ROXUL, USA, INC – WVG611896 Multi-Sector Stormwater General Permit.

From: G.A. Perry, Architect, and LEED AP

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Date; October 23, 2019

To; Director, Division of Water and Management, DEP

ATTN: Sharon Mullins, Permitting Section

601 57th Street SE, Charleston, WV 25304-2345

INTRODUCTION

My name is Gavin Perry; I am an architect and LEED AP and live with my family approximately half a mile from the Rockwool factory in Ranson WV. We and all our neighbors obtain our water from wells and are **greatly concerned that the Rockwool factory operations will contaminate the groundwater supply, our wells and drinking water. Water for 80% of the County residents, businesses and farms comes from private wells.**

The Rockwool factory will include a number of above ground ponds, including Stormwater Detention and Water Reuse Ponds. The ponds will hold stormwater runoff and waste materials from the mineral wool manufacturing process.

Water quality threats from Rockwool are real and very serious. **Of greatest concern and danger to the local community is the possibility that sinkholes will open up under the finished ponds, rupturing the pond's lining and seams, allowing toxic waste materials to drain into and contaminate the groundwater**. Jefferson County geology consists primarily of karst (limestone) and includes large numbers of sinkholes. Karst is very susceptible to sinkhole formation. Sinkholes have direct connections to the groundwater which flows rapidly in karst. The headwaters for a number of streams are located in the vicinity of the Rockwool factory.

SUMMARY

West Virginia DEP must not issue the Rockwool permit until and unless all of the technical questions are answered, as there is no possibility of assuring the safety of the groundwater and surface water resources in the area of Rockwool's proposed plant. Please respond in writing to each of my comments.

RECOMMENDATION

Because the safety of the groundwater and surface water resources depends on the design and construction of stormwater ponds, it is recommended that WV DEP require Rockwool to engage a third party independent engineering firm, expert in designing stormwater ponds in Karst terrain, to design and supervise the construction of the Stormwater ponds at their factory in Ranson WV.

CSN TECHNICAL BULLETIN No. 1

STORMWATER DESIGN GUIDELINES FOR KARST TERRAIN IN THE CHESAPEAKE BAY WATERSHED VERSION 2.0, June 2009

This stormwater design supplement has been prepared for engineers, plan reviewers, and public works officials to guide better stormwater decisions when land is developed in karst regions of the Chesapeake Bay watershed*. Until now, available local and state guidance on this topic has been uneven, sometimes conflicting and certainly not comprehensive. An informal working group has spent the last year developing this guide.*

It is intended that the Technical Bulletin can be incorporated directly or by reference into local and state land development codes, ordinances, regulations, permits and engineering manuals in the Bay watershed that govern how stormwater is managed in karst terrain. The supplement has been designed as an evolving document so that it can be updated over time to reflect new research, experience and project implementation.

Several important caveats apply to this edition. ***First, the effect of land development on karst terrain is complex and hard to predict, and requires professional analysis to reduce the risk of geological hazards, damage to infrastructure and groundwater contamination****. Second, the bulletin has been produced to respond to the recent growth pressures in many small communities in the Great Valley, Eastern Panhandle and South Central Pennsylvania.* ***The working group acknowledges that past approaches to stormwater and land development in karst terrain have been inadequate to safeguard the public and the environment.***

The following comments and recommendations are based on my forty plus years experience as an architect and the design guidelines contained in the CSN Technical Bulletin No. 1 Stormwater Design Guidelines For Karst Terrain In The Chesapeake Bay Watershed Version 2.0

COMMENT 1

IT IS ESSENTIAL THAT A DETAILED SITE INVESTIGATION BE MADE BEFORE LOCATING AND DESIGNING STORMWATER PONDS IN KARST TERRAIN.

