 process area of the Site. Since the 1990s, PCE has been used as needed to enhance the catalyst selectivity of the process. A small amount of PCE, typically 0.1 to 1 gallon, is added to the reactor as needed by drawing it from a one-gallon container into the circulation sample port. Historically, PCE was stored on a drum dolly in the process area. Prior to 2010, the drum was stored on an open metal drum dolly. In 2010, the dolly was replaced with a plastic containment dolly. Operators would pour a gallon or less of PCE from the drum into a one-gallon transfer container as needed. Due to the infrequent usage of PCE and to reduce the potential for leaks or spills during transfer, Symrise discontinued handling PCE in drums in May 2017 and now purchase PCE in individual one-gallon containers. In October 2015, PCE was detected in a soil sample collected beneath the Former PCE Drum Storage Area slab at a concentration of 26 mg/kg, and PCE was the only VOC detected in the sample (Brown and Caldwell 2016). The chlorinated solvents, primarily cis- 1,2-dichloroethylene, detected in groundwater within the AOC are not currently used at the Site, nor have they been previously used. Thus, it is likely these compounds are present due to the reductive dechlorination of PCE (see Section 3.4 and Figure 3-5).

The RCRA Facility Assessment for the Site, completed in June 2020, did not identify any sources other than the two discussed above (GA EPD, 2020).

6.2.2 Contaminant Fate and Transport

Contaminant fate and transport at the Site was modeled using EPA's BIOSCREEN (for benzene) and BIOCHLOR (for chlorinated solvents) models. The models were run based on the conditions of the surficial aquifer at the Site. A table of input data for the BIOSCREEN model is provided as Table 6-2 and a table of the BIOCHLOR model inputs is provided as Table 6-3. Both model outputs show that VOCs in the subsurface will attenuate before reaching the nearest downgradient Site boundary. The model predictions are shown in Figure 6-8 and 6-9, and the

model parameters are provided in Appendix C. Based on the BIOSCREEN model, benzene is predicted to reach non-detect levels between 510 and 680 feet downgradient of MW-34A, which is over 600 feet from the downgradient Site boundary.

The BIOCHLOR model shows similar predictions for the chlorinated solvent plume. Based on the model output, cis-1,2-DCE is expected to attenuate to non-detect levels between 780 and 910 feet downgradient of MW-14, which is over 500 feet from the downgradient Site boundary. Additionally, if no degradation occurs, levels are expected to reach non-detect by 1,040 feet downgradient of MW-14, nearly 300 feet before reaching the Site boundary.

Table 6-2 – BIOSCREEN Input Parameters

Parameter	**Value**	**Site Specific or Default**	**Source**
Hydraulic Conductivity	0.0254 cm/sec	Site Specific	Average value of slug tests previously conducted at the Site. Average value of 71.5 ft/day = 0.0254 cm/sec
Hydraulic Gradient	0.003 ft/ft	Site Specific	Average gradient across the Site
Porosity	0.3	Default	N/A
Estimated Plume Length	290 ft	Site Specific	Measured length of benzene plume
Soil Bunk Density	1.7 kg/L	Default	N/A
Partition Coefficient	38 L/Kg	Default	N/A
FOC	0.02	Site Specific	Based on TOC data from Site. Data is provided in Appendix D
Solute half-life	1	Default	N/A
Modeled Area Length	1700 ft	Site Specific	Distance from 'source' to downgradient property boundary
Modeled Area Width	200 ft	Site Specific	Approximate width of plume
Simulation Time	30 years	Site Specific	Length of standard post-closure monitoring period
Source Thickness	5 ft	Site Specific	Estimated value as source has been removed based on approximate thickness of vadose zone.
Source Width	50 ft	Site Specific	Estimated value as source has been removed.
Source Concentration	2.6 mg/L	Site Specific	Benzene concentration in well MW-34A
Soluble Mass	500 kg	Site Specific	Estimated value as source has been removed.
Field Data	Varies	Site Specific	Benzene concentrations from wells MW- 34A, MW-47A, and MW-62A

Table 6-3 – BIOCHLOR Input Parameters

Parameter	**Value**	**Site Specific or Default**	**Source**
Hydraulic Conductivity	0.0254 cm/sec	Site Specific	Average value of slug tests previously conducted at the Site. Average value of 71.5 ft/day = 0.0254 cm/sec

