Conner Samuel 17458

PPC Plan Site Specific Information

In Case of Emergency Call: 911

24-Hour Company Contact Number: 724-743-6700

PA Emergency Contact Number (PADEP): 1-800-541-2050

PA Emergency Contact Number (PEMA): 1-800-424-7362

Type of Facility: Unconventional Well Site
911 Site Address: 130 Grange Rd
McDonald, PA 15057

Municipality, County: Cecil Twp, Washington County
Access Road Coordinates: 40.327153 N -80.219333 W
Pad Coordinates: 40.329075 N -80.218439 W

Well Permit Numbers:

37-125-29167 1H	
37-125-29168 2H	
37-125-28893 3H	
37-125-29170 4H	
37-125-29171 5H	

Site Specific Implementation Authorization

Reviews and revisions (if needed) to the PPC Plan base document as well as this site specific appendix will be completed annually unless plan failure, operational changes, or regulatory revisions necessitate otherwise. Any questions, comments, or suggestions regarding this PPC Plan should be directed to the Environmental Compliance Department.

February 27, 2023
Implementation Date

Site Specific Information Revision Log

The following table is a record of the revisions made to this site specific section of the plan since the original date of site specific implementation. The requirements and applicability for this revision log can be found in Section 1.1 of the Plan base document as well as a log specific to changes to the base plan.

Date	Revision	Signature	Comments
1/21/2025	1	pj	Update to include new base plan and new wells
8/26/2025	2	pj	Periodic Review

Action Item Log

This site specific section of the Plan is in effect as of the implementation date listed above. The following table outlines the actions that must be taken in order to address elements for this Plan section that are missing or incomplete. A table of any outstanding Plan base document items can be found in **Section 1.2** of the Plan base document. Address any field modifications and/or recommended changes to this PPC Plan to the Environmental Compliance Department.

Action Item	Responsible Person	Anticipated Completion Date	Actual Completion Date

Preparedness, Prevention, and Contingency Plan (PPC)

Pennsylvania Unconventional Well Sites & Supporting Facilities Servicing Oil & Gas Well Operations

In Case of Emergency Call: 9-1-1

24-Hour Company Contact Number: 724-743-6700

PA Emergency Contact (PADEP): 1-800-541-2050

PA Emergency Contact (PEMA): 1-800-424-7362

Range Resources-Appalachia, LLC
3000 Town Center Blvd.
Canonsburg, PA 15317

Revised: December 2024

Table of Contents

APPENDICIES

EXECUTIVE SUMMARY

This Preparedness, Prevention and Contingency (PPC) Plan governs Range Resources - Appalachia, LLC's (Range) Pennsylvania oil and gas well sites and other supporting facilities including Tank Pads, Staging Areas & Meter Stations servicing unconventional oil and gas well operations. It has been developed in accordance with 25 Pa. Code § 91.34 & § 78a.55 to outline the measures taken to prevent potential pollution to waters of the Commonwealth. This Plan also includes the pressure barrier policy required by 25 Pa. Code § 78a.55(d) for identifying barriers used during unconventional well site operations, where applicable, as well as Master Containment Plan (MCP) requirements set forth in 58 P.S. § 3218.2. In addition, this PPC Plan also includes the requirements for a Spill Response Plan (SPR) in accordance with Pennsylvania Senate Bill 280, Act 32, the Storage Tank and Spill Prevention Act of 1989.

This PPC Plan is an integral part of Range's environmental compliance and safety and security programs. It is designed to provide preventative measures for foreseeable workplace occurrences by summarizing the operational activities at oil and gas well sites & other supporting facilities servicing unconventional oil and gas well operations, identifying the related regulated substances and wastes, and identifying the method for control and disposal of those substances or wastes.

The objective of this PPC Plan is to provide clear guidance to Range employees and contractors on how to effectively and efficiently prepare for and respond to incidents with the potential for causing accidental releases to waters of the Commonwealth. This PPC Plan will be reviewed on a regular basis with all involved Range personnel.

Range Environmental Compliance is the administrator of this PPC Plan as well as any necessary reviews, revisions, and maintenance. This includes reviews and revisions related to plan failure, operational changes, or regulatory revisions. Any questions, comments, or suggestions regarding this PPC Plan should be directed to Range Environmental Compliance.

The PPC Plan is implemented under the following authority:

Jeremy Matinko

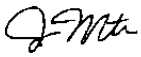
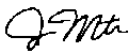
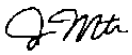
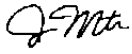
Vice President - Environmental Compliance	December 20, 2024 Date Implemented

1.0 Plan Review and Implementation Record

1.1 Periodic Plan Review and Revisions

The following table is a record of the revisions made to this plan since the original date of plan implementation. It is required by the Pennsylvania Department of Environmental Protection (PADEP) that the plan be reviewed annually. This PPC Plan will also be reviewed and revised if any of the following occur:

- an applicable statute or regulation is revised;
- the Plan fails in an emergency;
- there is a change in the design, construction, operation, or maintenance that materially affects the operation's potential for discharge;
- the list of Emergency Coordinators changes;
- the list of emergency response equipment changes; or
- as otherwise directed by Range management.

Date	Revision	Signature	Comments
03/22/21	1		Integrated plan to include supporting facilities for well sites
11/12/21	2		Revised to include all PA operations
02/27/23	3		Revised to include well development pipelines
6//2024	4		Updated Onsite Material Inventory (Typical). Plan no longer includes impoundment facilities. Update Pressure Barrier Policy. Update plan administrator. Included Dewatering Production Tank Containment appendix
12/2024	5		Update to include incident history (when applicable), downstream notification, SDSs, typical completion & drill out containment layout drawings

1.2 Outstanding Plan Aspect Implementation

This PPC Plan is in effect as of the date indicated on the Executive Summary page. The following table outlines the actions that must be taken to address elements for this PPC Plan that are missing or incomplete. Any field modifications and/or recommended changes to this PPC Plan should be addressed to Range Environmental Compliance.

Action Item	Responsible Person	Anticipated Completion Deadline	Actual Completion Date

2.0 Description of Sites and Supporting Facilities

2.1 Description of Operational Activities – Unconventional Well Sites

Activities to be conducted at unconventional well sites will include but are not limited to; well site construction and restoration, drilling, completions, and production operations. The average product produced at the well sites contains methane, propane, butane, iso-butane, pentane, and longer chain hydrocarbons. The operation's North American Industry Classification Systems (NAICS) code is 21111 (Crude Petroleum and Natural Gas Extraction).

The operational official responsible for each operational activity is set forth below; for contact information of the officials identified below see Appendix A.2. For a site-specific USGS map and site/operational drawings see Appendix G.

A. Well Site Construction and Restoration
Operational Official: Range Construction Supervisor

The well site and access road construction and well site restoration activities are like any other earth-moving activity. Construction operations begin with surveying and marking the well site and access road area. The access road is then constructed, which includes activities such as clearing, leveling and topping the road with an aggregate base. Following access road construction, the well site is constructed by leveling, grading, and topping the selected area with aggregate. During well site and access road construction, restoration and reclamation, erosion and sedimentation (E&S) controls and/or Post Construction Stormwater Management (PCSM) controls are installed in accordance with the established E&S Plan or permit.

After the final well on a well site has been drilled, completed, and is producing, well site restoration activities occur. During this process, all equipment not necessary for producing the wells is removed from the well site. The site will also be fully vegetated and stabilized. When a site is restored, it also is converted from an 'Erosion Control' state to PCSM. All temporary erosion control Best Management Practices (BMPs) are removed, and the post-construction BMPs are installed. This typically involves the conversion of sediment basins to stormwater basins. PCSM BMPs mitigate any increases in stormwater runoff from the

remaining gravel surfaces. Those BMPs are inspected semiannually and after significant rainfall events to ensure they are functioning as designed.

During typical well site construction operations, the only waste stream generated is plant trash (Residual Waste Code (RWC) 710). It is collected, segregated, and stored appropriately at the site prior to disposal per Range's Control and Disposal Plan (CDP) (See Appendix B).

B. Drilling

Operational Official: Range Drilling Supervisor or Drill Site Supervisor

Drilling can be divided into three stages: (1) well spud; (2) vertical bore drilling; and (3) horizontal lateral drilling. A well is initially spud through the use of an auger rig. The auger rig then moves off site and is replaced with an air rig that drills the vertical portions of each well. Following the completion of all vertical bores, a third rig, referred to as a horizontal rig, arrives to complete the drilling of the horizontal leg of the well.

During the drilling process, drilling mud and other drilling fluid wastes (RWC 803), secondary liner materials (RWC 806), drill cuttings (RWC 810), and plant trash (RWC 710) are likely to be generated. These waste streams are collected, segregated, and stored appropriately at the site prior to disposal. Refer to Range's Control & Disposal Plan (CDP) for more detail (See Appendix B).

During drilling operations, employees and contractors entering and exiting location must check in and be accounted for while on the location 24 hours a day. This may include a manned station or an electronic remote entry system. Persons requesting entry to the location must be authorized, accounted for, and must have Range-required personal protective equipment. Persons requesting entry to the location must sign in at the station and must have Range-required personal protective equipment.

C. Completions

Operational Official: Range Completions Supervisor or Operations Manager

The completions process consists primarily of two stages: hydraulic fracturing and flowback. During the hydraulic fracturing stage, production is stimulated from new and existing wells by pumping sand, water, and an additive mixture into the well bore at high pressure to induce fracturing of the producing rock formation. Once the hydraulic fracturing stage is completed, the flowback stage is initiated. During flowback, fracturing fluids will flow back out of the well and will be recycled or reused for completions jobs on other well sites.

During the completions process flowback sand & sludge (RWC 802), secondary liner materials (RWC 806), and plant trash (RWC 710) are anticipated to be generated. It is collected, segregated, and stored appropriately at the site prior to disposal. Refer to the CDP in Appendix B for additional information.

During completions operations, employees and contractors entering and exiting location must check in and be accounted for while on location 24 hours a day. This may include a manned station or an electronic remote entry system. Persons requesting entry to the location must be authorized, accounted for, and must have Range-required personal protective equipment.

D. Production

Operational Official: Range Well-specific Lease Operator and/or Production Supervisor

Once the completions process has been finalized and the pipeline infrastructure to the well site has been constructed, oil, natural gas, natural gas liquids (NGLs), and/or condensate can be produced. Natural gas will be transported via underground pipeline while the oil, condensates, and NGLs are transported via truck.

A producing well site is operated by a dedicated Range Lease Operator through routine maintenance and inspection processes and, on some equipment, by 24-hour remote monitoring. Unconventional sites are equipped with monitors and sensors that provide real-time information to Range's production control center. Each well site is also assigned a dedicated Range Field Environmental Compliance Specialist, who maintains the site through inspection protocols. In addition, mobile security guards monitor production sites periodically on a non-repetitive schedule. Production site access roads are secured with locked gates and fencing when not in use to prevent third party vandalism.

During the production phase of the well only produced fluid (RWC 802) and sediment from production storage (RWC 807) are anticipated to be generated. It is collected and stored appropriately in the production tanks at the site prior to disposal. Refer to the CDP in Appendix B for additional information.

E. Production Tubing Installation

Operational Official: Range Completions Supervisor or Operations Manager

Once a well is placed into production, tubing installation operations may occur at the well site. During this operation a small-diameter tubing string is installed inside the production casing of a well to facilitate the removal of liquids. The tubing is installed in the well while it is under pressure either using a combination of a workover rig and a rig-assist snubbing unit or a dedicated snubbing unit.

During the tubing installation process produced fluid, sand & sludge (RWC 802), secondary liner materials (RWC 806), and plant trash (RWC 710) are anticipated to be generated. It is collected, segregated, and stored appropriately at the site prior to disposal. Refer to the CDP in Appendix B for additional information.

2.2 Description of Operational Activity – WMGR/OG-71 Sites

Activities to be conducted at WMGR and OG-71 sites may include but are not limited to, site construction and restoration, operations, and maintenance. The operational official responsible for each operational activity is set forth below; for contact information of the officials identified below see Appendix A.2. For a site-specific USGS map and site/operational drawings see Appendix G.

A. WMGR/OG-71 Site Construction

Operational Official: Range Construction Supervisor

For sites not on existing well or tank pads, the site and access road construction and site restoration activities are like any other earth-moving activity. Construction operations begin with surveying and marking the site and access road area. The access road is then constructed, which includes activities such as clearing, leveling and topping the road with

an aggregate base. Following access road construction, the site is constructed by leveling, grading, and topping the selected area with aggregate.

For sites on existing well or tank pads, minor grading and aggregate placement on the existing surface will be performed in the tank placement area. Following earthwork, the tank facility, consisting of lined truck off loading and tank containment areas and/or Above Ground Storage Tanks (ASTs), is constructed and the tank/plumbing system and supporting equipment is installed.

During site and access road construction, restoration and reclamation, erosion, and sedimentation (E&S) controls and/or Post Construction Stormwater Management (PCSM) controls are installed in accordance with the established E&S Plan or permit.

After operations at the site are completed, site restoration activities occur. During this process, all operations equipment is removed from the site. The site will be returned to its original state and if required will also be fully vegetated and stabilized. Once 70% perennial vegetative cover has been established, all temporary erosion control Best Management Practices (BMPs) are removed and post-construction BMPs are installed (if applicable). The PCSM BMPs are inspected periodically in accordance with long term maintenance plans, as well as, after significant rainfall events to ensure they are functioning as designed.

During typical site construction operations, the only waste stream generated is plant trash (Residual Waste Code (RWC) 710). It is collected, segregated, and stored appropriately at the site prior to disposal. Refer to the CDP in Appendix B for additional information.

B. WMGR/OG-71 Site Operations

Operational Official: Third Party Contract On-Site Shift Supervisor and Range Water Infrastructure Personnel

Once the site construction is completed, the site can be placed into operation. During normal operations periodic deliveries to and/or withdrawals of fluids from the site occur. The fluids can be reuse water, fresh water, or a combination of both. The delivery and withdrawal mechanisms can be via trucks, pipeline, or a combination of both. Normal site activities may include truck management, radiation scanning of inbound loads (WMGR sites), routine water and air sampling, water transfer contractor oversight, routine equipment maintenance, environmental monitoring, site inspections, and ground keeping activities (e.g. dust control, grass cutting, snow removal, etc.).

Once in normal operations, a WMGR/OG-71 Tank site is staffed with an attendant or security guard 24/7.

During operations only produced fluid (RWC 802), secondary liner materials (RWC 806), and sediment from production fluid storage (RWC 807) are anticipated to be generated at the site. Much of this material is anticipated to be reused for well development activities. Small portions of this material may be collected and disposed of during maintenance operations. Refer to the CDP in Appendix B for additional information.

C. WMGR/OG-71 Site Maintenance

Operational Official: Third Party Contract On-Site Shift Supervisor and Range Water Infrastructure Personnel

Periodically maintenance is performed at the site. Maintenance can either involve cleaning of the tanks and equipment or general equipment maintenance.

Cleaning of the tanks, if required, involves the removal of all fluids and solids from the tanks. During this period fresh water is delivered to the site to be used to facilitate the cleaning. Reuse water and solids are removed from the tanks during cleaning. Fluid delivery and withdrawals during cleaning is by pipeline or truck. Other normal site activities may continue during the treatment process, such as truck management, routine sampling, contractor oversight, routine equipment maintenance, site inspections, and ground keeping activities (e.g. grass cutting, snow removal, etc.).

During cleaning the site is staffed as in normal operations; with an attendant or security guard 24/7. During the maintenance operations, produced fluid (RWC 802) and sediment from production storage (RWC 807) are anticipated to be generated at the site. It is collected and stored appropriately in properly contained tanks at the site prior to disposal. Refer to the CDP in Appendix B for additional information.

2.3 Description of Operational Activity – Staging Areas and Tank Pads

Activities to be conducted at staging areas and tank pad sites may include but are not limited to, site construction and restoration, operations, and maintenance. The operational official responsible for each operational activity is set forth below; for contact information of the officials identified below see Appendix A.2. For a site-specific USGS map and site/operational drawings see Appendix G.

A. Site Construction

Operational Official: Range Construction Supervisor

The site and access road construction and site restoration activities are like any other earth-moving activity. Construction operations begin with surveying and marking the site and access road area. The access road is then constructed, which includes activities such as clearing, leveling, and topping the road with an aggregate base. Following access road construction, the site is constructed by leveling, grading, and topping the selected area with aggregate. Following grading, tank(s) are set, if applicable. During site and access road construction, restoration and reclamation, erosion and sedimentation (E&S) controls and/or Post Construction Stormwater Management (PCSM) controls are installed in accordance with the established E&S Plan or permit.

After operations at the site are completed, site restoration activities occur. During this process, all operations equipment is removed from the site. The site will be returned to its original state and if required will also be fully vegetated and stabilized. Once 70% perennial vegetative cover has been established, all temporary erosion control Best Management Practices (BMPs) are removed and post-construction BMPs are installed (if applicable). The PCSM BMPs are inspected periodically in accordance with long term maintenance plans, as well as, after significant rainfall events to ensure they are functioning as designed.

During typical site construction operations, the only waste stream generated is plant trash (Residual Waste Code (RWC) 710). It is collected, segregated, and stored appropriately at the site prior to disposal Refer to the CDP in Appendix B for additional information.

B. Operations and Maintenance

Operational Official: Range Water Supervisor, Water Transfer Representative

The operation of a staging area or tank pad site consists primarily of the staging of vehicles and equipment, the loading of fresh water from pipelines into tanks and trucks, and the fueling of pumps and light plants in support of unconventional oil and gas operations.

During operations secondary liner materials (RWC 806) and plant trash (RWC 710) are anticipated to be generated. It is collected, segregated, and stored appropriately at the site prior to disposal. Refer to the CDP in Appendix B for additional information.

During operations, a dedicated Range Field Environmental Compliance Specialist maintains the site through inspection protocols. Additionally, mobile security guards monitor production sites periodically on a non-repetitive schedule.

2.4 Description of Operational Activity – Well Development Pipelines

Activities to be conducted for well development pipelines may include but are not limited to construction and/or restoration of right of ways and access roads as well as installation and/or removal of high-density polyethylene ("HDPE") pipeline and lay-flat lines (high pressure-flexible hoses).

Additionally, other activities may include the transfer of fresh water and/or reuse water from above ground storage tanks, and meter vaults to well pads for well completion activities, water transfer operations, and maintenance of above ground pipeline and right of way.

The operational official responsible for each operational activity is set forth below; for contact information of the officials identified below see Appendix A.2. For a site-specific USGS map and pipeline overall plan drawings see Appendix G.

A. Well Development Pipeline Installation

Operational Official: Range Water Operations Supervisor

The well development pipeline right of way and access road construction, restoration activities, and pipe installation and removal are like any other earth-moving and construction activity. A well development pipeline right of way is established for the purpose of minimizing earth disturbance and maintaining a work area for pipeline installation and removal. Construction operations begin with surveying and marking the right of way, center line, staging areas, environmentally sensitive areas, and right of way access area(s). The pipeline right of way is then constructed, which may include activities such as clearing, leveling, access road construction, installation of rock construction entrances, stream crossings, wetland crossings, and road bores or open cuts. Pipeline installation may also include installing transfer pumps, secondary containment, isolation valves, breather valves, timber mat bridges, truss, cribbing, and pipe anchoring.

During the well development pipeline installation, construction, restoration, and reclamation, erosion and sedimentation (E&S) controls are installed in accordance with the established E&S Plan and/or General Permit (PASPGP-6) under 25 Pa. Code Chapter

105. The construction, installation, use, maintenance, repair, and removal of the well development pipeline will be in accordance with all applicable requirements in Chapter 102 and 105 (relating to erosion and sediment control and dam safety and waterway management).

After operations are completed, pipeline removal and site restoration activities occur. During this process, all operations equipment and pipeline material is removed from the right of way. The right of way will be returned to its original state and if necessary, will also be fully vegetated and stabilized. Once 70% perennial vegetative cover has been established, all temporary erosion and sedimentation control Best Management Practices (BMPs) are removed.

During typical well development pipeline construction operations, the two waste streams generated are General Plant Trash (RWC 710) and HDPE pipe material (RWC 899). It is collected, segregated, and stored appropriately at the site prior to disposal. Refer to the CDP in Appendix B for additional information.

B. Operations and Maintenance

Operational Official: Range Water Operations Supervisor, Water Transfer Representative

The operation and maintenance of a well development pipeline consists of loading the line with fresh water to pressure test. The line must be capable of holding 125% of the anticipated maximum operating pressure for two hours prior to being placed into service. Once the pipeline is loaded with water and placed into operation, routine inspections are completed with intervals dependent on what type of fluid is being transferred. Routine inspections may include but are not limited to documenting the following: pipe condition, mechanical connections, isolation valves, breather valves, transfer pumps, pipeline markers, timber mat bridges, truss, cribbing, containment, erosion and sediment controls, and any environmental concerns observed. Water transfer contractors are responsible for managing water transfer and monitoring pressures and water volumes. Water transfer support contractors are responsible for right of way maintenance and repair work if needed.

During the normal operation and maintenance of the well development pipeline produced fluid (RWC 802), secondary liner materials (RWC 806), and sediment from reuse water transfer (RWC 899) may be generated from the well development pipeline. Refer to the CDP in Appendix B for additional information.

During operations, a dedicated Range Field Environmental Compliance Specialist monitors the well development pipeline and right of way for compliance through routine inspection protocols. Additionally, water transfer contractors and environmental contractors conduct inspections.

2.5 Description of Operational Activity – Meter Stations

Activities to be conducted at unconventional oil and gas well meter stations may include but are not limited to: site construction and restoration, operations, and maintenance. The operational official responsible for each operational activity is set forth below; for contact information of the officials identified below see Appendix A.2. For a site-specific USGS map and site/operational drawings see Appendix G.

C. Site Construction

Operational Official: Range Construction Supervisor

The site and access road construction and site restoration activities are like any other earth-moving activity. Construction operations begin with surveying and marking the site and access road area. The access road is then constructed, which includes activities such as clearing, leveling and topping the road with an aggregate base. Following access road construction, the site is constructed by leveling, grading, and topping the selected area with aggregate. During site and access road construction, restoration and reclamation, erosion and sedimentation (E&S) controls and/or Post Construction Stormwater Management (PCSM) controls are installed in accordance with the established E&S Plan or permit.

After operations at the site are completed, site restoration activities occur. During this process, all operations equipment is removed from the site. The site will be returned to its original state and if required will also be fully vegetated and stabilized. Once 70% perennial vegetative cover has been established, all temporary erosion control Best Management Practices (BMPs) are removed and post-construction BMPs are installed (if applicable). The PCSM BMPs are inspected periodically in accordance with long term maintenance plans, as well as, after significant rainfall events to ensure they are functioning as designed.

During typical site construction operations, the only waste stream generated is plant trash (Residual Waste Code (RWC) 710). It is collected, segregated, and stored appropriately at the site prior to disposal. Refer to the CDP in Appendix B for additional information.

D. Operations and Maintenance

Operational Official: Range Water Supervisor, Water Transfer Representative

The meter station is an unmanned site. The meter station measures the flow of gas along the pipeline and allows the company to monitor and track natural gas as it flows along the pipeline. The metering station employs a specialized meter to measure the natural gas as it flows through the pipeline, without impeding its movement. Infrequently, maintenance will be performed on the instruments, valves, and equipment at the meter station. Additionally, the meter station has a pig launcher/receiver.

During the normal operation of the meter station no waste materials are anticipated to be generated. During maintenance of the meter station, plant trash (RWC 710), secondary liner materials (RWC 806), and produced fluids (RWC 802, typically sent to reuse) could possibly be generated. If generated, these materials are collected, segregated, and stored appropriately prior to reuse or disposal. Refer to the CDP in Appendix B for additional information.

During operations, a dedicated Range Field Environmental Compliance Specialist maintains the site through inspection protocols. Additionally, mobile security guards monitor production sites periodically on a non-repetitive schedule.

2.6 Typical Incidents First Responders Could Encounter

Law Enforcement could be requested in order to:

- Receive reports of major damage or theft at the site
- Assist in removing trespassers or dispersing unlawful demonstrations
- Assist with traffic control or security of a site during a well control incident
- Assist Company and Local officials in evacuation of local residents from the vicinity

Emergency Medical Services could be requested in order to:

- Provide emergency medical services and evacuation of injured or sick personnel from the site
- Provide emergency medical services and evacuation in the event of a mass casualty event at the site

Firefighting services could be requested in order to:

- Contain fires greater than an incipient fire, i.e. equipment or grass fire near the site
- Provide assistance to Well Control Contractors during a well control situation
- Provide assistance to Company and Local officials in evacuation of local residents
- Provide assistance in monitoring air for released gases

2.7 Description of Existing Emergency Response Plans

This PPC Plan is compatible with the following existing emergency response plans that may be applicable to the specific site that, if relevant, are integrated in or attached as outlined below:

- Site Specific Emergency Response Plan (25 Pa. Code § 78a.55(i)(5)(i)), see Appendix G
- Control and Disposal Plan (25 Pa. Code § 78a.55 and § 91.34), see Appendix B
- Site Specific SPCC Plan (40 CFR 112), where applicable
- The Master Containment Plan (MCP) pursuant to 58 P.S. § 3218.2. The MCP requirements are contained within this PPC Plan as follows:
    - Plans showing the installation and location of containments, see Appendix G
    - Description of overall containment practices and system types, see Section 4.1.1
    - Maintenance practices, see Section 4.5
    - Spill containment and response equipment, see Section 5.5
    - Emergency Response Contractors contact information, see Appendix A.3
    - Containment materials manufacturer's information: see Appendix D

- Installation information, see Appendix D
- Chemical compatibility, see Appendix D
- Warranted uses, see Appendix D
- Reuse/disposal considerations, see Appendix D

Hazards on supporting facilities such as Tank Pads, WMGR Sites & Meter Stations are like those of well sites. Emergency response at these facilities is expected to follow the response procedure developed for well sites, see the site-specific Emergency Response Plan (ERP) in Appendix G. Critical information for first responders may also be found within the ERP.

2.8 Material and Waste Inventory

During the individual operational stages of construction, drilling, completions, production, and supporting operations, chemicals may be stored onsite. The actual type and volume of chemicals present at the site will vary depending on:

- The activities being conducted,
- Site conditions,
- Equipment usage,
- Other site or operational specific factors

Transfers of materials and wastes at sites are performed under the direct supervision of the Range operational officer listed for each operational stage in Sections 2.1 through Section 2.5 of this PPC Plan. Regulated chemicals and wastes are stored, handled, treated, transported, and disposed of in accordance with applicable federal, state, and local, laws and regulations (See the CDP in Appendix B for a description of common wastes and disposal methods, and Appendix C for typical chemicals present at the sites.)

Vendors or contractors using, or handling chemicals are responsible for maintenance of the Safety Data Sheet (SDS) and shall make the SDS immediately available to emergency responders and/or personnel working at the site. In instances where Range assumes control or ownership of a material (e.g. condensate, foamer, defoamer), Range is responsible for the maintenance of an SDS for each material. A copy of the SDS can typically be found in the mailbox near the entrance of the site, or at another designated location. The Range Safety Department is tasked with onsite placement of an SDS for each Range-owned material, as well as management of vendor/contractor SDS responsibilities.

2.9 Pollution Incident History

Releases resulting from construction, drilling, completions, and production/or restoration activities are recorded in Range's electronic database and those records are maintained for five years. Releases are remediated in accordance with federal, state, and local requirements. A site-specific incident history, if applicable, may be found in Appendix G.

2.10 Implementation Schedule for Elements Not Currently in Place

This PPC Plan is currently in effect. Any outstanding elements and their implementation schedule are detailed in Section 1.2.

3.0 Description of How This Plan is Implemented by the Organization

3.1 Organizational Structure of Facility for Implementation

The operational headcount on site will be no more than 60 personnel at any given time, including Range employees, contractors, and subcontractors. The Range Operational Officers (as detailed in Section 2.1 through Section 2.5) are the primary authority for implementing this PPC Plan during their listed stage of operation. Range's Environmental Compliance Team is available to support the Operational Officers with their specific roles and responsibilities detailed in Section 3.3 below. Management support and commitment is provided by Range and directed by the Environmental Compliance Team which supports and verifies the implementation of this plan. Range encourages its employees to ask questions or seek clarity directly from their supervisor or the Environmental Compliance Department related to this PPC Plan. If a situation arises where an employee does not feel comfortable using these channels of communication, employees and contractors are invited to utilize the third party-operated hotline called EthicsPoint. Reports can be made through the website at www.ethicspoint.com by clicking "File a Report" or by calling 1-866-384-4277.

Changes made to this PPC Plan that affect personnel will be communicated at the earliest available time, generally during regular safety meetings, and put into practice as part of standard operating procedures. Where mentoring or extended training is required for any employee, a mentoring system will be put in place and On-The-Job training will be documented by the Company within Range's training management software.