Chesapeake Stormwater Network (CSN) Technical Bulletin No. 1. Stormwater Design Guidelines for Karst Terrain in the Chesapeake Bay Watershed, Version 2.0 June 20019: (Page 8)

"Detailed site investigations are required in the design of all building, roads, stormwater conveyance and centralized stormwater facilities proposed within karst areas. The purpose of the investigation is to develop a ***KARST FEATURE PLAN*** *that identifies the location and elevation of subsurface voids, cavities, fractures and discontinuities. Presence of any of these features could pose a danger to groundwater quality, a construction hazard or an increased risk of sinkhole creation at a proposed centralized stormwater facility.*

Pertinent site data to collect includes:

- *Bedrock characteristics (e.g., type, geologic contacts, faults, geologic structure).*
- *Soil characteristics (type, thickness, spatial variability, mapped unit, geologic parent/history, infiltration rate, depth to seasonally high water table)*
- *Identification/verification of geological contacts if present, between karst and non-karst formations*
- *Photo-geologic fracture trace map*
- *Bedrock outcrop areas*
- *Sinkholes, closed depressions, grikes and solution-enlarged voids*
- *Cave Openings*
- *Springs*
- *Perennial, intermittent and ephemeral streams and their flow behavior and surface or subsurface discharge points (e.g., losing or gaining streams), channels and surface drainage network*
- *Site-scale watershed boundaries based on large scale site topography (i.e., one foot or less contour intervals)*
- *Layout of proposed buildings, roads, and stormwater structures (and estimated site impervious and turf cover)*
- *Existing stormwater flow pattern*

Stormwater designers should retain the services of a qualified consultant experienced in working in karst landscapes. There are many different techniques to reveal the nature of subsurface conditions in karst terrain, including:

- *Electric resistivity tomography*
- *Seismic refraction*
- *Gravity surveys*
- *Electromagnetic (EM) inductance/conductivity surveys*

These surveys provide a qualitative evaluation of the site area and may identify "suspect areas" to be further evaluated by borings. The use of these surveys may reduce the total number of soil borings by narrowing down the locations of suspect areas at the site".

It is my understanding that there was <u>not a detailed study undertaken or that a Karst Feature Plan was not developed</u>. This oversight and mistake by Rockwool resulted in the Rockwool factory and its Stormwater Ponds being located and built in an area totally unsuitable for such in such operations, endangering the groundwater drinking supply of the residents of Jefferson County.

<u>COMMENT 2</u>

<u>IT IS RECOMMENDED THAT STORMWATER PONDS NOT BE LOCATED IN KARST TERRAIN.</u>

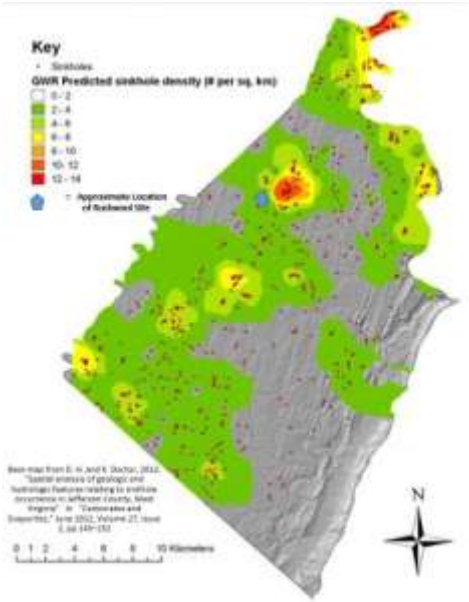
<u>Chesapeake Stormwater Network (CSN) Technical Bulletin No. 1. Stormwater Design Guidelines for Karst Terrain in the Chesapeake Bay Watershed, Version 2.0 June 20019:</u>

"…while communities that incorporate this guidance into their development review process can reduce the incidence of infrastructure damage and groundwater contamination, there is always some inherent risk when development occurs on this sensitive terrain. **<u>Consequently, the best local approach is to craft stronger comprehensive land use plans that direct new growth away from karst areas to more appropriate locations</u>***…" Page 3.*

The Rockwool factory is located in an area with the following features and characteristics;