Table 6-3 – BIOCHLOR Input Parameters

Parameter	Value	Site Specific or Default	Source
Hydraulic Gradient	0.003 ft/ft	Site Specific	Average gradient across the Site
Porosity	0.3	Default	N/A
Alpha x	20 ft	Site Specific	10% of total DCE plume length
Alpha y / Alpha x	2 ft	Default	Based on ration of alpha y / alpha x = 0.1*X provided in BIOCHLOR user guide
Estimated Plume Length	290 ft	Site Specific	Measured length of benzene plume
Soil Bunk Density	1.7 kg/L	Default	N/A
FOC	0.02	Site Specific	Based on TOC data from Site. Data is provided in Appendix D
Partition Coefficient	Various	Default	N/A
First Order Decay Coefficient	Various	Site Specific	Adjusted degradation rates to calibrate model to observed field data.
Simulation Time	30 years	Site Specific	Length of standard post-closure monitoring period
Modeled Area Width	150 ft	Site Specific	Approximate width of plume
Modeled Area Length	1300 ft	Site Specific	Distance from 'source to downgradient property boundary
Source Thickness	10 ft	Site Specific	Estimated value as source has been removed.
Source Width	10 ft	Site Specific	Estimated value as source has been removed.
Source Concentration	10 mg/L	Site Specific	Estimated value as source has been removed.
Field Data	Varies	Site Specific	cVOC concentrations from MW-14, MW-62A, and MW-64A

A Human Health Risk Assessment (HHRA) was conducted in 2016 on the soil and groundwater surrounding the Former First Flush Basin and Process Wet Well as part of the closure process (EA 2016). The HHRA identified 13 chemicals of potential concern (COPCs) in groundwater: MEK, 2-hexanone, 4-methyl-2-pentanone, acetone, benzene, cis-1,2-DCE, ethylbenzene, PCE, toluene, TCE, vinyl chloride, m&p-xylenes, and o-xylenes. Receptors identified in the HHRA included the resident, construction worker, and commercial/industrial worker. The HHRA did not identify any concerns for any receptors for exposure to soil. Carcinogenic risk results above USEPA's acceptable risk range were identified for the resident and commercial/industrial scenarios based upon the use of groundwater as a drinking water supply. Non-carcinogenic hazards were above the acceptable level of 1 for all receptors evaluated based on hypothetical ingestion and/or inhalation, although that pathway is not complete. The COPCs contributing to the risk were benzene, TCE, vinyl chloride, and cis-1,2-DCE.

The groundwater exposure pathways evaluated at the Site are not complete and will remain incomplete. Shallow groundwater is not used for any purpose at the Site nor is there any threat or risk of exposure to shallow groundwater. To ensure these pathways remain incomplete, an environmental covenant has been drafted and will be placed on the Site restricting use of shallow groundwater. Additionally, the facility's safe work permit includes a requirement to complete an

excavation permit, when applicable, to ensure that contractors do not come into contact with potentially impacted groundwater. The 2016 HHRA will be updated once the environmental covenant is in place.

6.3 Corrective Action Remedy

Based on the current Site conditions, contaminant trends, and plume characteristics, monitored natural attenuation (MNA) is the most appropriate remedy for the Site. MNA relies upon one or more of several naturally occurring physical processes, including advection, dispersion, dilution, diffusion, volatilization, as well as naturally occurring biodegradation or chemical transformation reactions. Previous groundwater data collected from the Site shows that natural attenuation is occurring, and monitoring will continue to track the progress of MNA.

6.3.1 MNA Groundwater Monitoring Plan

The purpose of this MNA plan is to establish the process and procedures for monitoring groundwater at the Site on a site-wide, holistic basis, to assess the effectiveness of natural attenuation. The proposed groundwater monitoring plan is based on knowledge gained from previous monitoring conducted at the Site. The primary objective is to monitor the extent and stability of the on-site groundwater plumes on a holistic basis.

6.3.2 Groundwater Monitoring Network

The monitoring network for this MNA plan consists of 21 wells at the Site (Figure 6-10). Tables 6-4 and 6-6 details the wells for which periodic Site-wide sampling is proposed, the frequency, and the rationale. The wells selected for this Plan are based on a combination of the following factors:

- Representation of a range of VOC concentrations,
- Well screen interval, and
- Spatial distribution within the VOC plumes including monitoring points along the perimeter and the interior of the plumes.

