# Remediation of AFFF/ PFAS Impacted Soil by Sequestration and Natural Attenuation

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SUPPORTING [DOING] LEADING

Battelle - 6th International Symposium on Bioremediation and Sustainable Environment Technologies

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# RockGen Energy Center Facility and Site Description

## Site Description

- 77.81 acres over two parcels located in the Town of Christiana/ Cambridge, WI in SW Dane County

## Site History

- 1910 – Agricultural land including dairy farm on southeast portion of the property
- 1945 – Limestone quarry operated by T&T Stone Co. until 1960s
- 2000 – Construction of generation facility (facility ownership changes multiple times)

## Facility Description

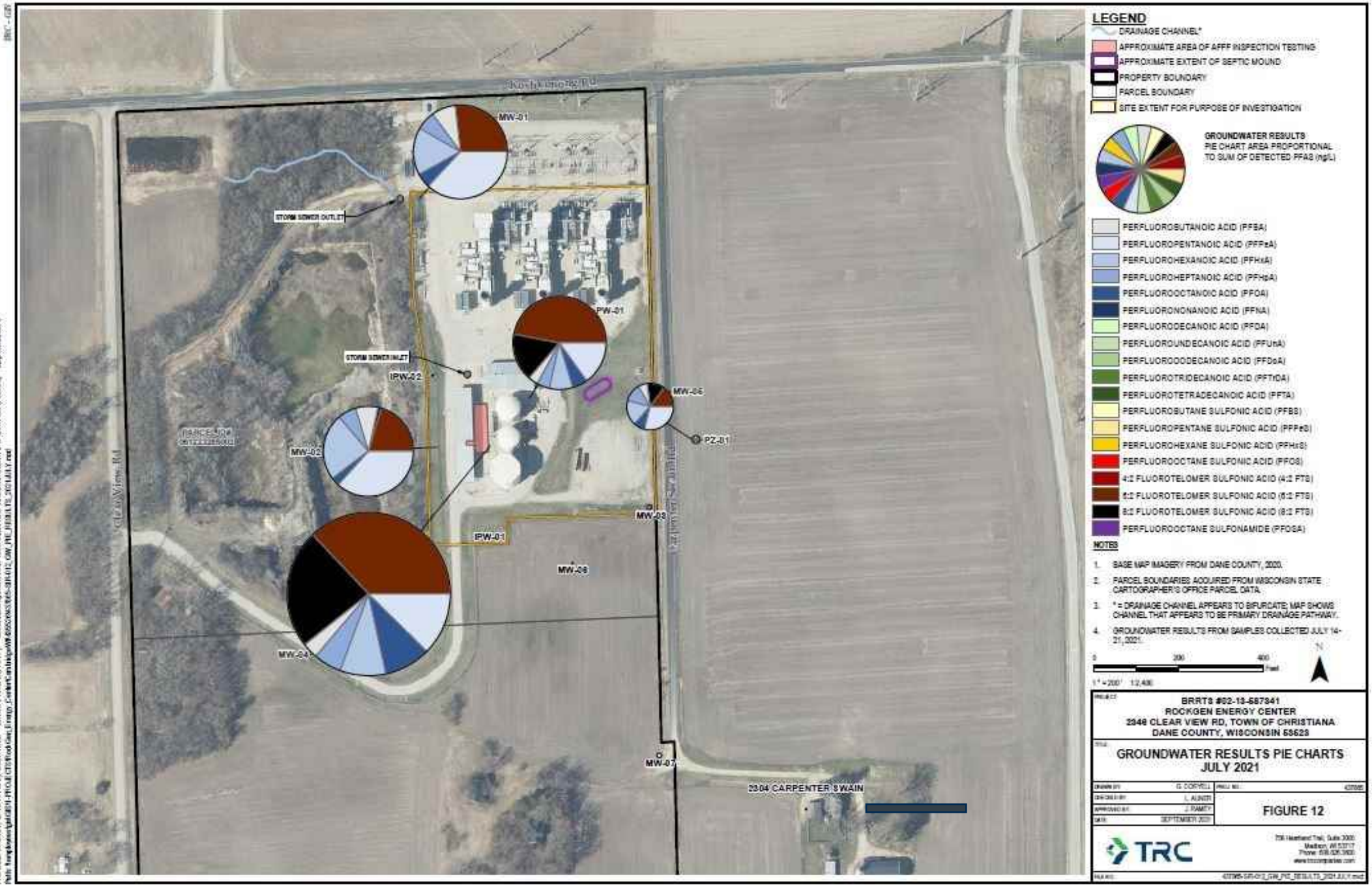
- Natural gas and fuel oil generation with three combustion turbines and generators, three above ground storage tanks, and support structures on 10 acres of the Site


# Site Topography and Layout

# Site Geology

# NR 700 Steps Completed/ In Progress

- March 2021 – NR 706 Hazardous Substances Discharge Notification
- April 2021 – NR 716 SIWP w/ Interim Action Options (approved within 1 week)
- Apr. 2021 – Jul. 2021 – NR 716 SI (initial)
- July 2021 – NR 708 Interim Action Workplan (approved within 1 week)
- August 2021 – NR 716 Supplemental SIWP (approved within 1 week)
- September 2021 – NR 716 SIR (approved April 2022)
- Oct. 2021 – Dec. 2021 – NR 716 SI (phase 2)
- Apr. 2022 – Jun. 2022 – NR 708 Interim Action Construction
- October 2022 – NR 708 Remedial Action Documentation Report (approved January 2023)
- December 2022 – NR 716 Technical Assistance Meeting CSM/3D Model (memo. January 2023)
- March 2023 – NR 716 Supplemental SIWP Addendum (review requested within 2 weeks)
- **April 2023 – May 2023 – NR 716 SI (phase 3)**