3.2 List of Emergency Coordinators and Chain of Command

Appendix A.2 of this PPC Plan includes the contact numbers for the Primary and Alternate Emergency Coordinators. Each of the Emergency Coordinators is familiar with:

- Contents of this PPC Plan
- Operations and activities at the site
- Location and characteristics of materials handled at the site
- Location of records associated with the site
- Layout of the site

In the event the Primary Emergency Coordinator is not present at the time of an emergency, the operational official present on the site as set forth in Section 2.1 through Section 2.5, will oversee the facility until a Range Emergency Coordinator or Incident Commander arrives on site. Operational officials are trained in the proper response procedures in the event of an emergency. Emergency Coordinators and alternates have the authority to commit the resources necessary to carry out this Plan.

If a well control situation occurs the Division Vice President activates the Well Control Emergency Response Plan (WCERP), and an incident command is established with a specific chain of command.

Range employees and contractors have specific roles and responsibilities during an emergency. Contact information for Range Emergency Response personnel is included in the Site-Specific Emergency Response Plan (see Appendix G).

3.3 Duties and Responsibilities of Emergency Coordinators

The Primary Emergency Coordinators general duties and responsibilities are as follows:

- Risk management and inventory of materials,
- Establishment of spill-reporting duties,
- Implementation of visual inspection procedures,
- Review of past incidents and actions taken,
- Implementation of Emergency Response Plan goals,
- Contact emergency response contractors, if necessary,
- Coordinate spill clean-up activities,
- Notification of necessary authorities,
- Notification of company officials,
- Education and training of onsite personnel,
- Evaluation of Emergency Response Plan and change as needed,
- Review any changes relative to the current Emergency Response Plan,
- Evaluate overall effectiveness of Emergency Response Plan, and
- Review and update the Emergency Response Plan on a regular basis and make changes as necessary.

During an emergency, the Emergency Coordinator or onsite authority at the site will direct the response efforts taken by Range. Upon notification of a real or potential emergency situation the Emergency Coordinator will complete the following steps in the order that they are listed:

1. Determine if injured personnel are present and contact emergency response services (fire, law enforcement, or emergency medical services), as required.
2. Make a preliminary evaluation of the seriousness of the situation. In the case of a material release, the Emergency Coordinator will determine the hazard potential of a spill by evaluating the factors:
    - the source of the release;
    - the amount of material spilled;

- the extent of spreading;
- whether effective containment exists;
- potential for uncontrolled or uncontained release; and
- hazard potential and proper personal protective equipment.

3. Notify his/her supervisor and request assistance or activation of the Range Emergency Response Plan, as required.
4. Determine if a shutdown is required and order one, if necessary.
5. Determine if the area must be evacuated and order evacuation, if necessary.
6. Deploy pollution control equipment if safety is not compromised.
7. As reinforcing personnel arrive on site (whether lead element of the On-Site Response Team (ORT) or augmentation personnel), provide initial orientation and direction.
8. Provide situation updates to the senior management listed in Appendix A.2.
9. If there has been a release of a reportable quantity of a substance the PADEP and, if necessary, the National Response Center ("NRC") will be notified per procedures in Section 6.2.

During the emergency the situation is always subject to change. The Emergency Coordinator should continuously be re-evaluating the situation by repeating the steps above as necessary. All steps consistent with employee safety will be taken to secure those portions of the site that are not involved in the emergency and to contain, control, and correct the emergency situation.

After the emergency situation is resolved, the Emergency Coordinator will be responsible for ensuring that the site is cleaned up and for arranging for the proper disposal of waste materials generated from or during the incident. The Emergency Coordinator will also prepare required post-incident reports.

4.0 Spill or Leak Prevention and Response

4.1 Pre-Release Planning

The sources for potential releases from the site are from aboveground storage tanks, drum and intermediate storage containers, trucks and other motorized equipment, drilling and completions equipment, and aboveground piping. Areas where there exists a higher potential for releases that are provided with surface containment are shown on the figures included in Appendix G. Quantities of potential releases will vary depending upon the causal factors at issue and the material and storage container involved.

The systems, equipment, and practices employed to prevent and mitigate releases are described below.

4.1.1 Containment Systems

The locations of the containment systems for each phase of site operations are shown on the drawings included in Appendix G.

Best Management Practices (BMPs) will be in place to prevent spills to the ground surface. Site prevention design includes containment systems and practices to prevent releases to the ground surface and to prevent releases to the ground from the containment. Containment control design and installation will be tailored to the specific substance and location at issue.

The overall capacity of the containment system will be designed to hold the contents of the largest container stored within the containment plus 10 percent to allow for precipitation. Some containers may utilize a local containment or double-walled tank system to meet the capacity requirements.

The physical and chemical characteristics of all liners, coatings or other materials used for containment, that could potentially come into direct contact with the products or materials being contained, are resistant to physical, chemical and other failure during handling, installation and use. In addition, the containments will be sufficiently impervious and capable of containing spilled material or waste until it can be removed or treated. Range Completions, Facilities, Water, and Infrastructure Engineers evaluate liner materials for these characteristics prior to their use.

Containment systems may include, but are not limited to the following:

- Diking
- Curbing or berming
- Double-walled tanks
- Open-top tanks and containers
- Manifold containment tanking systems
- Portable collapsible containment systems
- Liquid transfer containment kits
- Modular spill decks
- Pipe sleeves
- Surface liners
- Sub-surface liners
- Spill kits, booms, and absorbent pads, mats, pillows and socks

For general site operations, a temporary general surface containment system will be used at sites with localized containment around product storage areas (i.e., drilling mud additives, diesel fuel tanks, etc.). This method is effective to contain any releases to a small area for easy remediation. Specific containment sizes and materials used will vary depending on the type of operation and site layout. Modifications to the containment system may be required at the site based on changes associated with equipment requirements, operations, access, etc. Therefore, the exact footprint of each containment system will vary for each site but will meet the containment requirements for unconventional wells and supporting facilities such as Tank Pads, Staging Areas & Meter Stations. For producing well sites, water and natural gas liquids tanks have secondary containment systems comprised of steel walls with HDPE or spray on liner systems (Sioux wall-type containment systems).

First, the surface of the site will be prepared to eliminate large rocks or other undesirable materials that could potentially damage a containment system from beneath. Sand and pea gravel may be utilized in this process. A felt fabric or similar underlayment to be used as padding may also be required per design and installed for the containment system.

Next the containment system will be installed, which may include a surface liner system or a combination of different containment types depending upon the site layout. One type of area surface liner system commonly used at sites is a low-density polyethylene liner with a felt underlayment supported by different size berms constructed from open cell foam, plastic pipe, timbers, or other suitable material. A second type of area surface liner system commonly used at sites is a seamless spray liner which consists of prefabricated panels constructed of polyurea spray chemical applied to a woven backing supported by open-cell foam berms.

Smaller, prefabricated, equipment specific containments are also often used at and around sites for equipment that is located off of the larger surface liner or remotely from the site; such as pumps, generators, air releases, etc. The containments are often referred to as “duck ponds” and are constructed of low-density polyethylene liner with the sides supported by either metal brackets or berms constructed from open cell foam product.

Containments are durable and capable of supporting the weight of heavy equipment, such as drilling rigs and trucks, based on location and usage. It may be necessary to protect the installed liner system from surface damage, tools, impacts, or vibration by placing padding, decking, matting, or other material on top of the liner. In addition, ramps constructed of metal, wood, or other materials will be utilized for easy access onto the surface liner system without compromising the perimeter berming.

Refer to Appendix D for containment system manufacturer’s information regarding material data sheets, installation information, chemical compatibility, warranted uses, and reuse/disposal considerations.

Stormwater or spill material contained within a liner is collected by a vacuum unit and properly managed for appropriate reuse or disposal prior to the secondary containment capacity being reduced by 10% or more per § 78a.64a(e). All temporary secondary containment liner is inspected as part of the weekly environmental site inspections performed by Range Environmental Compliance.

4.1.2 Spill Response Resources

Range maintains spill response materials and equipment onsite to be used as necessary. Additionally, Range contracts with outside firms (Emergency Response Contractors) who can provide spill response resources when needed; see Appendix A.3. The materials, equipment, and resources maintained by or available to Range for spill response at construction, drilling, completions, production well sites and other supporting sites is described in Section 5.5 of this Plan.

4.1.3 Site Design and Construction

The site design and construction is such that:

- During site construction temporary Best Management Practices (BMPs) are used to control erosion and prevent sediment from leaving the site. These BMPs may include rock construction entrances, compost filter sock, erosion control blankets, rock filters, temporary interceptor channels, cross culverts, outlet protection, sediment trap, sediment basins, and seeding and mulching.
- Permanent post-construction BMPs include wet ponds, retention basins, infiltration basins, infiltration berms, permanent interceptor channels, stilling basins, and permanent seeding and mulching.

The above features also serve a tertiary function as a backup to the onsite secondary containment systems providing a means to control and collect potential releases from operations on the site.

4.2 Well Development Pipeline Valve Monitoring Plan

State regulation (25 Pa. Code § 78a.68b) requires the installation and use of emergency shutoff valves along various points of Well Development Pipelines. Range's internal policy is to inspect all operating Well Development Pipelines. Employees of the Water Transfer Contractor walk pipelines containing reuse water on an hourly basis and freshwater pipelines daily to identify any issues requiring repair. Reuse pipelines on well sites are inspected every four (4) hours. In the event of an issue, the employee notifies a Range Water Supervisor to address the issue. All inspections are documented on the Range Well Development Pipeline Inspection form and maintained in SharePoint.

4.3 Material Compatibility

Materials held in inventory are stored properly to ensure material compatibility. All chemicals are stored within chemically compatible containment while on site. Storage and handling practices employed at the site include:

- Drilling fluid and hydraulic fracturing additives, other than bulk acid, are stored in and dispensed from containers provided by the manufacturer.
    - Friction reducer (FR) is typically purchased, stored, and managed from a 6,000 gallon stainless steel tank, a steel lined 4,000 gallon tank, or 3,000 gallon composite tank.
    - Bulk additives from the completion's chemical provider, such as sodium nitrate, may be purchased, stored, and managed in 4,000-6,000 gallon International Organization for Standardization (ISO) tanks.
- Chemicals other than FR, bulk acids, and oils are typically purchased, stored, and managed in intermediate bulk containers (IBC) with galvanized steel or aluminum protective cages or smaller 5-10 gallon containers. These containers are compatible with liquid chemicals routinely managed onsite.
- Diesel fuel is dispensed on an as needed basis from a supplier's transport vehicle.
- Propane is stored in steel tanks.
- Bulk acids are delivered in and dispensed directly from 5,000-gallon composite tanks. These trailers are compatible with acids routinely used onsite.
- Lubricating oils, hydraulic oils, and glycols are typically purchased and dispensed directly from 55-gallon closed-head steel drums. These drums are compatible with petroleum oils, synthetic oils, and glycols routinely used onsite.
- Grease for lubricating valves is stored in factory-supplied cartridges.
- Gasoline for pumps and other hand operated equipment is stored in steel DOT Approved Safety cans.
- Chemicals are evaluated by Range engineers prior to being delivered and used at the site for process and material compatibility.

4.4 Inspection and Monitoring Program

4.4.1 Site Inspection and Monitoring Program

Several types of inspections are performed at the sites. During well development operations, sites are generally manned 24 hours a day. During this phase, the operational official as identified in Section 2.1 through Section 2.5, performs visual inspection regularly, observing equipment for leaks and potential hazards. Following well development, once the wells are placed into production, the sites are visited regularly by company lease operators and deficiencies noted, addressed, recorded, and stored in Range's electronic databases.

Specific inspections, monitoring, and testing include the following:

- Testing of pipe rams (daily) and blind rams (each round trip) while the equipment is in service (§ 78a.72(f)),
- Weekly environmental site inspections, including secondary containment liner inspections (§ 78a.64a(h)),
- Pressure test of iron before each stage during completions operations,
- Regular iron inspections during completions or pumping operations,
- Hourly active well development pipeline inspections (§ 78a.68b(i)),
- Monthly production tank inspections during production (§ 78a.57(i)),
- Quarterly well mechanical integrity inspection for active wells (§ 78a.88(a)),
- Yearly mechanical integrity inspection for regulatory inactive wells (§ 78a.103),
- Regular inspection and monitoring of discharge response equipment and restock as needed,
- Liquid level measurement instrumentation installed on all production tanks equipped with alarms – monitored by continuously manned remote-control centers and/or automatic shut-down devices; *and*
- Other inspection/monitoring described in the Site Operation & Maintenance Manual.

Additionally, sites covered by an active Erosion and Sediment Control General Permit (ESCGP) and Erosion and Sediment Permit (ESP) are inspected weekly, at a minimum by Range Environmental Compliance in accordance with permit conditions.

4.5 Preventative Maintenance

4.5.1 General

Preventative maintenance is conducted routinely at all sites to ensure the upkeep and maintenance of systems and equipment as well as to reduce or prevent the potential for leaks and/or spills. These processes may include the adjustment, repair and/or replacement of systems or equipment on an as-needed basis based on manufacturer recommendations or as dictated by inspection results. All adjustment, repair and/or replacement should be completed in a timely manner. General inspection and maintenance includes, but is not limited to:

- Production processing equipment;
- Tanks;
- Piping systems;

- Pipe fittings and connections;
- Valves; *and/or*
- Unions and joints.

Additionally, equipment found on tank pads, is typically considered rental and as such, is owned and operated by a 3rd party / contractor. The equipment, including plumbing, piping and ancillary fittings are inspected, maintained, and serviced by their respective 3rd party contractors.

4.5.2 Secondary Containment

Preventative maintenance measures also have a specific focus on secondary containment. Secondary containment areas for regulated substances are inspected during routine inspections. Accumulated precipitation in containments is periodically removed to ensure capacity compliance with § 78a.57(c) and § 78a.64a. Note: please see Appendix E for more information on dewatering stormwater from secondary containment practices. Containment system repairs and maintenance will be performed in a timely manner to address any tears, punctures, scuffs, or other conditions that compromise the integrity of the liner system. Any visibly worn hoses will be replaced.

4.6 Housekeeping Program

The following housekeeping items will be addressed as directed by the appropriate operational official as identified in Section 2.1 though Section 2.5:

- Equipment, packaging materials, and miscellaneous materials will be inspected for leaks, oily surfaces, etc. Deficiencies shall be promptly corrected.
- Areas where materials are unloaded, transferred, or loaded will be kept free of debris.
- Cleanup, storage, disposal, and inspection procedures will be reviewed with facility personnel as part of the training requirements of this PPC Plan.
- Housekeeping conditions will be included in the facility inspections conducted in accordance with PPC Plan.

4.7 Security

Different levels of security are utilized during the various activities in the development and operation of the site.

- Construction – Range's onsite supervisor will be responsible for managing personnel arriving on site. Roving mobile patrols periodically monitor sites under construction.
- Drilling – Employees and contractors entering and exiting location must check in and be accounted for while on the location 24 hours a day. This may include a manned station or an electronic remote entry system. Persons requesting entry to the location must be authorized, accounted for, and must have Range-required personal protective

equipment. Persons requesting entry to the location must sign in at the station and must have Range-required personal protective equipment.

- Completions – Employees and contractors entering and exiting location must check in and be accounted for while on location 24 hours a day This may include a manned station or an electronic remote entry system. Persons requesting entry to the location must be authorized, accounted for, and must have Range-required personal protective equipment.
- Production – The location is generally unmanned during the production phase of the well site. A remote telemetry system continuously monitors site operational conditions 24 hours a day. Various security measures are in place to prevent unauthorized access, including restricting access to the lease road by a locked gate and access to the production tank stairway by a locked chain link fence. Signs are posted at the location noting that access to the well site is restricted. Roving mobile patrols monitor production sites as well as discrete security cameras placed at various sites. Production sites are inspected for unauthorized entry and vandalism during each regularly scheduled site visit performed by Range's operators.
- Tank Pads & Staging Areas – The location is generally unmanned. Employees and contractors entering and exiting location must check in and be accounted for while on location 24 hours a day. This may include a manned station or an electronic remote entry system. Persons requesting entry to the location must be authorized, accounted for, and must have Range-required personal protective equipment.

4.8 External Factor Planning

Employees are trained in procedures that are in place for emergency situations. Power outages, floods, and/or snowstorms may prevent operations from continuing, but should not result in an incident that would have an adverse effect on public health or the environment. Power outages do not increase the likelihood for release of pollutants and do not affect spill prevention measures, or spill containment, cleanup, and removal operations.

In the event of an external emergency situation, no operations involving regulated material transfer will be initiated at the site.

4.9 Training Program

All employees are provided with the necessary skills and knowledge to perform work in a safe and environmentally responsible manner. The level and frequency of training required is based on the degree of risk and the complexity of the actions required to control or mitigate a particular risk. Measures are in place to assess the competencies of those trained and determine the effectiveness of the training programs. Records of training are maintained. Training needs are assessed annually and include an evaluation of regulatory and policy changes. All employees receive training as it relates to their assigned duties, including spill prevention and emergency response roles and responsibilities.

5.0 Countermeasures

5.1 Countermeasures to be Undertaken

Accidental releases of regulated materials may occur during the regular course of operations. Such releases may originate from storage tanks, transfer equipment, pipelines, or other containers. In the event of a release, measures shall be taken to minimize the impacts or risks of impacts following the guidelines below, and to promptly remediate any affected areas. **All releases are to be reported internally upon occurrence or discovery.** External notifications will be made by Range Environmental Compliance as necessary. Both internal and external notification criteria and mechanisms are described below.

Basic Steps to Take Following a Release:

- Assess the incident to ensure necessary actions can be performed safely
    - Shutdown of site / facility operations may be required[1]
    - Evacuation of personnel / adjacent properties may be required[2]
- Secure the source of the spill; close feed valves, shut off pumps, raise or invert discharge points, etc.
- Retrieve absorbent material(s) and/or necessary equipment to contain or collect the released material and secure migration pathways, if present
- Absorb, contain, or collect released material and secure migration pathways, if present
- Make proper notification, following the structure outlined in Appendix A.2. The Environmental Compliance Group will make notifications to the following external entities, as necessary:
    - PADEP (if a reportable quantity has been released, or if the released material has reached a waterway)

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[1] Under rare circumstances, shutdown of a site and/or facility may be deemed necessary. Circumstances warranting a shutdown scenario are largely dependent upon the situation at hand. Although all Range personnel and contractors are all trained for incident response and countermeasures, every countermeasure situation is different from the next and numerous variables must be considered. Range personnel and contractors are expected to rely upon training, experience, and situational variables to determine whether a site and/or facility requires shut-down measures. Local emergency response and instruction may also dictate the necessity of a shutdown and response measures taken.

[2] Under rare circumstances, evacuation of personnel and/or adjacent properties may be deemed necessary. Circumstances warranting an evacuation scenario are largely dependent upon the situation at hand. Although all Range personnel and contractors are all trained for incident response and countermeasures, no two situations are alike and numerous variables must be considered. Range personnel and contractors are expected to rely upon training, experience, competence, and situational variables to determine whether a site and/or facility requires evacuation of personnel and/or properties. Local emergency response and instruction may also dictate the necessity of a shutdown and response measures taken.

- PA Fish & Boat Commission (if the released material has reached a waterway)
- National Response Center (if the released material has reached or threatens to reach navigable waters)
- In some cases, local municipalities may require notification. The Range local government representative responsible for the municipality shall be contacted following all reportable releases. A map representing municipality responsibilities can be found in Appendix A.4

- Remove any remaining released material, and remediate any areas affected by the release. This may require vacuuming, pumping, excavation of media (stone, soil, etc.), cleaning of equipment / containers / containment, or other appropriate action, as determined by EC or the regulatory agency involved, if any
- Place used absorbent materials and affected media into appropriate containers (drums, overpacks, roll off boxes, etc.). Waste generated from clean up and remediation shall be disposed of by an authorized contractor
- Secure the site / affected area, ensure that no hazards to public safety, human health or the environment exist

5.2 Countermeasures to be Undertaken by Contractors

A release that cannot be contained, controlled, and/or cleaned up by onsite personnel will require assistance from emergency response contractors. See Appendix A.3 for emergency response contractor contact information. The emergency response contractors, under the direction of the Emergency Coordinator, will take all necessary measures to contain, control, and/or clean up the release.

5.3 Internal and External Communications and Alarm Systems

During a spill or release, cellular telephones, 2-way radios, voice, and/or hand signals are utilized to provide immediate instruction to facility personnel. Cellular telephones are utilized to communicate with emergency response contractors and emergency response agencies in the event of a spill or release.

5.4 Evacuation Plan for Facility Personnel

In the event of an onsite incident and/or emergency that cannot be mitigated by individuals at the site immediately implement and refer to the Site-Specific Emergency Response Plan and the Well Control Emergency Response Plan for the organization, formation, and responsibilities of the Emergency Response Team (ERT) and the Onsite Response Team (ORT).

All visitors and personnel not essential to the control and cleanup operations will evacuate the area. These individuals will exit the facility through the nearest available exit and proceed to the assembly point identified by the Emergency Coordinator (if possible, an area upwind and uphill from the incident). Employees can exit the facility by means of one (1) access road and travel in either direction along public roads to a place of safety. Signals used to begin evacuation will be voice or radio. At the assembly point, the Emergency Coordinator or their

designee will be responsible for a head count to ensure that all personnel have been accounted for.

5.5 Emergency Equipment Available for Response

Emergency equipment is maintained in proper working order, clearly labeled, and stored in strategic locations. Emergency equipment includes, portable fire extinguishers (periodically tested), spill control equipment, and first aid supplies. The spill control equipment is maintained in spill kits which are typically located near the muster point and contains the following materials:

- 55 Gallon or overpack drum
- Oil absorbent pads, 4" oil absorbent boom, and oil absorbent granular floor dry.
- Trash bags
- Labels for waste description

Operations personnel will ensure that spill kits are available, and Range Environmental Compliance will periodically check to ensure that appropriate materials are available.

In the event of fire at a site, the Emergency Coordinator or onsite authority will advise Community Fire Fighters about any possible water logistics support that Range, and its contractors can contribute to firefighting operations. Company water logistics includes assets such as pre-existing agreements with water hauling contractors, access to mobile storage water tanks, and cross-country freshwater pipelines. All drilling and completion sites maintain a collection of various hose connectors that are compatible with firefighting equipment used in that area by first responders.

If additional equipment is needed, emergency response contractors will assist in containment and cleanup efforts. See Appendix A.3 for emergency response contractor contact information.

After an emergency, the equipment used will be decontaminated, cleaned, and inspected for proper working order before normal operations resume.

All equipment used for emergency procedures shall be kept in satisfactory condition and maintained and or replaced as needed. Contaminated tools or equipment shall be properly cleaned or disposed. Emergency equipment shall be tested for proper working order and be replaced as necessary.

6.0 Emergency Spill Control Network

6.1 Arrangements with Local Emergency Response Agencies and Hospitals

Arrangements will be made prior to activities at the site to designate primary and support emergency response services. Information will be provided to police, fire departments, emergency response teams, and the County Public Safety Department to define and describe the site configuration; operation processes; hazardous material properties, storage, and

handling provisions; locations where personnel would normally be working, entrance and egress locations and access routes, and possible evacuation routes and muster points. Ancillary support facilities, such as local hospitals or medical transport providers, will be identified and contracted in advance of site activity, if needed.

Appendix A.1 provides a site-specific list of contact information for medical agencies and general emergency contacts which can be contacted, if necessary, in the event of an accident or release requiring outside assistance.

6.2 Notification Lists

The Emergency Coordinator will notify company officials in the chain of command as required by this Plan, as well as; State, Local, and Federal regulatory agencies depending upon the emergency and the required response.

Appendix A.2 provides a comprehensive list of contact information for key Range Resources personnel and State, local, and Federal regulatory agencies which can be contacted, if necessary, in the event of an accident or release requiring outside assistance.

6.2.1 Notification Protocol

The following narrative should be followed for making initial verbal contact with any Emergency Agency:

"This is **[*state your full name]*** with Range Resources – Location Coordinates. We have an emergency. Our emergency is a ***[specify type of emergency.]***"

FOR PRODUCT SPILL:

It is estimated that ***[state quantity]*** of ***[state product]*** has been released.

The spill is ***[contained/not contained]***.

The release occurred at ***[state time – a.m./p.m.]*** and lasted for approximately ***[state period of time]***.

The medium or media into which the release occurred is ***[state air, water, ground etc.]***.

The number of people known to be involved in the emergency is ***[state number]***.

There are ***[state number]*** of injuries known at this time.

WAIT FOR OTHER PARTY TO HANG UP FIRST!

6.3 Downstream Notification

Range's GIS Department has access to a digital dataset within its internal systems. Through the program, a Downstream Notification List and map of surface water users within 20 miles downstream of each well site with an aggregate aboveground storage >21,000 gallons of regulated substances can be gathered. The referenced map for this PPC Plan and well site can be located within Appendix G. The Downstream Notification List and associated contact information is stored within Range internal systems and can be made available should notification be necessary.

7.0 Erosion and Sedimentation Prevention

During construction or earth disturbance, the control of sediment erosion and migration is addressed by installing erosion control BMPs where appropriate and promptly covering disturbed land with seed and mulch.

Where required, Erosion and Sedimentation Control General Permit will be obtained from the PADEP. An Erosion and Sedimentation Control Plan will be prepared for each site where earth disturbance activities will occur and will contain the following:

- General Information
- Project Description
- Erosion & Sedimentation Control
- Staging of Activities
- Maintenance Program
- Seeding, Mulching & Soil Conditioning
- Hydrology
- Soil Maps
- Soil Information
- Location Map
- Detailed Drawings of the Proposed Site & BMPs

8.0 Stormwater Management Practices

Stormwater management activities are detailed in the E&S and PCSM plans designed specifically for this site. Some of the details and features are also detailed on the erosion and sediment control plan drawing in Appendix G.

The procedures for site housekeeping and inspections programs, are reasonable and appropriate, and are consistent with Best Management Practices (BMPs) for this type of site in regard to

stormwater management. Intermittent or perennial waterways within the potential area of influence, in the event of a release at the site, will be identified and protected.

9.0 Additional Requirement for EPCRA Section 313 Facilities

Not applicable. The site does not meet the criteria for EPCRA Section 313 reporting.