All wells listed in Table 6-4 will be monitored twice per year in odd numbered years and once in even numbered years for VOCs by EPA Method 8260D. One Point of Compliance (POC) well will be sampled annually on a rotating basis for all constituents listed in 40 CFR 264, Appendix IX. In addition, during the annual sampling event to be conducted in the even numbered years, nine additional wells will be sampled along with the previously referenced 12 wells and also analyzed for VOCs by EPA Method 8260D. The 21 wells to be sampled annually in the even numbered years are listed in Table 6-6. A list of VOCs that have been detected in groundwater samples collected at the Site in 2019, 2020, and 2021 is provided in Table 6-5. Other VOCs have been detected at low concentrations in groundwater at the Site, however they have not been detected in the past three years and thus are not included in Table 6-5. During each sampling event, field water quality parameters including dissolved oxygen (DO), pH, oxidation reduction potential (ORP), and conductivity will be collected and recorded prior to sampling. In addition, the BIOSCREEN and BIOCHLOR models will be updated annually and any new Site specific data collected will be incorporated into the model updates. A list of current Site-specific and default values used in the models is provided in Tables 6-2 and 6-3. A Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) supporting this program is in Appendix D. Additional wells may be sampled as needed and on a voluntary basis to supplement the monitoring lists in Tables 6-4 and 6-6.

Table 6-4. Monitoring Wells to be Sampled in Odd Years

Well ID	Site Area	Schedule	Rationale
MW-47A	Fmr. Wastewater Units	Semi-annual*	POC/MNA well for benzene
MW-62A	Fmr. PCE Drum Area	Semi-annual*	POC/MNA well for cVOCs
MW-53	Fmr. Wastewater Units	Semi-annual*	POC well
MW-66	Fmr. PCE Drum Area	Semi-annual	Defines horizontal extent to the south
MW-67	Area 6/12	Semi-annual	Defines horizontal extent to the south
MW-68	Area 6/12	Semi-annual	Defines horizontal extent to the south
MW-69	Area 6/12	Semi-annual	Defines horizontal extent to the south
MW-38A	Fmr. Wastewater Units	Semi-annual	MNA well for benzene
MW-51R	Fmr. Wastewater Units	Semi-annual	MNA well for benzene
MW-63A	Fmr. PCE Drum Area	Semi-annual	MNA well for cVOCs
MW-64A	Fmr. PCE Drum Area	Semi-annual	MNA well for cVOCs
UP-1	Background	Semi-annual	Upgradient background well

***** One POC well will be sampled annually on a rotating basis for the constituents listed in 40 CFR 264, Appendix IX.

Table 6-5. Current Groundwater COCs

Analyte – Background or ACL		
1,2-Dibromoethane	Chloromethane	Naphthalene
1,1-Dichloroethene	cis-1,2-Dichloroethylene	o-Xylene
2-Hexanone	Cumene	p-Isopropyltoluene
Acetone	Ethylbenzene	Styrene
Benzene	m & p-Xylenes	Tetrachloroethylene
Bromomethane	Methyl ethyl ketone	Toluene
Carbon disulfide	Methyl isobutyl ketone	trans-1,2-Dichloroethylene
Chlorobenzene	Methylcyclohexane	Trichloroethylene
Chloroethane	Methylene Chloride	Vinyl chloride
Chloroform		Xylenes (total)*

6.3.3 Groundwater Sampling Procedures

Per discussions/negotiations with the GAEPD in September and October of 2021, groundwater monitoring will be conducted twice per year in odd numbered years and once per year in even numbered years. The wells to be sampled during the odd numbered years are listed in Table 6-4 above and the wells to be sampled in even numbered years are listed in Table 6-6 below. Groundwater sampling will be conducted in accordance with USEPA Field Branches Quality System and Technical Procedures no. SESDPR OC-301-R4. Low flow sampling procedures will be utilized and the samples will be collected via Teflon-lined bailers. Field parameters will be measured during sampling and every attempt will be made to ensure turbidity is less than 10 nephelometric turbidity units (NTUs) at the time of sample collection. A complete Sampling and Analysis Plan is provided as Appendix D.

Table 6-6. Monitoring Wells to be Sampled in Even Years

UP-1	MW-51R	MW-64B
MW-1	MW-53	MW-65A
MW-30	MW-54	MW-65B
MW-38A	MW-62A	MW-66
MW-38D	MW-62B	MW-67
MW-47A	MW-63A	MW-68
MW-47D	MW-64A	MW-69

6.3.4 Groundwater Protection Standard

The Former First Flush Basin, Former Process Wet Well, and Former Underground Lines are all HWMUs as designated by EPA and the Former PCE Drum Area is an AOC. MCLs are being utilized as the Groundwater Protection Standard (GPS) for the former PCE drum area AOC in accordance with Georgia EPD's SWMU Guidance document.