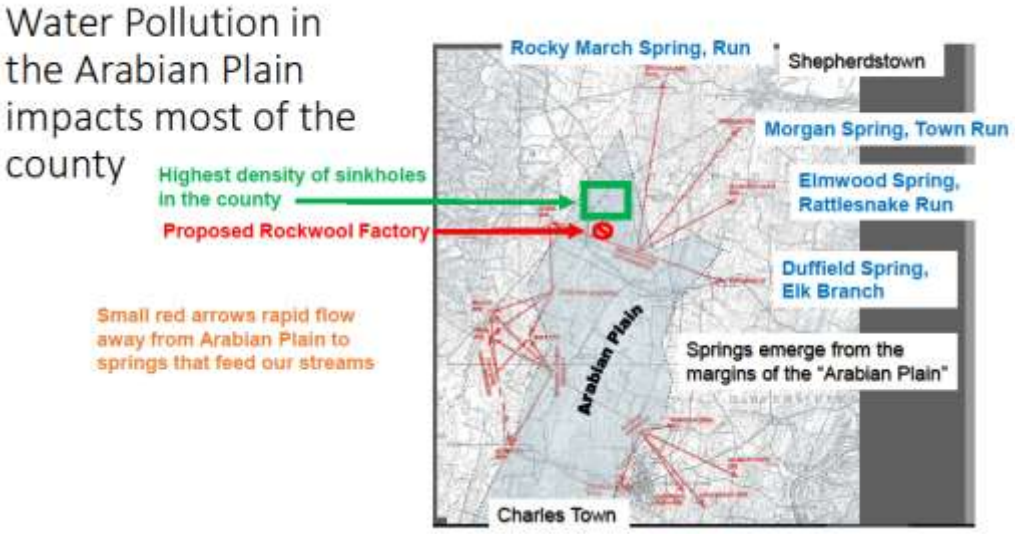
- **Karst terrain;**
- **At the headwater of local streams;**
- **In the area with highest concentration of sinkholes in Jefferson County (D.H. and K. Doctor in "Carbonates and Evaporates", June 2012, Vol 27, Issue 2,)**

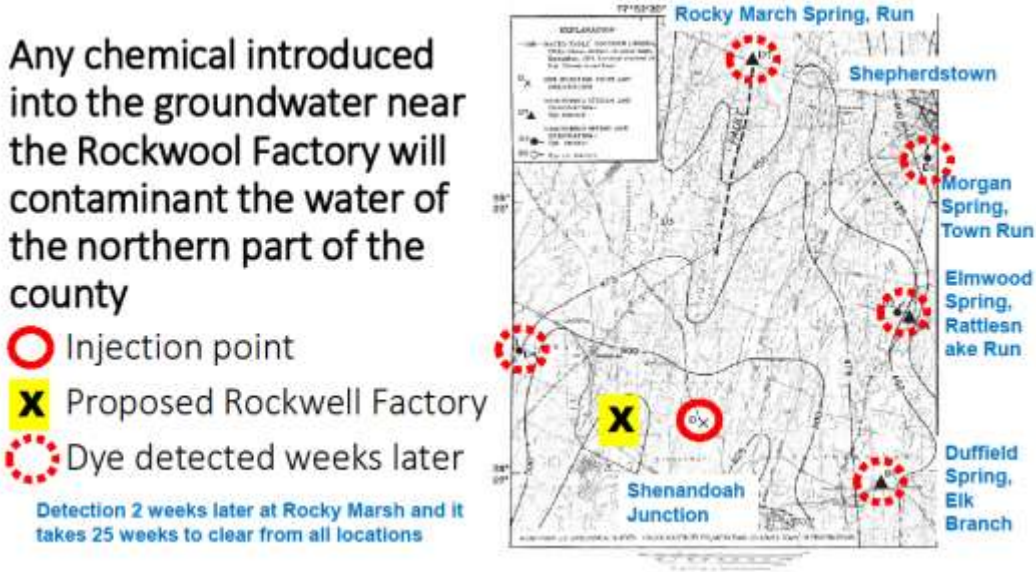
The local hydrology raises the strong possibility of pollutants entering the groundwater and contaminating wells and springs. **A spill, leaking sewer line or rupture of the lining of the above ground ponds could result in health and safety issues as the contaminated material moves underground rapidly. Underground contamination is very difficult to track and to clean up.**



In the 1990s, a County study injected dye into a well in Bardane in the Elk Run watershed, and within less than two weeks the dye was found in Rocky Marsh Spring, which feeds Rocky March Run, almost 8 miles away. The dye also found its way to the Morgan Spring, which feeds the Town Run; Elmwood Spring, which feeds Rattlesnake Run; and the Duffield Spring- Elk Branch. **The dye moved rapidly underground over area landscape and took 25 weeks to clear from all locations**. (Kozar, M. D., et al., 1990. Geohydrology, Water Availability, and Water Quality of Jefferson County, West Virginia, with Emphasis on the Carbonate Area. U.S. Geological Survey, Water-Resources Report 90-4118).

