July 21, 2023

Mr. Joshua Vaccaro
Assistant Engineer
NYSDEC DER Region 9
700 Delaware Avenue
Buffalo, New York 14209
Via email: joshua.vaccaro@dec.ny.gov

Re: Conceptual Site Model (CSM) and
Supplemental Remedial Investigation Work Plan (RIWP)
2122 Colvin Boulevard, BCP Site No. C915380
2122 Colvin Boulevard, Tonawanda, New York

Dear Mr. Vaccaro:

On behalf of our client, Midwest Storage Developers LLC (MSD), Benchmark Civil/Environmental Engineering & Geology, PLLC, in conjunction with TurnKey Environmental Restoration, LLC (BMTK) submitted a Draft Remedial Investigation/Alternative Analysis Report[1] (RI/AA) to New York State Department of Environmental Conservation (NYSDEC or Department), for review and comment. NYSDEC provided a comment letter to MSD dated May 26, 2023, regarding the Draft RI/AA. Two (2) of the main comments received were a request for additional investigation and sampling and the use of the 6NYCRR Part 375 Protection of Groundwater Soil Cleanup Objectives (PGWSCOs) as an evaluating criterion [BMTK's RI/AA report utilized the Commercial Soil Cleanup Objectives (CSCOs) as target cleanup objectives for the Site].

A conference call with NYSDEC and New York State Department of Health (NYSDOH) was held on June 16, 2023 to discuss the comments received. During the conference call there was discussion that a Conceptual Site Model (CSM) should be prepared and used to develop the scope of work (SOW) for the Supplemental Remedial Investigation (SRI) requested by NYSDEC. Areas identified in the May 26, 2023 comment letter, as requiring additional investigation or additional information, are as follows:

[1] "Draft Remedial Investigation/Alternative Analysis Report, 2122 Colvin Boulevard Site, Tonawanda, New York, BCP Site No. C915380". Prepared for Midwest Storage Developers LLC dated March 2023.

- additional soil and groundwater investigation downgradient of MW-14;
- indoor air sampling;
- black oily substance previously identified by others in 1998 under the Short Truck Bay (STB);
- non-aqueous phase liquid (NAPL);
- vault present in the former flammable storage room;
- drains associated with the former boiler room; and,
- additional 1,4-Dioxane groundwater sampling.

BMTK has prepared this letter to provide a CSM and SOW for the SRI in areas NYSDEC requested additional investigation/information.

CONCEPTUAL SITE MODEL

This Conceptual Site Model (CSM) has been prepared to provide a general understanding of Site conditions/operations, geology/hydrogeology, contaminant impacts to the Site, and to evaluate potential human exposure pathways. The Site has been subject to numerous investigations dating back to 1998. Data and information from the previous investigations and the current BCP RI have been used to prepare this CSM. The CSM will be updated with the information and data collected as part of the SRI, discussed below and included in the revised RI/AA report.

Site Conditions & Operations

The Site consists of the southern ±7.758 acres of the parcel (SBL 53.15-1-4.11, totaling ±13.6-acres) located at 2122 Colvin Boulevard, in the Town of Tonawanda, Erie County, New York. The Site is improved with one (1) approximately 140,000 square foot vacant building which was constructed in 1948 for drum and metal lid and rim manufacturing. The remaining areas are covered by asphalt pavement, concrete, and vegetated areas.

The previous drum and metal lid and rim manufacturing operations are the cause of the contamination that has been identified at the Site and subject to numerous investigations dating back to 1998 by Environmental Resource Management (ERM) on behalf of Sonoco Products Company (Sonoco), who has been identified as the Responsible Party.

MSD purchased the property in July 2021. The Site is being redeveloped for use as a commercial storage unit facility (Life Storage). Storage units have been constructed inside the building on the existing concrete slab. Figure 1 shows the area of the storage units already constructed and available for rent. MSD began renting storage units in March 2023. Future redevelopment plans include an addition in the southwest corner of the building, additional storage unit construction in the southwest corner of the building, and construction of exterior storage unit buildings in the western and southern portions of the Site (see Figure 2).

There are currently two (2) full-time employees at the facility, generally between the hours of 9:30 am and 6 pm, Monday through Saturday. An approximate 830 square foot office was constructed in the southeast corner of the building interior for the employees and is used as storage unit rental office and for storage supply sales (boxes, tape, packing material, etc.). At this time approximately 20% of the storage units are rented. Customers have access to their storage units 24 hours a day, 7 days a week via key-pad code access. Large overhead doors were installed at the east and west ends of the building to allow customers to drive into the building on the west side and exit on the east.

Geology & Hydrogeology

The geology at the Site generally consists of topsoil, hardscape subbase, reworked soil and/or fill materials ranging in depth from 0.5 to 8 feet below ground surface (fbgs). Areas of the thickest soil/fill have been encountered in the areas subject to previous remedial actions on the exterior portion of the building (Former Varnish USTs and Former Drum Storage Area) and near the Former Varnish Pit inside the building. The Varnish Pit was approximately 18 feet by 20 feet by 10 feet deep concrete structure beneath the southwest portion of the building.

Underlying the soil/fill are native silty clay and clay soils, which are approximately 10 to 32 feet thick containing some discontinuous lenses of silt or sand. The top of the clay layer appears to be deepest in the vicinity of the of the Former Vanish Pit and Short Truck Bay and rises in elevation approximately 4 to 5 feet within 20 to 30 feet of the structures. Native soil excavations were likely completed during building construction to facilitate the construction of these structures. The shallow water bearing zone is present in the soil/fill present above the silty clay and clay soil which act as a confining layer. The shallow water bearing zone in the vicinity of the Former Varnish Pit has been impacted, as discussed further below; however, the presence of the shallow clayey soils has hindered contaminant migration. Attachment 1 contains a top of clay contour from the ERM Data Gap Investigation[2]. The top of clay elevations identified by BMTK as part of the BCP RI were generally consistent with the elevations shown on the drawing in Attachment 1.

Underlying the native silty clay and clay soils confining layer is a silty sand layer 6 to 18 feet thick and is considered the intermediate water bearing zone. The only monitoring well location (MW-20) with any significant impacts in the intermediate water bearing zone is MW-20, which is immediately adjacent to the Former Varnish Pit.

Underlying the intermediate water bearing zone is a silty clay that is approximately 18 to 40 feet thick and is also considered a confining layer. A sand layer that is 12 to 24 ft thick is present beneath the 2nd confining layer and considered the deep water bearing zone, which is

[2] "Data Gap Investigation Report, Grief Bros. Site, 2122 Colvin Boulevard, Town of Tonawanda, Erie County New York, NYSDEC VCP # V00334-9". Prepared by ERM. December 2003.

present to the top of bedrock at approximately 70 to 80 fbgs. No impacts were identified in the deep water bearing zone.

Groundwater elevations measured during the RI in the shallow water bearing zone monitoring wells indicate a primarily northerly flow with a western component near a groundwater mound southwest of the building in the vicinity of where the Former Vanish UST remedial action was completed (see Figure 3).

Groundwater elevations measured during the RI in the intermediate water bearing zone monitoring wells indicate a northerly flow (see Figure 4). Groundwater elevations measured during the previous VCP RI indicated a northeasterly flow across most of the building footprint, however seven (7) intermediate wells (MW-1, -4, -5, -6, -7 and -8) were previously decommissioned.

The only deep monitoring well at the Site is MW-29, which was installed during the BCP RI west of the building, therefore a deep groundwater contour could not be prepared. Groundwater elevations measured during the previous VCP RI indicated a southernly flow direction, however the three (3) deep monitoring wells MW-9, -10, and -11 were previously decommissioned. These wells were located near the southwest corner of the building.

ERM conducted a Background Fluorescence Analysis (BFA) and Fluorescent Dye-Tracing (FDT) study at the Site as documented in their DRAFT BFA & FDT Report[3]. A copy of the report is provided as Attachment 2 which was initially included in ERM's Final Focused Feasibility Study Report[4]. This study was completed in the vicinity of the Former Vanish Pit to determine the potential source of NAPL at MW-23, located north of the Former Vanish Pit approximately 95 feet.

The BFA indicated that the shallow water bearing zone is very heterogenous and likely caused by the subsurface utilities, infilling, or fractures and micropores in the silty clay and clay soils. As part of the FDT, a dye was released at VMP-2, located immediately south of the Former Vanish Pit, and it was detected at 14 monitoring wells (MW-12, MW-13, MW-14, MW-20, MW-22, MW-23, MW-24, RW-1, RW-2, RW-5, VMP-1, VMP-3, VMP-5, and VMP-6) which include 12 shallow water bearing zone wells and two (2) intermediate water bearing zone wells. The detection of the dye in these wells occurred between 6 and 81 days after dye injection. The report concluded that the source of NAPL at MW-23 is the Former Vanish Pit. We note that five (5) monitoring wells locations (MW-13, -14, -20, -23, and RW-5) where the dye was detected from VMP-2, are also the five (5) monitoring wells at the Site with the highest concentrations of chlorinated VOCs (cVOCs) detected, which would

[3] "Draft BFA & FDT Report, Grief, Inc. Facility, Town of Tonawanda, Erie County New York". Prepared by ERM. March 2009.
[4] "Final Focused Feasibility Study Report, Grief, Inc. Facility, Town of Tonawanda, Erie County New York, NYSDEC Voluntary Cleanup Program #V00334-9". Prepared by ERM. May 2009.

indicate that the source of the groundwater contamination at these locations is also the Former Varnish Pit area.

Soil, Groundwater, and Soil Vapor Contamination

Volatile organic compounds (VOCs) are the primary contaminant class identified in the soil, groundwater, and soil vapor at the Site. cVOCs are the main class of VOCs that are currently present above their respective SCOs. Petroleum-VOCs (pVOCs) were also detected in soils at a few locations as part of the BCP RI (SB-17, -19 and 20) and previous data which primarily coincided with the Former Varnish UST Area and FDSA post-remedial sample results. Based on the BCP RI groundwater monitoring in 2022, pVOCs were detected in the groundwater at one (1) location, RW-5 above their respective groundwater quality standard (GWQS). Monitoring wells MW-19, MW-27, MW-29, and APW-3 (vicinity of Former Varnish UST Area) and MW-24, MW-25, and MW-18 (vicinity of FDSA) do not have pVOCs above their respective GWQS. Therefore, cVOCs in soil, groundwater, and soil vapor are the main contaminants of concern.

Figures 5A, 5B, and 6 identify sample locations where cVOCs were detected in soil samples collected from the Site above their respective PWGSCOs or CSCOs. The locations highlighted in BLUE represent cVOC exceedances of the PGWSCOs/CSCOs that are saturated samples/below the groundwater table. The locations highlighted in RED represent cVOC exceedances of the PGWSCOs/CSCOs in samples that are unsaturated or above the groundwater table. Saturation of soil/fill samples was determined based on the depth to water levels measured from ground surface in October 2022 and used to develop the groundwater contour map shown in Figure 3. There are five (5) sample locations (SB-4, SB-17, GB-17, GB-27, and MW-8) with cVOC exceedances of the PGWSCOs in unsaturated soil. SB-4 is the only location located on the exterior of the building (northwest corner of Site).

Figures 7 and 8 are Total cVOC isopleths for the shallow water bearing zone and intermediate water bearing zone, respectively, representing the area where Total cVOCs detected in groundwater were greater than 1,000 micrograms per liter (ug/l) or higher. The areas of the shallow and intermediate water bearing zones with Total cVOCs greater than 1,000 ug/l area are centered around the Former Varnish Pit area.

Semi-volatile organic compounds (SVOCs) were detected in surface (0 to 2-inches) and near-surface (2-inches to 1 foot) samples at the Site, that will require remedial action as the upper 1 foot of soil will constitute that cover system under a Track 4 Commercial Use cleanup scenario, which is what has been proposed for the Site as part of the RI/AA Report.

Based on the BCP RI groundwater monitoring in 2022, SVOCs were not detected in the groundwater at the Site. In addition to the SVOCs, metals, pesticides, herbicides, and PFAS were also not detected in the Site groundwater, nor where they detected in Site soil, with the exception of barium and manganese at SB-5 (fill material in the western portion of Site) and

manganese at SB-20 (inside the building underneath the former Flammable Storage Room). Therefore, with the exception of the SVOC-impacted surface/near-surface soil and barium CSCO exceedance at SB-5 area, which are identified in the RI/AA as area that will be addressed, SVOCs, metals, pesticides, herbicides, and PFAS are not a concern at the Site.

1,4-dioxane was analyzed in 18 soil samples collected during the BCP RI. It was detected in one (1) sample from SB-23 above the PGWSCO but below the CSCO, in the vicinity of the Former Vanish Pit. 1,4-dioxane was detected in four (4) of the six (6) monitoring wells tested for 1,4-dioxane as part of the BCP RI groundwater sampling. NYSDEC has requested additional groundwater sampling at the Site for 1,4-dioxane, which is discussed later in the SOW section of this letter.

Soil vapor present beneath the building has been impacted with cVOCs requiring the installation of a sub-slab depressurization system (SSDS) which has generally been in operation since it was installed in 2011. ERM is required to collect an indoor air sample annually as part of the Site Management Plan sampling requirements from an area near the Former Vanish Pit (VAC-9). These results have not indicated indoor air concerns inside the building since the sampling has been completed.

The SSDS will continue to operate within the building. Additional indoor air sampling requested by NYSDEC is discussed below in the SOW section of this letter.

Potential Human Exposure Pathways

The potential human exposure pathways for the Site based on the current Site conditions are as follows:

- exposure to impacted surface/subsurface soil
- exposure to impacted groundwater
- exposure to impacted soil vapor

There are a few locations at the Site where the upper 1 foot of the cover system will need to be removed and replaced with acceptable soil, as SVOCs are present above CSCOs. The SVOCs present are limited and slightly exceed the CSCOs. Customers who enter the property are currently directed to the office entrance of the building or to the west side entrance via coned driveway. There are no Site amenities on the exterior of the property for customers. Employees are aware that the Site is Brownfield Site and to avoid these areas of the property.