APPENDIX A – EMERGENCY CONTACTS

APPENDIX A.1 - EMERGENCY CONTACTS AND MEDICAL AGENCIES

Emergency Contacts	
All Emergencies or use Satellite Numbers	**911**
ALLEGHENY County Satellite Phone Number	(724) 473-3056
BEAVER County Satellite Phone Number	(724) 775-0880
BUTLER County Satellite Phone Number	(724) 282-1211
CRAWFORD County Satellite Phone Number	(814) 724-2548
LYCOMING County Satellite Phone Number	(570) 433-3166
WASHINGTON County Satellite Phone Number	(724) 229-4600

Local Medical Agencies - for CLOSEST Hospital to the site refer to the ERP IN APPENDIX G

ALLEGHENY County & Surrounding Area Medical Agencies	
Allegheny General Hospital	(412) 359-3131
Alle-Kiski Medical Center - Natronia Heights, PA	(724) 224-5100
AHN Wexford Hospital	(724) 939-3673
Heritage Valley Sewickley	(412) 741-6600
Heritage Valley Kennedy	(412) 777-6161
Jefferson Hospital	(412) 469-5000
St. Clair Hospital	(412) 942-4000
UPMC St. Margaret - Pittsburgh, PA	(412) 784-4000
University of Pittsburgh Medical Center	(412) 647-8762
West Penn Hospital	(412) 578-5000
BEAVER County & Surrounding Area Medical Agencies	
Heritage Valley Beaver	(724) 773-4600
Heritage Valley Sewickley	(412) 741-6600
Heritage Valley Health System	(724) 728-7000
BUTLER County & Surrounding Area Medical Agencies	
Butler Memorial Hospital	(724) 283-6666
UPMC Passavant - McCandless	(412) 981-5439
UPMC Passavant - Cranberry	(878) 252-5681
CRAWFORD County & Surrounding Area Medical Agencies	
Meadville Medical Center	(814) 333-5000
Titusville Area Hospital	(814) 827-1851
UPMC Northwest	(814) 676-7600
St. Vincent Hospital	(814) 452-5000
UPMC Hamot	(814) 877-6000
UPMC Horizon-Greenville	(724) 588-2100
LYCOMING County & Surrounding Area Medical Agencies	
UPMC Williamsport	(570) 321-1000
Geisinger Jersey Shore Hospital	(570) 398-0100
UPMC Muncy	(570) 546-8282
WASHINGTON County & Surrounding Area Medical Agencies	
UPMC-Washington	(724) 225-7000
Trinity Medical Center West-OH	(740) 264-8000
Canonsburg Hospital	(724) 745-6100
St. Clair Hospital	(724) 942-4000
UPMC-Greene	(724) 627-3101

APPENDIX A.2 - NOTIFICATION LIST

Range Resources Key Personnel Notifcation	
24-Hour Company Contact	(724) 743-6700
NW Emergency Coordinator (Primary) – Field Environmental Compliance Specialist	(724) 754-4510
SW Emergency Coordinator (Primary) – Field Environmental Compliance Specialist	(724) 754-4511
SW Emergency Coordinator (Alternate) – Field Environmental Compliance Manager	(724) 754-4512
NE Emergency Coordinator (Primary) – Field Environmental Compliance Specialist	(724) 754-4508
NE Emergency Coordinator (Alternate) – Field Environmental Compliance Specialist	(724) 754-4509
Security Manager	(724) 754-4517
Safety Director	(724) 754-4516
NE Safety Operations	(724) 754-4518
SW Safety Operations	(724) 754-4513
Vice President – Environmental Compliance	(724) 743-6700
Water Operations Supervisor	(724) 754-4507
District Production Manager	(724) 754-4515

Local County Agency Notification	
ALLEGHENY County - Emergency Management Agency	911 or (412) 473-3056
BEAVER County - Emergency Management Agency	911 or (724) 775-1700
BUTLER County - Emergency Management Agency	911 or (724) 282-1211
CRAWFORD County - Emergency Management Agency	911 or (814) 724-2552
LYCOMING County-Emergency Management Agency	911 or (570) 433-4461
WASHINGTON County - Emergency Management Agency	911 or (724) 228-6911

State Agency Notification	
PADEP Emergency Hotline (Statewide)	(800) 541-2050
PADEP NW Regional Office	(814) 332-6945
PADEP NC Regional Office	(570) 327-3636
PADEP SW Regional Office	(412) 442-4000
PA Emergency Management Agency	(800) 424-7362
PA Fish & Boat Commission Waterways Patrolman	(814) 445-8974

Federal Agency Notification	
DOT - Hazardous Material Information Center	(202) 366-4488
EPA Region 3	(215) 814-3255
National Response Center - (Only if the spill leaves the property and is likely to enter navigable waters)	(800) 424-8802
OSHA Hotline	(800) 321-6742

APPENDIX A.2 - NOTIFICATION LIST

Midstream Partner Notification - SW Area - IFO	
MarkWest – Senior Safety Coordinator	(724) 531-7632
MarkWest Liberty Houston Plant	(724) 514-4400
MarkWest Majorsville Plant	(304) 242-1341
Superior	(724) 678-8535
National Fuel Gas	(716) 827-2374
TCO Transmission	(304) 357-3647
NiSource Midstream (1360)	(304) 547-2701
NiSource (Big Pine)	(330) 542-1091
EQT Transmission	(412) 382-6700
EQT Gathering	(412) 395-2587
Williams (Cantaral)	(412) 328-4911

APPENDIX A.3 - EMERGENCY RESPONSE CONTRACTORS

Emergency Response Contractors for Spills-Southwest	
*Specialized Professional Services, Inc (SPSI)	(877) 228-7774
*EAP Industries, Inc.	(888) 294-5227
*Insight Pipe Company (IPC)	(724) 831-7167

*Companies with HAZWOPER Training

Emergency Response Contractors for Spills-Northeast	
*Miller Environmental (Brandon Coldron)	(570) 220-5854
B&E Powder Solutions (Sonny Stitt)	(724) 664-8746
NORtech Energy Solutions (Chad Livingston)	(570) 220-2423

*Companies with HAZWOPER Training

Emergency Response Contractors for Spills-Crawford County Only	
*Specialized Professional Services, Inc (SPSI)	(877) 228-7774

*Companies with HAZWOPER Training

Emergency Response Contractors for Pipelines-Southwest	
Alex E. Paris (All Locations)	(724) 947-2235

Emergency Response Contractors for Pipelines-Northeast	
Energy Transfer partners	(800) 375-5702
Superior Gas	(866) 904-4514

APPENDIX A.4 - LOCAL MUNICIPALITY NOTIFICATION LIST

In some cases, local municipalities may require notification. The Range local government representative responsible for the municipality shall be contacted following all reportable releases. A map representing municipality responsibilities may be found on the next page.

Municipalities That Require Notification - Allegheny County	
Indiana Township	(412) 767-5333
Fawn Township	(724) 226-0666

Municipalities That Require Notification - Washington County	
Buffalo Township	(724) 222-2711
Canton Township	(724) 225-8990
Chartiers Township	(724) 745-3415
Donegal Township	(724) 484-4017
East Finley Township	(724) 663-4483
Hopewell Township	(724) 345-3333
Independence Township	(724) 587-3518
Jefferson Township	(724) 947-3377
Mt. Pleasant Township	(724) 356-7974
North Strabane Township	(724) 745-8880
Robinson Township	(724) 926-8700
Smith Township	(724) 947-9456

APPENDIX B – CONTROL & DISPOSAL PLAN

December 2024
Version 4

Control and Disposal Plan

INTRODUCTION

The Pennsylvania Department of Environmental Protection ("PADEP") has promulgated regulations for the control and disposal of residual waste under 25 Pa Code § 78a.55 and § 91.34. Pursuant to these regulations, Range Resources ("Range") has developed and implements a Control and Disposal Plan to provide guidance for managing routine waste streams generated during operations.

The Control and Disposal Plan includes the following elements:

1) Identification of the Pennsylvania Residual Waste codes and non-exempt wastes applicable to Range
2) Explanation of how waste is controlled and disposed of and the record keeping process
3) Identification of positions of responsibility (*i.e.*, job titles) for collection of waste data

1.1 Descriptions of Range Wastes

1.1.1 Non-Oil and Gas Well Drilling Wastes (RWC 801)

Waste accumulated from subsurface water monitoring wells, probes, drinking water monitoring wells, or a series thereof, is accumulated in 55-gallon drums or roll-off containers. Upon completion of activities, wastes will be characterized by a third-party laboratory and transported to an appropriate non-hazardous landfill or transfer facility for disposal.

1.1.2 Produced Fluid (RWC 802)

Fluids generated from the production of oil and gas wells. Range's produced fluids are directly reused in fracing operations or sent to third party water treatment facilities where they are treated and returned to active fracing sites. This waste code includes frac sand in solid form that has been returned from the wellbore.

1.1.3 Drilling Fluid Waste (RWC 803)

Drilling fluids and mud returned to surface during drilling operations are conditioned and reused if possible. Non-reusable muds and fluids are chemically analyzed by a third-party laboratory, profiled then transported to approved landfills in tank trucks and are solidified upon arrival. Any unused drilling fluids or mud remaining on site after drilling operations, are transported back to the producer or to another Range drilling site.

1.1.4 Wastewater Treatment Sludge (RWC 804)

Impaired waters are stored in impoundments or tanks. Any residual sludge or solids generated by dewatering, cleaning or maintenance, is classified under this waste code. In the event Range would conduct on-site processing of its waste waters, the sludge from this process is analyzed, profiled and transported to a permitted disposal or transfer facility.

1.1.5 Unused Fracturing Fluid Waste (RWC 805)

Excess fracturing fluid or solid fracturing sand remaining on a site post-frac. Range reuses the fracturing fluid and solid fracturing sand thus limiting the use of the RWC. In the event this waste in generated, it is analyzed, profiled and transported to a permitted disposal or transfer facility.

1.1.6 Synthetic Liner Materials (RWC 806)

HDPE synthetic liner materials are used for secondary containment during all phases of well site development, equipment staging, and operational activities. When the secondary containment is no longer needed, it is containerized in a roll-off box, profiled and transported to a permitted disposal or recycle facility.

1.1.7 Sediment from Production Storage (RWC 807)

1.1.8 Servicing Fluid (RWC 808)

1.1.9 Spent Lubricant Waste (RWC 809)

Spent lubricant waste, if generated, is in very small quantities. It is stored in frac tanks or vacuum- roll off containers when generated. It is then analyzed, profiled, and accepted for disposal. Off-site solidification at a permitted landfill or transfer station is Range's preferred disposal practice.

1.1.10 Drill Cuttings (RWC 810)

Drill cuttings generated from air drilling operations are containerized on the generating site and transported to a permitted landfill in either roll-off containers or dump trucks. Drill cuttings may be mixed with inert solidification agents approved by the PADEP OG71 A or B prior to shipment to landfills to prevent spills or separation during transport. Range samples drill cuttings at certified laboratories prior to submitting disposal requests to landfills where required.

Drill cuttings from fluid drilling operations are containerized on the generating site and transported to a permitted landfill in either roll-off containers or dump trucks. Drill cuttings may be mixed with inert solidification agents, these processes will be detailed in the OG71 A or B authorization request Range samples drill cuttings at certified laboratories prior to submitting disposal requests to landfills where required.

1.1.11 Soil Contaminated by Oil and Gas Related Spills (RWC 811)

In the event of a spill, the waste generated is stored in approved roll-offs, drums or spill kits. The material stored in the approved containers may include contaminated rock, soil and/or snow. All storage containers are covered and properly labeled. Labels contain the following information:

- Site Name
- Date of the Spill
- Contents of the Container

Samples are analyzed by an approved laboratory if required. The material is then profiled and transported by an approved transporter to an approved and permitted transfer or disposal location.

1.1.12 Filter Socks (RWC 812)

Water filters used during fluid transfer which are contaminated with impaired water are segregated from other wastes streams. The contaminated filters are stored in properly labeled drums or spill kits at the generating site and are profiled and transported to a permitted transfer or disposal facility.

1.1.13 Other Oil and Gas Wastes (RWC 899)

Top hole water is generated during the drilling of the vertical section of the well and is stored on the generating site for reuse. In the event the top-hole water cannot be reused on the generating site, it is sampled, analyzed then transported to a permitted treatment facility for future reuse.

Stormwater accumulates on the secondary containment present during operations and must be removed to maintain the containment's 110% capacity requirement. The water is either reused at the generating site or a different site. When unable to be reused, it is transported to an approved, third-party treatment facility for treatment and temporary storage.

1.2 Non-Exempt Waste

Only waste generated downhole or by activities uniquely associated with the exploration, development, or production of oil of gas are RCRA exempt. There are some waste streams generated on Range sites which are not RCRA exempt. These waste streams are handled according to the regulations governing the management and disposal of those waste classifications. Examples of non-exempt waste occasionally generated at Range sites include, but are not limited to:

- Hazardous or Universal waste (including waste commingled with hazardous or universal

waste)
- Discarded unused chemical products
- Vehicle fluids (diesel, gasoline, lubricants, and antifreeze)
- Most maintenance and construction wastes
- Spent filter or exchanger media
- General plant trash
- Contaminated soil/debris/spill residue
- Waste petroleum impacted material
- Virgin petroleum impacted material

1.3 Municipal Solid Waste (MSW)

This is a broad category of non-hazardous solid waste that includes facility/office related wastes such as paper, plastic, Styrofoam, food and septic waste. When this waste is generated on site it is hauled to an approved landfill for disposal. This is not a Residual Waste and is not applicable to State waste reporting requirements.

1.4 Plant Trash (RWC 710)

Plant trash is a category of non-hazardous solid waste generated from construction activities or production sites. It includes discarded pipe, discarded operations, production equipment, material that is not classified as hazardous, or another types of waste. PADEP defines plant trash waste streams such as: industrial equipment, maintenance waste and scrap, including plant trash, as a residual waste. When this waste is generated, it is stored in an approved container and then hauled to an approved landfill for disposal.

2.0 Control and Disposal of Wastes on Range Sites

2.1 On Site Waste Segregation and Storage

Mitigation of potential environmental impacts resulting from transport and storage of waste material is a top priority. A crucial component to this is proper waste segregation and storage is. The following segregation and storage practices apply to all sites storing waste material prior to treatment or disposal, whether in containers, tanks, or in bulk form.

Waste Storage Area requirements include, but are not limited to:

- All waste should be stored in a designated secured area with no public access
- All containers should be securely covered with a lid and kept closed other than when adding or removing waste
- All containers must be properly labeled
- Containers must be of sufficient size to prevent overflow
- Secondary containment must be in place for hazardous materials and other regulated liquids, if there is a high potential for leaks or run-off.
- Storm water should not accumulate in the containment in a volume that could negatively impact the containment's capacity

Range uses the following dumpster types listed below for the collection of non-hazardous solid waste:

- Plant Trash/Construction Waste Dumpster: Materials generated that do not require characterization. Includes empty containers (not drums), uncontaminated liner material, and incidental amounts of plastic, cardboard and paper
- Residual Waste Dumpster: Materials generated requiring a separate landfill and PADEP

disposal approval, as well as specific characterization for each waste stream

- Construction Debris Dumpster: Staged on construction projects to collect construction debris such as banding, non-asbestos insulation, electrical wiring, flexible duct, and piping
- Scrap Metal Dumpster: If a project or site generates scrap metal, containers would be provided for collection of metals to be sent off-site to an approved metals recycling facility.
- Spill Kit (55-gallon container): Contaminated materials from spills

2.2 Waste Handling and Control

Under Pennsylvania law, waste handling and control is determined by classifying waste into one of three categories. These three categories are solid, sludge and liquid waste.

2.3 Solid Waste

Solid waste is generated during drilling and completions processes and includes drill cuttings and contaminated frac sand. These waste streams are initially collected in either a half round during drilling or in a frac tank during completions. The initial collection points are stored on top of rig mats and secondary containment. The rig mats are utilized to protect the containment and enhance safety by assuring operations are not occurring on standing fluids/ice from seasonal conditions. The waste transfer occurs on the well site and secondary containment is in place for this process.

Solid waste can also be generated in the event of a spill of a regulated substance to the ground. Solid waste generated due to a spill, is stored in spill kits, drums or roll off boxes depending on the spill volume. Once the spill is cleaned up, the material is profiled for disposal. The material is transported to an approved and permitted transfer facility or landfill once the profile is complete.

2.4 Sludge

Sludge is generated during drilling, completions, and production processes and may include drill mud, frac sand slurries and scale build up from production tanks. All Pennsylvania landfills require incoming wastes to pass a paint filter test. PADEP approved solidification agents (i.e., sawdust, corn/shell material, etc.) are mixed with sludges on site in mixing bins (half rounds) until the consistency is achieved to pass the paint filter test. The waste material is then transferred into either a roll off box or dump trucks for transport to approved and permitted landfills. The transfer of waste occurs within secondary containment. Occasionally, sludges may be put into a vac truck or vacuum box for transport to the landfill where they will be solidified and disposed of.

2.5 Liquid Waste

Liquid wastes are generated during drilling, completions and production processes. Range strives to reuse 100% of its liquid wastes. These wastes are transferred to holding tanks of various sizes and configurations to be stored while awaiting reuse. All liquid transfers are conducted on secondary containment.

2.6 Waste Characterization

Waste sent to landfills for disposal is characterized prior to transportation. The proper chemical analysis is obtained for disposal approval and for waste to be transported from Range sites.

2.7 Waste Transportation

Documentation is to be completed and accompany each waste stream sent off-site for disposal. Waste manifests or approved waste transportation tracking documents are required. All waste manifest forms are to be signed by a Range employee or approved agents.

Requirements for waste transportation from generating sites to appropriate disposal facilities varies depending on the waste classification of the waste stream. As noted above, federal and state regulations specify the requirements for the transportation of hazardous waste.

Off-site waste transportation is to be performed by an approved transporter and the container must be covered. If additional paperwork and placard requirements are necessary for industrial wastes, hazardous wastes or Department of Transportation ("DOT") hazardous materials, Environmental Compliance handles these requirements.

All solid and residual waste transported from Range sites is accompanied by a non-hazardous waste manifest (Attachment A). The manifests are retained for the required five-year period. All movements of liquid wastes from Range sites are accompanied by a non-hazardous Range specific waste manifest (Attachment B) and is retained for a five-year period.

2.8 Waste Disposal

All waste is sent for disposal to Range approved facilities that are capable of handling the waste. Below is a list of regularly utilized facilities:

CENTRALIZED TREATMENT PLANT FOR RECYCLE	SPIRIT SERVICES OF WV, LLC (Permit: WVD988782532)
CENTRALIZED TREATMENT PLANT FOR RECYCLE	PETROMAX LTD (Permit: PAR706105)
LANDFILL	APEX SANITARY LANDFILL (Permit: 06-08438)
LANDFILL	ARDEN LANDFILL (Permit: 100172)
LANDFILL	CARBON LIMESTONE LANDFILL - BFI (Permit: CID # 28726)
LANDFILL	WAYNE TOWNSHIP LANDFILL (Permit: 100955)
LANDFILL	IMPERIAL LANDFILL (Permit: 100620)
LANDFILL	KELLEY RUN LANDFILL (Permit: 100663)
LANDFILL	MONROEVILLE LDFL (Permit: 100594)
LANDFILL	PHOENIX RESOURCES LANDFILL (Permit: 301358)
LANDFILL	VALLEY LANDFILL (Permit: 100280)
RESIDUAL WASTE PROCESSING FACILITY	BELMONT SOLIDS CONTROL LLC (Permit: ODNR 2015-511)
RESIDUAL WASTE PROCESSING FACILITY	BELMONT SOLIDS CONTROL LLC - WEST VIRGINIA (Permit: 353102)
RESIDUAL WASTE PROCESSING FACILITY	CYCLE CHEM LEWISBERRY (Permit: 301280)
RESIDUAL WASTE PROCESSING FACILITY	FLUID MANAGEMENT SOLUTIONS, INC. (Permit: WVR000549360)
RESIDUAL WASTE PROCESSING FACILITY	BARRACUDA WATER STORAGE FACILITY (Permit: WMGR123SW046)
STORAGE PENDING DISPOSAL OR REUSE	BSI CLARKSBURG YARD (Permit: 017-00001821)
STORAGE PENDING DISPOSAL OR REUSE	HALIBURTON ENERGY SERVICES, INC
RESIDUAL WASTE PROCESSING FACILITY	HIGHLAND FIELD SERVICES KANE (Permit: WMGR123NW005)
RESIDUAL WASTE PROCESSING FACILITY	HYDRO RECOVERY LP WASHINGTON DEV (Permit: WMGR123SW019)
CENTRALIZED TREATMENT PLANT FOR RECYCLE	INTEGRITY INDUSTRIES MUNCY
STORAGE PENDING DISPOSAL OR REUSE	NEWPARK LMP (Permit: 2018-309)

STORAGE PENDING DISPOSAL OR REUSE	PARAGON INTEGRATED SERVICES GROUP, LLC
RESIDUAL WASTE PROCESSING FACILITY	RES WATER - GREENE LLC (Permit: WMGR123SW031)
RESIDUAL WASTE PROCESSING FACILITY	RES WATER BUTLER (Permit: WMGR123NW009)
RESIDUAL WASTE PROCESSING FACILITY	RESERVED ENV SVC HEMPFIELD TWP RESIDUAL WASTE OPER (Permit: WMGR123SW005)
RESIDUAL WASTE PROCESSING FACILITY	RIVERSIDE VALLEY SERVICES LLC (Permit: 253100)

3.0 Recordkeeping and Reporting

3.1 Manifests

Copies of waste/water manifests and weight slips are retained for five years at the regional Range office location.

3.2 Reporting

Residual wastes generated in Pennsylvania must be reported to the PADEP's Solid Waste and Oil and Gas Divisions. Range maintains a corporate Pennsylvania Environmental Reporting Compliance Handbook outlining all reporting requirements within PA for its employees. The following Procedures are maintained as a reference for Range employees:

- 26R Waste Reporting Procedure
- Oil and Gas Monthly Waste Reporting Procedure
- Biennial Waste Report Form 330/330-GM

4.0 Positions of Responsibility

4.1 VP- Environmental Compliance

Oversees and monitors the elements of this Plan, including instituting an effective communication program, developing waste procedures as appropriate, orchestrating reviews and audits of the waste program, managing investigations of noncompliance, reporting on compliance program status, and corrective action development. Consults with Environmental Compliance Management, Staff and Operations as necessary with regards to the elements outlined within this Plan.

4.2 Environmental Compliance Director

Oversees the waste management program and the elements of this Plan. Consults with the Environmental Compliance Waste Staff to manage the day-to-day operation of this Plan. Works with Operations to demonstrate compliance with this Plan.

4.3 Environmental Compliance Waste Staff

Oversees the profiling of all waste streams for disposal and waste reporting. Responsible for conducting audits on all transfer stations, landfills and water treatment plants used by Range to verify their compliance. Evaluate any waste transfer station, landfill or water treatment plant being approved for utilization by Range.

4.4 Waste Control Coordinator- Drilling

Oversees the transfer and disposal of all waste related to drilling operations in PA. Coordinates the movement of drilling mud to new drilling sites for beneficial reuse and disposal. Is responsible for handling the disposal of all drill cuttings, including the coordination of the approved and permitted transporter taking the drill cuttings to an approved and permitted landfill. Tracks the amount of waste taken to each landfill per day to verify Range does not

exceed its maximum allowed capacity. Tracks manifests to ensure the proper disposal of the drill cuttings.

4.5 Environmental Compliance Personnel

Ensures this Plan is implemented and followed during all phases of Operations. Assists the with ensuring compliance with the elements of this Plan.

Attachment A

WASTE MANAGEMENT

NON-HAZARDOUS MANIFEST

NON-HAZARDOUS MANIFEST	1. Generator's US EPA ID No. Generator's ID / Manifest Doc No. Number	2. Page 1 of Page
3. Generator's Mailing Address: **4. Generator's Phone**	**Generator's Site Address** (If different than mailing):	A. Manifest Number «number» B. State Generator's ID State Generator's ID
5. Transporter 1 Company Name Transporter 1 Company Name	**6. US EPA ID Number** US EPA ID Number	C. State Transporter's ID State Transporter ID D. Transporter's Phone Transporter 1 Phone
7. Transporter 2 Company Name Transporter 2 Company Name	**8. US EPA ID Number** US EPA ID Number	E. State Transporter's ID State Transporter ID F. Transporter's Phone Transporter 2 Phone
9. Designated Facility Name and Site Address ARDEN SANITARY LANDFILL 200 RANGOS LANE WASHINGTON, PA 15301	**10. US EPA ID Number** US EPA ID Number	G. State Facility ID State Facility ID H. State Facility Phone Facility Phone

GENERATOR

11. Description of Waste Materials	12. Containers No.	12. Containers Type	13. Total Quantity	Wt./Vol.	I. Misc. Comments
a. **WM Profile #** WM Profile Number		Type		Wt./ Vol.	Comments
b. Waste Name **WM Profile #** WM Profile Number	N.	Type	Total Qty.	Wt./ Vol.	Comments
c. Waste Name **WM Profile #** WM Profile Number	No.	Type	Total Qty.	Wt./ Vol.	Comments
d. Waste Name **WM Profile #** WM Profile Number	No.	Type	Total Qty.	Wt./ Vol.	Comments

J. Additional Descriptions for Materials Listed Above
Additional Description

K. Disposal Location

Cell		Level	
Grid			

15. Special Handling Instructions and Additional Information
Special Handling Instructions

Purchase Order # Purchase Order Number EMERGENCY CONTACT / PHONE NO.:

16. GENERATOR'S CERTIFICATE:
I hereby certify that the above-described materials are not hazardous wastes as defined by CFR Part 261 or any applicable state law, beenfully and have accurately described, classified and packaged and are in proper condition for transportation according to applicable regulations.

Printed Name	Signature "On behalf of"	Month	Day	Year

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed Name	Signature	Month	Day	Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed Name	Signature	Month	Day	Year

FACILITY

19. Certificate of Final Treatment/Disposal
I certify, on behalf of the above listed treatment facility, that to the best of my knowledge, the above-described waste was managed in compliance with all applicable laws, regulations, permits and licenses on the dates listed above.

20. Facility Owner or Operator: Certification of receipt of non-hazardous materials covered by this manifest.

Printed Name	Signature	Month	Day	Year

White

Attachment B

Range Resources – Appalachia, LLC
3000 Town Center Boulevard
Canonsburg, PA 15317
724.743.6700 DEP ID# 141142

WATER MANIFEST

RANGE RESOURCES®

Range Resources
Manifest No.

Generating Operation:	☐ Drilling	☐ Completions	☐ Production
Transported for:	☐ On Site Reuse/Recycle	☐ Off Site Treatment	☐ Disposal

Transporter Details:			
Company Name:		Address:	
Telephone:			
Vehicle License No:	Truck #:	Vehicle License State:	
Generating Location Details:			
Site Name:		Address:	
Well Name:		AFE #:	
Well Permit #:		Tank # if applicable:	
Date:	Time In:	Time Out:	
Destination Details:			
Site Name:		Address:	
Telephone (if applicable):	Date:	Time In:	Time Out:

Type of Water:

☐899- Containment Water
☐803- Drill Out Water
☐899- Filtered/Polished Water (Drilling)
☐805- Flowback Water
☐ Fresh Water
☐802- Production Water
☐802- Originating at RES/HydroRecovery Water
☐Other _____
Gallons Transported: _____

Unloaded to:

☐ Frac/Vertical Tank ☐ Impoundment
☐ AST (Aboveground Storage Tank) ☐ Other _____

SIGNATURES AND CERTIFICATION:

I certify under penalty of law that, to my knowledge and belief, that date and other information represented on this form are true and correct:

Generating Location Company Representative:	**Date:**
Transporter:	**Date:**
Destination:	**Date:**

White Copy – Hauler Copy Yellow Copy – Treatment/Disposal Facility Copy Pink Copy – Range Resources Copy

APPENDIX C – ONSITE MATERIAL INVENTORY (TYPICAL)

Appendix C – Onsite Material Inventory (Typical)

The following tables in this appendix identify the wastes, chemicals, and other materials that are typically stored and used on Range locations during different phases of well development and operation. The materials and quantities found onsite can vary depending on the number of wells being drilled, the point in time during a phase, size of the facility, and other additional factors. The Range Safety Department is tasked with onsite placement of an SDS for each Range-owned material, as well as management of vendor/contractor SDS responsibilities.