<u>The injection point for the dye is close to the location of the Rockwool factory</u>.





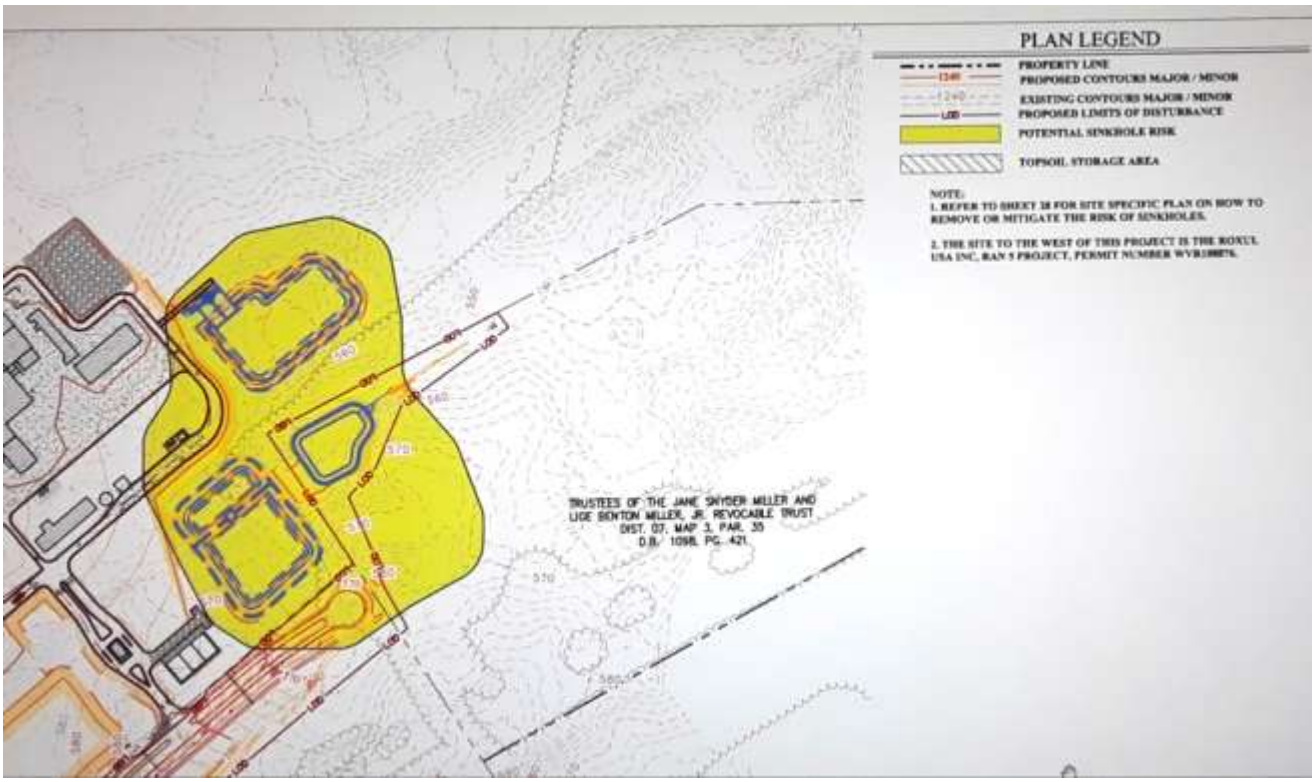
COMMENT 3.