There is no exposure to the employees or customers at the Site to subsurface soil or groundwater. There is a Site Management Plan in place that governs oversight and monitoring of subsurface activities that would need to be completed as part of remediation and/or development activities. The implementation of a health and safety plan, use of personal protective equipment, implementation of community air monitoring is required during subsurface activities and will mitigate exposure pathways to construction workers.

A SSDS is in operation at the Site and is monitored in accordance with Site Management Plan Monitoring Plan, which includes indoor air sampling. There is not exposure to employees, customers, of construction workers, working inside the building. If sub-slab work is required, implementation of a health and safety plan, use of personal protective equipment, implementation of community air monitoring will be required during sub-slab activities and will mitigate exposure pathways to construction workers.

Supplemental Remedial Investigation Scope of Work

As discussed earlier in this letter, NYSDEC's May 23, 2023 comment letter, as requested additional investigation or additional information, regarding the following areas or items:

- additional soil and groundwater investigation downgradient of MW-14;
- indoor air sampling;
- black oily substance previously identified by others in 1998 under the Short Truck Bay (STB);
- non-aqueous phase liquid (NAPL);
- vault present in the former flammable storage room;
- drains associated with the former boiler room; and
- additional 1,4-dioxane groundwater sampling.

These areas or items are discussed below along with the proposed SOW, if necessary. Please note that the field and sampling protocols and procedures identified in the RI/AA Work will be in place for the SRI.

Soil and Groundwater Downgradient (North) of MW-14

Elevated cVOCs have been detected in the groundwater at MW-14 and NYSDEC has requested soil and groundwater samples be collected downgradient of MW-14. As part of the previous investigations completed by ERM six (6) soil borings have been completed north of MW-14: GB-28, -29, -30, -47, -48, and -49 within approximately 150 feet, see Figure 9. No CSCOs exceedances were noted in the samples from these locations. The PGWSCOs were exceeded at one (1) location, GB-30 (approximately 50 feet northwest of MW-14) in a saturated sample at 8 to 9 fbgs. The soil north of MW-14 has also been investigated.

There are currently no monitoring wells downgradient (northerly) of MW-14. MSD proposes to install a new monitoring well, MW-30, which will be a shallow water bearing zone well, approximately 50 feet north of MW-14, as shown on Figure 9. The well will be installed to a depth of 16 to 20 fbgs, consistent with other shallow water bearing zone wells. Soil samples will be field screened with a photoionization detector (PID) for total volatile organics. Two (2) soil samples will be collected for VOC and 1,4-dioxane analysis. One (1) sample will be collected from above the saturated soil zone and one (1) sample will be

collected from the saturated soil zone. Samples exhibiting the highest field screening within the unsaturated and saturated zones will be submitted for analysis.

The new monitoring well will be developed using a bailer via surge and purge methodology. The well will be sampled using a submersible pump with dedicated pump tubing following low flow/purge and sample collection procedures. Field measurements for pH, temperature, dissolved oxygen, oxidation-reduction potential, specific conductance, turbidity, and water level, as well as visual and olfactory field observations will be monitored for stabilization and prior to sample collection. Groundwater sample analysis will include TCL plus CP-51 List VOCs plus TICs and 1,4-dioxane.

Indoor Air Sampling

NYSDEC has requested indoor air sampling be completed at the Site in the heating season.. The purpose of the sampling is to confirm the effectiveness of the sub-slab-depressurization system in protecting the indoor air and the occupants of the building. Five (5) proposed indoor air sample locations are shown on Figure 9.

NYSDEC has also requested information on the heating, ventilation, and air conditioning (HVAC) system which has been installed within the building. The HVAC drawings are included in Attachment 3. The HVAC system for the building consists of seven (7) rooftop units (RTU) manufactured by Johnston Controls. RTU-1 through RTU4 are 8,000 cubic feet per meter units, RTU-5 and RTU-6 are 1,600 CFM and RT-7 is 1,200 CFM. RTU-1 through -6 are associated with the portion of the building used for the storage units, approximately 139,587 square feet (sq ft) and RTU-7 is associated with the office area in the southeast corner of the building, approximately 830 sq ft.

There is a louver vent in the west wall of the building adjacent to the overhead driveway entrance door for vehicle exhaust ventilation. Carbon monoxide detectors within the building will open the louvers, if deemed necessary. There are also two (2) overhead infrared heaters located at the driveway entrance on the west side of the building to keep snow and ice from accumulating in the entrance to the building. There are two (2) overhead exhaust fans in the driveway near the exit door on the east side of the building. One (1) is in constant operation and the other is tied to the carbon monoxide detector for vehicle exhaust ventilation if carbon monoxide levels trigger the alarm. The remaining exhaust fans are located in the three (3) bathrooms west of the office in the southeast corner of the building.

Former Short Truck Bay

NYSDEC has requested assessment beneath the former STB, as boring completed by ERM in 1998 (GB-13 and GB-17) make references to an oily black liquid identified at a depth of 1 to 2 feet below the bottom of the Short Truck Bay, which is approximately 3.5 feet below the building slab grade. Two (2) soil borings will be completed within the STB to assess the current conditions and collect a soil sample for analysis, see Figure 9. These soil borings will be completed into the native clay soil underlying the former STB. Observations will be

made at both soil borings for the oily black liquid previously identified. If identified a sample of the material and/or soil impacted with the material will be sent for VOC analysis. If the oil black liquid is not present, a soil sample will be collected from the interval with the highest PID field screening. If no PID readings are noted, the sample will be collected from soil present above the native clay soil interface.

Non-Aqueous Phase Liquid (NAPL)

NYSDEC has requested that gross impacts including NAPL must be investigated and discussed in the RI/AA report. The RI/AA report will be revised. BMTK did not observe NAPL when gauging, developing, and/or sampling the 21 wells as part of the RI sampling program. BMTK did not observe evidence of free product or grossly impacted soil during the soil borings completed at the Site.

A requirement of the Site Management Plan[5] (SMP), Site Monitoring Plan, is to assess for NAPL (dense non-aqueous phase liquid (DNAPL) or light non-aqueous phase liquid LNAPL) at eight (8) locations semi-annually: RW-1, RW-2, RW-4, RW-6, VMP-2, VMP-5, MW-20, and MW-23, see Figure 9. NAPL assessments have been completed since October 2011 and are currently required to be completed semi-annually. We note that due to construction activities inside the Site building, no December 2021 NAPL assessment was completed. Per the SMP, if NAPL is detected, it will be removed from the well to the extent practical and stored in 55-gallon drums for off-site disposal as a hazardous waste.

The discussion below is based on the 49 NAPL assessment events that have been completed since 2011 and shown on Table 4 (see Attachment 4) of the August 2022 Periodic Review Report[6] (PRR) and BMTK's observations during ERM's June 2023 NAPL assessment event.

RW-1: DNAPL has been detected at this location one (1) time, June 2022 (0.02 ft). No DNAPL was measured in June 2023. This location is on the east side of the former Varnish Pit.

RW-2: DNAPL has been detected at this location once, June 2022 (0.1 ft). No DNAPL was measured in June 2023. This location is on the south side of the former Varnish Pit.

RW-4: NAPL has never been measured at this location. No NAPL was measured in June 2023. This location is on the north side of the former Varnish Pit.

[5] "Site Management Plan, Greif, Inc. Facility, Town of Tonawanda, Erie County, New York, NYSDEC VCP Site Number V00334-9". Prepared for Sonoco Products Company. Prepared by ERM Consulting & Engineering, Inc. June 2016.

[6] "Periodic Review Report, Former Greif, Inc. Facility, 2122 Colvin Boulevard, Tonawanda, New York, NYSDEC Site Number V00334". Prepared for Sonoco Products Company. August 2022, Revised March 2023

RW-6: DNAPL has been measure 31 times and a heavy sheen was noted 14 times. DNAPL was measured to be 0.1 ft in June 2023. This location is within the former Varnish Pit.

VMP-2: NAPL has never been measured at this location. No NAPL was measured in June 2023. This location is on the south side of the former Varnish Pit.

VMP-5: DNAPL was detect at this location one time, June 2022 (0.11 ft). No DNAPL was measured in June 2023. This location is on the northwest side of the former Varnish Pit.

MW-20: DNAPL has been measured 31 times and a heavy sheen was noted 14 times. DNAPL was measured to be 0.1 ft in June 2023. This monitoring well location is screened in the intermediate water bearing zone and adjacent to the east side of the former Varnish Pit.

MW-23: LNAPL has been measured 34 times and heavy sheen five (5) times. In the past 3 years, LNAPL was measured twice, June 2020 (0.32 ft) and June 2021 (0.08 ft). LNAPL was not measured in June 2023. As discussed previously in this letter, the NAPL identified at MW-23 is associated with the Former Varnish Pit (see Attachment 2).

Former Flammable Storage Room Vault

NYSDEC has requested additional information on the vault present in the former flammable storage room. The vault is located in the center of the former flammable storage room. It is covered with a perforated steel cover. The vault is 18-inches wide by 18-inches deep and constructed of concrete with a solid bottom. There was approximately 9-inches of standing water (approximately 12 gallons) inside the vault and less than ½-inch of soft sediment at the bottom. No odors or sheen was observed when the water and sediment were disturbed. No piping or penetrations were observed. Attachment 5 is a 1st floor plumbing plan for the Site building. No piping and/or plumbing are shown beneath the Former Flammable Storage Room, in the vicinity of the vault which is not shown on the drawing.

A sample of the water will be collected from the vault as part of the SRI. The water sample will be collected for VOC, SVOC, and metals analysis. The water in the vault will be removed, the structure closed (i.e., filled with concrete), and the water properly disposed off-site.

Former Boiler Room Drain

NYSDEC has requested additional information on the drains associated with the former boiler room. Attachment 5 is a 1st floor plumbing plan for the Site building. Drains associated with the former boiler room appeared to be connected to a sump that was present

in the southwest corner of the former boiler room and connected to an 18-inch diameter storm sewer line on the south side of the building. The pump and discharge pipe associated with the sump were removed and the structure was filled-in as part of the boiler room backfill. The storm line appears to discharge from the Site towards Colvin Boulevard near the northeast corner of the building. As part of the Phase II work completed by Stantec, five (5) soil borings were completed south of the building in the vicinity of the former boiler room. No elevated PID measurements or odors were noted. Four (4) soil samples and five (5) groundwater samples were collected for CP-51 list VOC and/or CP-51 list SVOCs. No VOCs and/or SVOCs were detected in the soil and groundwater samples above their respective SCOs or GWQS.

No additional work is proposed related to the former boiler room drains.

Additional 1,4-Dioxane Groundwater Sampling

NYSDEC has requested that all monitoring wells at the Site be sampled for 1,4-dioxane due to the elevated concentrations detected at MW-20 (900 ug/l). A total of five (5) samples were collected for 1,4 dioxane analysis during the RI: shallow wells MW-19 and MW-24, intermediate wells MW-3, -20, and -22. MSD proposes to sample an additional fourteen (14) wells, as follows: shallow wells MW-12, -13, -14, -21S, -23, -27, -28, APW-3, VMP-6, RW-05, and new MW-30; and intermediate wells MW-2, -18, and MW-21I for 1,4-dioxane. See Figure 9 for locations.

Please contact us if you have any questions or require additional information.

Sincerely,
Benchmark Civil/Environmental Engineering & Geology, PLLC and
TurnKey Environmental Restoration, LLC

Christopher Boron, P.G
Senior Project Manager

Michael A. Lesakowski
President

Attachments:

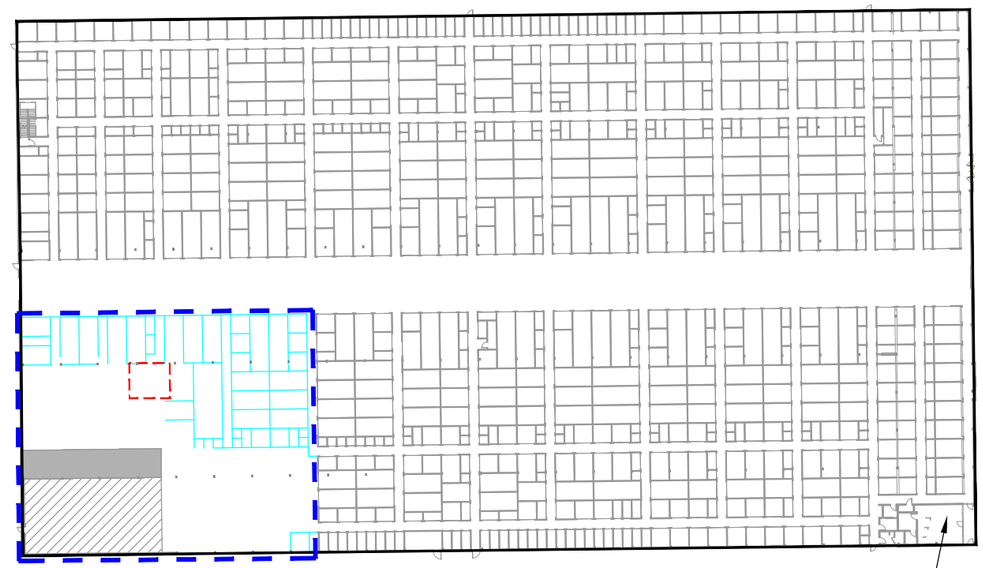
Figure 1 – Interior Storage Unit Layout
Figure 2 – Exterior Storage Unit Development Plan
Figure 3 – Shallow Groundwater Isopotential Map
Figure 4 – Intermediate Groundwater Isopotential Map
Figure 5A – PGWSCO & CSCO Exceedances Associated with Previous & RI Locations
Figure 5B – PGWSCO & CSCO Exceedances Associated with Previous & RI Locations in Varnish Pit Area
Figure 6 – PGWSCO & CSCO Exceedances Associated with Previous IRM Locations
Figure 7 – Total cVOC Concentrations in Shallow Groundwater
Figure 8 – Total cVOC Concentrations in Intermediate Groundwater
Figure 9 – Supplemental Remedial Investigation Locations
Attachment 1 – Top of Clay Elevation Contour
Attachment 2 – Draft BFA & FDT Report
Attachment 3 – HVAC Detail Drawings
Attachment 4 – Summary of Historic NAPL Thickness in Wells
Attachment 5 – 1st Floor Plumbing Plan