SDS Files
https://www.rangeresources.com/safety-data-sheet-library/

General Waste

RWC	Waste Stream	Typical Qty Onsite	Location	Containment	Reused
710	General Plant Trash	0-10 yards	Well Site	None	No

Drilling Waste

RWC	Waste Stream	Typical Qty Onsite	Location	Containment	Reused
803	Drilling Fluid	1,500 bbl	Well Site	Well Site Containment	Yes
810	Drill Cuttings	100-200 tons	Shaker, Half Rounds	Well Site Containment	No
803	Rig Wash	50 gallons	Well Site	Well Site Containment	Yes
803	Cellar Water	90 bbl	Well Site	Well Site Containment	Yes
803	Drilling Fluid/Mud	2,300 bbl	Well Site	Well Site Containment	Yes
710	General Plant Trash	75-150 yards	Well Site	None	No

Drilling Chemicals

Common Chemical Name	Trade Name	Container	Containment
Anionic Water/Soluble Polymer	WST-PN0305	Tote	Well Site Containment
Calcium	Closed Loop Calcium	Bag	Well Site Containment
Calcium Chloride	Calcium Chloride-MiSwaco	Tote	Well Site Containment
Calcium Chloride	Calcium Chloride-Multi-Chem	Tote	Well Site Containment
Cement	Cement Class A D901	Bag	Well Site Containment
Cement	Portland Cement	Bag	Well Site Containment
Cement Additive	LITEPOZ3 Extender D35	Bag	Well Site Containment
Defoamer	HDS 11 Defoamer	Tote	Well Site Containment
Diesel Fuel	Diesel Fuel	Double Wall Tank	Well Site Containment
Drilling Fluid	BaraXcel 1		Well Site Containment

Appendix C – Onsite Material Inventory (Typical)

Drilling Chemicals - Continued

Common Chemical Name	Trade Name	Container	Containment
Emulsifier	FORTI-MUL	Tote	Well Site Containment
Hammer Oil	Emblem Rock Drill Oils	Tote	Well Site Containment
Inhibitor	Master Clear Concentrate	Tote	Well Site Containment
Lime	Lime	Tote	Well Site Containment
Lost Circulation Material	STOPIT	Tote	Well Site Containment
Negative Polymer	Synfloc SC Negative	Tote	Well Site Containment
Neutral Polymer	Synfloc SC Neutral	Tote	Well Site Containment
Oil Wetting Agent	DRILTREAT	Tote	Well Site Containment
Omega HD Soap	Omega Foam	Tote	Well Site Containment
Positive Polymer	Synfloc SC Positive	Tote	Well Site Containment
Soap Foam	ENV Foam	Tote	Well Site Containment
Viscosifier	M-I GEL Wyoming	Tote	Well Site Containment
Weighting Agent	M-IBAR	Tote	Well Site Containment
	WST-PA3003	Tote	Well Site Containment
	WST-PCK4005	Tote	Well Site Containment

Completions Wastes

RWC	Waste Stream	Typical Qty Onsite	Location	Containment	Reused
802	Produced Fluid	2500 bbls	Storage Tanks	Tank Pad Containment	Yes
806	Liner Material	50-100 tons	Roll Off Containers	Area Containment	No
802	Frac Sand/Flowback Residuals	50-200 tons	Vac / Storage Tanks	Tank Pad Containment	No
710	General Plant Trash	75-150 yards	Well Site	None	No

Completions Chemicals

Common Chemical Name	Trade Name	Container	Containment
Hydrochloric Acid (<37%)	Hydrochloric Acid	Transport	Well Site Containment
Biocide	MX 8-4543	ISO	Well Site Containment
Brine	MX 5-3886	Tote	Well Site Containment
Biocide Additive (optional)		Totes	Well Site Containment
Diesel Fuel	Diesel Fuel	Double Wall Tank	Well Site Containment
Scale Inhibitor	Legend LD7750W	ISO	Well Site Containment
Friction Reducer	Excelerate LX-21	ISO	Well Site Containment
Friction Reducer	FDP-S1463-22	ISO	Well Site Containment
Mineral Oil Cleaning Solution	LCA-1 Cleaning Solution	Tote	Well Site Containment
Sand	Silica	Sand Box	Well Site Containment

Appendix C – Onsite Material Inventory (Typical)

Production Wastes					
RWC	**Waste Stream**	**Typical Qty Onsite**	**Location**	**Containment**	**Reused**
802	Produced Fluid	100 bbls	100 bbl Production Tanks	Production Tank Containment	No
710	General Plant Trash	0-10 yards	Well Site	None	No

Production Pad Chemicals			
Common Chemical Name	**Trade Name**	**Container**	**Containment**
Biocide	BIOC1113A	Chemical Tank or Tote	Tank Containment or Temporary Containment
Biocide	BIOC1112A	Chemical Tank or Tote	Tank Containment or Temporary Containment
Biocide	MC B-8614	Chemical Tank or Tote	Tank Containment or Temporary Containment
Biocide	B 8525 Biocide PDS	Chemical Tank or Tote	Tank Containment or Temporary Containment
Condensate	Condensate	Production Tank	Production Tank Containment
Corrosion Inhibitor	C-139 Corrosion Inhibitor	Chemical Tank	Tank Containment
Corrosion Inhibitor	CORR11540W	Chemical Tank	Tank Containment
Crude Oil		Production Tank	Well Site Containment
Defoamer	CoilSTREAM DF 8350	Chemical Tank	Tank Containment
Defoamer	DF-7090	Chemical Tank	Tank Containment
Diethylene Glycol	Intercool D-200N	GPU Bath	GPU Containment (not every site)
Diethylene Glycol	Thermodynall 3T-i	GPU Bath	GPU Containment (not every site)
Emulsion Breaker (never stored on site; removed once job is completed)	MC EB 1825A	Chemical Tote	Temporary Containment
Ethylene Glycol	Ethelene Glycol 100%	GPU Bath	GPU Containment (not every site)
Foamer	MX 4-5353	Chemical Tank	Tank Containment
Foamer	MXC 4-4964	Chemical Tank	Tank Containment
Heat Transfer Fluid	Thermal Charge EG Concentrate	Chemical Tank	Tank Containment

Appendix C – Onsite Material Inventory (Typical)

Production Pad Chemicals - Continued

Common Chemical Name	Trade Name	Container	Containment
Hydrochloric Acid (never stored on site; removed once job is completed)	AIH-9115 HCL	Chemical Tote	Temporary Containment
Methanol	MC MX 5-2026	Chemical Tank	Tank Containment
Methanol	MC SS-5669	Chemical Tank	Tank Containment
Natural Gas	Natural Gas (Dry)	Line	N/A
Scale Inhibitor	MC S-2510T	Chemical Tank or Tote	Tank Containment or Temporary Containment
Scale Inhibitor	MC SS-5669	Chemical Tank or Tote	Tank Containment or Temporary Containment
Triethylene Glycol	KOSTherm HD TEG	Dehy Equipment	Reboiler Skid & Double Walled Day Tank

* If Applicable

APPENDIX D – CONTAINMENT SYSTEM MANUFACTURER'S INFORMATION

WESTERN
ENVIRONMENTAL LINER

VersaShield (60/4)

Heavy duty fabric incorporating a special weave pattern heavy duty fabric incorporating a special weave pattern to ennhance material durability and strength at the same time promoting convenient installation and ease of repair. For use in geomembrane applications such as soil remediation, oil and gas pad containment, pond lining, canal lining, landfill covers, etc.

FABRIC SPECIFICATIONS

WEAVE	Woven black HDPE scrim
WEIGHT	30 oz/yd^2 (+/- 10%)
THICKNESS	60 mil +/-10%, ASTM D1777

PERFORMANCE

GRAB STRENGTH	Warp 840 lb	Weft 810lb	ASTM D7004
TONGUE TEAR	Warp 85 lb	Weft 110lb	ASTM D5844
TRAP TEAR	Warp 105lb/in	Weft 80lb/in	ASTM D-5053-11
SEAM STRENGTH (SHEAR) MIN	> 80% of the strip tensile value		ASTM D4851-07
SEAM STRENGTH (PEEL) MIN	4 lb/in		ASTM D4851-07
STRIP TENSILE	Warp 490 lb	Weft 440 lb	ASTM D4533
MULLEN BURST	>1000 psi, (did not break)		ASTM D3786
HYDRAULIC CONDUCTIVITY (PERMEABILITY)	<1.87 X 10^{-12} cm/s		Calculated from MVTR
HYDROSTATIC RESISTANCE	1154 psi		ASTM D751
Puncture Resistance Geomembrane Puncture Resistance CBR	410 lbs through Liner From Spun Bond Side 2500 lbs through Liner From Spun Bond Side		ASTM D4833 ASTM D6241

These values are typical data and are not intended as limiting specifications.

PRODUCT INFORMATION SHEET

SITEGUARD

Surface-mounted seamless secondary containment system

Features

- Seamless liner
- Durable and puncture resistant
- Professional engineer certified designs
- Inert and VOC-free materials
- Customizable to site requirements
- Liner can be easily cleaned and reused on multiple sites

Benefits

- Eliminates cost of soil remediation associated with leak or spill
- Proprietary gusset and anchor system minimizes surface disturbance
- Virtually maintenance free
- Proven useful life of 20+ years
- Lower total cost of ownership
- 100% capture of all non-volatile fluids

A permanent, low-maintenance, custom-built solution

The SITEGUARD™ seamless secondary containment system provides a barrier that protects the environment from corrosive elements without the need for below-grade installation. In many locations the subsurface conditions and/or local regulations restrict the construction of below-grade containments. In these areas, a surface-mounted containment is the most viable solution. Our secondary containment system is constructed from components and coatings that use our proprietary modified polyurea lining and coating technology. The technology maintains impermeability and puncture resistance under exposure to harsh UV and weather extremes, resulting in long life and minimal maintenance costs.

SITEGUARD secondary containment systems have been installed in more than 8,000 locations with a 100% environmental success rate.

Engineered for total protection

To construct each containment system our proprietary polyurea lining and coating technology is sprayed onto a flexible geotextile base by our state-of-the-art computer-controlled, robotic system. This assures that a consistent layer of protection is precisely applied across every square inch of the liner. Combined with sturdy steel wall construction, this system ensures your containment will support full hydrostatic loading as designed.

Complete spill containment

In instances where a production tank has failed, our secondary containment system has captured 100% of the non-volatile fluid.

Each system is custom built to fit your site and SPCC requirements. The SITEGUARD seamless secondary containment system is backed with an 18-month warranty.

Specialized gusset and anchor system

The walls of our surface-mounted containment system are supported through a proprietary gusset and poly anchor system to conform to stringent state regulations regarding surface disturbance. The result is a robust wall structure that provides many years of protection.

Our surface-mounted secondary containment systems are *engineered to protect* your investment, the environment and your reputation.

FALCON TECHNOLOGIES
A CARBO business

SITEGUARD

Surface mounted seamless secondary containment system

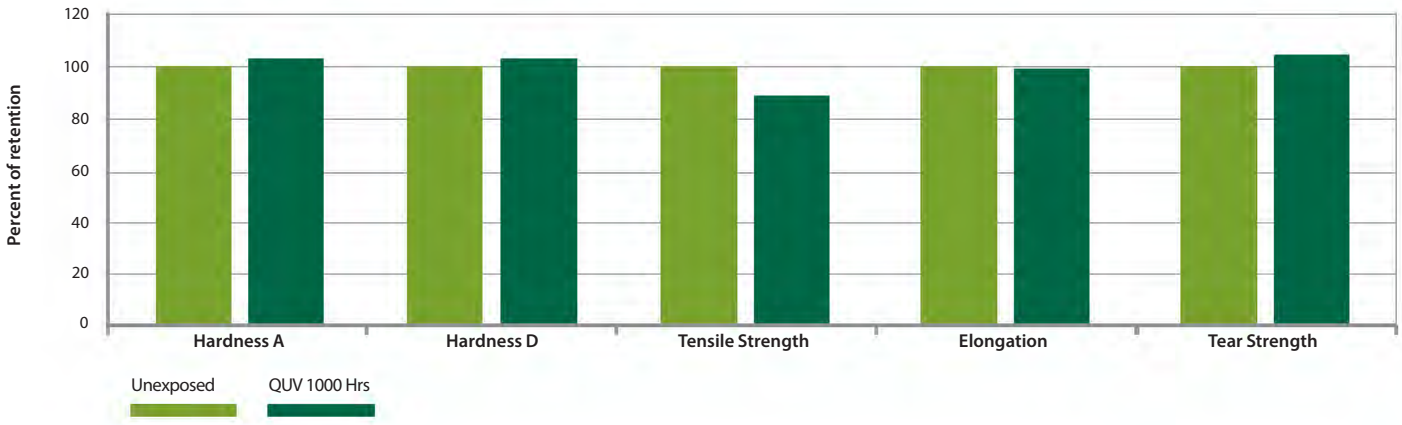
Elastomer physical properties

Physical Test	Test Method	Typical Value
Hardness, Shore A	ASTM D-2240	85-90
Tear strength (pli)	ASTM D-624	300-350
Elongation (%)	ASTM D-412	350-500
Tensile strength (psi)	ASTM D-412	1,600-2,800
Taber abrasion (mg wt loss)	ASTM D-4060	1.0* (0.001%)
Static coefficient of friction (wet/dry)	ASTM C-1028	0.77/1.02
Electrical resistance (Ω)	ASTM F-150	10^{12} (insulative)
Permeability (perms)	ASTM E-96	0.05
Permeability (cm/sec)	ASTM D-4491	0×10^{-12}
Puncture resistance (lbs) (top side)	ASTM D-751	129
Puncture resistance (lbs) (bottom side)	ASTM D-751	137

*Abrasion loss: tested at CS17 wheel, 1 kg load, 1,000 cycles

The polyurea spray used in our proprietary liner retains its properties even after years of exposure to UV light and extreme weather conditions. The maximum recommended long-term exposure temperature is 200°F (93°C).

Weatherability characteristics



The most durable liner in the industry

FALCON TECHNOLOGIES produces a family of high-performance products featuring a proprietary modified polyurea lining and coating technology that provides a seamless, durable, maintenance-free layer of protection for your wellsite. Weather is not an issue either—our liner is UV resistant and retains its properties to -40°F. With a proven useful life of 20+ years, our liner technology significantly extends asset life, resulting in dramatically reduced maintenance and replacement costs for a much lower total cost of ownership.

For purchasing or inquiries about SITEGUARD surface-mounted products, please contact +1 724 553 9300

falcontsi.com

FALCON TECHNOLOGIES
A CARBO business

PRODUCT INFORMATION SHEET

GROUNDGUARD

Prefabricated liner

Features

- Geotextile material coated with an impermeable layer of proprietary modified polyurea
- State-of-the-art, automated application process ensures a consistent layer of durable protection
- Engineered and tested to resist tearing, puncturing and most chemicals
- Customize size, color and thickness to fit any application

Benefits

- Lasts longer than HDPE to provide industry-leading environmental protection from spills
- Lays flat for easy installation
- Durable under heavy truck traffic
- Maintenance-free, easily cleaned and reused on multiple sites
- Highest customer satisfaction due to design flexibility and fast turnaround on custom orders

Highly cost-effective temporary and permanent site protection

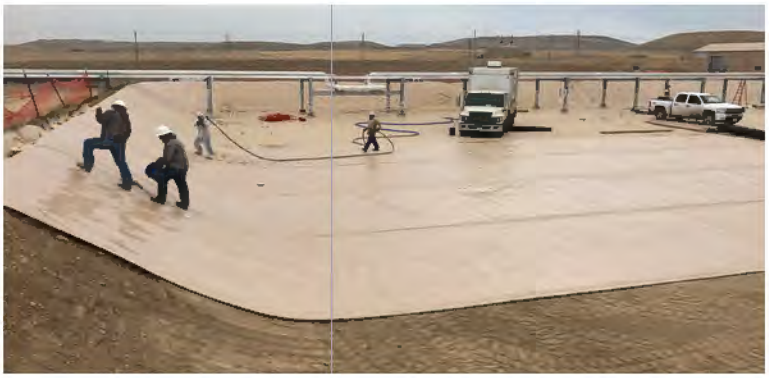
The GROUNDGUARD® prefabricated liner creates an impermeable protective layer between the environment and hazardous fluids commonly found in oil and gas, mining and industrial sites. GROUNDGUARD provides protection against leaks or spills from tanks, pipes and other vessels—simplifying or eliminating the need for remediation.

The GROUNDGUARD liner features our proprietary modified polyurea coating technology applied with a state-of-the-art automated process to ensure the highest level of consistency and coverage per square foot. It maintains impermeability and puncture resistance under exposure to harsh UV and weather extremes, resulting in a long lifespan with minimal maintenance requirements.

Only a single layer of the liner is required instead of multiple layers of HDPE. And it lays flatter for an easier installation than alternative liners, reducing trip hazards and improving site safety and spill containment.

Proven durability and protection in over 36,000 installations globally

The durability and performance of our revolutionary liner has been proven in more than 36,000 installations. Should a spill occur on the liner, it is contained, so it can be recovered and cleaned easily, avoiding a reportable incident, costly remediation and negative publicity.



Flexible, reusable and recyclable

The GROUNDGUARD liner is flexible and durable so it can be transported and reused multiple times for a variety of applications. The liner can be sized to fit individual equipment, such as trucks, temporary secondary containment for tanks, permanent secondary containment, containment tail ponds or entire work sites. It can be easily cleaned and trimmed to smaller sizes for subsequent applications. The liner can be attached to perimeter materials such as steel, concrete, wood, corrugated pipe, foam or our proprietary POLYBERM product to create a containment system. It contains no VOCs and is chemically inert, which makes it safe and fully recyclable.

ASSETGUARD
A CARBO business

GROUNDGUARD

Prefabricated liner

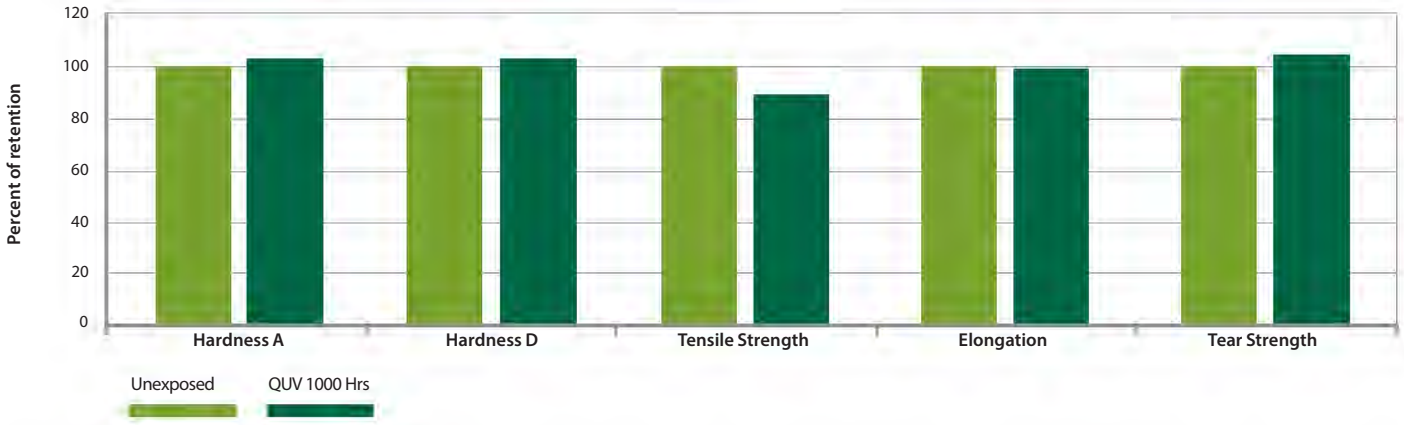
Elastomer physical properties

Physical Test	Test Method	Typical Value
Hardness, Shore A	ASTM D-2240	85-90
Tear strength (pli)	ASTM D-624	300-350
Elongation (%)	ASTM D-412	350-500
Tensile strength (psi)	ASTM D-412	1,600-2,800
Taber abrasion (mg wt loss)	ASTM D-4060	1.0* (0.001%)
Static coefficient of friction (wet/dry)	ASTM C-1028	0.77/1.02
Electrical resistance (Ω)	ASTM F-150	10^{12} (insulative)
Permeability (perms)	ASTM E-96	0.05
Permeability (cm/sec)	ASTM D-4491	0×10^{-12}
Puncture resistance (lbs) (top side)	ASTM D-751	129
Puncture resistance (lbs) (bottom side)	ASTM D-751	137

*Abrasion loss: tested at CS17 wheel, 1 kg load, 1,000 cycles

The polyurea spray used in our proprietary liner retains its properties even after years of exposure to UV light and extreme weather conditions. The maximum recommended long-term exposure temperature is 200°F (93°C).

Weatherability characteristics



The most durable liner in the industry

ASSETGUARD produces a family of high-performance products featuring a proprietary modified polyurea lining and coating technology that provides a seamless, durable, maintenance-free layer of protection. Weather is not an issue either—our liner is UV resistant and retains its properties to -40°F. With a proven useful life of 20+ years, ASSETGUARD technology significantly extends asset life, resulting in dramatically reduced maintenance and replacement costs for a much lower total cost of ownership.

Talk to ASSETGUARD to find out how we can help you protect your assets and the environment.

assetguardproducts.com

ASSETGUARD
A CARBO business

FS 8500

Polyurea Lining for Secondary Containment Applications

Features

Chemical Resistant
FS 8500 provides excellent resistance against a variety of chemicals used in the Oil and Gas Industry.

Good Flexibility and Elongation
FS 8500 is formulated to be extremely flexible and have high elongation to conform to the substrate during movement.

Wetting
FS 8500 is designed specifically to wet out geotextiles to create a tough, durable liner.

Fast Set
FS 8500 is formulated as a fast-set lining to minimize down times of application areas.

Zero VOCs
FS 8500 is a 100% solids coating and is formulated with zero VOCs.

Application

FS 8500 should be applied through a two-component, high pressure proportioning unit. Material and hose heaters should be between 150-170°F. Pressure should be a minimum of 2200 psi. If A side and B side pressures are not equal, stop spraying and examine equipment.

Be sure to consult with a Chemline representative for specific recommendations regarding application.

Description

FS 8500 is a 1:1, fast-set, spray applied two-component polyurea coating. It is 100% solids and contains zero VOC's.

FS 8500 is specifically designed for application to geotextile fabric to form a durable, flexible, seamless liner for use in secondary containment applications. It is ideal for preventing leaks and containing spills of wastewater, fuels, and many other chemicals. FS 8500 has exceptional resistance to impact and chemical attack.

Typical applications for FS 8500 include wastewater containment, chemical containment and spill control, fuel loading and unloading stations, water ponds, vapor barriers and landfills.

Technical Data

Property	Value
Hardness, Shore A (ASTM D-2240)	87-92
Tensile Strength, psi (ASTM D-412	2500-3500
Tear Strength, pli (ASTM D-624)	350-500
Elongation, % (ASTM D-412	400-500
Permeability, g/h*m*mmHg (ASTM E-96)	0.04
Linear Shrinkage, %	0.15
Taber Abrasion: mg wt. loss/1000 revs – CS-17	23
Application Temperature	
Substrate, °F	-40 to 220
Ambient, °F	-40 to 220
Gel Time, sec	10-15
Tack Free Time, sec	30-45

*Values obtained in laboratory setting for comparison purposes only and should not be considered specifications.

Safety

This product is for industrial use only. Avoid contact with eyes and skin. Do not inhale or ingest. When spraying, wear a respirator or a fresh air hood. Spraying indoors requires forced ventilation. Be sure to read MSDS in its entirety prior to using FS 8500.

Packaging, Storage, & Shelf Life

FS 8500 is available in 54 gallon drums and 270 totes. It should be stored in sealed containers between 60°F and 90°F. Shelf life is 12 months under normal conditions.

Revised 05/2019

Chemline, Inc. • 5151 Natural Bridge Rd. • St. Louis, MO 63115 • Phone : (314) 664 - 2230

HYDRALINE™ HD60

HIGH DENSITY POLYETHYLENE – LAYFLAT – MEETS GRI-GM13

RAVEN

PRODUCT DESCRIPTION

HydraLine™ HD60 is made from high density polyethylene (HDPE) resins protected by UV stabilizers to provide exceptional longevity and durability. HydraLine™ HD60 has great chemical resistance and a fairly low permeability as a result of the HDPE properties.

HydraLine™ HD60 requires specialized welding equipment and certified welding technicians to be properly installed. Welding is done with hot wedge welders on long field seams, and extrusion welders are used on detail work and pipe penetrations.

HydraLine™ HD60 is available in smooth, textured, and conductive variations. Colors include black and custom colors with minimum quantity requirements.

PRODUCT USE

HydraLine™ HD-Series is an excellent product for large applications that require UV stability and chemical resistance. HydraLine™ HD-Series geomembranes are a cost effective choice for large and exposed lining projects. This product is successfully used in landfills, waste water treatment lagoons, animal waste lagoons, mining applications and more.

HydraLine™ HD-Series meets the physical property values as stated in GRI test method GM13.

SIZE & PACKAGING

HydraLine™ HD60 is shipped to job sites in large 22.5' or 23' wide master rolls tightly rolled on to a heavy core and deployed by on site equipment. Seaming by certified installation technicians occurs in the field by heat fusion welding.

HydraLine CONTAINMENT SOLUTIONS

Waste Lagoon Liner

PRODUCT	PART #
HydraLine™	HD60B
HydraLine™	HD60W

APPLICATIONS

Landfill Liner & Caps

Animal Waste Lagoons

Golf Course Ponds

Gas Collection Covers

Pond & Lake Liners

Irrigation Reservoirs

Waste Water Treatment Lagoons

Mining Tailing & Heap Leach Pads

Canal Lining

HYDRALINE™ HD60

HIGH DENSITY POLYETHELYNE – LAYFLAT

		HydraLine™ HD60			
		IMPERIAL		METRIC	
PROPERTIES	TEST METHOD	TEST VALUE	TESTING FREQUENCY (MINIMUM)	TEST VALUE	TESTING FREQUENCY (MINIMUM)
Appearance		Black, White, & Custom Colors Available with Minimum Order Quantity			
Thickness (min. avg.)	ASTM D5199	60 Mils	Per roll	1.50 mm	Per roll
Formulated Density (minimum)	ASTM D1505 / ASTM D792	0.940 g/cc	200,000 lb	0.940 g/cc	90,000 kg
Tensile Properties (min. avg.) [1] - yield strength - break strength - yield elongation - break elongation	ASTM D6693 Type IV	 126 lb/in. 228 lb/in. 12 % 700 %	20,000 lb	 22 kN/m 40 kN/m 12 % 700 %	9,000 kg
Tear Resistance (min. avg.)	ASTM D1004	42 lb	45,000 lb	187 N	20,000 kg
Puncture Resistance (min. avg.)	ASTM D4833	108 lb	45,000 lb	480 N	20,000 kg
Stress Crack Resistance [1]	ASTM D5397 (App.)	500 hr	Per GRI-GM10	500 hr	Per GRI-GM10
Carbon Black Content (range) [1]	ASTM D4218	2.0-3.0 %	20,000 lb	2.0-3.0 %	9,000 kg
Carbon Black Dispersion	ASTM D5596	Pass	45,000 lb	Pass	20,000 kg

[1] See reference notations for the listed test methods located in the Geosynthetics Research Institute; GRI-GM13 Standard Specification.

HydraLine™ HD60 is made from high density polyethylene (HDPE) resins protected by UV stabilizers to provide exceptional longevity and durability. HydraLine™ HD60 has great chemical resistance and a fairly low permeability as a result of the HDPE properties.

RAVEN ENGINEERED FILMS
P.O. Box 5107 Sioux Falls, SD 57117-5107
Ph: +1 (605) 335-0174 • TF: +1 (800) 635-3456

efdsales@ravenind.com
www.ravenefd.com

Raven 502
Technical Data Sheet

MANUFACTURER

Raven Lining Systems, Inc.
13105 East 61st Street, Suite A
Broken Arrow, OK 74012
Phone: (918) 615-0020

DESCRIPTION

Raven® 502 is a 100% solids modified polyurethane coating designed for a variety of applications. Raven 502 can be used in high humidity conditions with minimal bubbling and loss of adhesion. Raven 502 adheres well to properly prepared concrete, steel, aluminum, wood, composites and many other substrates. Contact Raven for for primer recommendations for various substrates.

PHYSICAL PROPERTIES (Typical)

Test Performed, Units	Method	Result
Tensile Strength, psi	ASTM D412/638	2250
Elongation, %	ASTM D412/638	250
Taber Abrasion, CS17 Wheel	ASTM D4060	12.4
Die “C” Tear , pli	ASTM D624	400
ANSI/NSF- 61	ASTM D624	Not Tested
Hardness, Shore A	ASTM D2240	96
Hardness, Shore D	ASTM D2240	48
Viscosity A-Side (75ºF), CPS	Brookfield	350 - 800
Viscosity B-Side (75ºF), CPS	Brookfield	550 - 1250
Recommended pH Range Exceed	Application not to exceed	3 to 12
Moisture vapor tran.	ASTM D1653-WVT grams/m2	1.3
Shrinkage, % (80Mils dft)	Internal	1.4
Processing Properties	**Units**	**Result**
Recoat Window	Hours @72°F	2
Gel Time	Seconds	3
Tack Free Time	Seconds	4

TYPICAL USES

- Secondary Containment
- Primed Steel
- Primed Aluminum
- OEM Applications
- Concrete Waterproofing
- Industrial Facilities

COLOR

Standard Colors:

- Black, BLM Desert Tan, BLM Shale Green, BLM Covert Green

APPLICATION EQUIPMENT

Raven 502 has been developed for use with high pressure plural component spraying equipment capable of maintaining 2000 psi and 140F temperature at all times. Heated hose is required. The manufacturer recommends Graco equipment such as a Graco HXP 2. Contact the manufacturere for details on material delivery systems.

COMPONENTS AND MIX RATIO

Part A Iso: Part B Resin mix ratio is 1:1 by volume.

CLEAN-UP

Cured product may be disposed of without restriction. The un-cured isocyanate and resin portions should be mixed together and disposed of in a normal manner. “Drip free” containers should be disposed of according to state, local, and federal laws.

LIMITATIONS

Raven 502 is an aromatic polyurethane. While the physical properties may not be affected, the elastomer could fade with exposure to UV light or mercury vapor light. If color stability is mandatory, contact the manufacturer for recommendations. The chemical resistance chart should be consulted prior to application. Each individual user should check the product compatability with their own application requirements prior to use.

SURFACE PREPARATION

Prior to coating, the substrate must be prepared in a manner that provides a uniform, clean, sound, neutralized surface suitable for the specified coating. The substrate must be free of all contaminants, such as oil, grease, rust, scale or deposits. In general, coating performance is proportional to the degree of surface preparation.

Steel surfaces may require “Solvent Cleaning” (SSPC-SP 1) to remove oil, grease and other soluble contaminants. Chemical contaminants may be removed according to SSPC-SP 12/NACE No. 5. Identification of the contaminants along with their concentrations may be obtained from laboratory and field tests as described in SSPC-TU 4 “Field Methods for Retrieval and Analysis of Soluble Salts on Substrates”. Surfaces to be coated should then be prepared according to SSPC-SP 5/NACE No.1 “White Blast Cleaning” for immersion service or SSPC-SP 10/NACE No. 2 “Near White Blast Cleaning” for all other service. In certain situations, an alternate procedure may be to use high (>5,000 psi) or ultrahigh (>10,000 psi) pressure water cleaning or water cleaning with sand injection. The resulting anchor profile shall be 2.5-5.0 mils and be relative to the coating thickness specified.

Concrete and Masonry surfaces must be sound and contaminant-free with a surface profile equivalent to a minimum CSP3 to CSP5 in accordance with ICRI Technical Guideline No. 310.2R-2013. This can generally be achieved by abrasive blasting, shot blasting, high pressure water cleaning, water jetting, or a combination of methods.

AVAILABLE PACKAGES

Raven 502 is available in 5 gallon pails, 55 gallon drums and 275 gallon totes.

SHELF LIFE AND STORAGE

The product can be stored for six months in factory delivered, unopened drums. Keep away from extreme heat, freezing, and moisture. Proper storage temperature is between 60ºF and 95ºF. Ideal material storage temperature is between is between 60°F and 80°F. It is recommended to warm the materials to 80°F in the drum prior to spraying.

SAFETY

MSDS's are available on the website (www.ravenlining.com) or upon request. All personnel should read and understand the safety recommendations as set forth in the MSDS. Keep uncured product away from children at all times.

