



August 11, 2016

Mr. Dan Kowalski
Project Manager
Guardian Environmental Services, Inc.
70 Albe Drive
Newark, DE 19702

RE: Results of Borehole Geophysical Logging: ERT-47
Site: Crown Cleaners Superfund Site, Village of Herrings, NY

Dear Mr. Kowalski,

In response to your request, Earth Data Northeast, Inc. ("EDN") is pleased to provide Guardian Environmental Services, Inc. ("GES") with the following summary of borehole geophysical logging services performed July 26, 2016 at the Crown Cleaners Superfund Site, located in Village of Herrings, New York.

Borehole Geophysical Logging

The following suite of geophysical logs was performed (as indicated by the "X") in well ERT-47.

- ☐ Color Borehole Video Survey
- ☒ Fluid Temperature / Fluid Conductivity
- ☒ 3-Arm Caliper
- ☒ Electrical Resistivity Suite
 - ☒ Spontaneous Potential ("SP")
 - ☒ Single Point Resistance ("SPR")
 - ☒ Short (16") & Long (64") Normal Resistivity
- ☒ Natural Gamma
- ☒ Acoustic Televier ("ATV")
- ☒ Optical Televier ("OTV")
- ☒ Heat Pulse Flowmeter
 - ☒ Ambient conditions
 - ☒ Pumping conditions; Depth of pump: ~ 15'; Rate: ~ 0.6 gpm
- ☐ Additional Tooling: _____

Results of Borehole Geophysical Logging

The results of the borehole geophysical logging conducted in ERT-47 are summarized below. A geophysical composite graph containing the logs performed in ERT-47 is included as an attachment.

Features identified with the ATV & OTV are presented in both tabular and graphical format, referenced to True North, and are also attached. A qualitative classification of each feature, with respect to its potential aperture, was assigned according to the following criteria:

Fracture/Feature – obvious, dark sinusoidal line across the entire acoustic image; usually supported by the response of the 3-arm caliper.

Hairline Fracture/Feature – as above, though not as evident; generally minimal aperture noted

Discontinuous Fracture (Hairline or otherwise)/Feature – shape of sinusoidal line is intact; does not span across entire acoustic image.

Bedding/Change in Lithology – shape of sinusoidal line is intact, usually supported by natural gamma log and/or response of acoustic return; generally minimal aperture noted

More features may exist than could be identified. Characterization of features was aided by software provided by the geophysical tool manufacturer.

Data collected by the heat pulse flowmeter are presented in tabular format, and can be found within the body of this report.

All geophysical logs presented in this report are referenced from below top of casing (“toc”).

ERT-47

Well diameter: nominal 8"

Total depth: 48'

Casing depth: 9.3'

Casing stick-up (above grade): 1.7'

Static water level: 5.5'

Field observations / Remarks:*Fluid characteristics:*

- Slight changes in fluid temperature log slope at 14', 16', 23', 27', & 30'.
- Fluid temp at the bottom of the borehole: 10.4°C
- Changes in the slope of the fluid conductivity log between 13', 18', 22', 25', & 45'

Rock characteristics:

- Larger feature/fracture observed between 12'-14'
- Smaller fractures observed at 10.5', 15'-17', 21.5', & 40.5'
- Relatively uniform lithology throughout open borehole. Slight increase in natural gamma between 31'-32'.

ATV & OTV features: 29 (see attached summary table and graphical presentation)

Apparent strike: East-Southeast – West-Northwest & North-Northeast – South-Southwest

Apparent dip: South-Southwest & East-Southeast

Heat pulse flowmeter results:

Heat Pulse Flow Stations	Ambient/Pumping Flow Direction	Ambient/Pumping Rate in GPM
20'	Upward / Inconclusive Test	0.012 / N/A
30'	No Flow / No Flow	0.000 / 0.000
39'	No Flow / No Flow	0.000 / 0.000

While reviewing the table above, please note the following:

- The operating range of the heat pulse probe is 0.03 gpm to 1.0 gpm. Values less than 0.03 gpm are provided for qualitative purposes only.
- Inflow zones (water flowing into the borehole) are generally observed where flow directions diverge from an area/feature within the borehole or increase in strength while moving in the same direction. The largest *increase* in upward flow was observed between 20'-30' (potential inflow zone) under ambient conditions.