FIGURES

F:\CAD\TurnKey\Box Builders\Supplemental RI\Figure 1 - Interior Storage Unit Layout.dwg, 6/27/2023 9:39:26 AM, CKanaley, DWG To PDF.pc3

LEGEND:

- BCP SITE BOUNDARY
- PARCEL BOUNDARY
- PLANNED BUILDING OUTLINE
- VARNISH PIT
- CONSTRUCTED STORAGE UNIT WALLS
- UNDEVELOPED AREA, NOT AVAILABLE FOR RENTAL
- UNIT WALLS CONSTRUCTED IN UNDEVELOPED AREA, NOT AVAILABLE FOR RENTAL
- PLANNED BUILDING ADDITION AREA
- SHORT TRUCK BAY



COLVIN WOODS PARKWAY

N

80' 0' 80' 160'

SCALE: 1 INCH = 80 FEET
SCALE IN FEET
(approximate)

DATE: JUNE 2023
DRAFTED BY: CNK

TURNKEY ENVIRONMENTAL RESTORATION, LLC

IN ASSOCIATION WITH BENCHMARK

2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218,
(716) 856-0599

JOB NO.: B0655-022-001

INTERIOR STORAGE UNIT LAYOUT

SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN

2122 COLVIN BOULEVARD SITE
BCP SITE NO. C915380
TONAWANDA, NEW YORK

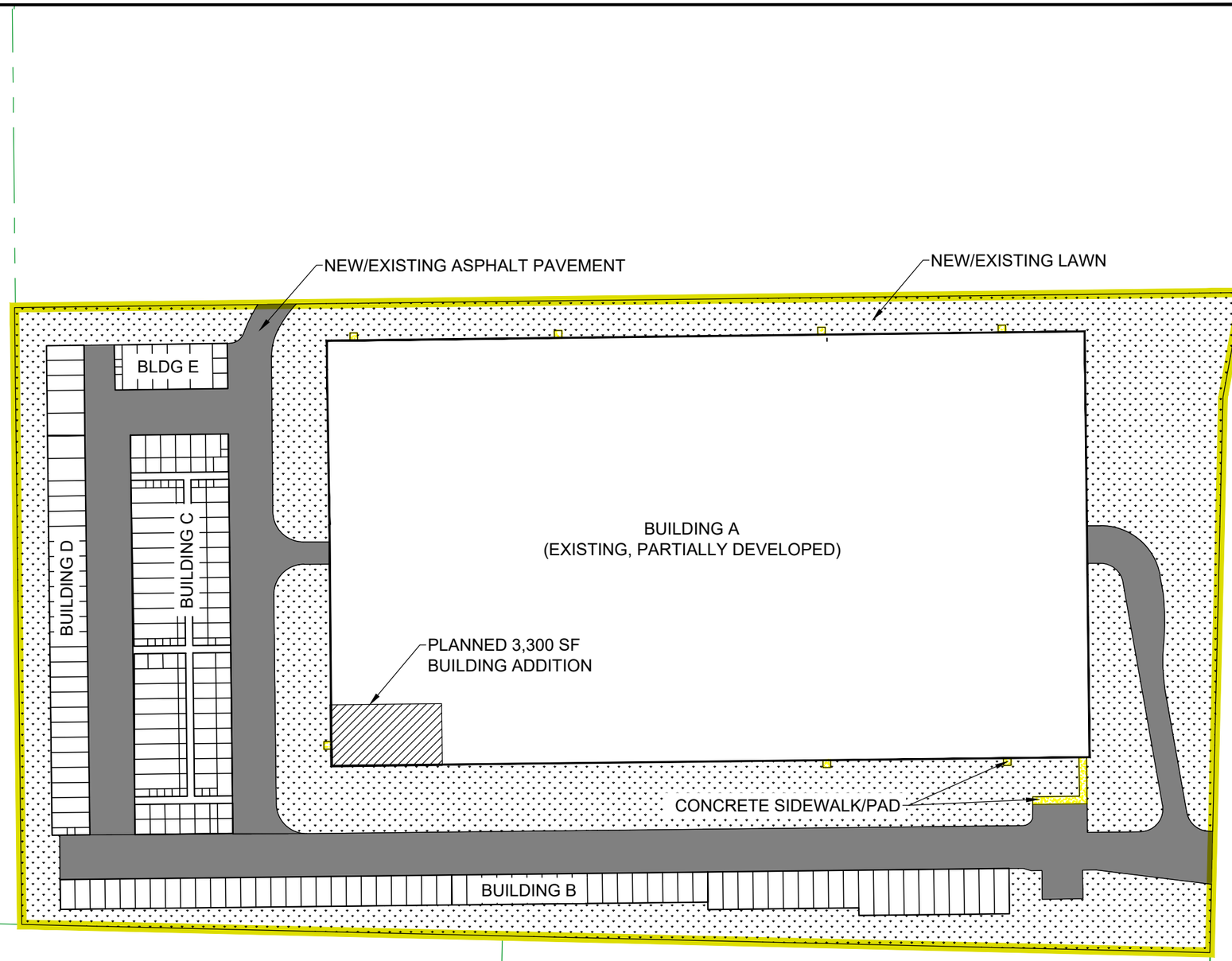
PREPARED FOR

MIDWEST STORAGE DEVELOPERS LLC

FIGURE 1

LEGEND:

- BCP SITE BOUNDARY
- PARCEL BOUNDARY
- BUILDING OUTLINES



SCALE: 1 INCH = 80 FEET
SCALE IN FEET
(approximate)

DATE: JUNE 2023
DRAFTED BY: CNK

EXTERIOR STORAGE UNIT DEVELOPMENT PLAN

SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN

2122 COLVIN BOULEVARD SITE
BCP SITE NO. C915380
TONAWANDA, NEW YORK

PREPARED FOR
MIDWEST STORAGE DEVELOPERS LLC

TURNKEY ENVIRONMENTAL RESTORATION, LLC
IN ASSOCIATION WITH
BENCHMARK
2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218,
(716) 856-0599

JOB NO.: B0655-022-001

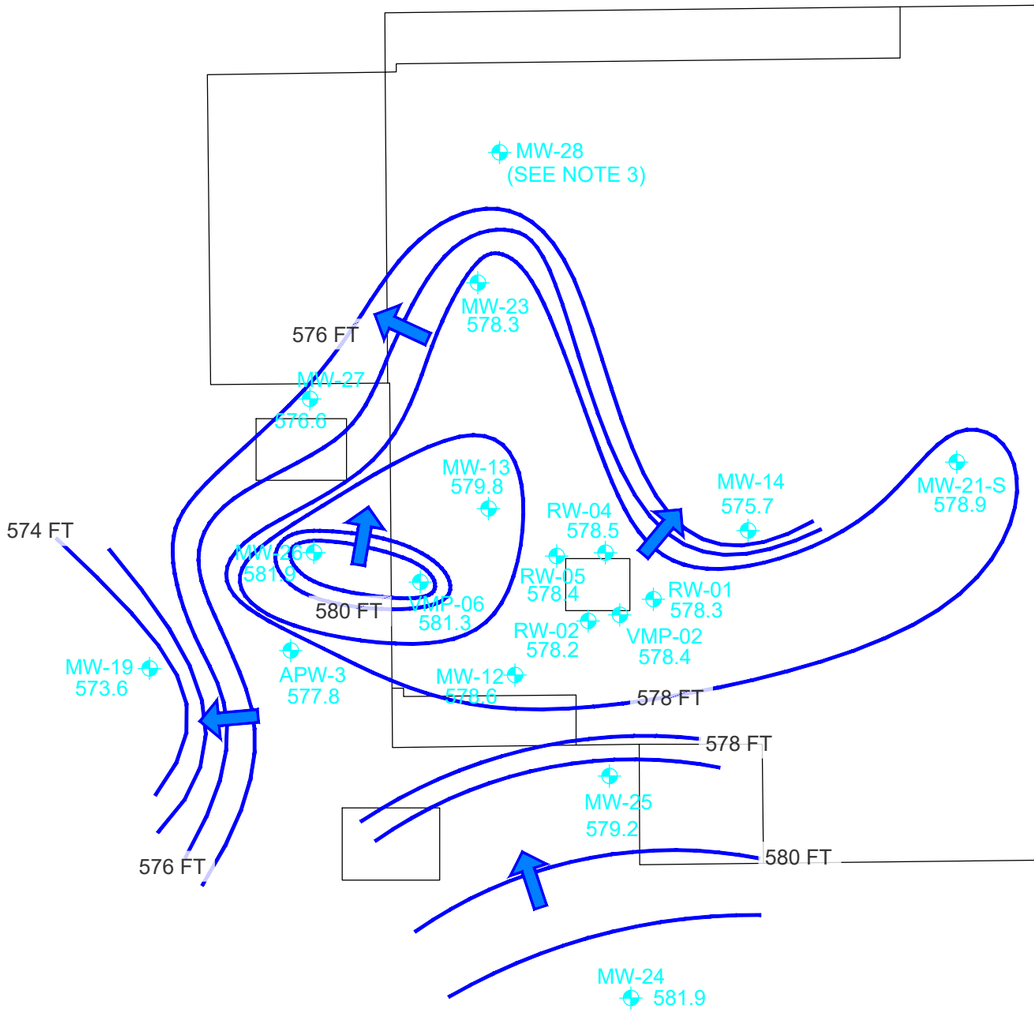
FIGURE 2

LEGEND:

- BCP SITE BOUNDARY
- PARCEL BOUNDARY
- MW-12 — SHALLOW MONITORING WELL
- GROUNDWATER ISOPOTENTIAL
- GROUNDWATER FLOW DIRECTION

NOTES:

1. WATER LEVEL MEASUREMENTS COLLECTED OCTOBER 10, 2022.
2. MONITORING WELL ELEVATIONS COLLECTED USING THE RIM OF THE CATCH BASIN ALONG THE SOUTH TRAIN WELL WITH KNOWN ELEVATION OF 582.51 FT.
3. WATER LEVEL MEASURED AT NEWLY INSTALLED WELLS MW-16R AND MW-28 ON THIS DATE WERE SIGNIFICANTLY LOWER THAN NEARBY WELLS (SEE BELOW), LIKELY DUE TO SLOW RECOVERY AND RECHARGE. THE RELATIVELY LOW WATER LEVELS INDICATE THESE WELLS HAD NOT YET REACHED EQUILIBRIUM AT THE TIME THE MEASUREMENTS WERE TAKEN.
   MW-16R: 13.3 FBGS (571.9 FT)
   MW-28: 16.6 FBGS (569.5 FT)



N

50' 0' 50' 100'

SCALE: 1 INCH = 50 FEET
SCALE IN FEET
(approximate)

DATE: JUNE 2023
DRAFTED BY: CNK

SHALLOW GROUNDWATER ISOPOTENTIAL MAP

SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN

2122 COLVIN BOULEVARD SITE
BCP SITE NO. C915380
TONAWANDA, NEW YORK

PREPARED FOR

MIDWEST STORAGE DEVELOPERS LLC

FIGURE 3

TURNKEY ENVIRONMENTAL RESTORATION, LLC
IN ASSOCIATION WITH
BENCHMARK
2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218,
(716) 856-0599

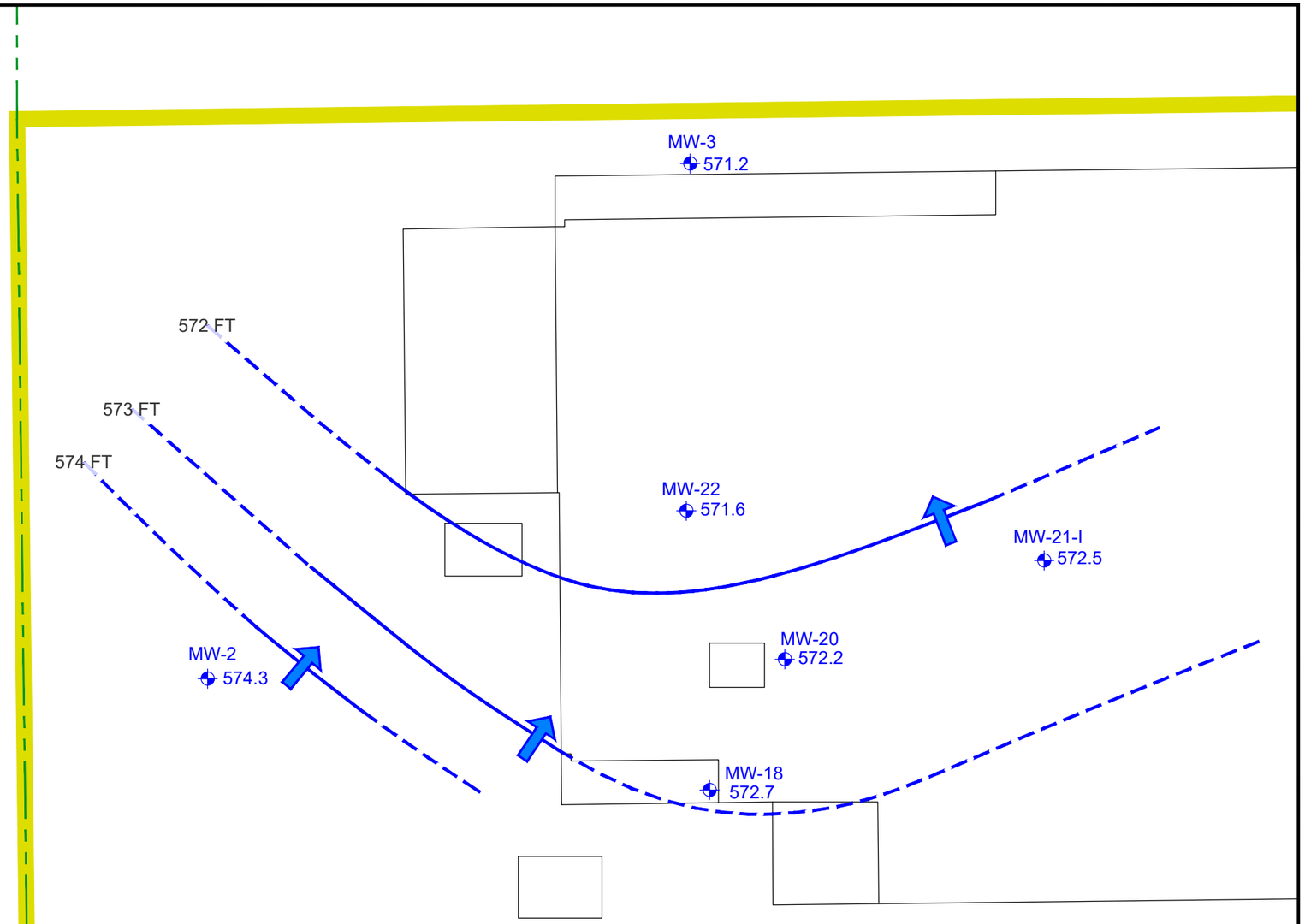
JOB NO.: B0655-022-001

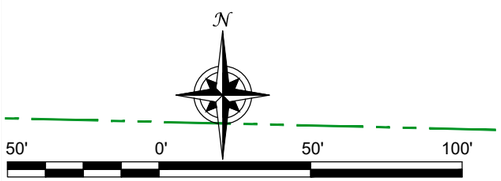
LEGEND:

- BCP SITE BOUNDARY
- PARCEL BOUNDARY
- MW-1 — INTERMEDIATE MONITORING WELL
- GROUNDWATER ISOPOTENTIAL
- GROUNDWATER FLOW DIRECTION

NOTES:

1. WATER LEVEL MEASUREMENTS COLLECTED OCTOBER 10, 2022.
2. MONITORING WELL ELEVATIONS COLLECTED USING THE RIM OF THE CATCH BASIN ALONG THE SOUTH TRAIN WELL WITH KNOWN ELEVATION OF 582.51 FT.