CHEMICAL RESISTANCE

Test Method: ASTM D 3912 M 24 Hour Spot

Chemical	Result
Acetone	C
Brake Fluid (DOT3)	RC
Clorox® (10%)/Water	R
Diesel Fuel	R
Gasoline	R
Hydraulic Fluid (oil)	RC
Methyl Ethyl Ketone (M.E.K.)	N
Motor Oil	R
Muriatic Acid (31.45%)	R
NaCl/Water (10%)	R
Potassium Hydroxide (10%)	R
Sodium Hydroxide (10%)	R
Sodium Bicarbonate	R
Sugar/Water (10%)	R
Sulfuric Acid (10%)	R, Dis
Sulfuric Acid (<22%)	R
Sodium Hydroxide w/w (30%)	R
Transmission Fluid	R
Vinegar (5%)/Water	R
Water	R
Xylene	RC
UV Light (Sunlight)	Dis

R = Recommend = Little or no Visible Damage
RC = Recommend Conditional = Some Effect-Swelling
C = Conditional = Poss. Cracking - Wash Down Within 1 Hour
NR = Not Recommended
Dis = Discoloration Only

VF 502

Hybrid Polyurethane/Polyurea

Technical Data Sheet

686 S. Adams St. | Kansas City, KS 66105 | (913) 321-9000 | www.versaflex.com

Selection & Specification Data

Description

VersaFlex VF 502 "Hybrid" Polyurea is a fast set, rapid curing, 100% solids, flexible, two-component polyurethane/polyurea elastomer spray coating material. VF 502 was developed for use in high-pressure spray equipment and is used by itself or in combination with other materials to produce a protective coating on metal, concrete, aluminum, and composite substrates. **VF 502** creates an extremely tough film at all thicknesses and can produce films from 10 mils to 250 mils without visible sag or runs in single or multiple pass applications. This material is relatively moisture and temperature insensitive, allowing use in the most problematic ambient conditions.

Ideal for:

- Foam and asbestos encapsulation
- Secondary containment
- Geotextile liners
- Water and wastewater storage ponds
- Landfills
- Solid and organic waste processing facilities

Color & Stability (Limitations)

Standard colors are Black (VF1280), Tan (VF1223), Dark Gray (VF1220), and Light Gray (VF1221). Custom colors are available upon request. Note: Custom colors are not returnable; custom color options can be viewed at www.versaflex.com. The A-side (Iso) color could vary from clear to amber.

Limitations

VF 502 is an aromatic polyurea and discoloration from exposure to ultraviolet light may occur, however the physical properties are unaffected. **VF 502** should not be used for direct contact with extremely high or low pH levels.

Physical Properties (Typical) Post cured at 225°F for 24 hours

Description	Method	Result
VOC	Theoretical	**0 %**
Solids Content	Theoretical	**100 %**
Gel Time	ASTM D1640	**2-3 seconds**
Tack Free Time	ASTM D1640	**3-4 seconds**
Tensile Strength (psi)	ASTM D638	**2814**
Tensile Elongation (%)	ASTM D638	**146%**
Tear Strength (lb./in)	ASTM D624	**276**
Hardness, Shore D	ASTM D2240	**55**
100% Modulus	ASTM D638	**2328**
Free Film Shrink	Internal Test	**0.73%**

The value ranges stated in this Technical Data Sheet are based on system processing under controlled laboratory conditions. Equipment configuration and/or field application conditions may produce variances in the final system values.

Coverage Rate

VF 502 is designed for a variety of substrates and applications. Application method, substrate roughness, profile, and porosity will effect coverage rates. Always consult the specification and contract documents prior to installation.

Recommended Dry Film Thickness (Typical exposure)	
Concrete:	80-100+ mils dft.
Steel (Carbon)	60-80 mils dft.
Geotextile Fabric:	60-80 mils dft.

VF 502

Hybrid Polyurethane/Polyurea

Technical Data Sheet

Substrate and Surface Preparation

General

Prior to coating, the substrate must be prepared in a manner that provides a uniform, clean, sound, and neutralized surface suitable for the specified coating. The substrate shall be free of all contaminants, such as oil, grease, rust, scale or deposits. The substrate shall be free of all dirt, dust, debris, and deleterious material. Coating performance is dependent on the degree of surface preparation.

Geotextile

Ensure geotextile is clean, dry, and free of dirt, dust, debris, or deleterious material. Only apply to the "ironed" side of geotextile. Non-woven, or spun-woven geotextiles are recommended.

Concrete & Masonry

Reference SSPC-SP 13/NACE No. 6 Surface Preparation of Concrete. Minimum surface profile equivalent to ICRI CSP3 to CSP5 in accordance with ICRI Technical Guideline No. 310.2R-2013. Maximum Moisture Content of 3 lb./24 hr./1,000 ft² per ASTM F1869 and/or less than 5% maximum moisture content per ASTM F2420.

Steel (Atmospheric/Non-Immersion Service)

Visible deposits of oil, grease, or other contaminants shall be removed according to SSPC-SP 1. Prepare in accordance with SSPC-SP6/NACE No. 3 Commercial Blast Cleaning. Provide a sharp angular anchor profile of 3.0 mil or greater.

Non-Ferrous Metals

Reference SSPC SP-16 Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steel, and Non-Ferrous Metals. Only use non-metallic blast media. Contact VersaFlex Technical Services for more information on additional substrates.

Recommended Primers

Concrete & Masonry	VF-20 VF-15 Raven 175 Raven 171FS
Carbon Steel (Optional)	PW-1 AquataPoxy 190
Non-Ferrous Metals	PW-1
Wood & Fiberglass	VF-20 VF-15

Note: Substrate composition and moisture, application temperature, exposure temperature, and site conditions may effect primer selection.

VersaFlex is part of a family of companies. Specific primers may be available for different substrates or service conditions.

Mixing, Thinning and Pre-Warming

Mixing:

B Side component must be thoroughly agitated prior to use. Mix using a manufactures recommended 3-tier, collapsible blade power mixer through the center bung hole. Mixer diameter should be ⅓ diameter of the container. Mix for at least 30 minutes prior to processing. Color should be a consistent uniform color without striations.

Components & Mix Ratio:

Mix ratio is 1:1 by volume

Thinning:

DO NOT THIN.

Pre-warming:

A and B components should be warmed to a minimum of 70°F prior to processing.

VF 502

Hybrid Polyurethane/Polyurea

Technical Data Sheet

Application and Equipment Guidelines

General

VersaFlex VF 502 must be installed using plural component, direct impingement mix application equipment.

Recommend Equipment Operating Parameters	
A Side Primary Heat	160˚F
B Side Primary Heat	160˚F
Hose Heat	160˚F
Dynamic Pressure	2,000—2500 psi
Dynamic Pressure Differential	< 200 psi
Inlet Pressure	> 90 psi

- Material supply capacity should be 4x the material output of the selected spray gun configuration.
- Processing equipment should be capable of maintaining set temperatures and pressures at rest and during operation.
- Proper equipment selection and maintenance is critical to achieve material properties.
- Additional equipment manufacturers and set-ups are acceptable.

Recommended Proportioners	
Graco	Reactor E-XP2 Reactor H-XP2

Recommended Spray Gun Configuration		
Graco	Fusion AP	AR/AF 2929
		AR/AF 3737
		AR/AF 4242
	Fusion MP	XR/XF 3535
		XR/XF 4747
	Probler P2	00 - 02

Apply in a uniform manner to desired thickness. Application thickness is determined by spray gun configuration and speed of application. Lower output configurations are recommended for vertical and overhead applications to avoid runs, drips and sags. Excessive thickness does not negatively impact the material properties.

Application and Service Conditions

Environmental & Substrate Conditions

Substrate temperatures must be greater than -20°F. Lower substrate and ambient temperatures will increase the ultimate cure time.

Do not install over damp, wet, or saturated substrates. Concrete and masonry substrate moisture content shall be less than 5% when measured with a Tramex CME meter or equal. If the substrate is below freezing, traditional methods of determining moisture content are not effective. Additional steps should be taken to validate moisture readings.

The substrate must be 5°F above dew point and rising before application of coating materials.

Service Temperatures (Temperature Resistance):

Dry temperature resistance is -40°F to 250°F.

Limitations:

VF 502 is not recommended for direct contact with extremely high or low pH chemicals.

VF 502 is an aromatic based polyurea. Discoloration from exposure to ultraviolet light may occur without affecting the performance characteristics.

VF 502

Hybrid Polyurethane/Polyurea

Technical Data Sheet

Curing Schedule, Recoat Windows and Top Coats

Cure Time

Return to service is determined by ambient temperature, the service environment and exposures. Foot and light vehicle traffic can typically be allowed within 2 hrs. Full cure is achieved in 14 days at 72°F.

Top Coating

VF 502 can be built to the desired thickness or touched up immediately during application. **VF 502** may be top-coated with non-solvent based coatings after curing for 30 minutes.

Recoat Time (Maximum)

VF 502 can be recoated up to 3 hours after the initial application. If the recoat window is exceeded, additional preparation is required. Before recoating over **VF 502,** the surface shall be clean, dry, and free of all dirt, dust, debris, and other contamination. Mechanical scarification and the use of **VersaFlex Tack Coat or Raven 161** as a re-activating adhesion promoters are recommended.

Clean Up & Safety

Cleanup

Cured product may be disposed of without restriction. Excess liquid 'A' & 'B' material should be mixed together and allowed to cure, then disposed of in the normal manner. Product containers that are "drip free" may be disposed of according to local, state, and federal laws.

Safety

Consult the Safety Data Sheet (SDS) at www.versaflex.com for information concerning health and safety before using. Strictly follow all notices on the SDS and container label. If you do not fully understand the notices and procedures provided on the SDS or if you cannot strictly comply with them, do not use this product.

Packaging, Storage and Shelf Life

Packaging

VF 502 is available in **10, 110** and **550-gallon kits**. The containers are filled by weight.

Shelf-Life and Storage

One year from date of shipment, in original, unopened factory containers, stored in a sheltered area between 60°F - 95°F. Seal tightly after use to prevent introduction of moisture laden air. Store open 'A' side with a nitrogen cap after each use.

Warranty

Limited Warranty. Company warrants its goods to be free of manufacturing defects. Goods manufactured by Company will comply with all applicable federal, state and local laws and regulations. Company makes no warranty as to any parts or equipment manufactured by others. Customer shall look solely and only to the manufacturer of such parts or equipment with respect to any warranty claims. Company hereby assigns to Customer the original manufacturer's warranties to all such equipment and parts, to the full extent permitted. THE AFORESAID IS THE EXCLUSIVE WARRANTY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. SPECIFICALLY, THERE ARE NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

Limitation of Liability. COMPANY'S LIABILITY FOR DEFECTIVE OR NON-CONFORMING GOODS SHALL BE LIMITED TO, AND SHALL IN NO EVENT EXCEED, THE AMOUNT PAID BY CUSTOMER FOR SUCH DEFECTIVE OR NON-CONFORMING GOODS. UNDER NO CIRCUMSTANCES SHALL COMPANY BE LIABLE FOR ANY SPECIAL, PUNITIVE, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR FOR LOST PROFITS. In no event may any claim by Customer arising from or relating to any sale of any goods or services referenced herein be brought more than one year after the date of delivery of such Goods.

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TECHNICAL DATA SHEET

HDPE 40 mils Black ST (top)

PROPERTY(1)	TEST METHOD	FREQUENCY	UNIT Imperial	1034708
SPECIFICATIONS				
Nominal Thickness		-	mils	40
Thickness (min. avg.)	ASTM D5994	Every roll	mils	38.0
Lowest ind. for 8 out of 10 values			mils	36.0
Lowest ind. for 10 out of 10 values			mils	34.0
Asperity Height (min. avg.)	ASTM D7466	Every roll	mils	16
Textured side		-		Top
Resin Density	ASTM D1505	1/Batch	g/cc	> 0.932
Melt Index - 190/2.16 (max.)	ASTM D1238	1/Batch	g/10 min	1.0
Sheet Density	ASTM D792	Every 10 rolls	g/cm³	≥ 0.940
Carbon Black Content	ASTM D4218	Every 2 rolls	%	2.0 - 3.0
Carbon Black Dispersion	ASTM D5596	Every 10 rolls	Category	Cat. 1 & Cat. 2
OIT - standard (min. avg.)	ASTM D8117	1/Batch	min	100
Tensile Properties (min. avg) (2)	ASTM D6693	Every 2 rolls		
Strength at Yield			ppi	88
Elongation at Yield			%	13
Strength at Break			ppi	88
Elongation at Break			%	150
Tear Resistance (min. avg.)	ASTM D1004	Every 5 rolls	lbf	30
Puncture Resistance (min. avg.)	ASTM D4833	Every 5 rolls	lbf	90
Dimensional Stability	ASTM D1204	Certified	%	± 2
Stress Crack Resistance (SP-NCTL)	ASTM D5397	1/Batch	hr	500
Oven Aging - % retained after 90 days	ASTM D5721	Per formulation		
HP OIT (min. avg.)	ASTM D5885		%	80
UV Res. - % retained after 1600 hr	ASTM D7238	Per formulation		
HP-OIT (min. avg.)	ASTM D5885		%	50
Low Temperature Brittleness	ASTM D746	Certified	°F	- 106
SUPPLY SPECIFICATIONS(Roll dimensions may vary ±1%)				
Roll Dimension - Width	-		ft	22.3
Roll Dimension - Length	-		ft	780
Area (Surface/Roll)	-		ft²	17394

NOTES

1. Testing frequency based on standard roll dimensions and one batch is approximately 180,000 lbs (or one railcar).
2. Machine Direction (MD) and Cross Machine Direction (XMD or TD) average values should be on the basis of 5 specimens each direction.

* All values are nominal test results, except when specified as minimum or maximum.
* The information contained herein is provided for reference purposes only and is not intended as a warranty or guarantee. Final determination of suitability for use contemplated is the sole responsibility of the user. SOLMAX assumes no liability in connection with the use of this information.

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TECHNICAL DATA SHEET

HDPE 60 mils Black ST (top)

PROPERTY(1)	TEST METHOD	FREQUENCY	UNIT Imperial	1038700
SPECIFICATIONS				
Nominal Thickness		-	mils	60
Thickness (min. avg.)	ASTM D5994	Every roll	mils	57.0
Lowest ind. for 8 out of 10 values			mils	54.0
Lowest ind. for 10 out of 10 values			mils	51.0
Asperity Height (min. avg.)	ASTM D7466	Every roll	mils	16
Textured side		-		Top
Resin Density	ASTM D1505	1/Batch	g/cc	> 0.932
Melt Index - 190/2.16 (max.)	ASTM D1238	1/Batch	g/10 min	1.0
Sheet Density	ASTM D792	Every 10 rolls	g/cm³	≥ 0.940
Carbon Black Content	ASTM D4218	Every 2 rolls	%	2.0 - 3.0
Carbon Black Dispersion	ASTM D5596	Every 10 rolls	Category	Cat. 1 & Cat. 2
OIT - standard (min. avg.)	ASTM D8117	1/Batch	min	100
Tensile Properties (min. avg) (2)	ASTM D6693	Every 2 rolls		
Strength at Yield			ppi	132
Elongation at Yield			%	13
Strength at Break			ppi	132
Elongation at Break			%	150
Tear Resistance (min. avg.)	ASTM D1004	Every 5 rolls	lbf	45
Puncture Resistance (min. avg.)	ASTM D4833	Every 5 rolls	lbf	120
Dimensional Stability	ASTM D1204	Certified	%	± 2
Stress Crack Resistance (SP-NCTL)	ASTM D5397	1/Batch	hr	500
Oven Aging - % retained after 90 days	ASTM D5721	Per formulation		
HP OIT (min. avg.)	ASTM D5885		%	80
UV Res. - % retained after 1600 hr	ASTM D7238	Per formulation		
HP-OIT (min. avg.)	ASTM D5885		%	50
Low Temperature Brittleness	ASTM D746	Certified	°F	- 106
SUPPLY SPECIFICATIONS(Roll dimensions may vary ±1%)				
Roll Dimension - Width	-		ft	22.3
Roll Dimension - Length	-		ft	560
Area (Surface/Roll)	-		ft²	12488

NOTES

1. Testing frequency based on standard roll dimensions and one batch is approximately 180,000 lbs (or one railcar).
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Listed below are test results reported by the high-density polyethylene resin industry. The degree of chemical attack is influenced by a number of variable factors including temperature, pressure, stresses, concentration, exposure duration and area under attack. Where the liner will be exposed to a mixture of chemicals and/or variable factors, it is recommended for the end user to perform testing for the liner resistance. While this information is believed to be reliable, it is intended as a guide for use at our customer's own discretion and risk. It does not provide any certification for a specific project and/or application. For different chemicals and/or further details, please contact your Sales Representative.

DEFINITIONS, SYMBOLS AND ABREVIATIONS:

Type of resistance :

(R) Resistant: Excellent, little or no swelling or softening or surface deterioration (< 10% swelling, < 15% loss of tensile strength,little or no chemical attack)

(L) Limited: Limited chemical resistance, moderate chemical attack. Conditional service. (< 20% swelling, < 50% loss of tensile strength, moderate chemical attack)

(N) Not recommended: Severe attack, swelling or softening. Not recommended. (> 20% swelling, > 50% loss of tensile strength, material is attacked)

Concentration :

Dil. Sol.: Dilute aqueous Solution at a concentration equal to or less than 10 %

Sol.: Aqueous Solution at a concentration higher than 10 %, but not saturated

Sat. Sol. : Saturated aqueous Solution, prepared at 20 °C

Chemical or product	Concentration	Resistance at (20°C)	(60°C)
A			
ACETIC ACID	50 %	R	L
ACETIC ACID	10 %	R	R
ACETIC ACID	96 % (GLACIAL)	R	L
ACETIC ANHYDRIDE	100 %	R	L
ACETONE	100 %	L	L
ADIPIC ACID	SAT. SOL.	R	R
ALLYL ALCOHOL	100%	R	-
ALUMINIUM CHLORIDE	SAT. SOL.	R	R
ALUMINIUM FLUORIDE	SAT. SOL.	R	R
ALUMINIUM SALTS	-	R	R
ALUMINIUM SULFATE	SAT. SOL.	R	R
ALUMS	SOL.	R	R
AMMONIA, AQUEOUS	DIL. SOL.	R	R

Chemical or product	Concentration	Resistance at (20°C)	(60°C)
AMMONIA, DRY GAS	100 %	R	R
AMMONIA, LIQUID	100 %	R	R
AMMONIUM CHLORIDE	SAT. SOL.	R	R
AMMONIUM FLUORIDE	SOL.	R	R
AMMONIUM NITRATE	SAT. SOL.	R	R
AMMONIUM SULFATE	SAT. SOL.	R	R
AMMONIUM SULFIDE	SOL.	R	R
AMYL ACETATE	100%	L	N
AMYL ALCOHOL	100 %	R	L
ANILINE	100%	R	L
ANILINE CHLOROHYDRATE	-	L	N
ANILINE DYES	-	N	-
ANILINE HYDROCHLORIDE, AQ	ALL	L	N
ANTIMONY TRICHLORIDE	90 %	R	R

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Chemical or product	Concentration	Resistance at (20°C)	(60°C)
AQUA REGIA	HCl-HNO33/1	N	N
ARSENIC ACID	SAT. SOL.	R	R
B			
BARIUM CARBONATE	SAT. SOL.	R	R
BARIUM CHLORIDE	SAT. SOL.	R	R
BARIUM HYDROXIDE	SAT. SOL.	R	R
BARIUM SULFATE	SAT. SOL.	R	R
BARIUM SULFIDE	SAT. SOL.	R	R
BENZALDEHYDE	100 %	R	L
BENZENE	100%	L	N
BENZENE SULFONIC ACID	10%	L	N
BORAX(SODIUM TETRABORATE	SAT. SOL.	R	R
BORIC ACID (AQUEOUS)	SAT. SOL.	R	R
BROMINE (DRY GAS)	100 %	N	N
BROMINE (LIQUID)	100 %	N	N
BUTANE GAS	100 %	R	R
BUTANOL	100 %	R	R
BUTYRIC ACID (AQUEOUS)	100 %	R	L
C			
CALCIUM CARBONATE	SAT. SOL.	R	R
CALCIUM CHLORATE	SAT. SOL.	R	R
CALCIUM CHLORIDE	SAT. SOL.	R	R
CALCIUM HYDROXIDE	SAT. SOL.	R	R
CALCIUM NITRATE	SAT. SOL.	R	R
CALCIUM SULFATE	SAT. SOL.	R	R
CALCIUM SULFIDE	DIL. SOL.	L	L
CARBON DIOXIDE (WET OR DR	100 %	R	R
CARBON DISULFIDE	100 %	N	N
CARBON MONOXIDE	100 %	R	R
CARBON TETRACHLORIDE	100 %	L	N
CHLORIC ACID	20 %	R	N
CHLORINE, GASEOUS, DRY	SAT. SOL.	N	N
CHLORINE, GASEOUS, MOIST	-	N	N
CHLORINE, LIQUID	-	N	N
CHLORINE, WATER	-	L	N
CHLOROFORM	PURE	N	N
CHROMIC ACID	20 %	R	L
CITRIC ACID, AQUEOUS	SAT. SOL.	R	R
COPPER CHLORIDE, AQEOUS	SAT. SOL.	R	R
COPPER NITRATE, AQUEOUS	SAT. SOL.	R	R

Chemical or product	Concentration	Resistance at (20°C)	(60°C)
COPPER SULFATE, AQUEOUS	SAT. SOL.	R	R
CORN OIL	-	R	R
CREOSOTE	-	R	R
CRESYLIC ACID	SAT. SOL.	L	-
CYCLOHEXANOL	100 %	L	N
CYCLOHEXANONE	100 %	L	N
D			
DECAHYDRONAPHTHALENE	100 %	R	L
DEXTRIN	SOL.	R	R
DIESEL FUEL	-	R	L
DIETHYL ETHER	100 %	L	-
DIOXANE	100 %	R	R
E			
ETHANEDIOL	100 %	R	R
ETHANOL	40 %	R	L
ETHYL ACETATE	100%	R	N
ETHYLENE TRICHLORIDE	100 %	N	N
F			
FERRIC CHLORIDE	SAT. SOL.	R	R
FERRIC NITRATE	SOL.	R	R
FERRIC SULFATE	SAT. SOL.	R	R
FERROUS CHLORIDE	SAT. SOL.	R	R
FERROUS SULFATE	SAT. SOL.	R	R
FLUORINE, GASEOUS	100 %	N	N
FLUOROSILIC ACID	40 %	R	R
FORMALDEHYDE	40 %	R	R
FORMIC ACID, AQUEOUS	10 % - 50 %	R	R
FORMIC ACID, AQUEOUS	85 % - 100 %	R	R
FURFURYL ALCOHOL	100 %	R	L
G			
GASOLINE	-	L	N
GLACIAL ACETIC ACID	99 %	R	L
GLUCOSE	SAT. SOL.	R	R
GLYCERINE	100 %	R	R
GLYCOL	SOL.	R	R
H			
HEPTANE	100 %	R	N
HEXANE	-	R	L
HYDROBROMIC ACID	100 %	R	R
HYDROGEN	100 %	R	R

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Chemical or product	Concentration	Resistance at (20°C)	(60°C)
HYDROGEN PEROXIDE, AQUEO	30 %	R	L
HYDROGEN PEROXIDE, AQUEO	90 %	R	N
I			
ISOPROPANOL	PURE	R	N
J			
JAM, JELLIES	-	R	R
JET FUELS, JP-4 & JP-5	-	L	N
K			
KEROSENE	-	L	N
KETONES	-	L	N
L			
LACTIC ACID	100 %	R	R
LEAD ACETATE	SAT. SOL.	R	R
M			
MAGNESIUM CARBONATE	SAT. SOL.	R	R
MAGNESIUM CHLORIDE	SAT. SOL.	R	R
MAGNESIUM HYDROXIDE	SAT. SOL.	R	R
MAGNESIUM NITRATE	SAT. SOL.	R	R
MALEIC ACID	SAT. SOL.	R	R
MERCURIC CHLORIDE	SAT. SOL.	R	R
MERCURIC CYANIDE	SAT. SOL.	R	R
MERCUROUS NITRATE	SOL.	R	R
MERCURY	100 %	R	R
METHANOL	100 %	L	N
METHYLENE CHLORIDE	100 %	L	N
MILK	-	R	R
MINERAL OIL	-	L	N
N			
NICKEL CHLORIDE	SAT. SOL.	R	R
NICKEL NITRATE	SAT. SOL.	R	R
NICKEL SULFATE	SAT. SOL.	R	R
NICOTINIC ACID	DIL. SOL.	R	R
NITRIC ACID	60 %	N	N
NITRIC ACID	>30 % - 50 %	L	N
NITRIC ACID	0 - 30 %	R	R
NITRIC ACID	75 %	N	N
O			
OILS AND FATS	-	R	L
OILS AND GREASE	-	R	L
OILS, VEGETABLES	-	L	N

Chemical or product	Concentration	Resistance at (20°C)	(60°C)
OLEIC ACID	100 %	L	N
ORTHOPHOSPHORIC ACID	85 %	R	L
ORTHOPHOSPHORIC ACID	50 %	R	R
OXALIC ACID, AQUEOUS	SAT. SOL.	R	L
OXYGEN, GAS	100 %	R	L
OZONE, GAS	100 %	L	N
P			
PETROLEUM (CRUDE OIL)	-	L	N
PHENOL	SOL.	R	R
PHOSPHORUS TRICHLORIDE	100 %	R	L
PICRIC ACID, AQUEOUS	SAT. SOL.	R	N
POTASSIUM BICARBONATE	SAT. SOL.	R	R
POTASSIUM BISULFIDE	SOL.	R	R
POTASSIUM BROMATE	SAT. SOL.	R	R
POTASSIUM BROMIDE	SAT. SOL.	R	R
POTASSIUM CARBONATE, AQU	SAT. SOL.	R	R
POTASSIUM CHLORATE, AQUE	SAT. SOL.	R	R
POTASSIUM CHROMATE	SAT. SOL.	R	R
POTASSIUM CYANIDE, AQUEOU	SAT. SOL.	R	R
POTASSIUM DICHROMATE, AQ	SAT. SOL.	R	R
POTASSIUM FERRICYANIDE, A	SAT. SOL.	R	R
POTASSIUM FERROCYANIDE, A	SAT. SOL.	R	R
POTASSIUM FLUORIDE, AQUEO	SAT. SOL.	R	R
POTASSIUM HYDROGEN SULFI	SOL.	R	R
POTASSIUM HYDROXIDE, AQUE	SAT. SOL.	R	R
POTASSIUM HYPOCHLORITE	SOL.	R	L
POTASSIUM NITRATE	SAT. SOL.	R	R
POTASSIUM ORTHOPHOSPHAT	SAT. SOL.	R	R
POTASSIUM PERCHLORATE	SAT. SOL.	R	R
POTASSIUM PERMANGANATE	20 %	R	R
POTASSIUM PERSULFATE, AQU	SAT. SOL.	R	R
POTASSIUM SULFATE	SAT. SOL.	R	R
POTASSIUM SULFIDE	SOL.	R	R
PROPIONIC ACID	100 %	R	L
PROPIONIC ACID	50 %	R	L
PYRIDINE	100 %	R	L
Q			
QUINOL (HYDROQUINONE)	SAT. SOL.	R	R
S			
SALICYLIC ACID	SAT. SOL.	R	R

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Chemical or product	Concentration	Resistance at (20°C)	(60°C)
SEA WATER	-	R	R
SILVER ACETATE	SAT. SOL.	R	R
SILVER CYANIDE	SAT. SOL.	R	R
SILVER NITRATE	SAT. SOL.	R	R
SODIUM BENZOATE	SAT. SOL.	R	R
SODIUM BICARBONATE	SAT. SOL.	R	R
SODIUM BIPHOSPHATE	SAT. SOL.	R	R
SODIUM BISULFITE	STA. SOL.	R	R
SODIUM BROMIDE	SAT. SOL.	R	R
SODIUM CARBONATE, AQUEOU	ALL	R	R
SODIUM CHLORATE	SAT. SOL.	R	R
SODIUM CHLORIDE	SAT. SOL.	R	R
SODIUM CYANIDE	SAT. SOL.	R	R
SODIUM FERRICYANIDE	SAT. SOL.	R	R
SODIUM FERROCYANIDE	SAT. SOL.	R	R
SODIUM FLUORIDE	SAT. SOL.	R	R
SODIUM HYDROXIDE	SOL.	R	R
SODIUM HYPOCHLORITE	15 %	R	R
SODIUM NITRATE, AQUEOUS	SAT. SOL.	R	R
SODIUM NITRITE	SAT. SOL.	R	R
SODIUM ORTHOPHOSPHATE	SAT. SOL.	R	R
SODIUM SULFATE	SAT. SOL.	R	R
SODIUM SULFIDE	SAT. SOL.	R	R
SULPHUR DIOXIDE, DRY	100 %	R	R
SULPHUR TRIOXIDE	100 %	N	N
SULPHURIC ACID	FUMING	N	N
SULPHURIC ACID	> 90 %	L	N
SULPHURIC ACID	50 %	R	R
SULPHURIC ACID	50 % - 90 %	R	L
T			
TANNIC ACID	SOL.	R	R
TARTARIC ACID	SAT. SOL.	R	R
THIONYL CHLORIDE	100 %	L	N
TOLUENE	100 %	L	N
TRANSFORMER OIL	-	L	N
TRIETHYLAMINE	SOL.	R	L
U			
UREA	SOL.	R	R
URINE	-	R	R
V			

Chemical or product	Concentration	Resistance at (20°C)	(60°C)
VASELINE	-	R	L
VEGETABLE OILS	-	R	R
VINEGAR	-	R	R
W			
WATER	-	R	R
WINE	-	R	R
X			
XYLENE	100%	L	N
Y			
YEAST	SOL.	R	R
Z			
ZINC (II) CHLORIDE	SAT. SOL.	R	R
ZINC (IV) CHLORIDE	SAT. SOL.	R	R
ZINC CARBONATE	SAT. SOL.	R	R
ZINC CHLORIDE	SAT. SOL.	R	R
ZINC OXIDE	SAT. SOL.	R	R
ZINC SULFATE	SAT. SOL.	R	R

Mustang Extreme Environmental Services
5049 Edwards Ranch Rd.
Suite 240
Fort Worth, TX 76109

May 6, 2024

60 mil Single-side Textured HDPE Geomembrane (1101533) – Permeability ASTM E96

The undersigned, being qualified and authorized to do so, hereby certifies that when tested in accordance with ASTM E96, SOLMAX 60 mil Single-side Textured HDPE Geomembrane (1101533) will meet a permeability of $\leq 1 \times 10^{-12}$ cm/sec.