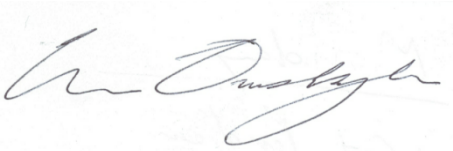
- Outflow zones (water flowing out of the borehole and into the formation) are generally observed where flow directions converge on an area/feature or decrease in strength while moving in the same direction. An outflow zone may exist above 20’.
- During the pumping portion of the heat pulse testing (lasting approximately 30 minutes), a total of 2.5’ of drawdown was observed, at a pumping rate of approximately 0.6 gpm.
- The accuracy and reliability of the heat pulse flowmeter are dependent on borehole conditions. If the borehole fluid is turbulent or heavily impacted with particulates, the log may be unintelligible and/or produce inconclusive results.
- It is important to note that the open borehole creates a conduit for water to flow between fractures. Therefore, flow patterns may not be indicative of the natural conditions that existed prior to the commencement of drilling operations.

The findings and conclusions presented in this report are the result of fieldwork, data analysis, and interpretations completed by EDN personnel as of this date. This report was prepared in response to a request from GES, using generally accepted geophysical practices, for the exclusive use of GES. No other warranty, express or implied, is made.

Additional copies of the geophysical logs are available upon request.

If you should have any further questions or comments, please feel free to contact me at (610) 524-9466 or via email at eonuskanych@earthdatane.com.

Sincerely,

A handwritten signature in black ink, appearing to read 'E. Onuskanych', is written over a faint, circular official stamp.

Evan Onuskanych
Staff Geoscientist
Earth Data Northeast, Inc.

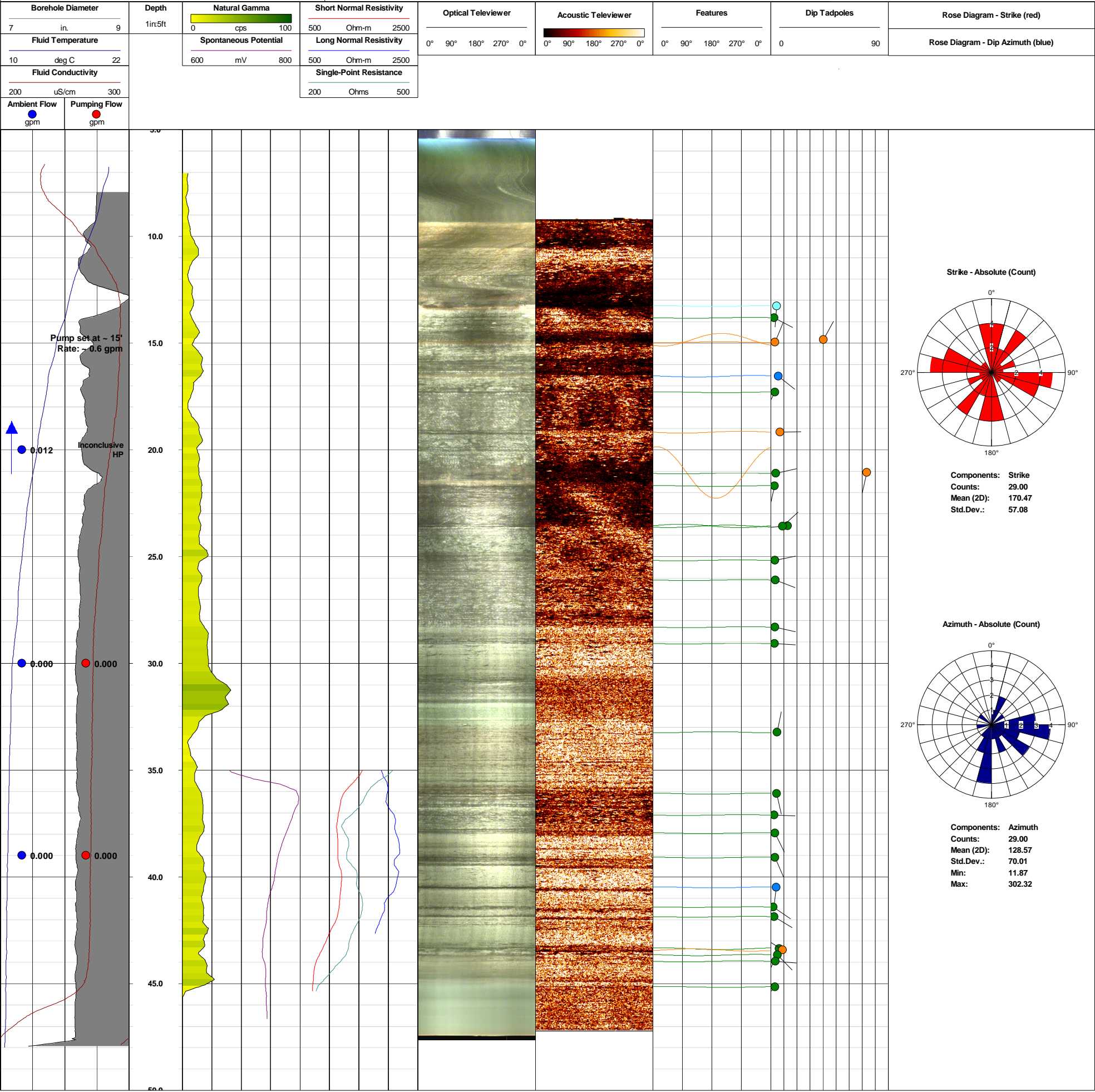
Client: **Guardian Environmental**
Location: **Crown Cleaners Site**
Well Name: **ERT-47**
Date: **07/26/16**
Depth Reference: **Top of Casing**
Magnetic Declination: **-12.97 deg**
North reference: **True North**