SCALE: 1 INCH = 50 FEET
SCALE IN FEET
(approximate)

DATE: JUNE 2023
DRAFTED BY: CNK

INTERMEDIATE GROUNDWATER ISOPOTENTIAL MAP

SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN

2122 COLVIN BOULEVARD SITE
BCP SITE NO. C915380
TONAWANDA, NEW YORK

PREPARED FOR
MIDWEST STORAGE DEVELOPERS LLC

FIGURE 4

TurnKey Environmental Restoration, LLC
In association with
Benchmark
2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218,
(716) 856-0599

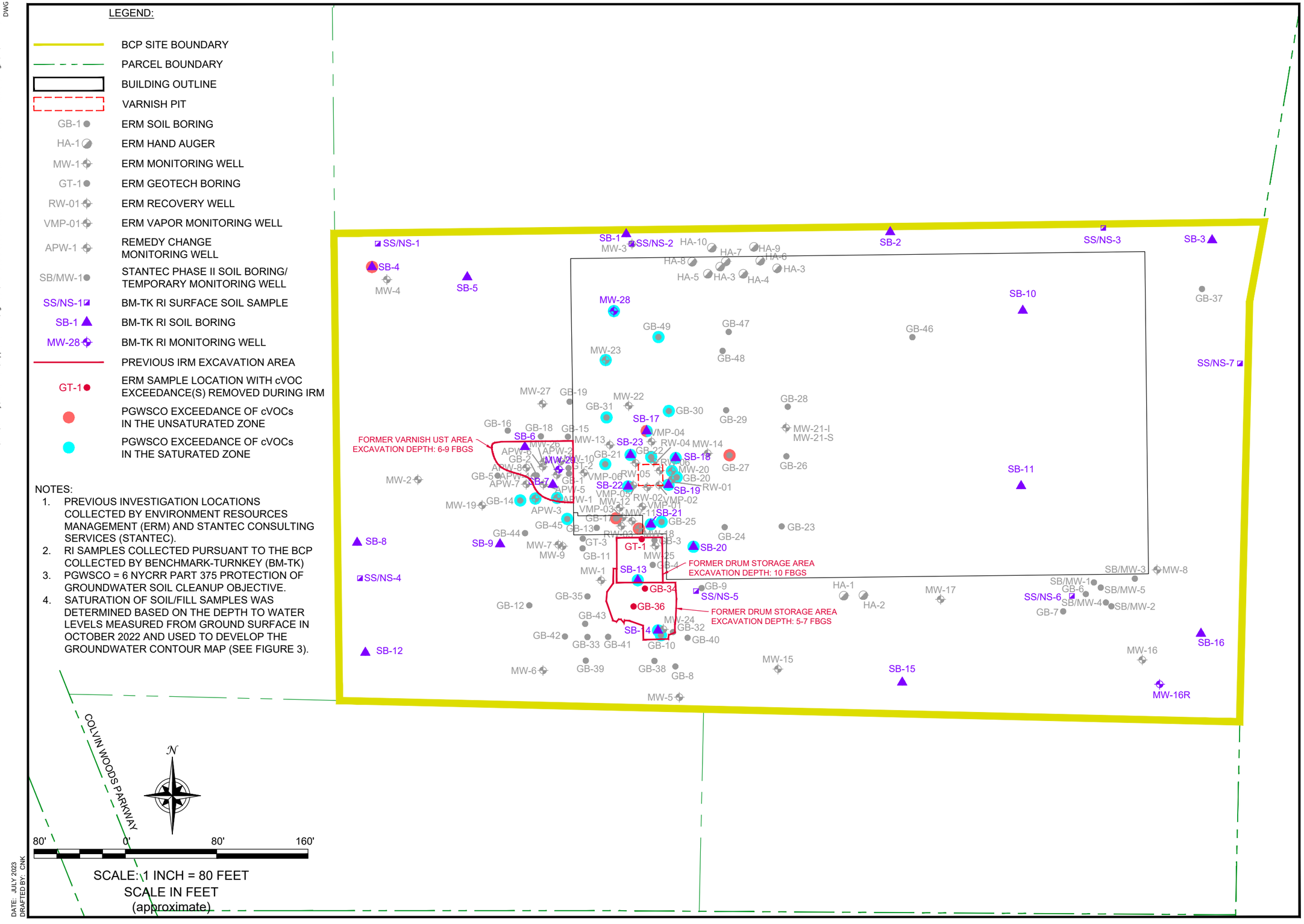
JOB NO.: B0655-022-001

LEGEND:

- BCP SITE BOUNDARY
- PARCEL BOUNDARY
- BUILDING OUTLINE
- VARNISH PIT
- GB-1 ERM SOIL BORING
- HA-1 ERM HAND AUGER
- MW-1 ERM MONITORING WELL
- GT-1 ERM GEOTECH BORING
- RW-01 ERM RECOVERY WELL
- VMP-01 ERM VAPOR MONITORING WELL
- APW-1 REMEDY CHANGE MONITORING WELL
- SB/MW-1 STANTEC PHASE II SOIL BORING/ TEMPORARY MONITORING WELL
- SS/NS-1 BM-TK RI SURFACE SOIL SAMPLE
- SB-1 BM-TK RI SOIL BORING
- MW-28 BM-TK RI MONITORING WELL
- PREVIOUS IRM EXCAVATION AREA
- GT-1 ERM SAMPLE LOCATION WITH cVOC EXCEEDANCE(S) REMOVED DURING IRM
- PGWSCO EXCEEDANCE OF cVOCs IN THE UNSATURATED ZONE
- PGWSCO EXCEEDANCE OF cVOCs IN THE SATURATED ZONE

NOTES:

1. PREVIOUS INVESTIGATION LOCATIONS COLLECTED BY ENVIRONMENT RESOURCES MANAGEMENT (ERM) AND STANTEC CONSULTING SERVICES (STANTEC).
2. RI SAMPLES COLLECTED PURSUANT TO THE BCP COLLECTED BY BENCHMARK-TURNKEY (BM-TK)
3. PGWSCO = 6 NYCRR PART 375 PROTECTION OF GROUNDWATER SOIL CLEANUP OBJECTIVE.
4. SATURATION OF SOIL/FILL SAMPLES WAS DETERMINED BASED ON THE DEPTH TO WATER LEVELS MEASURED FROM GROUND SURFACE IN OCTOBER 2022 AND USED TO DEVELOP THE GROUNDWATER CONTOUR MAP (SEE FIGURE 3).



DATE: JULY 2023
DRAFTED BY: CNK

TURNKEY ENVIRONMENTAL RESTORATION, LLC
IN ASSOCIATION WITH
BENCHMARK

2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218,
(716) 856-0599

JOB NO.: B0655-022-001

PGWSCO & CSCO EXCEEDANCES ASSOCIATED WITH PREVIOUS & RI LOCATIONS

SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN

2122 COLVIN BOULEVARD SITE
BCP SITE NO. C915380
TONAWANDA, NEW YORK

PREPARED FOR

MIDWEST STORAGE DEVELOPERS LLC

FIGURE 5A

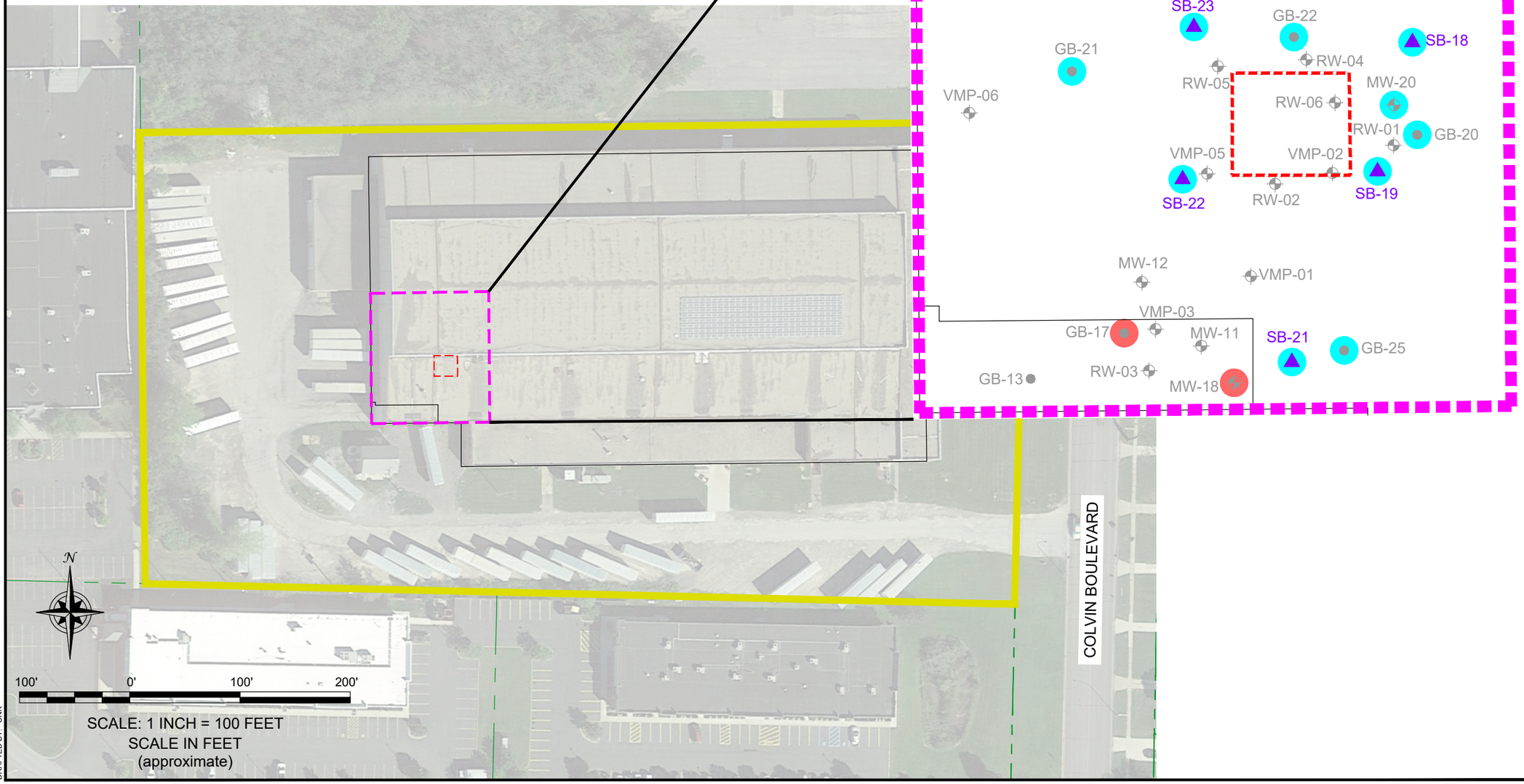
F:\CAD\TurnKey\Box Builders\Supplemental RI\Figure 5B; PGWSCO & CSCO Exceedances Associated with Previous & RI Locations in Source Area.dwg, 7/21/2023 2:57:49 PM, CKanaley, DWG To PDF.pc3

LEGEND:

- BCP SITE BOUNDARY
- PARCEL BOUNDARY
- BUILDING OUTLINE
- VARNISH PIT
- GB-1 ERM SOIL BORING
- MW-1 ERM MONITORING WELL
- RW-01 ERM RECOVERY WELL
- VMP-01 ERM VAPOR MONITORING WELL
- SB-1 BM-TK RI SOIL BORING
- PGWSCO EXCEEDANCE OF cVOCs IN THE UNSATURATED ZONE
- PGWSCO EXCEEDANCE OF cVOCs IN THE SATURATED ZONE

NOTES:
1. PREVIOUS INVESTIGATION LOCATIONS COLLECTED BY ENVIRONMENT RESOURCES MANAGEMENT (ERM) AND STANTEC CONSULTING SERVICES (STANTEC).
2. RI SAMPLES COLLECTED PURSUANT TO THE BCP COLLECTED BY BENCHMARK-TURNKEY (BM-TK)
3. PGWSCO = 6 NYCRR PART 375 PROTECTION OF GROUNDWATER SOIL CLEANUP OBJECTIVE.
4. SATURATION OF SOIL/FILL SAMPLES WAS DETERMINED BASED ON THE DEPTH TO WATER LEVELS MEASURED FROM GROUND SURFACE IN OCTOBER 2022 AND USED TO DEVELOP THE GROUNDWATER CONTOUR MAP (SEE FIGURE 3).