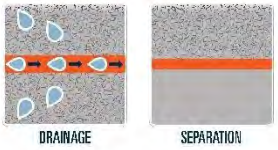
Please do not hesitate to contact us if you require any additional information.

Sincerely,

Miguel Garcia
Project Technical Manager

TENCATE GEOSYNTHETICS
Americas

Mirafi®
PT1000E



Mirafi® PT1000E is a needlepunched nonwoven geotextile composed of polymeric fibers, which are formed into a stable network such that the fibers retain their relative position. Mirafi® PT1000E is inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids.

TenCate Geosynthetics Americas Laboratories is accredited by Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP).

Mechanical Properties	Test Method	Unit	Typical Roll Value	
			MD	CD
Grab Tensile Strength	ASTM D4632	lbs (N)	200 (890)	180 (801)
Grab Tensile Elongation	ASTM D4632	%	80	110
Trapezoid Tear Strength	ASTM D4533	lbs (N)	85 (378)	85 (378)
Puncture Strength	ASTM D4833	lbs (N)	80 (311)	
Permittivity	ASTM D4491	sec^{-1}	1.3	
Flow Rate	ASTM D4491	$gal/min/ft^2$ ($l/min/m^2$)	100 (4074)	

Physical Properties	Unit	Roll Size
Roll Dimensions (width x length)	ft (m)	15 x 300 (4.57 x 91.4)
Roll Area	yd^2 (m^2)	500 (418)

365 South Holland Drive
Pendergrass, GA 30567

Tel 706 693 2226
Tel 888 795 0808

Fax 706 693 4400
www.tencate.com

FGS000811
ETQR4

GAI-LAP-25-97

TECHNICAL DATA SHEET

ITL 60XGL™

Geomembrane Coated Woven Polyethylene (CWPE)

Property	Test Method	Unit		ITL 60XGL™
Thickness nominal	ASTM D 1777*	mil		60
Mass per Unit Area	ASTM D 751	oz./yd.^{2}		27.4
Grab Tensile	ASTM D 751			
Warp		lbs.		909
Weft		lbs.		963
Tongue Tear Resistance	ASTM D 751			
Warp		lbs.		144
Weft		lbs.		172
Mullen Burst Strength	ASTM D 3786	psi		1,500+
Puncture Resistance	ASTM D 4833	lbs.		438
Color	Observed			Black-Black

* ASTM D I777 Option 1
+ Exceeds limits of test

UV Accelerated Weathering
More than 90% strength retained after 2,000 hours exposure

All values are +/- 10% and are not intended as limiting specifications.

DISCLAIMER: The information contained herein is provided for reference purposes only and is not intended as a warranty or guarantee. Final determination of suitability for application is the sole responsibility of the user. These values are based on testing results from past fabric runs. . Each production run varies in final results. If a certain specified value is required, please inform ITL in advance and we can provide current testing results.

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U.S. Fabrication & Distribution Centers

Moses Lake, Washington ● 4172 North Frontage Road E, Moses Lake, WA 98837 ● 800.346.7744 ● Fax 509.766.0414

Fostoria, Ohio ● 1600 North Main Street, Fostoria, OH 44830 ● 888.377.5640 ● Fax 419.436.6007

To: Site Safe
Attn: Jacob Bitner

Certification of Compliance

The undersigned, being qualified and authorized to do so, hereby certifies that Inland Tarp and liners 40XGL Geomembrane will meet or exceed the following property values and conditions pursuant to 25 Pa. Code § 78a.64a(c)(2)-(3):

Inland Tarp and Liners 40 XGL CWPE membrane has been independently tested under ASTM E96 Procedure B with a rating of $< 1.41 \times 10^{-11}$ cm/sec

Backup data can be provided upon request.

Ron MacKenzie, Chief Technical Officer
Inland Tarp and Liner, LLC, Fostoria, Ohio
ronm@inlandtarp.com

To: Site Safe
Attn: Jacob Bitner

Certification of Compliance

The undersigned, being qualified and authorized to do so, hereby certifies that Inland Tarp and liners 60XGL Geomembrane will meet or exceed the following property values and conditions pursuant to 25 Pa. Code § 78a.64a(c)(2)-(3):

Inland Tarp and Liners 60 XGL CWPE membrane has been independently tested under ASTM E96 Procedure B with a rating of < 1.03 x 10 ⁻14 cm/sec

Backup data can be provided upon request.

Ron MacKenzie, Chief Technical Officer
Inland Tarp and Liner, LLC, Fostoria, Ohio
ronm@inlandtarp.com

For more information and technical assistance contact:

Chevron Phillips Chemical Company LP
P.O. Box 4910
The Woodlands, TX 77387-4910
800.231.1212

PREMIUM EXTRUSION AND RIGID PACKAGING RESINS

Marlex® K306

MEDIUM DENSITY POLYETHYLENE

This medium density, high molecular weight hexene copolymer is tailored for geomembrane applications that require:

- Outstanding ESCR
- Broad fusion range
- Excellent melt strength
- Good processability

This resin meets these specifications:

- ASTM D4976 - PE 225
- GRI-GM13 except carbon black requirements
- FDA 21 CFR 177.1520(c) 3.1a, use conditions C through G per 21 CFR 176.170(c). Volume of food contacting article must be equal to or greater than 5 gallons.

Typical geomembrane applications for K306 include:

- Landfill liners
- Gasoline and chemical tank containment liners
- Tunnel moisture barriers
- Mine tailing collection projects

NOMINAL PHYSICAL PROPERTIES[1]	English	SI	Method
Density	---	0.937 g/cm^3	ASTM D1505
Flow Rate (HLMI, 190/21.6)	---	12.0 g/10 min	ASTM D1238
Tensile Strength at Yield, 2 in/min, Type IV bar	2,700 psi	19 MPa	ASTM D638
Elongation at Break, 2 in/min, Type IV bar	800%	800%	ASTM D638
Flexural Modulus, Tangent - 16:1 span:depth, 0.5 in/min	115,000 psi	790 MPa	ASTM D790
ESCR, Condition B (10% Igepal), F_{50}	>1,500 h	>1,500 h	ASTM D1693
ESCR, Condition C (100% Igepal), F_{50}	>1,500 h	>1,500 h	ASTM D1693
SP-NCTL	>900 h	>900 h	ASTM D5397 (Appendix)
Durometer Hardness, Type D (Shore D)	59	59	ASTM D2240
Vicat Softening Temperature, Loading 1, Rate A	241°F	116°C	ASTM D1525
Heat Deflection Temperature, 66 psi, Method A	140°F	60°C	ASTM D648
Brittleness Temperature, Type A, Type I specimen	<-103°F	<-75°C	ASTM D746
Tensile Impact, Type S bar	240 ft•lb/in^2	500 kJ/m^2	ASTM D1822

1. The nominal properties reported herein are typical of the product, but do not reflect normal testing variance and therefore should not be used for specification purposes. Values are rounded. The physical properties were determined on compression molded specimens that were prepared in accordance with Procedure C of ASTM D4703, Annex A1.

Revision Date July, 2004

Protective & Marine Coatings

ENVIROLASTIC® CR965

PART A	B81V4355	ISOCYANATE SERIES
PART B	B81-4350	

Revised: November 16, 2020

PRODUCT INFORMATION

TRM.57

PRODUCT DESCRIPTION

ENVIROLASTIC CR965 is a 100% solids spray applied, aromatic polyurea coating and lining system, which exhibits extraordinary toughness and elastomeric performance characteristics. CR965 can be applied at thicknesses of 30-250 mils in multiple passes during a single application.

- Fast cure - short down time
- Low odor
- Seamless flexible and waterproof
- Impact, tear,and abrasion resistant
- Bridges moving cracks to 1/16"
- Retains physical properties at -20°F to 250°F

PRODUCT CHARACTERISTICS

Finish:	Semi-Gloss
Color:	Select colors available
Volume Solids:	100%
VOC (calculated)	<50 g/L ; 0.42 lb/gal
Mix Ratio:	1:1 by volume

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	**30.0** (750)	**250** (6250)
Dry mils (microns)	**30.0** (750)	**250** (6250)
~Coverage sq ft/gal (m^2/L)	**6** (0.152)	**53** (1.35)

Drying Schedule @ 30.0 mils wet (750 microns):

	@ 73°F/23°C *50% RH*
To touch:	20 seconds
To recoat:	
minimum:	20 seconds
maximum:	16 hours
Gel Time:	10 seconds
Tack Free:	20 seconds
Light Traffic:	2 hours
To cure:	
Service:	24 hours

If maximum recoat time is exceeded, abrade surface before recoating. Drying time is temperature, humidity, and film thickness dependent.

Pot Life:	None
Sweat-in-time:	None
Viscosity (mixed):	550 cps

Shelf Life:	12 months, unopened Store indoors at 40°F (4.5°C) to 110°F (43°C).
Flash Point:	200°F (93°C),
Reducer:	Not recommended
Clean up*:	MEK

*see Application Equipment section on Page 3

RECOMMENDED USES

Designed for use in immersion or atmospheric exposure as a tough, flexible, impact resistant, waterproof coating and lining system.

Ideally suited for use in areas to include:

- Tunnels
- Below grade waterproofing
- Geotextile linings (geo membrane)
- Secondary containment
- Basins, Ponds, and reservoirs
- Water and waste water
- Suitable for use in USDA inspected facilities

PERFORMANCE CHARACTERISTICS

Test Name	Test Method	Results
Abrasion Resistance	ASTM D4060, CS17 wheel, 1000 cycles, 1000 g	17.53 mg loss
Adhesion	ASTM D4541	350 psi, Concrete Failure 566 psi Steel 250 psi Wood Failure
Durometer Hardness	ASTM D2240 Shore D	22
Tear Strength	ASTM D634	265 lbf/in
Tensile Elongation	ASTM D638	270%
Tensile Modulus	ASTM D 638	100% modulus - 800 psi 300% modulus - 1,500 psi
Tensile Strength	ASTM D638	511 psi
Water Vapor	ASTM D1653-03, Method A (dry cup), Condition A; ASTM E96-00 Desiccant Method, Procedure A	105 mils (2625 microns), 77°F (25°C), 50% RH, 0.409 grains/hr ft^2 in Hg

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Protective & Marine Coatings

ENVIROLASTIC® CR965

PART A B81V4355
PART B B81-4350

ISOCYANATE SERIES

Revised: November 16, 2020

PRODUCT INFORMATION

TRM.57

RECOMMENDED SYSTEMS

		Dry Film Thickness / ct. Mils	(Microns)
Steel (coatings and linings):			
1 ct.	EnviroLastic CR965	60.0 - 80.0 mils dft*	
Steel, with hold primer (coatings and linings):			
1 ct.	Macropoxy 240	1.0 - 1.5 mils dft	
1 ct.	EnviroLastic CR965	30.0 - 250 mils dft*	
Concrete (coatings and linings):			
1 ct.	Corobond HS Epoxy Primer	3.0 - 4.0 mils dft	
1 ct.	EnviroLastic CR965	30.0 - 250 mils dft*	
Concrete or Steel, low temperature or Fast set:			
1 ct.	EnviroLastic LT Primer	3.0 - 250.0 mils dft*	
1 ct.	EnviroLastic CR965	30.0 - 250 mils dft*	
Geotextile Lining (earthen base)			
1 ct.	Geo textile non-woven poly propylene, 3 - 4 oz Amoco " Petromat," style 4599		
1 ct.	EnviroLastic CR965	30.0 - 250 mils dft*	

*Note: When using as a lining in immersion service, a minimum thickness of 60 mils is required. Refer to Performance Tips section.

The systems listed above are representative of the product's use. Other systems may be appropriate.

SURFACE PREPARATION

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Refer to product Application Bulletin for detailed surface preparation information.

Minimum recommended surface preparation:

Steel:
- Atmospheric: SSPC-SP10/NACE 2, 2 mil profile
- Immersion: SSPC-SP10/NACE 2, 3 mil profile

Concrete & Masonry:
Sandblast or shotblast to remove all laitance and achieve a profile equal to 80-100 grit sandpaper.

Refer to SSPC-SP13/NACE 6 or ICRI Guide 310.2R

Surface Preparation Standards

	Condition of Surface	ISO 8501-1 BS7079:A1	SSPC	NACE
White Metal		Sa 3	SP 5	1
Near White Metal		Sa 2.5	SP 10	2
Commercial Blast		Sa 2	SP 6	3
Brush-Off Blast		Sa 1	SP 7	4
Hand Tool Cleaning	Rusted	C St 2	SP 2	-
	Pitted & Rusted	D St 2	SP 2	-
Power Tool Cleaning	Rusted	C St 3	SP 3	-
	Pitted & Rusted	D St 3	SP 3	-

TINTING

Do not tint.

APPLICATION CONDITIONS

Temperature:
- Material*: 120°F minimum, 160°F maximum
- Air and surface: -20°F minimum, 120°F maximum
  At least 5°F above dew point

Relative humidity: 80% maximum

*Temperature needed may vary from Part A to Part B for better balance of dynamic pressures

Refer to product Application Bulletin for detailed application information.

ORDERING INFORMATION

Packaging:
- Part A: 54.47 gallon filled drums
- Part B: 54.47 gallon filled drums

SAFETY PRECAUTIONS

Refer to the SDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

Protective & Marine Coatings

ENVIROLASTIC® CR965

PART A B81V4355
PART B B81-4350

ISOCYANATE SERIES

Revised: November 16, 2020

APPLICATION BULLETIN

TRM.57

SURFACE PREPARATIONS

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Iron & Steel (immersion service)

Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Minimum surface preparation is Near White Metal Blast Cleaning per SSPC-SP10. Blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (3 mils). Remove all weld spatter and round all sharp edges by grinding. Prime any bare steel the same day as it is cleaned or before flash rusting occurs.

Iron & Steel (atmospheric service)

Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Minimum surface preparation is Near White Metal Blast Cleaning per SSPC-SP10. Blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2 mils).Prime any bare steel the same day as it is cleaned or before flash rusting occurs.

Poured Concrete

New

For surface preparation, refer to SSPC-SP13/NACE 6. Surface must be clean, dry, sound, and offer sufficient profile to achieve adequate adhesion. Minimum substrate cure is 28 days at 75°F. Remove all form release agents, curing compounds, salts, efflorescence, laitance, and other foreign matter by sandblasting, shotblasting, mechanical scarification, or suitable chemical means. Refer to ASTM D4260. Rinse thoroughly to achieve a final pH between 10.0 and 13.0. Allow to dry thoroughly prior to coating.

Old

Surface preparation is done in much the same manner as new concrete; however, if the concrete is contaminated with oils, grease, chemicals, etc., they must be removed by cleaning with a strong detergent. Refer to ASTM D4258. Form release agents, hardeners, etc. must be removed by sandblasting, shotblasting, mechanical scarification, or suitable chemical means. If surface deterioration presents an unacceptably rough surface, Steel-Seam FT910 is recommended to patch and resurface damaged concrete.

Fill all cracks, voids and bugholes with Steel-Seam FT910.

Always follow the ASTM methods listed below:

ASTM D4258 Standard Practice for Cleaning Concrete.
ASTM D4259 Standard Practice for Abrading Concrete.
ASTM D4260 Standard Practice for Etching Concrete.
ASTM F 1869 Standard Test Method for Measuring Moisture Vapor Emmission Rate of Concrete

Immersion Service:

In addition to the above surface preparation, Brush Blasting of the concrete surface is required.

Surface Preparation Standards

	Condition of Surface	ISO 8501-1 BS7079:A1	SSPC	NACE
White Metal		Sa 3	SP 5	1
Near White Metal		Sa 2.5	SP 10	2
Commercial Blast		Sa 2	SP 6	3
Brush-Off Blast		Sa 1	SP 7	4
Hand Tool Cleaning	Rusted	C St 2	SP 2	-
	Pitted & Rusted	D St 2	SP 2	-
Power Tool Cleaning	Rusted	C St 3	SP 3	-
	Pitted & Rusted	D St 3	SP 3	-

APPLICATION CONDITIONS

Temperature:	
Material*:	120°F minimum, 160°F maximum
Air and surface:	-20°F minimum, 120°F maximum At least 5°F above dew point
Relative humidity:	80% maximum

*Temperature needed may vary from Part A to Part B for better balance of dynamic pressures

APPLICATION EQUIPMENT

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compatible with the existing environmental and application conditions.

Reducer .....Not recommended

Clean-up .....MEK
Equipment not used for 3 months or more should be flushed and left with Butyl Cellusolve™ inside and sealed.

Plural Component Heated Spray Equipment:

Equipment	1:1 Heated Plural Component Proportioner capable of at least 2500 psi
Gun	mechanical, air, or solvent purged impingement mix gun
Min Impingement Port Size	.020 in. (0.50 mm)
Fluid Pressure	2200 psi
Air Pressure	100 psi
Inlet Strainer Screen	30 mesh
Gun Screen	80 mesh

If specific application equipment is listed above, equivalent equipment may be substituted. Consult your Sherwin-Williams Technical Service representative for specific equipment recommendations.

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Protective & Marine Coatings

ENVIROLASTIC® CR965

PART A	B81V4355	ISOCYANATE SERIES
PART B	B81-4350	

Revised: November 16, 2020

APPLICATION BULLETIN

TRM.57

APPLICATION PROCEDURES

Surface preparation must be completed as indicated. Route and seal all cracks greater than 1/16" with EnviroLastic JS80 SL

Mixing Instructions:
Agitate resin blend (B) component thoroughly with a drum mixer before use to disperse pigment and assure homogeneity. Do not thin. Do not mix "A" and "B" resins together. **Caution: Do not agitate in air and moisture.**

Apply coating/lining at the recommended film thickness and spreading rate as indicated below:

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	**30.0** (750)	**250** (6250)
Dry mils (microns)	**30.0** (750)	**250** (6250)
~Coverage sq ft/gal (m^2/L)	**6** (0.152)	**53** (1.35)

Drying Schedule @ 30.0 mils wet (750 microns):

	@ 73°F/23°C *50% RH*
To touch:	20 seconds
To recoat:	
minimum:	20 seconds
maximum:	16 hours
Gel Time:	10 seconds
Tack Free:	20 seconds
Light Traffic:	2 hours
To cure:	
Service:	24 hours

If maximum recoat time is exceeded, abrade surface before recoating. Drying time is temperature, humidity, and film thickness dependent.

Pot Life:	None
Sweat-in-time:	None
Viscosity (mixed):	550 cps

Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.

CLEAN UP INSTRUCTIONS

Clean spills and spatters immediately with MEK. Clean tools and equipment immediately after use (including both A & B sides of plural component spray system) with MEK. Equipment not used for 3 months or more should be flushed and left with Butyl Cellusolve™ inside and sealed.

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

PERFORMANCE TIPS

For concrete, always perform Calcium Chloride test as per ASTM F1869. Do not proceed with MVE >3 lbs.

**Where primers are used, do not fill the profile on concrete or steel with excess primer. Topcoat epoxy primers immediately after they become tack free. "Tack free" is defined as slight to medium pressure with a gloved hand, placed on a primed surface, that when lifted shows a slight imprint or distortion to the surface, with no transfer of primer to the glove.

For immersion applications, a minimum total dry film thickness of 40 mils on steel and 60 mils on concrete is required.

For Immersion Service: Spark test in accordance with ASTM D5162 for steel, or ASTM D4787 for concrete. Repair holidays found in accordance with these ASTM methods.

May be applied in one or two coats to achieve the recommended film thickness.

For steel, stripe coat all chine, welds, bolted connections, and sharp angles to prevent early failure in these areas. For concrete, all cracks must receive a 6" wide by 30 mil dft detail coat.

Use only heated, plural component equipment capable of producing 2,500 psi at 160°F and 2 gallon/minute output consistently.

In order to avoid blockage of spray equipment, clean equipment before use or before periods of extended downtime with MEK. Equipment not used for 3 months or more should be flushed and left with Butyl Cellusolve™ inside and sealed.

While spraying, use a 50% overlap with each pass of the gun to avoid holidays, bare areas, and pinholes. If necessary, cross spray at a right angle.

Spreading rates are calculated on volume solids and do not include an application loss factor due to surface profile, roughness or porosity of the surface, skill and technique of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, overthinning, climatic conditions, and excessive film build.

Do not agitate in air and moisture.

Consult your Sherwin-Williams representative for specific application and performance recommendations.

Refer to Product Information sheet for additional performance characteristics and properties.

SAFETY PRECAUTIONS

Refer to the SDS sheet before use.

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WARRANTY

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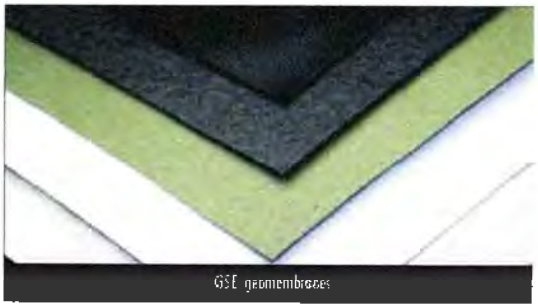
The Pioneer Of Geosynthetics

Technical Note

Chemical Resistance for Geomembrane Products



GSE geomembranes

GSE geomembranes are made of high quality, virgin polyethylene which demonstrates excellent chemical resistance. GSE polyethylene geomembranes are resistant to a great number and combinations of chemicals. It is this property of (HDPE) high density polyethylene geomembranes that makes it the lining material of choice.

In order to gauge the durability of a material in contact with a chemical mixture, testing is required in which the material is exposed to the chemical environment in question. Chemical resistance testing is a very large and complex topic because of two factors. First, the number of specific media is virtually endless and second, there are many criteria such as tensile strength, hardness, etc. that may be used to assess a material's resistance to degradation.

The chemical resistance of polyethylene has been investigated by many people over the past few decades. We are able to draw from that work when making statements about the chemical resistance of today's polyethylene geomembranes. In addition to that, many tests have been performed that specifically use geomembranes and certain chemical mixtures. Naturally, however, every mixture of chemicals cannot be tested for. As a result of these factors, GSE published a chemical resistance chart, demonstrating general guidelines.

Polyethylene is, for practical purposes, considered impermeable. Be aware, however, that all materials are permeable to some extent. Permeability varies with concentration, temperature, pressure and type of permeant. The rates of permeation are usually so low, however, that they are insignificant. As a point of reference, polyethylene is commonly used for packaging of several types of materials. These include gasoline, motor oil, household cleaners (i.e. bleach), muratic acid, pesticides, insecticides, fungicides, and other highly concentrated chemicals. Also, you should be aware that there are some chemicals which may be absorbed by the material but only when present at very high concentrations. These include halogenated and/or aromatic hydrocarbons at greater than 50%; their absorption results in swelling and slight changes in physical properties such as increased tensile elongations. This includes many types of fuels and oils. Recognize that this action, however, does not affect the liner's ability to act as a barrier for the material it is containing.

Since polyethylene is a petroleum product, it can absorb other petroleum products. Like a sponge, the material becomes slightly thicker and more flexible but does not produce a hole or void. However, unlike a sponge, this absorption is not immediate. It takes a much longer time for a polyethylene liner to swell than it does for a sponge. The exact time it takes for swelling to occur depends on the particular constituents and concentrations of the contained media. However, a hole would not be produced. Also, this absorption is reversible and the material will essentially return to it's original state when the chemical is no longer in contact with the liner.

With regard to typical municipal landfills in the United States, legally allowable levels of chemicals have been demonstrated to have no adverse affect on polyethylene geomembrane performance. The very low levels of salts, metals and organic compounds do not damage polyethylene. A double-lined containment with a leachate (leak detection) removal system effectively prevents any significant, continuous exposure of the secondary membrane to these materials and for practical purposes makes the total liner system even more impermeable.

GSE

The Pioneer Of Geosynthetics

Chemical Resistance Chart

GSE is the world's leading supplier of high quality, polyethylene geomembranes. GSE polyethylene geomembranes are resistant to a great number and combinations of chemicals. Note that the effect of chemicals on any material is influenced by a number of variable factors such as temperature, concentration, exposed area and duration. Many tests have been performed that use geomembranes and certain specific chemical mixtures. Naturally, however, every mixture of chemicals cannot be tested for, and various criteria may be used to judge performance. Reported performance ratings may not apply to all applications of a given material in the same chemical. Therefore, these ratings are offered as a guide only.