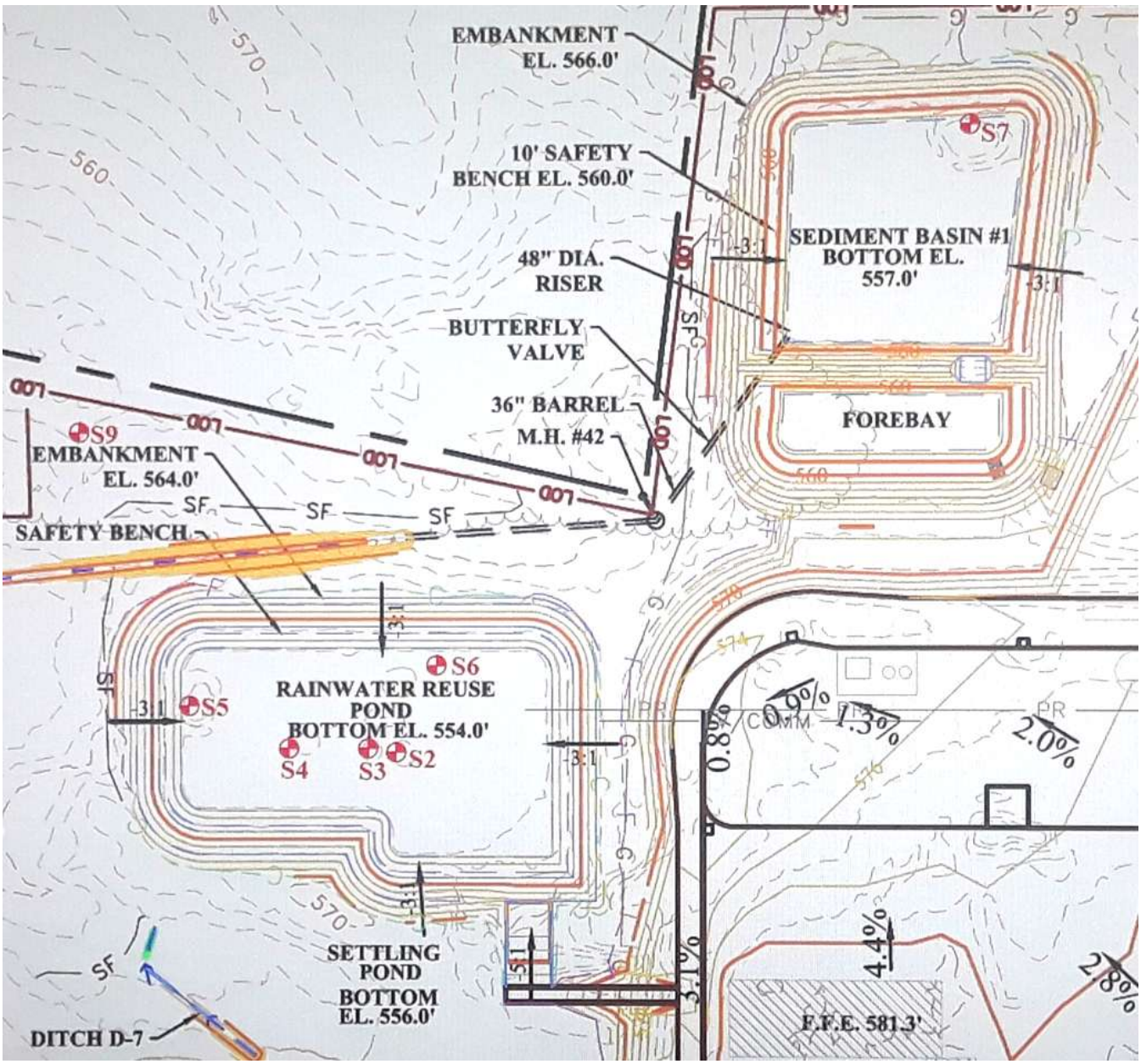
THE STORMWATER PONDS ARE LOCATED IN A "POTENTIAL SINKHOLE RISK" AREA

The drawing below is titled Potential Sinkhole Risk Map and shows the location of the three lagoons. The drawing notes that the lagoons are located in a **"POTENTIAL SINKHOLE RISK"** area.

The greatest danger to the groundwater supply is from the sinkholes which have NOT YET FORMED. It is almost certain that sinkholes will form under the ponds. It is highly likely that the ponds liners will be damaged and the seams opened up due to the great stress placed on the liner and the liner joints from the weight of the liquid in the pond and the opening of the sinkhole below.