INSET
SCALE: 1 IN = 20 FT



DATE: JULY 2023
DRAFTED BY: CNK

TURNKEY ENVIRONMENTAL RESTORATION, LLC
IN ASSOCIATION WITH
BENCHMARK
2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218,
(716) 856-0599
JOB NO.: B0655-022-001

PGWSCO & CSCO EXCEEDANCES ASSOCIATED WITH PREVIOUS & RI LOCATIONS IN VARNISH PIT AREA

SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN

2122 COLVIN BOULEVARD SITE
BCP SITE NO. C915380
TONAWANDA, NEW YORK

PREPARED FOR
MIDWEST STORAGE DEVELOPERS LLC

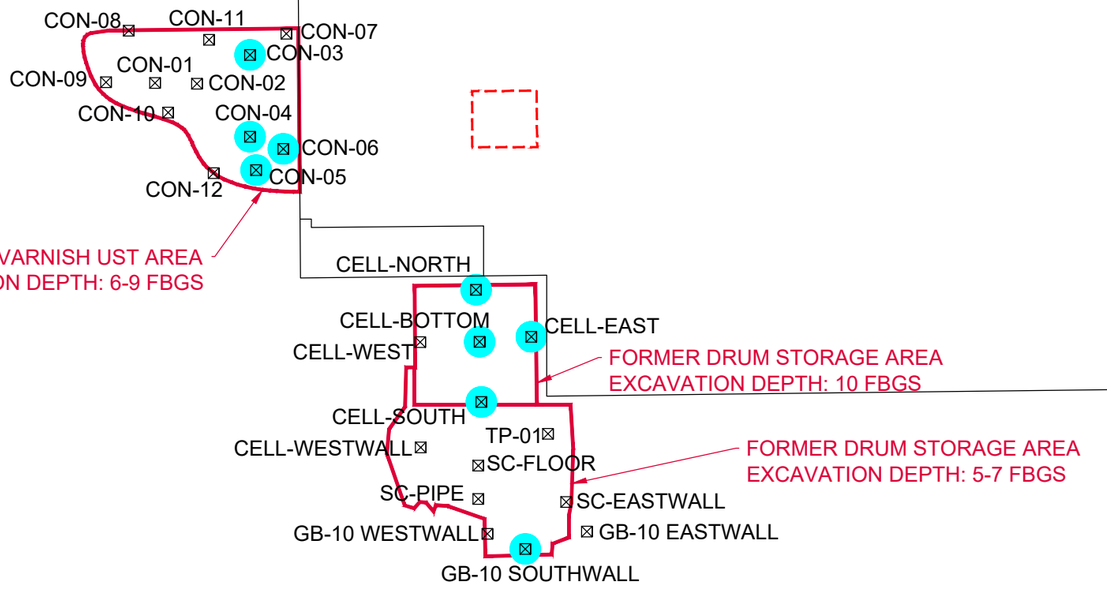
FIGURE 5B

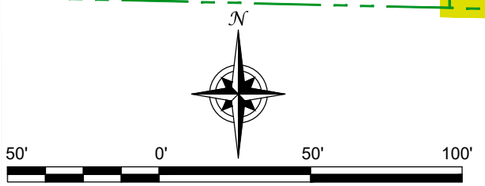
LEGEND:

- BCP SITE BOUNDARY
- PARCEL BOUNDARY
- PREVIOUS IRM EXCAVATION AREA
- BUILDING OUTLINE
- VARNISH PIT
- IRM CONFIRMATION SAMPLE LOCATION
- PGWSCO EXCEEDANCE OF cVOCs IN THE UNSATURATED ZONE
- PGWSCO EXCEEDANCE OF cVOCs IN THE SATURATED ZONE

NOTES:

1. AREAS OF CONCERN TAKEN FROM ENVIRONMENT RESOURCES MANAGEMENT SITE MANAGEMENT PLAN (2014) FIGURE 1-2.
3. PGWSCO = 6 NYCRR PART 375 PROTECTION OF GROUNDWATER SOIL CLEANUP OBJECTIVE.
4. SATURATION OF SOIL/FILL SAMPLES WAS DETERMINED BASED ON THE DEPTH TO WATER LEVELS MEASURED FROM GROUND SURFACE IN OCTOBER 2022 AND USED TO DEVELOP THE GROUNDWATER CONTOUR MAP (SEE FIGURE 3).





SCALE: 1 INCH = 50 FEET
SCALE IN FEET
(approximate)

DATE: JULY 2023
DRAFTED BY: CNK

TURNKEY ENVIRONMENTAL RESTORATION, LLC
IN ASSOCIATION WITH
BENCHMARK

2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218,
(716) 856-0599

JOB NO.: B0655-022-001

PGWSCO & CSCO EXCEEDANCES ASSOCIATED WITH PREVIOUS IRM LOCATIONS

SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN

2122 COLVIN BOULEVARD SITE
BCP SITE NO. C915380
TONAWANDA, NEW YORK

PREPARED FOR
MIDWEST STORAGE DEVELOPERS LLC

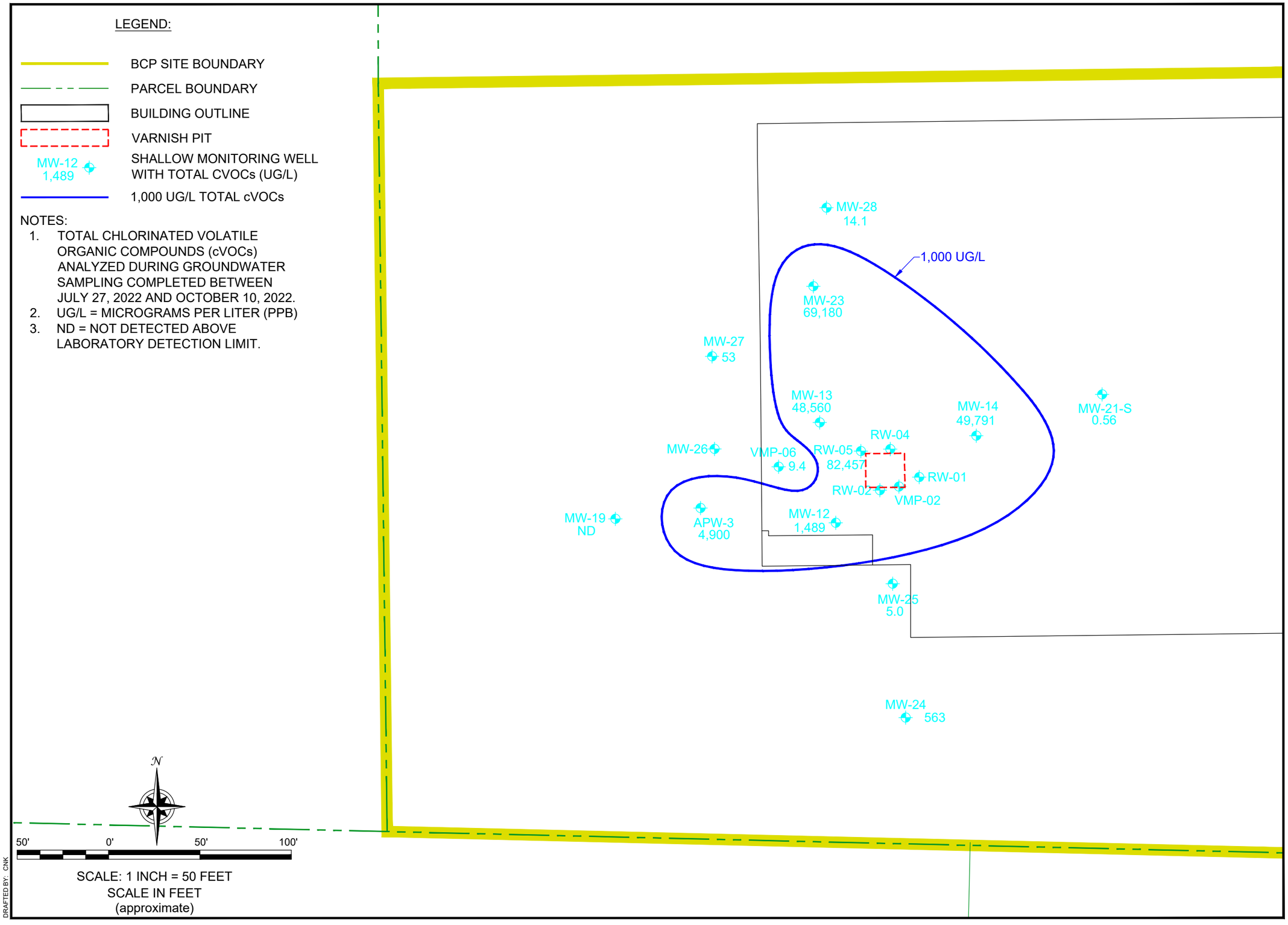
FIGURE 6

LEGEND:

- BCP SITE BOUNDARY
- PARCEL BOUNDARY
- BUILDING OUTLINE
- VARNISH PIT
- MW-12 1,489 — SHALLOW MONITORING WELL WITH TOTAL CVOCs (UG/L)
- 1,000 UG/L TOTAL cVOCs

NOTES:

1. TOTAL CHLORINATED VOLATILE ORGANIC COMPOUNDS (cVOCs) ANALYZED DURING GROUNDWATER SAMPLING COMPLETED BETWEEN JULY 27, 2022 AND OCTOBER 10, 2022.
2. UG/L = MICROGRAMS PER LITER (PPB)
3. ND = NOT DETECTED ABOVE LABORATORY DETECTION LIMIT.



SCALE: 1 INCH = 50 FEET
SCALE IN FEET
(approximate)

DATE: JUNE 2023
DRAFTED BY: CNK

TOTAL CVOC CONCENTRATIONS IN SHALLOW GROUNDWATER

SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN

2122 COLVIN BOULEVARD SITE
BCP SITE NO. C915380
TONAWANDA, NEW YORK

PREPARED FOR
MIDWEST STORAGE DEVELOPERS LLC

FIGURE 7

TURNKEY ENVIRONMENTAL RESTORATION, LLC
IN ASSOCIATION WITH
BENCHMARK
2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218,
(716) 856-0599

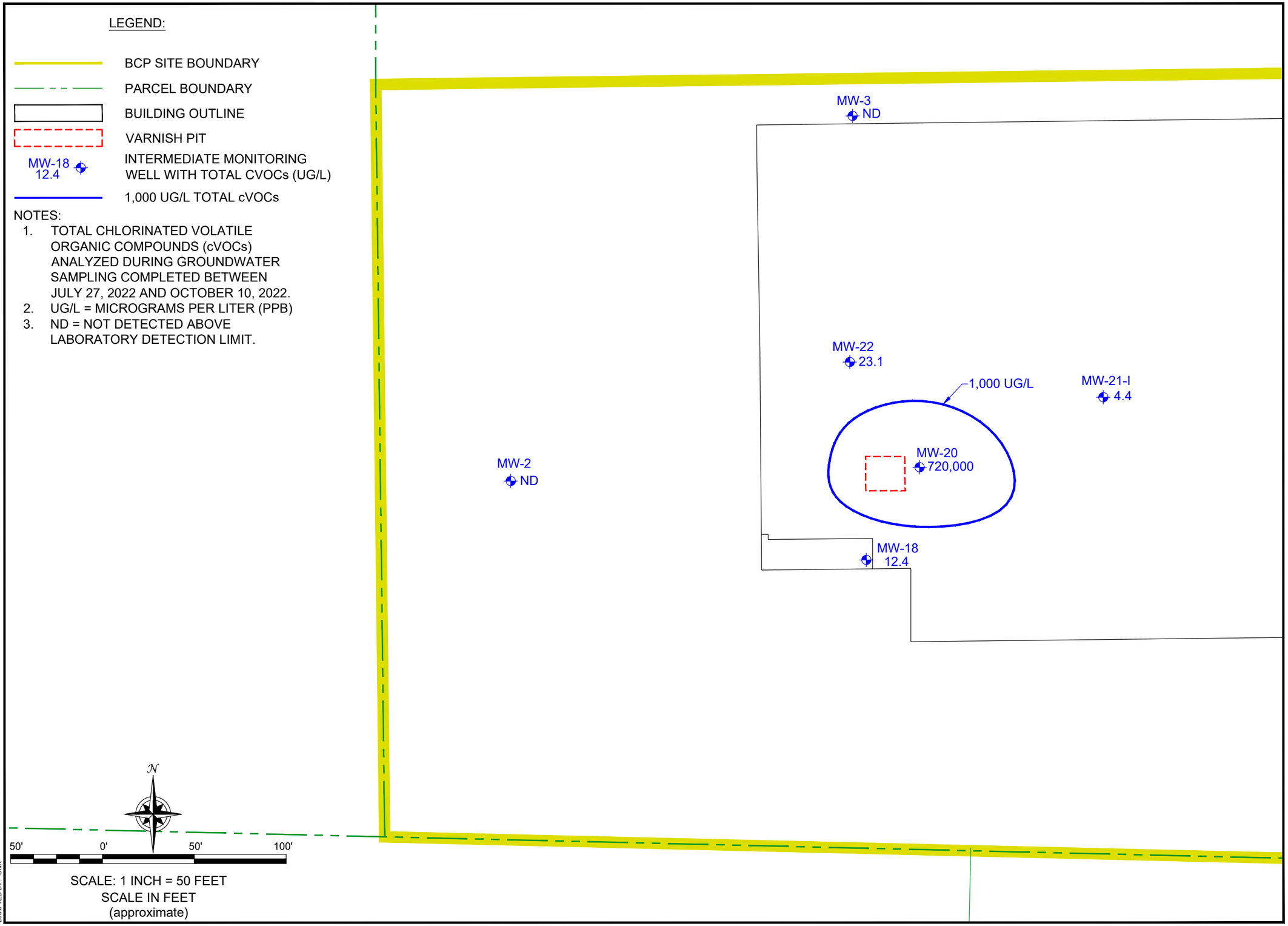
JOB NO.: B0655-022-001

LEGEND:

- BCP SITE BOUNDARY
- PARCEL BOUNDARY
- BUILDING OUTLINE
- VARNISH PIT
- MW-18 12.4 — INTERMEDIATE MONITORING WELL WITH TOTAL CVOCs (UG/L)
- 1,000 UG/L TOTAL cVOCs

NOTES:

1. TOTAL CHLORINATED VOLATILE ORGANIC COMPOUNDS (cVOCs) ANALYZED DURING GROUNDWATER SAMPLING COMPLETED BETWEEN JULY 27, 2022 AND OCTOBER 10, 2022.
2. UG/L = MICROGRAMS PER LITER (PPB)
3. ND = NOT DETECTED ABOVE LABORATORY DETECTION LIMIT.