Medium	Concentration	Resistance at: 20° C (68° F)	60° C (140° F)
A			
Acetic acid	100%	S	L
Acetic acid	10%	S	S
Acetic acid anhydride	100%	S	L
Acetone	100%	L	L
Adipic acid	sat. sol.	S	S
Allyl alcohol	96%	S	S
Aluminum chloride	sat. sol.	S	S
Aluminum fluoride	sat. sol.	S	S
Aluminum sulfate	sat. sol.	S	S
Alum	sol.	S	S
Ammonia, aqueous	dil. sol.	S	S
Ammonia, gaseous dry	100%	S	S
Ammonia, liquid	100%	S	S
Ammonium chloride	sat. sol.	S	S
Ammonium fluoride	sol.	S	S
Ammonium nitrate	sat. sol.	S	S
Ammonium sulfate	sat. sol.	S	S
Ammonium sulfide	sol.	S	S
Amyl acetate	100%	S	L
Amyl alcohol	100%	S	L
Aniline	100%	S	L
Antimony trichloride	90%	S	S
Arsenic acid	sat. sol.	S	S
Aqua regia	HCl-HNO3	U	U
B			
Barium carbonate	sat. sol.	S	S
Barium chloride	sat. sol.	S	S
Barium hydroxide	sat. sol.	S	S
Barium sulfate	sat. sol	S	S
Barium sulfide	sol.	S	S
Benzaldehyde	100%	S	L
Benzene		L	L
Benzoic acid	sat. sol.	S	S
Beer	-	S	S
Borax (sodium tetraborate)	sat. sol.	S	S
Boric acid	sat. sol.	S	S
Bromine, gaseous dry	100%	U	U
Bromine, liquid	100%	U	U
Butane, gaseous	100%	S	S
1-Butanol	100%	S	S
Butyric acid	100%	S	L
C			
Calcium carbonate	sat. sol	S	S
Calcium chlorate	sat. sol.	S	S
Calcium chloride	sat. sol.	S	S
Calcium nitrate	sat. sol.	S	S
Calcium sulfate	sat. sol.	S	S
Calcium sulfide	dil. sol.	L	L
Carbon dioxide, gaseous dry	100%	S	S
Carbon disulfide	100%	L	U
Carbon monoxide	100%	S	S
Chloracetic acid	sol.	S	S
Carbon tetrachloride	100%	L	U
Chlorine, aqueous solution	sat. sol.	L	U
Chlorine, gaseous dry	100%	L	U
Chloroform	100%	U	U
Chromic acid	20%	S	L
Chromic acid	50%	S	L
Citric acid	sat. sol.	S	S

Medium	Concentration	Resistance at: 20° C (68° F)	60° C (140° F)
Copper chloride	sat. sol.	S	S
Copper nitrate	sat. sol.	S	S
Copper sulfate	sat. sol.	S	S
Cresylic acid	sat. sol.	L	
Cyclohexanol	100%	S	S
Cyclohexanone	100%	S	L
D			
Decahydronaphthalene	100%	S	L
Dextrine	sol.	S	S
Diethyl ether	100%	L	
Dioctylphthalate	100%	S	L
Dioxane	100%	S	S
E			
Ethanediol	100%	S	S
Ethanol	40%	S	L
Ethyl acetate	100%	S	U
Ethylene trichloride	100%	U	U
F			
Ferric chloride	sat. sol.	S	S
Ferric nitrate	sol.	S	S
Ferric sulfate	sat. sol.	S	S
Ferrous chloride	sat. sol.	S	S
Ferrous sulfate	sat. sol.	S	S
Fluorine, gaseous	100%	U	U
Fluorosilicic acid	40%	S	S
Formaldehyde	40%	S	S
Formic acid	50%	S	S
Formic acid	98-100%	S	S
Furfuryl alcohol	100%	S	L
G			
Gasoline		S	L
Glacial acetic acid	96%	S	L
Glucose	sat. sol.	S	S
Glycerine	100%	S	S
Glycol	sol	S	S
H			
Heptane	100%	S	U
Hydrobromic acid	50%	S	S
Hydrobromic acid	100%	S	S
Hydrochloric acid	10%	S	S
Hydrochloric acid	35%	S	S
Hydrocyanic acid	10%	S	S
Hydrofluoric acid	4%	S	S
Hydrofluoric acid	60%	S	L
Hydrogen	100%	S	S
Hydrogen peroxide	30%	S	L
Hydrogen peroxide	90%	S	U
Hydrogen sulfide, gaseous	100%	S	S
Lactic acid	100%	S	S
Lead acetate	sat. sol.	S	
M			
Magnesium carbonate	sat. sol.	S	S
Magnesium chloride	sat. sol.	S	S
Magnesium hydroxide	sat. sol.	S	S
Magnesium nitrate	sat. sol.	S	S
Maleic acid	sat. sol.	S	S
Mercuric chloride	sat. sol.	S	S
Mercuric cyanide	sat. sol.	S	S
Mercuric nitrate	sol.	S	S

-Continued-

Technical Note

Medium	Concentration	Resistance at: 20° C (68° F)	60° C (140° F)
Mercury	100%	S	S
Methanol	100%	S	S
Methylene chloride	100%	L	
Milk		S	S
Molasses		S	S
N			
Nickel chloride	sat. sol.	S	S
Nickel nitrate	sat. sol	S	S
Nickel sulfate	sat. sol.	S	S
Nicotinic acid	dil. sol.	S	
Nitric acid	25%	S	S
Nitric acid	50%	S	U
Nitric acid	75%	U	U
Nitric acid	100%	U	U
O			
Oils and Grease		S	L
Oleic acid	100%	S	L
Orthophosphoric acid	50%	S	S
Orthophosphoric acid	95%	S	L
Oxalic acid	sat. sol.	S	S
Oxygen	100%	S	L
Ozone	100%	L	U
P			
Petroleum (kerosene)		S	L
Phenol	sol.	S	S
Phosphorus trichloride	100%	S	L
Photographic developer	cust. conc.	S	S
Picric acid	sat. sol.	S	
Potassium bicarbonate	sat. sol.	S	S
Potassium bisulfide	sol.	S	S
Potassium bromate	sat. sol.	S	S
Potassium bromide	sat. sol.	S	S
Potassium carbonate	sat. sol.	S	S
Potassium chlorate	sat. sol.	S	S
Potassium chloride	sat. sol.	S	S
Potassium chromate	sat. sol.	S	S
Potassium cyanide	sol.	S	S
Potassium dichromate	sat. sol.	S	S
Potassium ferricyanide	sat. sol.	S	S
Potassium ferrocyanide	sat. sol.	S	S
Potassium fluoride	sat. sol.	S	S
Potassium hydroxide	10%	S	S
Potassium hydroxide	sol.	S	S
Potassium hypochlorite	sol.	S	L
Potassium nitrate	sat. sol.	S	S
Potassium orthophosphate	sat. sol.	S	S
Potassium perchlorate	sat. sol.	S	S
Potassium permanganate	20%	S	S
Potassium persulfate	sat. sol.	S	S
Potassium sulfate	sat. sol.	S	S
Potassium sulfite	sol.	S	S
Propionic acid	50%	S	S
Propionic acid	100%	S	L
Pyridine	100%	S	L
Q			
Quinol (Hydroquinone)	sat. sol	S	S
S			
Salicylic acid	sat. sol	S	S
Silver acetate	sat. sol.	S	S
Silver cyanide	sat. sol.	S	S
Silver nitrate	sat. sol.	S	S
Sodium benzoate	sat. sol.	S	S
Sodium bicarbonate	sat. sol.	S	S
Sodium biphosphate	sat. sol.	S	S
Sodium bisulfite	sol.	S	S
Sodium bromide	sat. sol.	S	S
Sodium carbonate	sat. sol.	S	S
Sodium chlorate	sat. sol.	S	S
Sodium chloride	sat. sol.	S	S
Sodium cyanide	sat. sol.	S	S
Sodium ferricyanide	sat. sol.	S	S
Sodium ferrocyanide	sat. sol.	S	S
Sodium fluoride	sat. sol.	S	S
Sodium hydrnxide	40%	S	S
Sodium hydroxide	sat. sol.	S	S
Sodium hypochlorite	15% active chlorine	S	S
Sodium nitrate	sat. sol.	S	S
Sodium nitrite	sat. sol.	S	S
Sodium orthophosphate	sat. sol.	S	S
Sodium sulfate	sat. sol.	S	S
Sodium sulfide	sat. sol.	S	S
Sulfur dioxide, dry	100%	S	S
Sulfur trioxide	100%	U	U
Sulfuric acid	10%	S	S
Sulfuric acid	50%	S	S
Sulfuric acid	98%	S	U
Sulfuric acid	fuming	U	U
Sulfurous acid	30%	S	S
T			
Tannic acid	sol.	S	S
Tartaric acid	sol.	S	S
Thionyl chloride	100%	L	U
Toluene	100%	L	U
Triethylamine	sol	S	L
U			
Urea	sol.	S	S
Urine		S	S
W			
Water	–	S	S
Wine vinegar		S	S
Wines and liquors		S	S
X			
Xylenes	100%	L	U
Y			
Yeast	sol	S	S
Z			
Zinc carbonate	sat. sol.	S	S
Zinc chloride	sat. sol.	S	S
Zinc (II) chloride	sat. sol.	S	S
Zinc (IV) chloride	sat. sol.	S	S
Zinc oxide	sat. sol.	S	S
Zinc sulfate	sat. sol.	S	S

Specific immersion testing should be undertaken to ascertain the suitability of chemicals not listed above with reference to special requirements.

NOTES:

(S) **Satisfactory:** Liner material is resistant to the given reagent at the given concentration and temperature. No mechanical or chemical degradation is observed.

(L) **Limited Application Possible:** Liner material may reflect some attack. Factors such as concentration, pressure and temperature directly affect liner performance against the given media. Application, however, is possible under less severe conditions, e.g. lower concentration, secondary containment, additional liner protections, etc.

(U) **Unsatisfactory:** Liner material is not resistant to the given reagent at the given concentration and temperature. Mechanical and/or chemical degradation is observed.

(–) **Not tested**

sat. sol. – Saturated aqueous solution, prepared at 20° C (68° F)

sol. – aqueous solution with concentration above 10% but below saturation level

dil. sol. – diluted aqueous solution with concentration below 10%

cust. conc. – customary service concentration

APPENDIX E – DEWATERING PRODUCTION TANK CONTAINMENT

Dewatering Secondary Containment (Stormwater)
Job Aid – Appalachia

The following steps are limited to dewatering accumulated stormwater found within secondary containment.

Dewatering Steps

1. Ensure the following **water quality requirements** are met prior to discharging stormwater:
    a. No additives, drilling muds, regulated substances or drilling fluids have been added to or are contained in the water, unless otherwise approved by the PADEP [have contacted the water];
    b. pH is 6-9;
    c. The specific conductance is < 1000 *µS/cm;*
    d. No sheen from oil or grease;
2. Select **appropriate discharge location** which includes a stable graveled area of the well pad or a level well vegetated area that:
    a. Is capable of absorbing the discharge;
    b. The discharge is not directly to surface waters;
    c. Is not within 200 feet of a water supply;
    d. Is not within 100 feet of a stream/wetland or floodplain;
3. Ensure that the **pump(s) and associated hoses are clean and free** of any regulated substances that could otherwise impact the water quality of the stormwater being discharged.
4. Ensure flowrate of the discharge **does not create any accelerated erosion** issues. Appropriate BMPs will be utilized during the dewatering process to prevent channelized flow. Discharge should be spread across the absorption area as evenly as practical.
5. If all above-mentioned conditions are obtained – begin dewatering process.
    ❖ Note - if any of the previously mentioned criteria is not met, the water shall be evacuated and reused for operations.
6. Record the information and location of dewatering on the Range *Water Discharge Form.* Records will be maintained within internal databases and can be made available upon request.

Other Considerations:

- Prior to any discharge activities, personnel must ensure water quality meter / equipment is calibrated in accordance with equipment manuals and Range best management practices.
- All pump refueling activities must be managed within secondary containment.

Contact Information

- Reach out to any member of the Environmental Compliance Surface Staff for any questions regarding discharge requirements.

APPENDIX F – PRESSURE BARRIER POLICY-WELLSITES

Pressure Barrier Policy

OVERVIEW

This Pressure Barrier Policy (Policy) has been developed in accordance with the requirements of 25 Pa. Code § 78a.55(d) and in consideration of the Pennsylvania Department of Environmental Protection's (PADEP) *Guidelines for Development of Operator Pressure Barrier Policy for Unconventional Wells* published guidance document.[1] The intent of the Policy is to ensure compliance with applicable regulatory requirements as well as provide consideration as to when and which pressure barriers are needed during oil and gas operations, to help control fluids in a manner that will reasonably ensure well control and protection of public health, public safety and the environment.

APPLICABLE OPERATIONS

The Policy is intended to apply to the following operations:

- Drilling a well that is intended to produce natural gas from an unconventional formation.
- Drilling out solid core hydraulic fracturing plugs to complete a well.
- Operations on wells when well head pressures or natural open flows are anticipated at the well site that may result in a loss of well control.
- Drilling in an area where there is no prior knowledge of the pressures or natural open flows to be encountered.
- Operations associated with wells regulated by the Oil and Gas Conservation Law (58. P.S. §§ 401-419).
- Drilling within 200 feet of a building.
- Drilling within a gas storage reservoir or within the gas storage reservoir protective area.
- Other identified operations requiring a pressure barrier, as determined by the operator.

[1] *See* Guidelines for Development of Operator Pressure Barrier Policy for Unconventional Wells, Document Number 800-0810-003, http://tinyurl.com/800-0810-003.

PRESSURE BARRIER POLICY

All unconventional operators conducting well drilling and/or completion activities must employ at least two (2) mechanical pressure barriers between the open producing formation and the atmosphere. Each mechanical pressure barrier must be capable of being tested and must be tested according to manufacturer specifications prior to operation. If during the course of operations, the operator only has one (1) functioning barrier, operations must cease until additional barriers are added and tested, or the redundant barrier is repaired and tested.[2]

- **Drilling Operations**

  a. General

  Range Drilling is responsible for ensuring that a minimum of two (2) tested mechanical barriers and one (1) hydrostatic barrier* are in place prior to commencement of operations. Fluid can only be considered a hydrostatic barrier after it has been monitored for a sufficient amount of time to ensure an adequate barrier has been formed.

  * Note, a hydrostatic barrier is only employed during horizontal (non-air drilling) operations.

  Examples of mechanical barriers include, but are not limited to:

  - Cemented and unperforated casing.
  - Tested blow off prevention (BOP) stack.
  - Casing shoe track with float and bumped plug.
  - Tested casing head and casing valves.
  - Tested cemented plug.
  - Tested bridge plug, retainer or packer.
  - Casing hanger and back pressure valve.

  Examples of hydrostatic barriers includes, but is not limited to:

  - Kill weight drilling fluid.
  - Kill weight treated water.

[2] *See* 25 Pa. Code § 78a.72 (Use of safety devices – blow-out prevention equipment).

c. Air / Pneumatic Drilling Pressure Barriers

The following information relates to pressure barriers employed during air / pneumatic drilling operations which may include several different wellbore sections as outlined below.

i. Surface, Coal and Intermediate Wellbore Section(s)

When drilling the surface, coal and intermediate sections, a rubber and rotating head are used to divert air, cuttings, and any shallow gas away from the rig floor. Cement is brought to surface in all three of these hole sections with downhole float equipment utilized in the casing strings.

Surface, Coal and Intermediate Section(s) Barrier Summary		
#	*Barrier*	*Comments*
1	Cemented and unperforated casing	N/A
2	Casing shoe track with float and bumped plug	N/A
3	Kill weight treated water	Fluid inside casing utilized to displace cement job acts as a hydrostatic barrier

ii. 8-3/4” Air Drilled Hole to Kick Off Point (KOP) Wellbore Section

Prior to drilling out the 9-5/8” casing, the BOP stack is nippled up on an 5M, 11” casing head and pressure tested. Two mechanical barriers (cemented and unperforated casing as well as a casing shoe track with float and bumped plug) exist with a hydrostatic (fluid) barrier in the casing. An 5M, 11” stack is then installed on the wellhead prior to continuing operations to function as an additional barrier.

8-3/4” Air Drilled Hole Section Barrier Summary		
#	*Barrier*	*Comments*
1	Cemented and unperforated casing	N/A
2	Casing shoe track with float and bumped plug	N/A
3	Kill weight treated water	Fluid inside casing utilized to displace cement job acts as a hydrostatic barrier
4	Tested casing head and casing valves	Tested per manufacturer SOP
5	5M 11” Annular Preventor	Tested per API Standard 53
6	5M 11” Blind Rams	Tested per API Standard 53
7	5M 11” Pipe Rams	Tested per API Standard 53

iv. 8-1/2” Curve / Lateral Wellbore Section

Prior to drilling the curve/lateral sections, a 13-5/8” 5M or 10M BOP stack is nippled up on the wellhead and pressure tested prior to drilling. 5-1/2”, 20 lb/ft production casing is run to TD and cemented. After, the well is turned over to the completions group for hydraulic fracture stimulation at a later time.

After cementing the production casing, the annulus is isolated with C-22 casing slips within the pressure tested casing head. The hole is left full of freshwater, which is not sufficient to balance the anticipated reservoir pressure of the Marcellus and therefore not considered a barrier. However, it is sufficient to conduct a negative pressure test by checking the floats after cementing.

d. Oil / Mud Based Drilling Pressure Barriers

The following information relates to pressure barriers employed during oil / mud based drilling operations, which is typically limited to horizontal wellbore section drilling procedures.

i. Horizontal Wellbore Section

8-1/2” Curve / Lateral Drilling Barrier Summary		
#	*Barrier*	*Comments*
1	5M / 10M 13-5/8” Annular Preventor	Tested per API Standard 53
2	5M / 10M 13-5/8” Blind Rams	Tested per API Standard 53
3	5M / 10M 13-5/8” Pipe Rams	Tested per API Standard 53
4	Tested casing head and casing valves	Tested per manufacturer SOP

e. Non-Active Drilling Pressure Barriers

The following chart details pressure barriers utilized during non-drilling scenarios, which typically includes time periods between and after drilling rig operations (i.e. there is no active drilling rig at the well).

5-1/2” Production Casing Barrier Summary		
#	*Barrier*	*Comments*
1	Kill weight treated water	Fluid inside casing utilized to displace cement job acts as a hydrostatic barrier
2	Tested casing head and casing valves	Tested per manufacturer SOP
3	Cemented and unperforated casing	N/A
4	Casing shoe track with float and bumped plug	N/A

Drilling Operations Well Control Summary

Hole Section	BOP's	Configuration	Test Pressure
24" Air Drilled Surface String	Poor Boy Diverter, which is an extension of the conductor	N/A	N/A
17-1/2" Air Drilled Coal String	Poor Boy Diverter, which is an extension of the conductor	N/A	N/A
12-3/8" Air Drilled Intermediate String	Poor Boy Diverter, which is an extension of the conductor	N/A	N/A
8-3/4" Air Drilled Open Hole Section	Air Bowl on top of the diverter, which is an extension of the conductor	- 5M 11" Annular Preventer - 5M 11" Blind Rams - 5M 11" Pipe Rams *Compatible with drill pipe in use on the rig.	All tested to 250 psi low and 5,000 psi high, with the exception of the annular, which is tested to 70% of the RWP, against test plug set in wellhead
8-1/2" Curve/Lateral	5M / 10M BOP Stack	- 5M / 10M 13-5/8" Annular Preventer - 5M / 10M 13-5/8" Blind Rams - 5M / 10M 13-5/8" Pipe Rams - 5M / 10M 13-5/8" Variable Bore Rams (VBR's) *Compatible with drill pipe in use on the rig.	All tested to 250 psi low and 5,000 psi high, with the exception of the annular, which is tested to 70% of the RWP, against test plug set in wellhead

- **Completions Operations**

a. General

During post completion cleanout operations in horizontal unconventional formations, a coiled tubing rig or a hydraulic work over unit with appropriate blowout prevention equipment will be utilized. Range Completions is responsible for ensuring that all mechanical barriers are installed to manufacturer specifications and testing information is recorded in the office trailer during operations of each well. Documentation is typically disposed of after successful well operations.

b. Pressure Testing Requirements

i. Marcellus Wells (10,000 psi rated working pressure BOP's and stack configuration)
   - BOP's – low test between 250-500 psi and high test of 5,000 psi Marcellus held for 5 minutes with visual inspection for any leaks.
   - Annular – 250-500 psi low test and high test of 70% to annular RWP (Rated Working pressure).

ii. Deep Utica Wells (15,000 psi rated working pressure BOP's and stack configuration)
   - BOP's – low test between 250-500 psi and high test of 10,000 psi each held for 5 minutes with visual inspection for any leaks.
   - Annular – 250-500 psi low test and high test to 70% of annular RWP (Rated Working pressure).

c. Active Hydraulic Fracturing Operations

Hole Section	BOP's	Configuration	Test Pressure
5 ½" Production Casing in Lateral: Frac	2 Frac Valves	Manual Lower Valve Emergency Hydraulic Valve	5,000 psi high
5 ½" Production Casing in Lateral: Zipper Frac	2 Frac Valves	Hydraulic Valve Hydraulic Valve	5,000 psi high

d. Post - Hydraulic Fracturing Operations

Hole Section	BOP's	Configuration	Test Pressure
Post – Frac 5 ½" Production Casing in Lateral: Plug Drill Outs with WOR	5M/10M BOP Stack	- 5M/10M Annular Preventer - 5M/10M Blind Rams - 5M/10M Pipe Rams - Flow Cross - 5M/10M Pipe Rams - Manual Lower Master Valve	All tested to 250 psi low and 5,000 psi high, with the exception of the annular, which is tested to 70% of the RWP, against test plug set in wellhead
Post – Frac 5 ½" Production Casing in Lateral: Plug Drill Out with Coil Tubing	5M / 10M BOP Stack	- 5M/10M Annular Preventer - 5M/10M Blind Rams - 5M/10M Shear Pipe Rams - 5M/10M Slip Rams - 5M/10M Pipe Rams	All tested to 250 psi low and 5,000 psi high, with the exception of the annular, which is tested to 70% of the RWP, against test plug set in wellhead

d. Plugging / Abandonment Operations

Hole Section	BOP's	Configuration	Test Pressure
P&A (Unconventional Only)	5M/10M BOP Stack	- TIW Valve - 5M/10M Blind Shear Rams - 5M/10M Pipe Rams - Manual Master Lower Valve	All tested to 250 psi low and 5,000 psi high, with the exception of the annular, which is tested to 70% of the RWP, against test plug set in wellhead

APPENDIX G – SITE SPECIFIC INFORMATION

Conner Samuel 17458

PPC Plan Site Specific Information

In Case of Emergency Call: 911

24-Hour Company Contact Number: 724-743-6700

PA Emergency Contact Number (PADEP): 1-800-541-2050

PA Emergency Contact Number (PEMA): 1-800-424-7362

Type of Facility: Unconventional Well Site
911 Site Address: 130 Grange Rd
McDonald, PA 15057

Municipality, County: Cecil Twp, Washington County
Access Road Coordinates: 40.327153 N -80.219333 W
Pad Coordinates: 40.329075 N -80.218439 W

Well Permit Numbers:

37-125-29167 1H	
37-125-29168 2H	
37-125-28893 3H	
37-125-29170 4H	
37-125-29171 5H	

Site Specific Implementation Authorization

Reviews and revisions (if needed) to the PPC Plan base document as well as this site specific appendix will be completed annually unless plan failure, operational changes, or regulatory revisions necessitate otherwise. Any questions, comments, or suggestions regarding this PPC Plan should be directed to the Environmental Compliance Department.

February 27, 2023
Implementation Date

Site Specific Information Revision Log

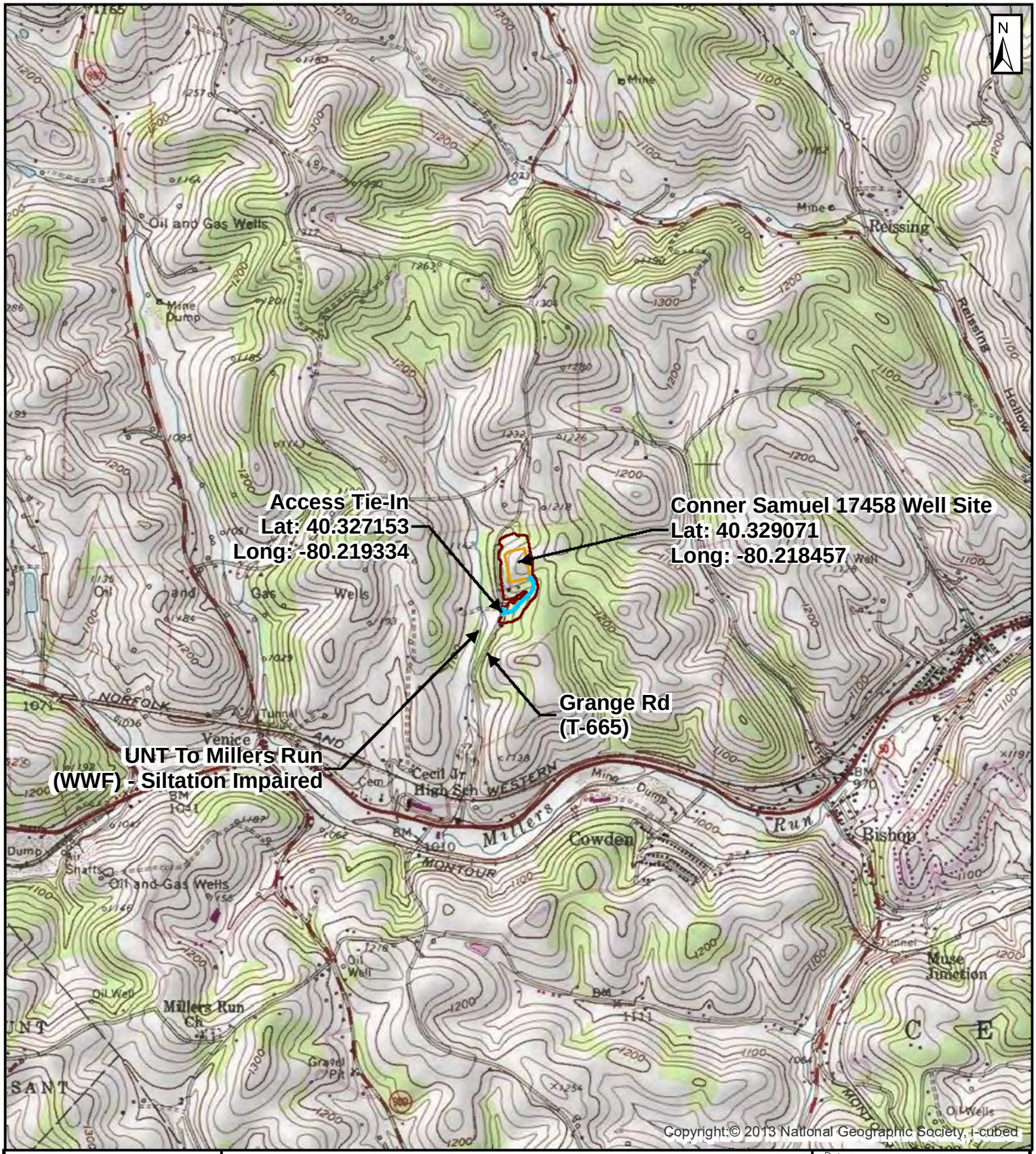
The following table is a record of the revisions made to this site specific section of the plan since the original date of site specific implementation. The requirements and applicability for this revision log can be found in Section 1.1 of the Plan base document as well as a log specific to changes to the base plan.

Date	Revision	Signature	Comments
1/21/2025	1	pj	Update to include new base plan and new wells
8/26/2025	2	pj	Periodic Review

Action Item Log

This site specific section of the Plan is in effect as of the implementation date listed above. The following table outlines the actions that must be taken in order to address elements for this Plan section that are missing or incomplete. A table of any outstanding Plan base document items can be found in **Section 1.2** of the Plan base document. Address any field modifications and/or recommended changes to this PPC Plan to the Environmental Compliance Department.

Action Item	Responsible Person	Anticipated Completion Date	Actual Completion Date



Larson Design Group

Conner Samuel 17458 Well Site

Cecil Township
Washington County, PA

Location Map
Canonsburg Quad

Date	6/28/2019
Designer	BTF
Project No.	6863-042
Scale	1 inch = 2,000 feet

Path: P:\6863\6863-042 Conner Samuel 17458 Well Site\DATA\MAPS\Conner Samuel Location Map.mxd

TOTAL LIMITS OF DISTURBANCE: 14.9 ACRES

50 0 50 100 FEET
SCALE

STOCKPILE MATERIALS UNSUITABLE FOR STRUCTURAL FILL (CH AND MH SOILS PER GEOTECHNICAL REPORT)

TOPSOIL STOCKPILE (11,125 CY CAPACITY)

N/F LANDS OF CIAFFONI PETE JR & MARIBETH MILLER, & ET AL 140-004-00-00-0025-00

~WOODS~

CULVERT CAPPED DURING E&S

CULVERT #2 18" HDPE 33' LENGTH 4% SLOPE

R-3 CHANNEL SUPPLEMENTED WITH R-4 PIPE OUTLET FOR EROSION CONTROL

CULVERT #1 15" HDPE 67' LENGTH 7% SLOPE

24' WIDE GRAVEL ACCESS ROAD

DIVERSION BERM (2,500 CY CAPACITY)

ROADSIDE DITCH #4 RIPRAP LINED (R-4)

DIVERSION TO BE S75 LINED

PRESERVE EXISTING DEPRESSION AND NATURAL DRAINAGE PATTERN; NO TREE CLEARING OUTSIDE LIMIT OF DISTURBANCE

CHANNEL #3 SC250 LINED OR RIPRAP LINED (R-4)

3' TALL TYPE M INLET CULVERT #4 INLET ELEV. 1124.50

DOWNSTREAM BLOCK

CULVERT #4 24" HDPE 60' LENGTH 3% SLOPE

EXTENDED ROCK CONSTRUCTION ENTRANCE (100')

ROADSIDE DITCH #3 RIPRAP LINED (R-3)

LOWER SECTION OF CHANNEL #3 TO BE RIPRAP LINED (R-4)

TOPSOIL STOCKPILE OR STAGING AREA

N/F LANDS OF CIAFFONI PETE J & MARIBETH MILLER, & ET AL 140-005-00-00-0009-00

~AG. FIELD~

2:1 CUT SLOPES

Y-FITTING WITH 6" CONNECTION

TYPE M INLET (2) 4" OUTLET PIPES

10' WIDE EMERGENCY SPILLWAY AT 1177.40'

6" SOLID WALL OUTLET PIPE

4" PERFORATED SDR 35 PIPE, TYP.

2' WIDE BOTTOM; R-3 RIPRAP LINED COLLECTION TRENCH AT 0.1% SLOPE

EXTEND CONTAINMENT BERM TO TIE-IN WITH CUT SLOPE TO ENSURE PROPER RUNOFF CAPTURE

TYPE M INLET (1 OUTLET PIPE)

CHANNEL #1 RIPRAP LINED (R-3) 2' WIDTH 1.5' DEPTH 2:1 SIDE SLOPES

CONNER SAMUEL 17458 WELL SITE
PAD ELEVATION = 1176.90'
PAD AREA = 141,950 S.F. / 3.26 AC.