- According to recent Permit Application of 6/22/2019 and 7/22/2019, there are a total of **17 reported sinkholes within the site, including 5 in the Rainwater Reuse Pond, shown as S2 to S6 on the plan..** Some of the sinkholes are many feet in diameter and located in the ponds.
- The increase of **impervious surface** area due to roads, parking lots and buildings will produce a much greater rate and volume of runoff. **More runoff greatly increases the risk of new sinkhole formation.**
- It is **highly likely that more sinkholes will be formed,** caused by the excavation, blasting and pile driving required to construct the foundations of the smokestacks and the heavy equipment required to build the smokestacks.
- Rockwool drawings show the lagoons located in a "**potential sinkhole risk"** area. **The drawings do not show how the risk from sinkholes is to be mitigated.**

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EL. 566.0'
10' SAFETY
BENCH EL. 560.0'
48" DIA.
RISER
BUTTERFLY
VALVE
36" BARREL
M.H. #42
SEDIMENT BASIN #1
BOTTOM EL.
557.0'
FOREBAY
S7
S9
EMBANKMENT
EL. 564.0'
SAFETY BENCH
RAINWATER REUSE
POND
BOTTOM EL. 554.0'
S6
S5
S4
S3
S2
SETTLING
POND
BOTTOM
EL. 556.0'
DITCH D-7
F.F.E. 581.3'
0.8%
0.9%
1.3%
2.0%
4.4%
2.8%
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General Permit No WV 0115924 – West Virginia Department Of Environmental Protection, WV/NPDES Construction Stormwater Permit

Sinkholes pictured in the reuse pond.

Sinkhole in Basin #1

COMMENT 4.

INTERGRATED ENVIRONMNETAL PLAN, RAN 5 FACILITY - POND LINER SYSTEM DETAIL, SHEETS 1, & 2, DATED 05/09/2019

The following comments are on the Pond Liner System Detail Drawings and Notes in Rockwool's' Integrated Environmental Plan:

- Cross Section C-1 shows **one layer Geomembrane liner,** but does not indicated the type of Geomembrane **material or thickness** of the material.
- Cross Section C-1; Notes 2-5, show a Compacted Borrow Clay Layer of 4 inches thick. Table 6 from the CSN Technical Bulletin recommends **24 inches of soil or clay, depending on the depth to bedrock.**
- **Note 2 indicate Borrow Soil requirements which vary from the information shown in Table 6.**
- Note 3 states **"making several passes on vibratory mode"**. The compaction of the soil under the liner is not recommended and can lead to the **formation of new sinkholes**
- The Notes states that the contractor or material installer shall be responsible for the installation. **Because of the critical nature of the pond liners in preventing groundwater contamination, it is highly recommended that an independent Quality Assurance program** be implemented to ensure the lagoons are constructed as designed in the construction documents.
- The Stormwater Design Guideline notes that 60 mil is the **minimum** thickness for liners. Because of the critical part the liners play in preventing groundwater contamination, the **minimum should not be the standard that is used.**
- The drawings do **not show a leak detection system** installed under the pond liner. It is critically important that leaks in the liner be **detected as soon as possible so that remediation action can be taken as quickly as possibl**e
- Due to the high probability that the on-site construction activity will cause new sinkholes to be formed, **it is recommended that the lagoons be built after the completion of all other on-site construction.**

Table 6. Required Groundwater Protection Liners for Ponds in Karst Terrain (WVDEP, 2006 and VA DCR, 1999)	
Pond Excavated at least Three Feet Above Bedrock	24 inches of soil with maximum hydraulic conductivity of 1×10^{-5} cm/sec
Pond Excavated within Three Feet of Bedrock	24 inches of clay[1] with maximum hydraulic conductivity of 1×10^{-6} cm/sec
Pond Excavated Near Bedrock within wellhead protection area, in recharge area for domestic well or spring, or in area with high fracture density or significant geophysical anomalies.	Synthetic liner with a minimum thickness of 60 ml.
[1] Clay properties as follows: Plasticity Index of Clay: Not less than 15% (ASTM D-423/424) Liquid Limit of Clay: Not less than 30% (ASTM D-2216) Clay Particles Passing: Not less than 30% (ASTM D-422) Clay Compaction: 95% of standard proctor density (ASTM D-2216)	

COMMENT 5.