SCALE: 1 INCH = 50 FEET
SCALE IN FEET
(approximate)

DATE: JUNE 2023
DRAFTED BY: CNK

TURNKEY ENVIRONMENTAL RESTORATION, LLC
IN ASSOCIATION WITH
BENCHMARK

2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218,
(716) 856-0599

JOB NO.: B0655-022-001

TOTAL CVOC CONCENTRATIONS IN INTERMEDIATE GROUNDWATER

SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN

2122 COLVIN BOULEVARD SITE
BCP SITE NO. C915380
TONAWANDA, NEW YORK

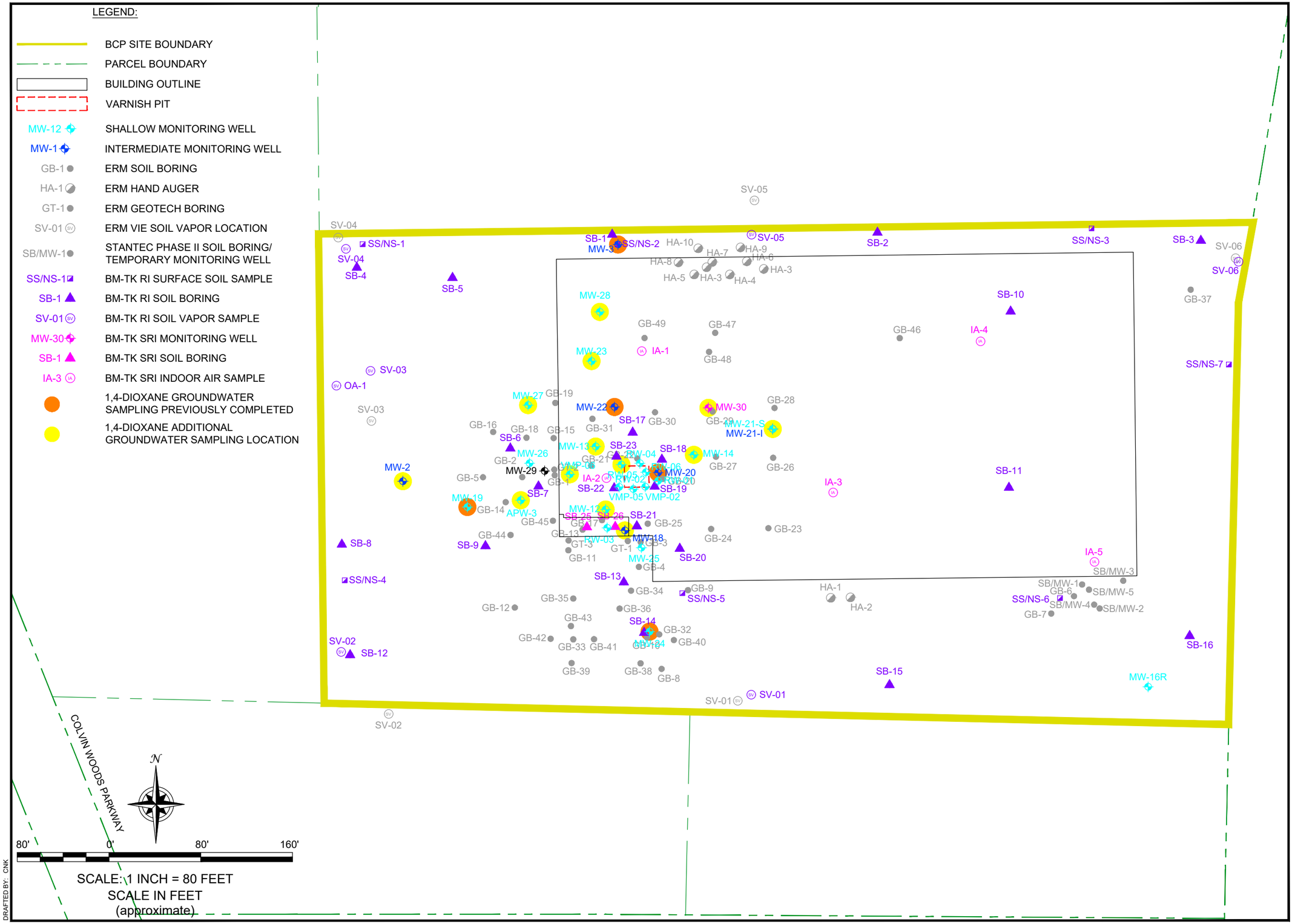
PREPARED FOR
MIDWEST STORAGE DEVELOPERS LLC

FIGURE 8

F:\CAD\TurnKey\Box Builders\Supplemental RI\Figure 9; Supplemental Remedial Investigation Locations.dwg, 7/19/2023 2:43:15 PM, CKanaley, DWG To PDF.pc3

LEGEND:

- BCP SITE BOUNDARY
- PARCEL BOUNDARY
- BUILDING OUTLINE
- VARNISH PIT
- MW-12 SHALLOW MONITORING WELL
- MW-1 INTERMEDIATE MONITORING WELL
- GB-1 ERM SOIL BORING
- HA-1 ERM HAND AUGER
- GT-1 ERM GEOTECH BORING
- SV-01 ERM VIE SOIL VAPOR LOCATION
- SB/MW-1 STANTEC PHASE II SOIL BORING/ TEMPORARY MONITORING WELL
- SS/NS-1 BM-TK RI SURFACE SOIL SAMPLE
- SB-1 BM-TK RI SOIL BORING
- SV-01 BM-TK RI SOIL VAPOR SAMPLE
- MW-30 BM-TK SRI MONITORING WELL
- SB-1 BM-TK SRI SOIL BORING
- IA-3 BM-TK SRI INDOOR AIR SAMPLE
- 1,4-DIOXANE GROUNDWATER SAMPLING PREVIOUSLY COMPLETED
- 1,4-DIOXANE ADDITIONAL GROUNDWATER SAMPLING LOCATION



DATE: JULY 2023
DRAFTED BY: CNK

SUPPLEMENTAL REMEDIAL INVESTIGATION LOCATIONS

SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN

2122 COLVIN BOULEVARD SITE
BCP SITE NO. C915380
TONAWANDA, NEW YORK

PREPARED FOR

MIDWEST STORAGE DEVELOPERS LLC

FIGURE 9

TURNKEY ENVIRONMENTAL RESTORATION, LLC

IN ASSOCIATION WITH

BENCHMARK

2558 HAMBURG TURNPIKE, SUITE 300, BUFFALO, NY 14218,
(716) 856-0599

JOB NO.: B0655-022-001

ATTACHMENT 1

Figure 5-4
Structure Contour Map
Top of Native Silty Clay or Clay
Greif Bros. Facility
Tonawanda, New York

N

MW-3
MW-4
MW-2
MW-6
MW-5
MW-8
Long Truck Bay
Truck Dock
Asphalt
Pallet Storage
Former Varnish UST Area
MW-10 583.5
Drum Storage
Varnish Pit
Short Truck Bay
Former Drum Storage Area
Concrete Vault
Flammables Room (includes Haz Waste Storage)
Offices
Lockers
Boiler Room
Lunch Room
Transformer Substation
Sodium Silicate Tanks
Sanitary Pipe (Subfloor)
To Sanitary Sewer
COLVIN BOULEVARD
Asphalt Roadway
MW-19 577.9
MW-1 582.3
MW-7 578.1
MW-9
MW-11 576.0
MW-12 581.2
MW-13 580.7
MW-14 584.2
MW-15 583.8
MW-16
MW-17 584.8
MW-20
MW-21-I
MW-21-S 585.3
MW-22 585.2
MW-23 581.2
GB-1
GB-2
GB-3
GB-4
GB-5
GB-6
GB-7
GB-8
GB-9
GB-10
GB-11
GB-12
GB-13 578.54
GB-14
GB-15
GB-16
GB-17 577.54
GB-18
GB-19
GB-20 578.2
GB-21
GB-22 579.1
GB-23 582.2
GB-24 582.2
GB-25 580.2
GB-26 583.2
GB-27 584.7
GB-28 585.2
GB-29 584.2
GB-30 584.2
GB-31 580.1
GB-32
GB-33
GB-34 578.8
GB-35 585.0
GB-36 585.4
GB-37
GB-38 583.9
GB-39 582.9
GB-40
GB-41
GB-42
GB-43 582.7
GB-44 578.6
GB-45 578.54
GB-46
GB-47
GB-48
GB-49 585.2
GT-1 578.4
GT-2 586.8
GT-3 578.0
584
582
580
578

Legend

- Monitoring Well Location
- RI Soil Boring Location
- Phase II Soil Boring Location
- Phase III Soil Boring Location
- DGI Monitoring Well Location
- DGI Soil Boring Location
- 582.3 Top of Native Silty Clay or Clay (feet above mean sea level)
- 584 Structure Contour (feet above mean sea level)

Notes:

Exterior Phase II and Phase III soil boring data not incorporated due to lack of surveyed elevation data

Ground elevation of interior Phase III soil borings inferrred based on survey data from nearby RI soil borings or wells.

Datum = mean seal level

Contour Interval = 2 feet

60 30 0 60

Scale in Feet

ATTACHMENT 2

Sonoco Products Company

DRAFT
BFA & FDT REPORT

Greif, Inc. Facility
Town of Tonawanda, Erie County New York

March 2009

Prepared By:

Environmental Resources Management
5788 Widewaters Parkway
DeWitt, New York 13214

TABLE OF CONTENTS

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Appendices

EXECUTIVE SUMMARY

Environmental Resources Management conducted a Background Fluorescence Analysis (BFA) and Fluorescent Dye-Tracing (FDT) study at the Greif Inc. Facility located in the Town of Tonawanda, New York (the Site). Data collected during the studies were used to evaluate the distribution of affected ground water from known areas of concern at the Site to evaluate potential sources of light non-aqueous phase liquid in monitoring well MW-23.

The BFA showed that the COC distribution follows the general ground water flow direction and affected ground water deviates by refraction in the horizontal plane. This refraction implies pronounced preferential flow paths, and heterogeneities in the subsurface, probably caused by one or more conditions including subsurface utility lines, construction infilling, or macropores and fractures in the upper silty clay unit.

Five organic fluorescent dyes were injected at different locations at the site on 11 January 2007. The FDT study also showed that the dye sulforhodamine G injected in vapor monitoring point VMP-2 located within Varnish Pit Area reached 12 wells proximal to the injection point including monitoring well MW-23. Pyranine, injected into a trench in the Former Varnish UST Area, was not detected in monitoring well MW-23. These results are consistent with LNAPL in monitoring well MW-23 being derived from the Varnish Pit Area and not the Former Varnish UST Area. The FDT study indicates that linear ground water flow velocity along preferential ground water flows is much faster than would have been suspected based on measured saturated hydraulic conductivity measurements of the upper silty clay unit (10^{-8} cm/s).

1.0 INTRODUCTION

Environmental Resources Management (ERM) conducted a Background Fluorescence Analysis (BFA) and Fluorescent Dye-Tracing (FDT) study at the Greif Inc. (Greif) Facility located at 2122 Colvin Boulevard in the Town of Tonawanda, Erie County, New York (the Site). The Site is being remediated by Sonoco Products Company (Sonoco) through a Voluntary Cleanup Agreement (VCA) between Sonoco and the New York Department of Environmental Conservation (NYSDEC). The BFA investigation was utilized to evaluate the background fluorescence of Site ground water and to select organic fluorescent dye to be used as tracers to evaluate distribution of affected ground water from known source areas to evaluate potential sources of the light non-aqueous phase liquid (LNAPL) observed in monitoring well MW-23 based on an inquiry from the NYSDEC regarding the source of LNAPL. Dyes were selected based on the results of the BFA and injected in selected locations. Ground water samples were collected using standard sampling techniques and were analyzed using fluorescence spectroscopy. This report summarizes field work, laboratory operations, and findings of the BFA/FDT investigation.

1.1 BACKGROUND FLOURESCENCE

Most organic compounds including naturally occurring organic compounds and volatile organic compounds (VOCs) emit characteristic fluorescence at specific wavelengths depending on the nature of the compound. The degree of fluorescence intensity will vary based on the wavelength emitted. Continuous fluorescence synchroscans characterize the organic compounds present in a sample according to the predominant fluorescent wavelength and intensity. The intensity indicated by a synchroscan is the sum of organic substances (naturally occurring and anthropogenic) emitting at this specific wavelength. However, the dominant substance contributes most to the overall intensity.

The x-axes of a synchroscan indicate the emission wavelength from 320 to 720 nanometres (nm) and the y-axes indicate the relative fluorescence intensity (RFI). In general, high fluorescence intensity is comparable to areas high in organic content as RFI is directly related to the dissolved organic carbon found at a specific well. Fluorescence spectrometry is more sensitive than typical laboratory analysis. Compounds may be resolved with BFA that are not reported in laboratory reports. It is important to note that an area of high fluorescence does not necessarily

mean there is a high VOC concentration. A VOC may not exhibit significant fluorescence or could be present at very low concentrations (i.e., much lower than our current ppb levels). BFA is an additional tool that provides a unique perspective to the location, characterisation and delineation of the contaminants of concern.

1.2 ORGANIC FLOURESCENT DYES

Organic fluorescent dyes have been qualitatively used for more than 150 years to trace water flow because of their ease of handling, cost-effectiveness, low detection limits and non-toxic properties. These water-soluble organic substances include a large range of hydrologic tracers, all with different characteristic fluorescence "signatures". To successfully conduct a FDT test in a contaminated aquifer, the physical and chemical behavior of the fluorescent dyes being used and the background fluorescence of ground water need be evaluated.

Continuous fluorescence synchroscans measured with a spectro-fluorometer characterize the organic compounds present in a sample according to the predominant fluorescent wavelength and intensity. The intensity indicated by a synchroscan is the sum of all organic substances emitting at the specific emission wavelength. The dominant substance contributes most to the overall intensity.