418'

268'

215'

APPROXIMATE LOCATION ABANDONED WELL

CHANNEL #4 S75 LINED

R-3 RIPRAP SLOPE PROTECTION

FOREBAY 5'x30'

FOREBAY SPILLWAY PROTECTION

EMERGENCY SPILLWAY

CS-24

TYPE M INLET

3:1 FILL SLOPES

INSTALL ORANGE CONSTRUCTION BARRIER FENCE 10' AROUND CHIMNEY TO PREVENT DISTURBANCE

10' WIDE EMERGENCY SPILLWAY AT 1177.40'

CONTAINMENT BERM AROUND PAD; 1' HEIGHT; SEE DETAIL

5' EXPOSED R-3 INSIDE CONTAINMENT BERM

SEDIMENT TRAP #2 1,950 SF BASAL AREA TOTAL DEPTH 4.5' BOTTOM ELEV. 1128.5'

SEDIMENT TRAP #1 93'x30' TOTAL DEPTH 5.5' BOTTOM ELEV. 1144.25'

PROVIDE EROSION CONTROL MATTING, SEED, AND SOIL SUPPLEMENTS, TYPICAL

RE-PLACE TOPSOIL ON CUT AND FILL SLOPES AT MIN 6" DEPTH;

CHANNEL #2 RIPRAP LINED (R-3) 2' WIDTH; 1.5' DEPTH 2:1 SIDE SLOPES

~AG. FIELD~

~WOODS~

~SHED~

STONE CHIMNEY

GRANGE RD (T-635)

24" CONCRETE CULVERT

UNNAMED TRIBUTARY TO MILLERS RUN (WWF), SILTATION IMPAIRED

N/F LANDS OF LUDWIN FRANK K & ROSE MARIE 140-004-00-00-0027-00

R-3 RIPRAP SLOPE PROTECTION

FOREBAY SPILLWAY PROTECTION

FOREBAY 5'x10'

GUARD PAD 20'x40'

CS-24

EMERGENCY SPILLWAY

FOREBAY 5'x15'

SEDIMENT TRAP #3 10'x30' BOTTOM TOTAL DEPTH 5.5' BOTTOM ELEV. 1117.0'

12" HDPE CULVERT

ROADSIDE DITCH #2 RIPRAP LINED (R-3)

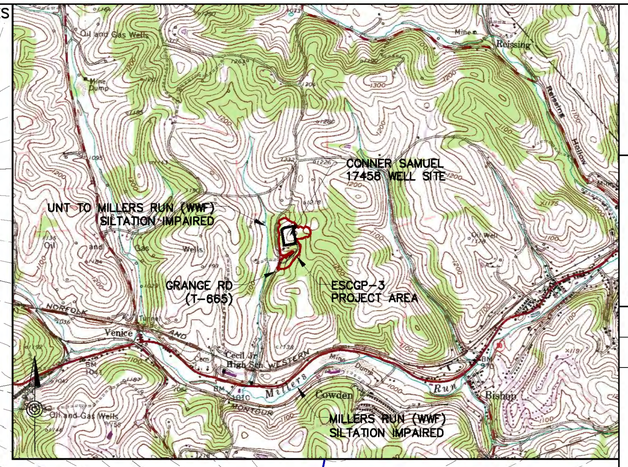
SUMP INLET TO ELEV. 1105.50 OUTLET ELEV. 1104.50

CULVERT #3 12" HDPE 80' LENGTH 1% SLOPE

ACCESS TIE-IN N 40.327153° W 80.219333°

PAVED ENTRANCE; 50'

RE-GRADE EXISTING ROADSIDE DITCH TO GENERATE POSITIVE DRAINAGE TO CULVERT AT ACCESS ROAD TIE-IN SEE SHEET C145



Larson Design Group

RANGE RESOURCES

NO.	DATE	COMMENTS	BY	CHKD
2	2/19/20	TOWNSHIP SUBMISSION	BTF	RNH
1	11/1/19	RESUBMISSION PER DEP COMMENTS	BTF	RNH
0	7/2/19	ESCGP-3 SUBMISSION	BTF	RNH

ISSUE / REVISIONS

EROSION AND SEDIMENT CONTROL PLAN

CONNER SAMUEL 17458 WELL SITE

CECIL TOWNSHIP, WASHINGTON COUNTY, PENNSYLVANIA

RANGE RESOURCES - APPALACHIA, LLC
3000 TOWN CENTER BOULEVARD
CANONSBURG, PA 15317
PHONE 724.743.6700

Larson Design Group • Architects Engineers Surveyors
1000 Commerce Park Drive • Suite 201
Williamsport, PA 17701
PHONE 570.323.6603 TOLL FREE 877.323.6603
FAX 570.323.9902 • www.larsondesigngroup.com

SHEET NO.: C130

PROJECT NO.: 6863-042

AIR RIG DRILLING OPERATION
CONTAINMENT PLAN

RANGE RESOURCES®

DIVERSION CHANNEL

CUT SLOPE

PAD CHANNEL

ACCESS ROAD

INTERCEPTOR CHANNEL

CONTAINMENT BERM

SECONDARY CONTAINMENT
60 MIL PE LINER WITH
BERM

CUTTINGS LOADOUT

DOGHOUSE

CONTAINMENT BERM

INTERCEPTOR CHANNEL

UPRIGHT FLUID STORAGE

AIR COMPRESSORS (4)

AIR PACKAGE W/ BOOSTER

CONTAINMENT BERM

FILL SLOPE

POND OUTFALL STRUCTURE

EROSION CONTROL / STORMWATER BASIN

DRAWN BY: KANE KETTLES
DATE: 7/5/2022

60 0 60 120 FEET

SCALE

W:\Drilling\Containment Drawings

Path & Filename:C:\Users\kkettles\Desktop\RAD_FOLDER\Air Rig Containment Plan.dwg

FLUID RIG DRILLING OPERATION
CONTAINMENT PLAN

RANGE RESOURCES®

DIVERSION CHANNEL

CUT SLOPE

ACCESS ROAD

SECONDARY CONTAINMENT
60 MIL PE LINER WITH
BERM

INTERCEPTOR CHANNEL

FUEL TANK

GENERATORS

MUD PUMPS

CONTAINMENT BERM

FLARE
STACK

HALF ROUND

HALF ROUND

CUTTINGS LOADOUT

HALF ROUND

HALF ROUND

UPRIGHT MUD STORAGE

BARITE SILOS

CONTAINMENT BERM

INTERCEPTOR CHANNEL

CONTAINMENT BERM

FILL SLOPE

POND OUTFALL STRUCTURE

EROSION CONTROL / STORMWATER BASIN

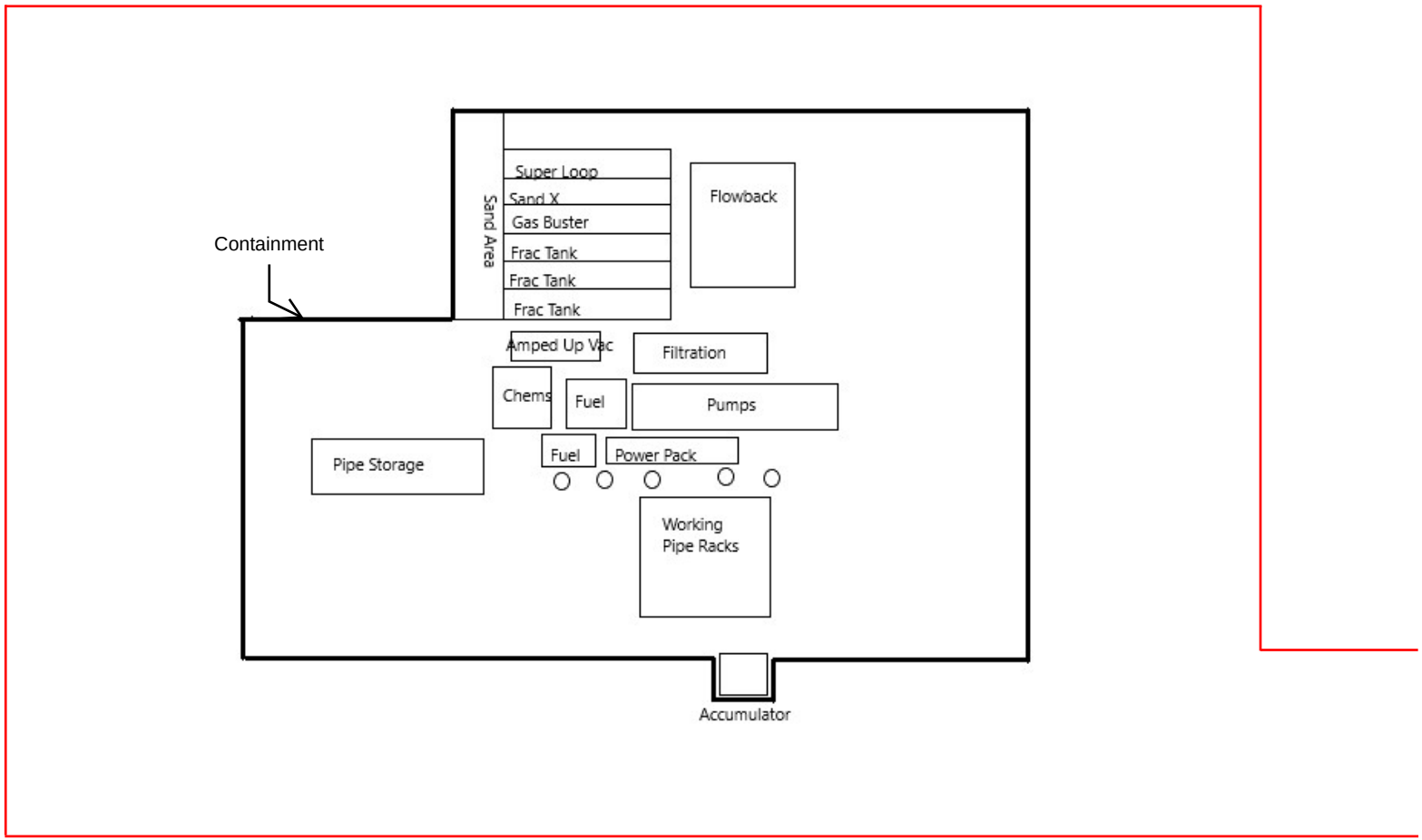
DRAWN BY; KANE KETTLES
DATE: 7/5/2022

60 0 60 120 FEET

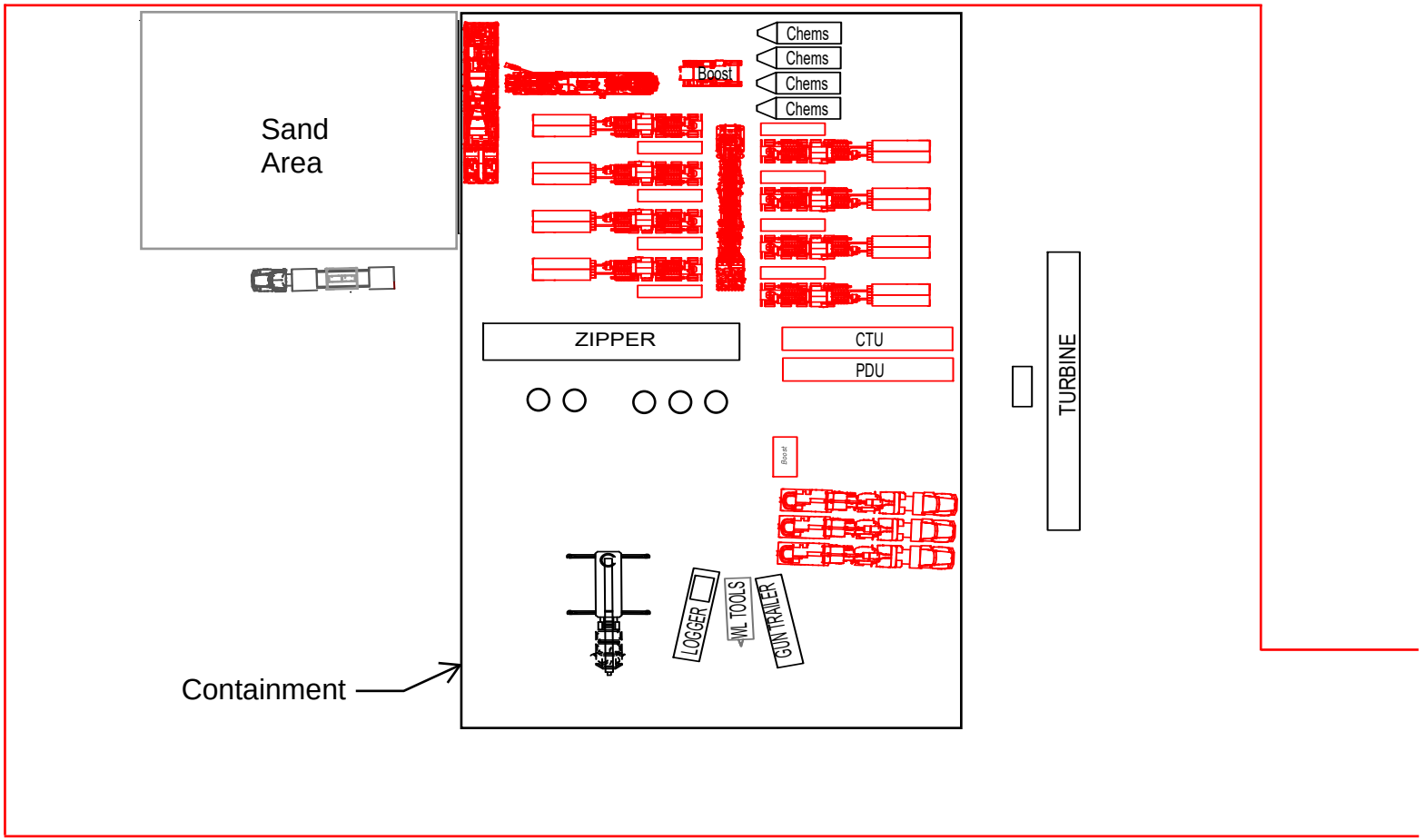
SCALE

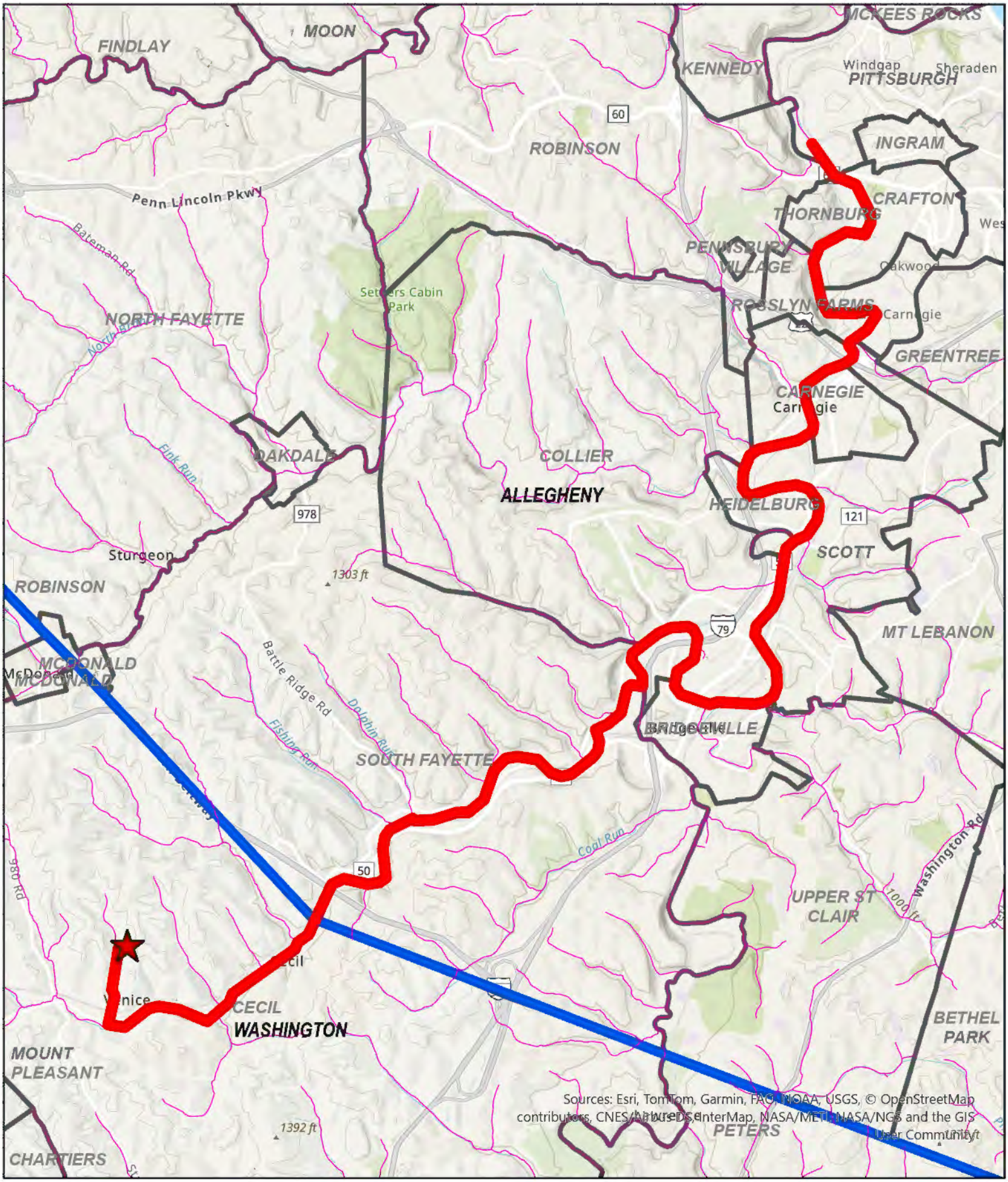
W:\Drilling\Containment Drawings

Typical Drillout Containment Plan



Typical Frac Containment Plan





Downstream PPC Notification Map
Conner Samuel Pad 17458
Washington County PA

RANGE RESOURCES®

0 0.5 1 2 Miles

Site Specific Incident History								
Occurence Date	Site Name	Incident Type	Incident Sub Type	Incident Description	Material Type	Estimated Volume off Containment	Environmental Damage	Corrective Action
8/11/2025 7:21:00 PM	CONNER SAMUEL 17458	Environmental	Spill - Regulated Substance	Following the cement job on the 4H, the 10" flow line was being flushed with a Schlumberger pump truck. A 10" knife valve was left in the closed position which caused the flow line to over pressure. As a result, a 10" cap dislodged from the flow line and SOBM released. An estimated 1 bbl of SOBM released to secondary containment and roughly a half bbl of SOBM misted onto the graveled well pad.	Drilling Mud (Synthetic Oil Based)	21	Remediated	Tarr remediated the impacted gravel placing the material into a spill drum for disposal. Patterson pressure washing equipment and secondary containment, fluid being recovered with the KSW vac unit.

EMERGENCY RESPONSE PLAN

CONNER SAMUEL 17458
130 Grange Rd.
McDonald, PA 15057
Cecil Twp., Washington County

Access Road Coordinates: 40.327148 N, -80.219356 W
Well Pad Coordinates: 40.329070 N, -80.218440 W

DRIVING DIRECTIONS TO SITE

- From I-79, take Exit 54 (Bridgeville exit) and take SR 50W.
- Go 6.8 miles on SR 50W to right on T-665 (Grange Rd).
- Go 0.65 miles on Grange Rd to site entrance on the right.

EMERGENCY CONTACT INFORMATION

Range Resources-Appalachia, LLC: Canonsburg, PA

Title	Contact Number
1. Safety Operations	(724) 754-4514
2. Safety Compliance Coordinator	(724) 754-4515
3. Safety Director	(724)754-4516
4. Security Manager	(724)754-4517
24-Hour Emergency Number - (724) 743-6700	

FIRST RESPONDER EMERGENCY NOTIFICATION

Dial 911 from a cell phone or a landline telephone.

CLOSEST HOSPITAL

AHN Canonsburg Hospital
100 Medical Boulevard, Canonsburg, PA15317

911 Addresses (To Access Rd)
County Approved Landing Zones
Well Location
Parcels
Limits of Disturbance
Access Roads
Buildings
Municipalities
Rivers and Streams
Road Centerlines
1000' Buffer
3000' Buffer

RANGE RESOURCES

N

1 in = 1,500 ft

130 Grange Rd

0 750 1,500 3,000 Feet

Generated via Range Resources Web-Based Mapping Operations

Produced: 8/26/2025

CRITICAL INFORMATION REQUIREMENT FOR FIRST RESPONDERS (FR)

The deployment of First Responder personnel and equipment at a Range location in the event of an emergency will be at the discretion of the First Responder Incident Commander. In emergency situations to which local First Responders are called, the Range Representative is qualified, and expected, to advise and assist First Responder Incident Commanders on-scene by providing the following information to inform Emergency Action planning.

	Briefing on the general situation at the incident site.
	Accounting of personnel on the site; total personnel, casualties, injured; personnel location(s) at the site; possible location of unaccounted-for personnel
	The potential for fire or gas release to become more severe.
	Hazardous materials; identify the location, quantity and nature of the hazardous substances on site. A Range Safety representative will provide the SDS for chemicals on site.
	A general orientation to the layout of the site; obstacles, access and egress routes, hazardous areas, equipment locations; water sources, auxiliary power units, generators, material handling equipment, etc.
	Location of run-off water containments and sumps
	Location of possible First Responder Command Post sites
	Location of most likely staging areas near the site for parking and equipment staging
	Location of Range security personnel and how to secure the area/control access
	Available communications resources—cell phones primary
	Location of Range owned/operated power, water, and gas lines near/on the site that could affect emergency operations
	Location of residents, critical infrastructure, waterways, and avenues of approach to the site
	Recommended initial objectives for First Responders

EMERGENCY RESPONSE PROCEDURES FOR WELL SITE PERSONNEL

FIRE:

- ☐ Initiate site emergency notifications and shut down procedures
- ☐ Use fire extinguishers to extinguish incipient fires
- ☐ For fires beyond incipient stage, call 9-1-1; conduct internal notification
- ☐ First Responders contain fires larger than incipient stage, i.e., grass, structure, or equipment fires
- ☐ First Responders contain fires at production and storage tanks
- ☐ For fires at wellhead evacuate and secure site; operator will contact Well Control Contractors for guidance and assistance

MEDICAL EMERGENCY:

- ☐ Dial 9-1-1 from a cell phone or landline telephone
- ☐ Provide first aid until Emergency Medical Services arrive
- ☐ Conduct internal notification procedures

EXPLOSIONS:

- ☐ Execute emergency shutdown procedures
- ☐ Safety permitting, attempt to extinguish all heat producing sources
- ☐ Immediately conduct personnel evacuation from the site to the Muster Point; account for personnel
- ☐ Implement internal notification procedures
- ☐ Secure the site and monitor site activity for changes in situation

SPILLS:

- ☐ If spill response is within the capabilities of site personnel, deploy absorbent materials, booms to contain spill and prevent migration of released material
- ☐ Implement internal incident notification procedures
- ☐ If warranted, initiate emergency shutdown procedures at the site
- ☐ Notify 9-1-1 if local emergency response support is required

SECURITY BREACH or other SECURITY event:

- ☐ Contact Security Department Representative or Law Enforcement
- ☐ Register all visitors to site with Security Guard; only authorized personnel permitted
- ☐ Establish security to isolate areas subject to investigation

RISKS AND HAZARDS TO THE PUBLIC

Public Risk/Hazard from Well Site Emergencies	Planning Assumptions*
Drifting smoke from on-site fire obscures roadway visibility	☐ First Responders (FR) will assist with traffic control/re-routing
Fire from on-site spreads to surrounding property	☐ FR combat fire on-site where feasible; combat fires spreading offsite ☐ FR Incident Commander determines if evacuation of residents required; assist in traffic control on adjacent roadways ☐ Range Land Department assists with identification and notification of affected residents; Range assists with transportation and temporary lodging of displaced residents
Toxic or combustible fumes from gas release threaten local residents	☐ FR Incident Commander determines if evacuation of residents required; assist in traffic control on adjacent roadways deploys HAZMAT control team if required ☐ Range Land Department assists with transportation and temporary lodging of displaced residents
Traffic congestion in conjunction with well control event	☐ FR will assist in traffic control with influx if emergency vehicles and well control traffic ☐ FR vehicles will be staged to not block access road to well site while action plan is being developed ☐ Range will coordinate external equipment and trucking requirements to resolve well control events
Spills	☐ Range will contain spills on-site with existing equipment and absorption materials; heavy equipment will be used to divert and contain off-site fluids ☐ FR will be asked to assist in spill control beyond Range capabilities; assist with notification of residents and evacuation where required; deploys HAZMAT control team if required

* Assumptions common to all: Incident Commander will ensure safety of First Responders in addressing all emergency situations; Reconnaissance of affected site and assessment of situation will be conducted prior to introducing emergency vehicles to well site.

SAFETY DATA SHEETS (SDS) INFORMATION

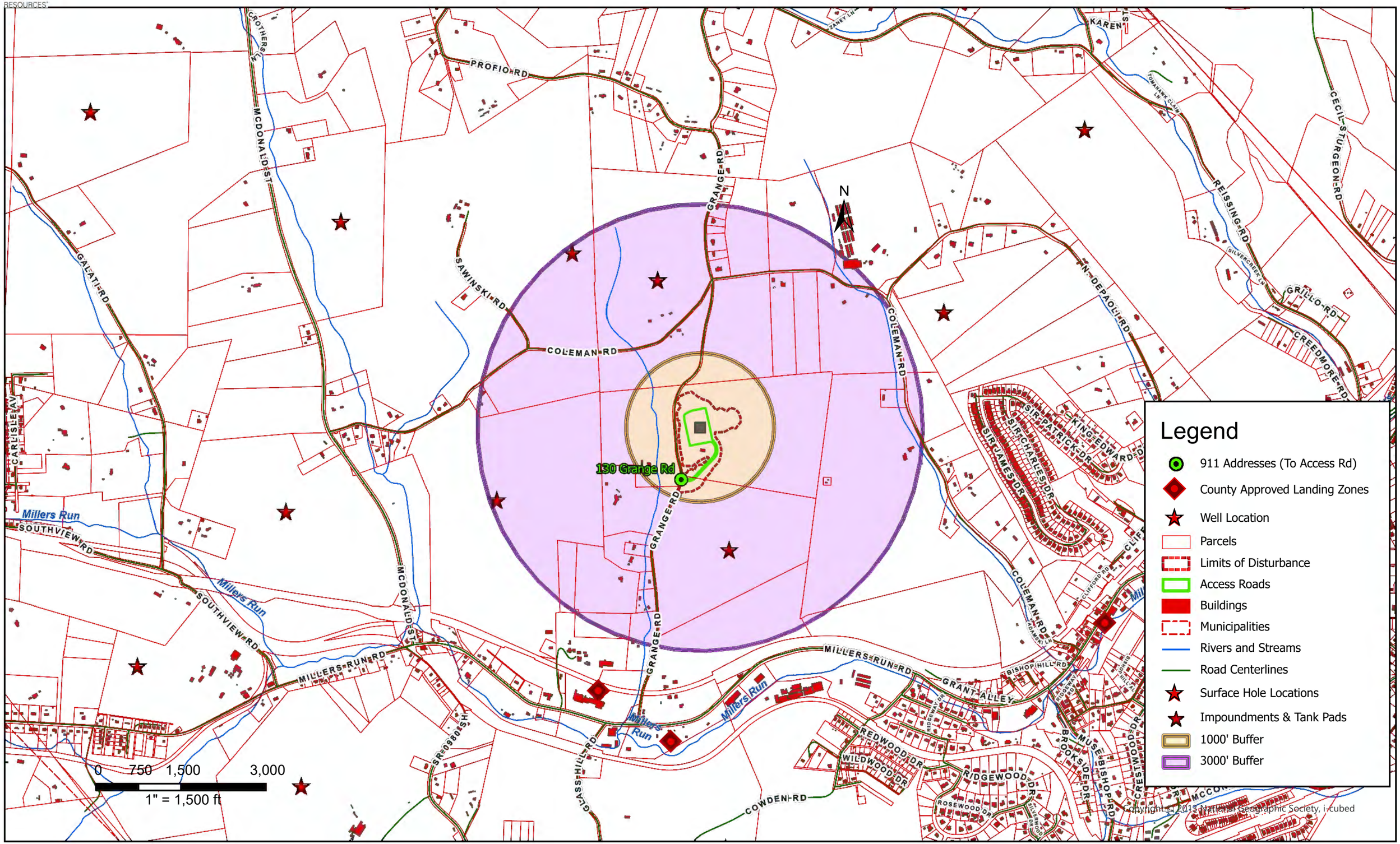
Vendors or contractors using or handling chemicals are responsible for maintenance of the Safety Data Sheet (SDS), and shall make the SDS immediately available to emergency responders and/or personnel working at the site. In instances where Range assumes control or ownership of a material (e.g. condensate, foamer, defoamer), Range is responsible for the maintenance of an SDS for each material. A copy of the SDS can typically be found in the mailbox near the entrance of the site, or at another designated location. The Range Safety Department is tasked with onsite placement of an SDS for each Range-owned material, as well as management of vendor/contractor SDS responsibilities.

SPILL CONTROL / FIRE SUPPRESSION

- ☐ Absorbent pads, disposal drums are stored at the Range warehouse and available at all times.
- ☐ Handheld fire extinguishers are mounted in all Range company trucks.

Above Information Provided by: Director of Safety, Range Resources – Appalachia, LLC

CONNER SAMUEL 17458



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