RECOMMEDEND CHANGES TO ROCKWOOL'S STORMWATER POND DESIGN

James T. Wells, PhD, PG is an environmental geologist with 20 years of experience in hydrogeology and geochemistry and is a Professional Geologist, registered by the State of California. Dr. Wells is the Chief Operating Officer of L. Everett & Associates. He earned a BA in Earth Sciences from Dartmouth College and MS and PhD degrees in Geological Sciences from the University of Washington. He serves on the editorial board of the academic journal, Environmental Forensics. His area of expertise includes groundwater hydrology, environmental forensics and fate and transport of contamination in soil and groundwater.

Below are the recommendations from Dr. Wells detailing the best way to protect groundwater from contamination caused by leaks and the failure of the stormwater ponds.

"Mr. Perry,

We reviewed your write-up about the planned stormwater and waste lagoons at the proposed Rockwool plant in Ranson, WV. My colleague, Dr. Lorne Everett has done a lot of work over the years designing vadose zone and groundwater monitoring systems for all sorts of waste facilities like landfills and land treatment units. We recognize that one of the challenges at this site will be that it's probably not feasible to design a groundwater monitoring network since the karst geology makes it very difficult to understand where releases into the aquifer would go. ***We are also not aware of any way to specifically monitor for sinkholes under the lagoons, once they are constructed.***

One level of protection that is employed at hazardous waste sites and other types of landfills is:

- **INSTALL TWO LINER SYSTEMS WITH A LIQUID DETECTION SYSTEM BETWEEN THE LAYERS. This might consist of a sand layer with perforated pipe (like a French drain) all leading to a centralized sump. Something like that might work at this site"**

Additional recommendations include the following:

- **INSTALL MONITORING WELLS TO REGULARLY TEST THE GROUNDWATER FOR CONTAMINATION**

- **ESTABLISH THE ACTIONS TO BE TAKEN WHEN GROUNDWATER CONTAMINATION IS DETECTED.**

COMMENT 6

ROCKWOOL'S STORMWATER PONDS ARE NOT DESIGNED IN ACCORDANCE WITH THE DESIGN PRINCIPLES DETAILED BELOW

STORMWATER DESIGN PRINCIPLES FOR KARST

Chesapeake Stormwater Network (CSN) Technical Bulletin No. 1. Stormwater Design Guidelines for Karst Terrain in the Chesapeake Bay Watershed, Version 2.0 June 20019: Page 17

- *Treat runoff as sheet flow in a series of small runoff reduction practices before it becomes concentrated.* ***Practices should be designed to disperse flows over the broadest area possible to avoid ponding, concentration or soil saturation.***
- ***Small-scale low impact design (LID) practices work well in karst areas, although they should be shallow and sometimes use perforated under drains to prevent groundwater interaction****. For example, micro-bioretention and infiltration practices are a key part of the treatment train.*
- ***Distributed treatment is recommended over centralized stormwater facilities,*** *which are defined as any practice that treats runoff from a contributing drainage area greater than 20,000 square feet IC, and/or has a surface ponding depth greater than three feet. Examples include wet ponds, dry extended detention (ED) ponds, and infiltration basins.*
- ***The use of centralized stormwater practices with large drainage areas is strongly discouraged even when liners are used.*** *Centralized treatment practices require more costly geotechnical investigations and design features than smaller, shallower distributed LID practices. In addition, distributed LID practices generally eliminate the need to obtain an underground injection permit*
- ***Designers should refer to the list of preferred and acceptable stormwater practices as outlined in Table 3.***
- *Designers must address both the flooding and water quality aspects of post development stormwater runoff. In most localities, the sequence of stormwater practices should have the capacity to safely handle or bypass the 2- and 10- year design storm, following the methods outlined in Section 5.4.*
- ***Designers should maintain both the quality and quantity of runoff to predevelopment levels and minimize rerouting of stormwater from existing drainage.***

COMMENT 7.

WHO WILL MONITOR THE GROUNDWATER TO DETECT GROUNDWATER CONTAMINATION?