1.3 SITE DESCRIPTION AND BACKGROUND

The Site is currently used for the manufacture and processing of fibre drums and associated equipment maintenance and administrative activities. ERM was retained by Sonoco in 1998 to conduct environmental investigation activities at the Site. ERM's work was later expanded to include remedial design and related activities. The following major phases of environmental investigation and remediation have been completed at the Site:

- 1998 – Phase II/Phase III soil boring and monitoring well installations;
- 2001- Remedial Investigation passive soil vapor sampling, soil boring and monitoring well installations, soil and ground water sampling, sampling of water from the concrete vault in the former drum storage area and visual inspection of the varnish pit
- 2002 – Data Gap Investigation;

- 2004- Dense non-aqueous phase liquid (DNAPL) recovery interim remedial measure (IRM) pilot testing;
- 2004- Soil Excavation IRM of former drum storage area and soil boring GB-10 completed;
- 2005- DNAPL Recovery IRM system installed and pumping phase of operation started;
- 2006 - Low vacuum applied to DNAPL recovery system;
- 2006- Focused Feasibility Study (FFS) initiated to evaluate remedial alternatives for the Site
- 2006 and 2007– Quarterly ground water monitoring; and
- 2007 – Fluorescent Dye-Tracing evaluation of sub-slab ground water and source evaluation of light non-aqueous phase liquid in MW-23.;
- 2008 –Vapor intrusion evaluation.

The following documents prepared by ERM present detailed summaries of the investigation and remedial activities at the Site:

- Work Plan for Remedial Investigation dated (ERM, 2000);
- Voluntary Remedial Investigation Report (ERM, 2001);
- Addendum to The Work Plan For Remedial Investigation - Data Gap Investigation (ERM, 2002);
- Data Gap Investigation Report (ERM, 2003);
- Interim Remedial Measure Work Plan (ERM, 2004);
- DNAPL Recovery IRM Pilot Test Report (ERM, 2005);
- Interim Report - Soil Excavation Interim Remedial Measure (ERM, 2006);

Several VOCs and semi-volatile organic compounds (SVOCs) of potential concern have been identified in Site soil and ground water. The main chemicals of potential concern are 1,1,1-trichloroethane (1,1,1-TCA), trichloroethene (TCE), 1,1-dichloroethane (1,1- DCA), 1,1-Dichloroethene (1,1- DCE), cis-1,2-dichloroethene (cis-1,2-DCE) and xylenes.

Surficial geology in the vicinity of the Site was previously mapped by the New York State Geological Survey (NYSGS) as lacustrine silt and clay (Cadwell et al., 1988). These deposits consist predominantly of laminated, calcareous silt and clay deposited in proglacial lakes with variable thickness up to 100 meters. Sand or silty sand units are locally present. Bedrock in the vicinity of the Site consists predominantly of dolostones, shales, and evaporites of the Upper Silurian Salina Group based on mapping performed by NYSGS (Rickard and Fisher, 1970).

2.0 FIELD WORK AND LABORATORY ANALYSES

BFA Sampling and Preparation

Ground water samples were collected at the Site on 19 April 2006 by ERM personnel using standard sampling techniques. Figure 2-1 presents the general Site layout, including well locations. Following purging of each well, the glass sample vials were preconditioned with sampling water prior to collection of the samples for background fluorescence analysis. All vials were stored in a cooler to prevent photo-degradation of the fluorescent organic compounds immediately after sample collection. After the samples were received by Nano Trace Laboratory in Dewitt, New York on 20 April 2006, all samples were filtered at the laboratory using acid-washed Whatman GMF 0.45-nm glass fibre filters as means of sample preservation. All samples were analyzed within two days.

BFA Analytical

All filtered samples were analyzed using a Suprasil quartz cell on a Shimadzu RF-5301 spectrofluorophotometer with the following settings: excitation and emission slit adjusted both to 10/10, and a response time of 3, with a delta between excitation and emission wavelength of 21 nm. Between each sample run, Milli-Q water was analyzed to assess the instrumental background and to assure that the cell was clean prior to the next analysis. The reproducibility of fluorescence analyses during this investigation was within 3%. Synchroscans of similar ground waters are presented in Appendix A.

Dye Injection

Five organic dyes were selected for the Site by comparing each dye's specific characteristic fluorescence signature to the existing background fluorescence of Site ground water. Selection dye using this approach ensures the positive identification of the dyes during the FDT analysis. Each or the organic dyes were injected at the Site in pre-selected areas to determine the source of the ground water and LNAPL in MW-23. Figure 2-1 presents the Site layout and injection locations of each of the selected dyes. Peristaltic pumps were utilized to inject a dye in a recovery well (RW-3) in a truck bay on the south side of the facility and a dye into a vapor monitoring point (VMP-2) located in the Varnish Pit Area (VPA).

Three dyes were injected into shallow 2 feet deep trench excavated outside the facility. Two trenches were located along the west side of the facility, one trench inject in the former Varnish UST Area and a second 5 feet west of the facilities fire suppression blow off pipe. The third trench injection was located hydrogeologically up-gradient of the facility proximal to MW-6. Dyes were allowed 24 hours to infiltrate the matrix prior to backfilling.

Ground water samples were collected according a Site-specific sample schedule and analyzed as outlined in the subsequent section. The reproducibility of analyzed samples during this FDT study was 3%. FDT Synchroscans are presented in Appendix B. Breakthrough curves of RFI vs. Time are presented in Appendix C.

3.0 RESULTS

3.1 BACKGROUND FLOURESCENCE ANALYSIS

Thirty-three samples were collected at the Site for BFA. RFI, values varied from 0 to 4830 RFI. Natural ground water systems with high organic acid contents, such as wetland waters, rarely have an RFI greater than 700. Whereas, "clean", water by unaffected by anthropogenic chemicals typically have background levels around 20 RFI.

Table 3-1 summarizes the total RFI of the samples. Peaks between 357-364 nm and 349 nm correspond to the area with the greatest concentration of DOC. Noteworthy is the broad variety of different fluorescent synchroscans, which suggests this aquifer is very heterogeneous. Many wells show a mixture of waters from multiple adjacent wells, but many of the source waters are refracted from the expected flow path estimated from the conventional hydrological gradient (generally south to north). Estimated ground water flow direction in the shallow saturated zone is generally to the north. Estimated ground water flow direction in the intermediate ground water zone is generally to the north-northeast. Refraction in the BFA data implies pronounced preferential flow paths, and heterogeneities in the subsurface, probably caused by subsurface utilities, construction infilling, or fractures and macro pores in the predominantly fine-grained soil matrix.

Some significant tracer peaks are present. Nevertheless, only six sets of wells had nearly identical fluorescence signatures (See Appendix A), whereas all of them except MW-22 and MW-23 showed some similarities in peak distributions with each other. A summary of the different Synchroscan relationships is presented in Table 3-2.

3.2 FLOURESCENT DYE STUDY

Five fluorescent dyes were selected based on the results of the BFA and injected in selected areas on 11 January 2007. Twenty-one of the sample locations were sampled on high frequency for two weeks following the dye injection to evaluate potential fast flowing preferential flow paths. A sample schedule was developed to run four months, incorporating all non-injection wells at the site. A total of 448 samples were collected and analyzed by fluorescence spectroscopy during the FDT investigation.

During the 125-day monitoring period Sulforhodamine G (SRG) dye was detected in 14 Site wells, including MW-23. (SRG) was injected into VMP-2 just south of the Varnish Pit Area. The other four dyes were not detected in any sample. Table 3-3 presents a timeline for the travel times from the injection of SRG through the first detection of the dye within the wells and the number of days for the peak concentration to reach the well and the corresponding RFIs. Figures 3-1 and Figure 3-2 illustrate the travel time from the injection well to the observation well for the initial detection of dye and the main concentration of dye, respectively.

The FDT was useful in evaluating the source of LNAPL and water in monitoring well MW-23 (the Varnish Pit Area). SRG dye injected within the Varnish Pit Area was detected in 14 wells including MW-23. SRG reached MW-23 in 36 days, with the highest concentration reach the well within 81 days. A linear ground water velocity for the area of 0.52 m/day is calculated based on travel times of the dye moving between the injection well VMP-2 and MW-23 located 42-meters (138-feet) to the north. The average Darcy velocity at the Site calculated using saturated hydraulic conductivity data was estimated to be 4.7×10^{0} cm/sec. Based on the significant difference in velocities, it is evident that ground water is moving much faster along preferential flow paths in the silty clay matrix.

Figure 3-1 presents the first appearance of SRG in monitoring wells, which also suggests ground water movement along preferential flow paths in the upper silty clay matrix at the Site. The timing of appearance of SRG in various monitoring wells shows strong preferential flow paths to the northeast, southwest (against or at least lateral to mapped ground water flow direction), and to the west-north west.

Based of the data collected the source of the LNAPL in MW-23 is the Varnish Pit Area, as dyes injected in the other known areas of concern at the Site and upgradient of the study area were not detected in the MW-23 during the observation time. SRG injected adjacent to the Varnish Pit Area was detected in a relatively short time frame.

Of the five dyes introduced at the site, four dyes were not detected within the observation time of the FDT. The dyes may not have reached any of the wells within the observation time of the FDT or there may not be a direct connection between injection point and the ground water at the various sampling locations.

4.0 SUMMARY AND CONCLUSION

A detailed BFS/FDT investigation was performed at the Site in response to an inquiry from the NYSDEC regarding the source of LNAPL observed in monitoring well MW-23. One of five organic dyes was detected in site monitoring wells. The observed distribution and detection of SRG dye indicates that ground water flow in the vicinity of the Varnish Pit Area occurs predominantly along preferential flow paths at flow velocities that are much quicker compared to flow velocities estimated based on measured saturated hydraulic conductivity of the upper silty clay unit. The generally northerly direction of ground water flow was confirmed although detections of SRG in multiple directions from the Varnish Pit Area injection point (VMP-2) were observed. The detection of SRG in well MW-23 and the non-detection of dyes injected at other locations, including the Former Varnish UST Area, is consistent with the LNAPL observed in well MW-23 being derived from the Varnish Pit Area.

Figures

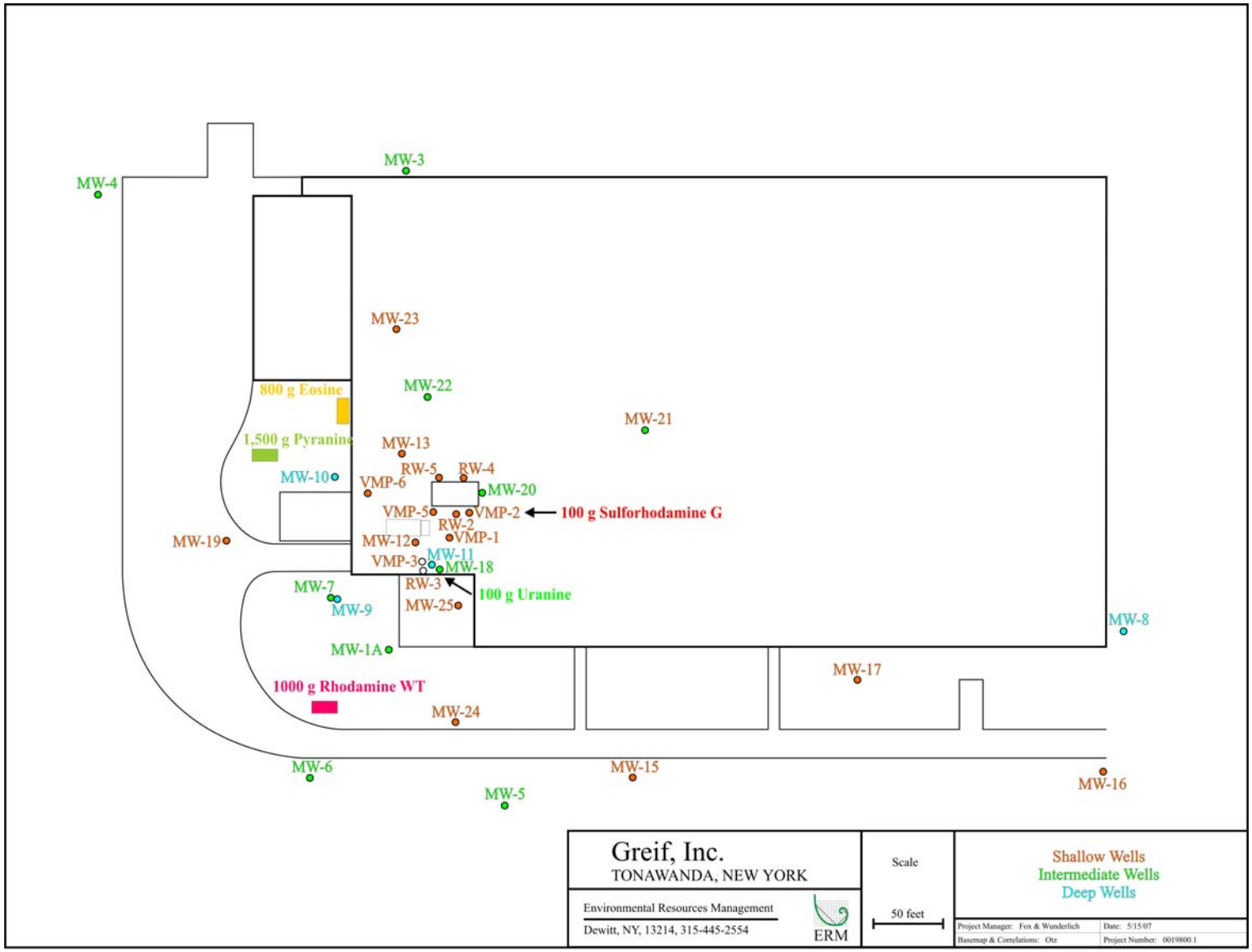

Figure 2-1- Layout of the facility and wells utilized in the FDT. The figure also illustrates the injection location with amount of dye injected at each specific location.