In accordance with 40 CFR §264.92-94, the GPS utilized for the Process Wet Well and First Flush Basin constituents will be background for VOCs (which are non-detect), or the 40 CFR §264.94 Table 1 maximum concentration, or an alternate concentration limit (ACL) which will be pursued after issuance of this permit. The Site has no receptors or complete pathways for any COC; therefore, a site-specific standard is appropriate to assess the risk at this Site and remediate based on appropriate Corrective Action endpoints per EPA-supported guidance and policy (See, for example, May 1,1996 EPA Proposed Rules for Corrective Action at Solid Waste Management Units and Hazardous Waste Management Units, Cotsworth Memo, March 16, 1998) and consistent with precedence established at other GA sites.

6.3.5 Procedures for Establishing Background Water Quality

A background well, designated as UP-1, was installed in November 2020 at a location hydraulically upgradient of the regulated units and AOC at the Site (Figure 6-11). Statistical analysis of the data obtained from the background monitoring well will be used to evaluate background conditions at the Site in accordance with the procedures outlined in 40 CFR 264.97(h).

6.3.6 Procedures to Evaluate Groundwater Monitoring Data

The primary constituents of concern (COCs) in on-site groundwater are benzene and chlorinated VOCs. Groundwater samples will be collected from the 12 wells listed in Table 6-4 on a semi-annual basis in odd numbered years and the 21 wells listed in Table 6-6 on an annual basis in even numbered years. Groundwater data for the Site will be evaluated in annual groundwater monitoring reporting. Annual groundwater reports will present maps showing groundwater elevations and contours and concentrations of benzene and select cVOCs in groundwater. Time series charts showing concentration trends over time in individual wells will be included. All groundwater data will be reviewed for quality assurance/quality control (QA/QC), as outlined in the QAPP, prior to submittal to EPD.

6.3.7 Measurement of Groundwater Standard Compliance

The primary objective of the groundwater monitoring program is to ensure that COCs in the groundwater are not migrating off-site. MCLs are being utilized as the GPS for the former PCE drum area AOC in accordance with Georgia EPD's SWMU Guidance document.

In accordance with 40 CFR §264.92-94, the GPS utilized for the Process Wet Well and First Flush Basin constituents will be background for VOCs (which are non-detect), or the 40 CFR §264.94 Table 1 maximum concentrations, or an alternate concentration limit (ACL) which will be pursued after issuance of this permit. Three monitoring wells have been designated as the current Point of Compliance (POC) wells at the Site. Wells MW-47A and MW-53 are downgradient of the Former Wastewater Treatment Units and MW-62A is downgradient of the Former PCE Drum Area. The POC wells are shown on Figure 6-12.

6.3.8 Reporting

An annual report will be submitted on an annual basis by April 1 of the following year. The report will include:

- Descriptions of work performed during the past year,
- Groundwater elevations,
- Groundwater potentiometric map,
- Updated groundwater flow rate with calculation,
- Groundwater analytical results,
- Concentration time series charts,
- Plume maps
- Updated geochemical results of Bioscreen and Biochlor models, and
- Recommendations for any adjustments to the groundwater monitoring plan.

In an effort to keep the GA EPD abreast of sampling results, a brief data submittal letter will be provided within 30 days of receipt of laboratory results and once the data has undergone validation.

7.0 Financial Assurance

The post-closure care cost estimate including annual estimated costs are included in Table 7-1. The annual costs are $20,790.00 with a 30-year cost of $623,700. This cost estimate will be updated as appropriate to show increases or decreases in post-closure costs.

Blue Jay is providing financial assurance for post-closure care in accordance with the requirements of 40 CFR 122.25(a)(15) and 264.145 on behalf of Symrise. Currently, Blue Jay has an irrevocable standby letter of credit with BMO Harris Bank N.A. for $359,000 and a standby trust agreement with U.S. Bank. Upon issuance of the post-closure care permit, the letter of credit will be updated to $717,255.00 and issued to the benefit of Symrise. The current letter of credit and trust agreement are included as Attachment I.

Table 7-1. Post-Closure Care Cost Estimate

Task	Activity	Quantity	Unit	Rate per Unit	Annual Total
1	Inspections and Inspection Reporting	2	Inspection	$500.00	$1,000
2	Groundwater Monitoring Program				
	Labor	2	Event	$4,000	$8,000
	Materials	2	Event	$550	$1,100
	Laboratory (16 samples per event)	2	Event	$1,120	$2,240
	Disposal	2	Drums	$300	$600
	Data validation and GIS update	2	Event	$1,000	$2,000
3	Annual Report	1	Report	$5,850	$5,850
	Annual Total				**$20,790**
	30-year Cost				**$623,700**
	30-year Cost with 15% Contingency				**$717,255**

Note: This cost estimate was prepared in current (2021) dollars

8.0 References

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