On Page 69 of the **WVDEP stormwater management guidance** document it states: **"Monitoring wells and groundwater sampling may be required by the Director for the assessment of the potential for or existence of groundwater contamination**…"

It is recommended that the Director use the existing authority noted above to **require Rockwool to install groundwater monitoring wells along its property boundaries,** especially northeast and northwest from the two Stormwater Outlets, as these are the directions towards existing surface water receptors at The Compound: Historic Nature Preserve Park (recharged by groundwater) and the **drinking water wells at residences along Warm Springs Road, Granny Smith Lane, Good Folks Road, Stubbs Road, Americana Lane and Vista Lane.**

Title 47 Legislative Rules, Division Of Environmental Protection, Office Of Water Resources, Series 58, Groundwater Protection Rule, 47 CSR 58 4.9C; **"New facilities shall monitor groundwater upon order of the director if the director reasonably believes that an industrial establishment or activity has the potential to contaminate groundwater".**

COMMENT 8.

WHAT ACTION WILL BE TAKEN BY ROCKWOOL WHEN THE CONTAMINATION OF THE GROUNDWATER IS DETECTED?

COMMENT 9.

WHO WILL NOTIFY, WHEN AND BY WHAT MEANS, THE WATER USERS WHEN THE CONTAMINATION OF THE GROUNDWATER IS DETECTED?

COMMENT 10.

WHO HAS LEGAL LIABILITY AND FINANCIAL RESPONSIBILITY IF THE GROUNDWATER IS CONTAMINATED BY ROCKWOOL?

The NPDES permits that if not amended, will transfer all liability for any past, present and future pollution from Roxul/Rockwool to the taxpayers of Jefferson County.

Here is the official NPDES permit and liability transfer form that WVDEP requires on ownership transfer. Note that there are only two options: New Owner (Jefferson County) accepts all liability, past, present, and future; and New Owner (Jefferson County) does not accept liability for past issues, and must DELINEATE in a detailed addendum, those environmental conditions they are willing to accept at the current time and in the future. Only those items that are specifically called out in the Addendum can be made to fall back to Roxul/Rockwool. If it is not called out, then it WILL be a Jefferson County liability.

https://dep.wv.gov/WWE/permit/general/Documents/Transfer%20GP%20form.pdf

COMMENT 11.

WHO WILL COMPENSATES PROPERTY OWNERS AND BUSINESSES FOR THE CONTAMINATION OF THE GROUNDWATER.?

Farmers need special protection against contamination of the water supply used to feed their animals. The Market Facilitation Program (MFP) designed to help farmers who are being hurt in the tariff war pays the farmers upfront for their losses so that the farmers can stay in business rather than waiting for the legal wrangling to be completed. The same needs to be true for the liability process. Water pollution from spills at the Rockwool installation that cows drink and comes out in their milk could make the milk and the cow unsellable. The farmer would be facing a complete loss of income and the added expense of killing and removing the cow (~$300 per head). To protect framers there needs to be an escrow account that pays the farmer when the claim is filed just like the MFP. Rockwool will be protected because if a false or excessive claim is filed, they can sue the farmer and then reclaim their money after the legal process has taken its course if they win. The same is true for farmers who raise livestock for meat, if the meat is tainted by a spill. They need to be compensated as soon as the complaint is filed. If the spill is detected earlier enough to avoid contamination of the milk and meat. The farmers need to compensated for buying 30 gallons of fresh water per day per head of cattle. For most farmers this will require truckloads of water every day. Compensation for sheep goats needs be for 5 gallons per day per head, horses require 10 gallons per day. Compensation needs to include water purchase, and hauling costs

These water pollution events may result from poor design and poor design practices –

- Building lagoons on ground where sinkholes may form;
- Catastrophic breaks in tanks, pumps, values and piping, design flaws like filling a sinkhole with concrete (which at one time was recommended, has now been long recommended against because the evidence is that this makes the sinkhole reemerge faster).

COMMENT 12.

AT THE END OF THE LIFE OF THE FACTORY WHO WILL BE LEGALLY AND FINANCIALLY RESPONSIBLE FOR THE ENVIRONMNETAL RESTORATION OF GROUNDWATER AND DRINKING WELLS CAUSED BY CONTAMINATION FROM ROCKWOOL'S STORMWATER PONDS?