Borehole Diameter: **8" nominal**
Static Water Level: **5.5'**
Casing Depth: **9.3'**
Total Depth: **48'**

-  Hairline Fracture/Feature

 Discontinuous Fracture/Feature
-  Discontinuous Hairline Fracture/Feature

 Bedding/Change in Lithology



ERT-47 ATV & OTV Feature Summary Table
Crown Cleaners Superfund Site; Village of Herrings, NY

Avg. Depth of Feature (ft)	Dip Azimuth (deg from North)	Dip Angle (deg)	Strike (deg from North)	Feature Description
13.3	184	5	94	Discontinuous Fracture/Feature
13.8	117	3	27	Bedding/Change in Lithology
14.8	29	40	299	Discontinuous Hairline Fracture/Feature
15.0	22	3	292	Discontinuous Hairline Fracture/Feature
16.6	129	6	39	Hairline Fracture/Feature
17.3	208	3	118	Bedding/Change in Lithology
19.2	89	7	359	Discontinuous Hairline Fracture/Feature
21.1	193	74	103	Discontinuous Hairline Fracture/Feature
21.1	78	4	348	Bedding/Change in Lithology
21.7	193	3	103	Bedding/Change in Lithology
23.6	265	13	175	Bedding/Change in Lithology
23.6	47	9	317	Bedding/Change in Lithology
25.2	78	3	348	Bedding/Change in Lithology
26.1	111	4	21	Bedding/Change in Lithology
28.3	103	3	13	Bedding/Change in Lithology
29.1	94	3	4	Bedding/Change in Lithology
33.2	12	5	282	Bedding/Change in Lithology
36.1	167	5	77	Bedding/Change in Lithology
37.1	93	3	3	Bedding/Change in Lithology
38.0	154	3	64	Bedding/Change in Lithology
39.1	156	3	66	Bedding/Change in Lithology
40.5	186	4	96	Hairline Fracture/Feature
41.4	124	2	34	Bedding/Change in Lithology
41.9	121	2	31	Bedding/Change in Lithology
43.4	204	7	114	Bedding/Change in Lithology
43.4	302	9	212	Discontinuous Hairline Fracture/Feature
43.7	135	5	45	Bedding/Change in Lithology
44.0	95	4	5	Bedding/Change in Lithology
45.2	223	3	133	Bedding/Change in Lithology