# Forensic Signature

# Ansulite 3% AFFF AFC-3A


## LEGEND

- MONITORING WELL
- PIEZOMETER
- GEOPROBE SOIL BORING (APRIL 2021)
- HAND AUGER SOIL BORING (MAY 2021)
- SOIL SAMPLE
- POTABLE WELL
- DEEP PRODUCTION WELL
- STORM SEWER INLET/OUTLET
- DRAINAGE CHANNEL*
- APPROXIMATE AREA OF AFFF INSPECTION TESTING
- APPROXIMATE EXTENT OF SEPTIC MOUND
- PROPERTY BOUNDARY
- PARCEL BOUNDARY
- SITE EXTENT FOR PURPOSE OF INVESTIGATION

BORING/SAMPLE ID (SAMPLE DEPTH, FT BGS)
RESULTS (µg/kg)

SOIL RESULTS FOR SELECT PFAS
(DETECTIONS OF 8:2 FTS, PFOA, AND PFOS)

## NOTES

1. BASE MAP IMAGERY FROM DANE COUNTY, 2020.
2. PARCEL BOUNDARIES ACQUIRED FROM WISCONSIN STATE CARTOGRAPHER'S OFFICE PARCEL DATA.
3. * = DRAINAGE CHANNEL APPEARS TO BIFURCATE; MAP SHOWS CHANNEL THAT APPEARS TO BE PRIMARY DRAINAGE PATHWAY.

N

0 150 300 Feet

1 " = 150 '
1:1,800

BRRTS #02-13-587341
ROCKGEN ENERGY CENTER
2346 CLEAR VIEW RD, TOWN OF CHRISTIANA
DANE COUNTY, WISCONSIN 53523

SOIL SAMPLING RESULTS MAP

| | | | |
|---|---|---|---|
| DRAWN BY: | G. CORYELL | PROJ. NO: | 437865 |
| CHECKED BY: | L. AUNER | | |
| APPROVED BY: | J. RAMEY | | FIGURE 8 |
| DATE: | SEPTEMBER 2021 | | |

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FILE NO: 437865-SIR-008_SS_Results.mxd

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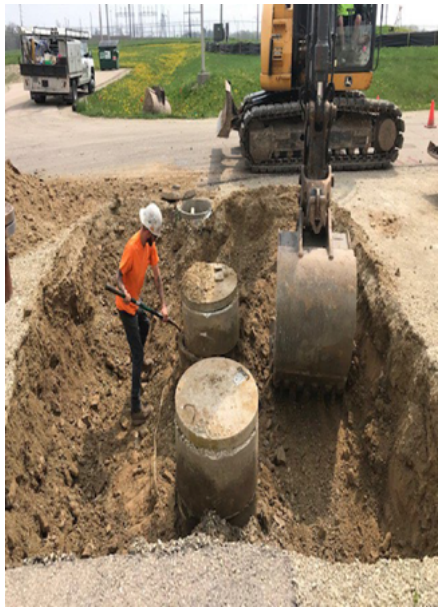
# Soil Investigation

# Potable Well Abandonment

- Existing well drilled to 200’ bsg. impacted
- Abandonment eliminates downward groundwater gradient from pumping
- Two production wells drilled to 1,000’ bgs not impacted
- HDD to minimize waste generation (~400’)
- Southern industrial well selected for potable

# Impacted Infrastructure: Clean or Replace?

- Impacted systems may include:
  - Fire suppression systems (concentrate storage tank, piping, nozzles) – Fully replaced
  - Fire trucks and response vehicles – Not applicable
  - Septic tanks – Fully replaced
  - Process equipment – Not applicable



# Excavation

- TRC self-performed excavation of septic system and mound.
- 1,000 tons disposed of in Subtitle C landfill (Wayne Disposal)







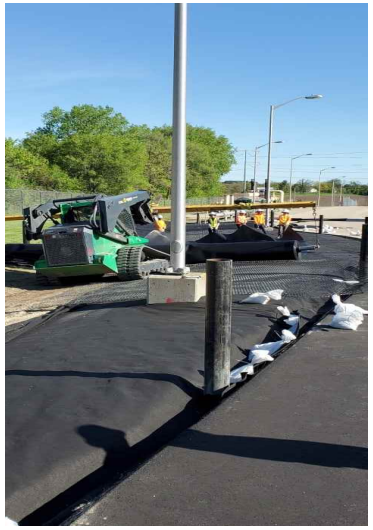

# Capping - Asphalt

- Site grading and prep – no removal and disposal of soil
- 5” asphalt cap
- Geosynthetic cover beneath piping and facility infrastructure
- Drainage enhanced




# Capping – Geosynthetic Cover System

- Subgrade preparation – no removal and disposal of soil
- Non-woven geotextile cushion
- 40-mil LLDPE
- Engineered synthetic turf
- Hydrobinder infill



# MNA Approach

Enhanced attenuation to manage PFAS plumes in groundwater – 2021, Newell, et. al.

1. Injection of particulate sorbents to enhance retention
2. Capping to retain PFAS in the vadose zone
3. Gas sparging in aquifers to concentrate, retain PFAS
4. Retention via PFAS salting out processes
5. Emplacement of particulate sorbents with geotech equipment
6. Intentional LNAPL barrier emplacement to retain PFAS
7. Inject emulsified veg. oil (EVO) to enhance chemical retention
8. Capture PFAS in groundwater discharging to surface water

# Soil Natural Attenuation

- Source sequestration achieved through interim action remedies to allow soil natural attenuation

# Thanks!

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