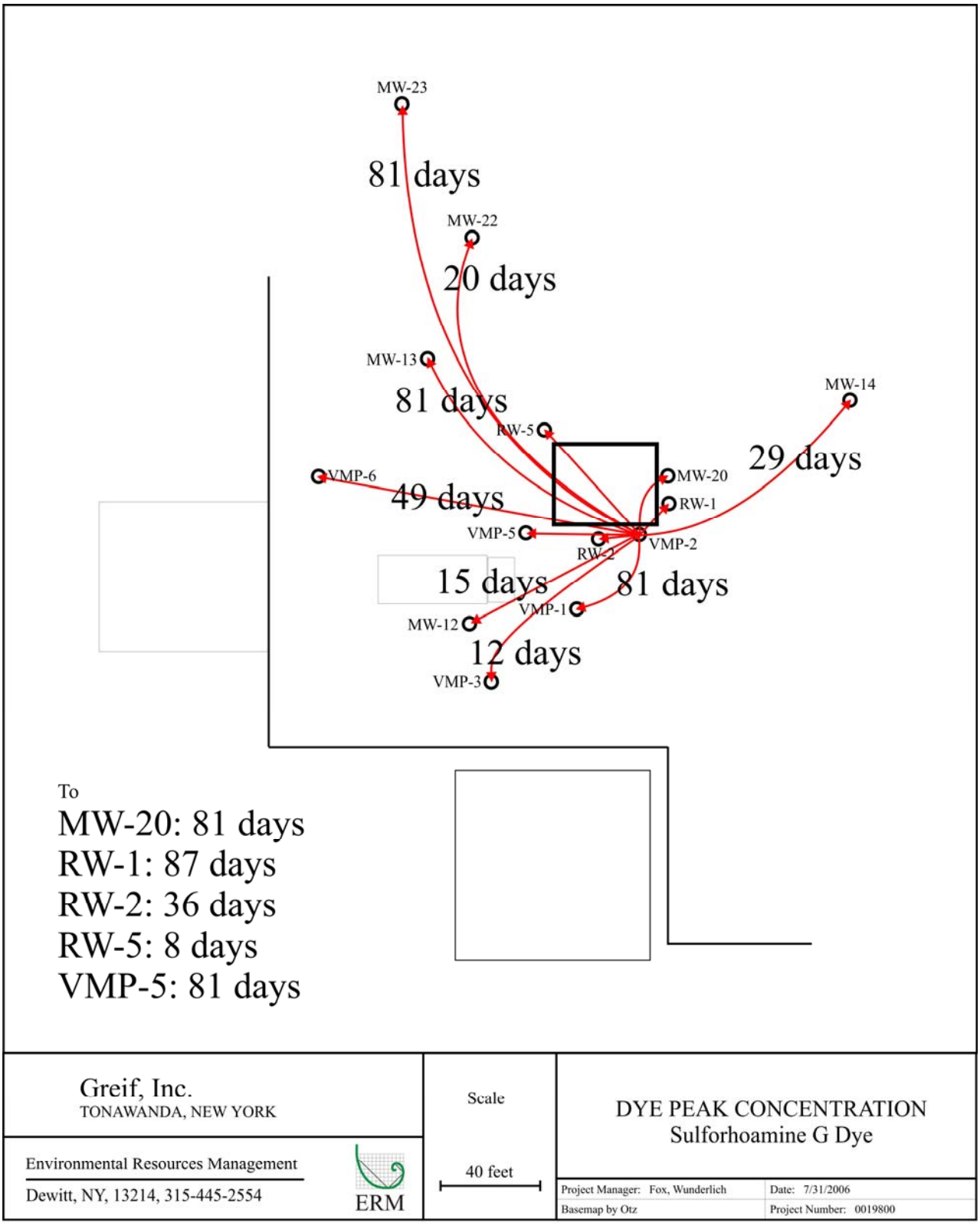

Figure 3-1- Travel times from the injection wells to the initial detection of SRG within a given well.

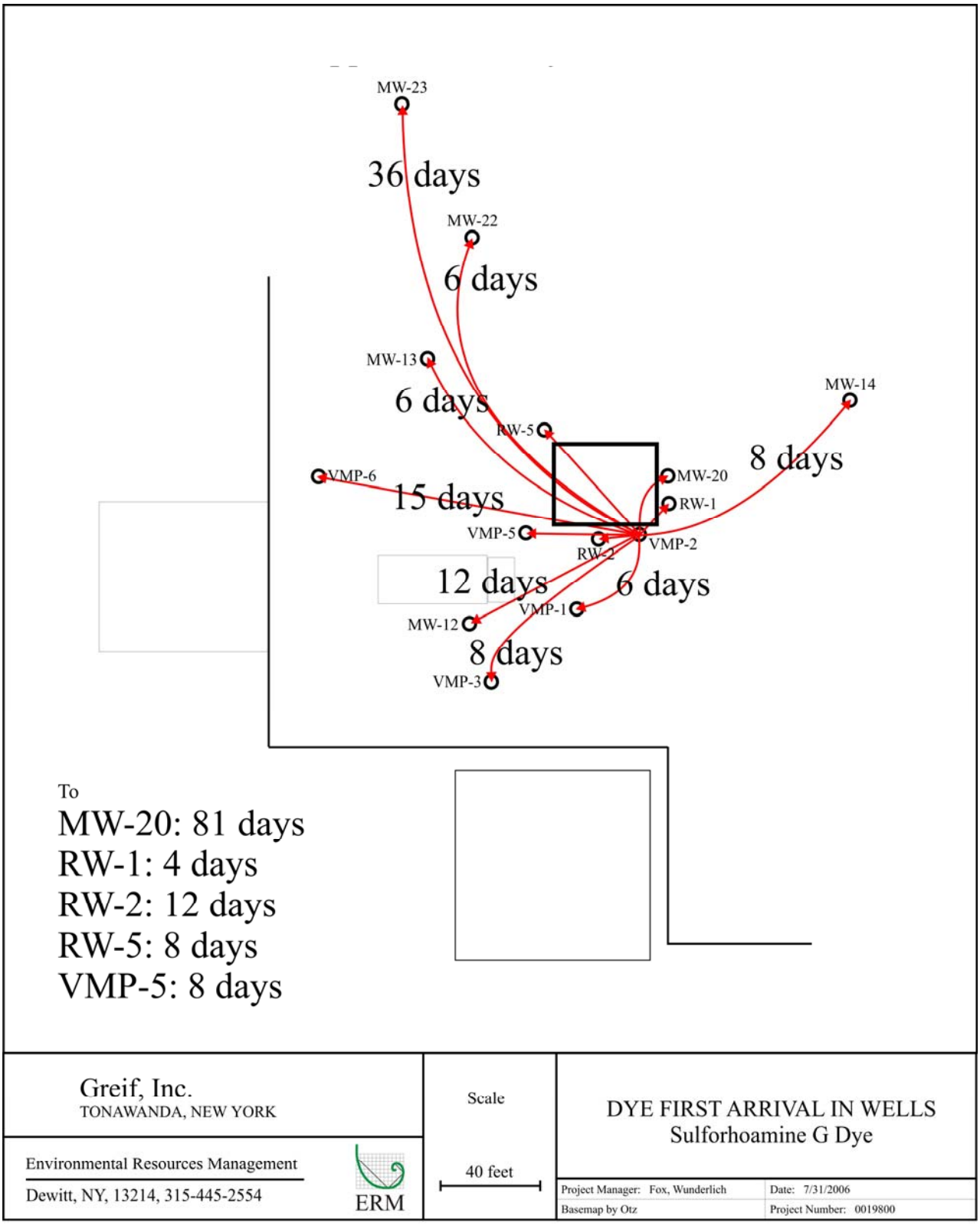

Figure 3-2 Travel times from the injection wells to the peak concentration of SRG within a given well.

Tables

Table 3-1: The table summarizes all peaks and elevated areas found between 320 nm and 720 nm. The fields highlighted in yellow represent the dominant peaks whereas the number indicates the relative fluorescence intensity (RFI). The RFI emission values are proportional to dissolved organic carbon concentration values.

Well ID	Wavelength												
	323-324	329-333	349	357-364	367-372	401-404	411-415	419-424	436	445-452	476	486	489-494
MW-1A								482		550			
MW-3				55									
MW-4		121		156									
MW-5		1902		1936								399	
MW-6		100		148						22			
MW-7				386			419			409			
MW-8				84						10			
MW-9					85					44			
MW-10				573									
MW-11				51									
MW-12				141						53			44
MW-13	219			210					56				41
MW-15					219					169			148
MW-16					263					192			
MW-17				329						280			
MW-18		533		582			318					130	
MW-19				55						33			36
MW-20													
MW-21S				113		122				94			
MW-21I				133		140							
MW-22					72							23	
MW-23		4212	4765										
MW-24				764								164	
MW-25				187			206						
RW-2				544			251	251					
RW-3					237					181			
RW-4				882			464						
RW-5													
VMP-1				190						98			91
VMP-2	635			894									
VMP-3													
VMP-5		457		603									
VMP-6				587		360				309	247		

Table 3-1 (Continued…)

Well ID	Wavelength												
	498-505	506-509	512-513	545-546	566-568	574-579	590	624	637	676-679	685-692	695-700	701-710
MW-1A	571											10	
MW-3				51									2
MW-4				64									
MW-5				791						83			
MW-6	15			19				4				8	
MW-7		392											9
MW-8			19				3					1	
MW-9			37									4	
MW-10	26												15
MW-11				9		6							
MW-12										5			
MW-13					31						11		
MW-15													6
MW-16	192										11		
MW-17												11	
MW-18		128							22			24	
MW-19													2
MW-20													
MW-21S		105										4	
MW-21I		98										4	
MW-22													2
MW-23								69		166			
MW-24		162											25
MW-25		55				32						6	
RW-2											29		
RW-3		170											7
RW-4											31		
RW-5													
VMP-1													6
VMP-2											29		
VMP-3													
VMP-5											22		
VMP-6		247			327							34	

Table 3-2: This color coded table summarizes correlations between the different wells at the Greif Site. The fields highlighted in red represent nearly identical synchroscans; blue represent similar fluorescence synchroscans that are adjacent to the observation well; and mint represent similar fluorescence synchroscans that are significantly further away from the observation well.

identical peak pattern | adjacent similar synchroscans | similar synchroscans further away

Well IDs	MW-1A	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-15	MW-16	MW-17	MW-18	MW-19
MW-1A																	
MW-3																	
MW-4																	
MW-5																	
MW-6																	
MW-7																	
MW-8																	
MW-9																	
MW-10																	
MW-11																	
MW-12																	
MW-13																	
MW-15																	
MW-16																	
MW-17																	
MW-18																	
MW-19																	
MW-20																	
MW-21s																	
MW-21i																	
MW-22																	
MW-23																	
MW-24																	
MW-25																	
RW-2																	
RW-3																	
RW-4																	
RW-5																	
VMP-1																	
VMP-2																	
VMP-3																	
VMP-5																	
VMP-6																	

Table 3-2 (Continued…)

identical peak pattern | adjacent similar synchroscans | similar synchroscans further away

Well IDs	MW-20	MW-21s	MW-21i	MW-22	MW-23	MW-24	MW-25	RW-2	RW-3	RW-4	RW-5	VMP-1	VMP-2	VMP-3	VMP-5	VMP-6
MW-1A																
MW-3																
MW-4																
MW-5																
MW-6																
MW-7																
MW-8																
MW-9																
MW-10																
MW-11																
MW-12																
MW-13																
MW-15																
MW-16																
MW-17																
MW-18																
MW-19																
MW-20																
MW-21s																
MW-21i																
MW-22																
MW-23																
MW-24																
MW-25																
RW-2																
RW-3																
RW-4																
RW-5																
VMP-1																
VMP-2																
VMP-3																
VMP-5																
VMP-6																

Table 3-3: FDT Timeline

Dye Injected	Location of Injection	Date/ Time of Injection
1500 g PYR	MW-10	1/11/2007 9:35
100 g URA	RW-3	1/11/2007 10:40
800 g EOS	trench/pool	1/11/2007 9:45
100 g SRG	VMP-2	1/11/2007 11:05
1000 g RWT	trench	1/11/2007 9:20

Note:

hydraulic gradient	0.01
effective porosity	0.4937

Well Ids	Dye Detected	First Appearance	Days After Injection	Maximum Peak Appearance	Maximum Peak (days)	RFI of Maximum Peak Intensity	RFI Estimated Detection Limit
MW-12	SRG	23-Jan-07	12	26-Jan-07	15	3952	39
MW-13	SRG	17-Jan-07	6	2-Apr-07	81	198	17
MW-14	SRG	19-Jan-07	8	9-Feb-07	29	646	12
MW-20	SRG	2-Apr-07	81	2-Apr-07	81	3586	35
MW-22	SRG	17-Jan-07	6	31-Jan-07	20	429	12
MW-23	SRG	16-Feb-07	36	2-Apr-07	81	3688	86
MW-24	SRG	17-Feb-07	37	19-Feb-07	39	288	60
RW-1	SRG	15-Jan-07	4	8-Mar-07	87	9235	154
RW-2	SRG	23-Jan-07	12	16-Feb-07	36	4796	72
RW-5	SRG	19-Jan-07	8	19-Jan-07	8	205	72
VMP-1	SRG	17-Jan-07	6	2-Apr-07	81	3627	25
VMP-3	SRG	19-Jan-07	8	23-Jan-07	12	374	32
VMP-5	SRG	19-Jan-07	8	2-Apr-07	81	395	66
VMP-6	SRG	26-Jan-07	15	1-Mar-07	49	923	69
500-gal	SRG	23-Jan-07	12	9-May-07	109	13095	122

Well Ids	Maximum Peak Concentration ppb (=ug/L)	Distance From Injection to Target (M)	First Appearance Velocity (mm/day)	Main peak Velocity (mm/day)	Velocity ft/day	Hydraulic Conductivity cm/s
MW-12	6.05	11.21	934	747	2.45	4.3E-02
MW-13	0.17	16.97	2828	210	0.69	1.2E-02
MW-14	0.88	15.15	1894	522	1.71	3.0E-02
MW-20	5.48	3.94	49	49	0.16	2.8E-03
MW-22	0.54	18.48	3080	924	3.03	5.3E-02
MW-23	5.56	35.76	993	441	1.45	2.5E-02
MW-24	0.24	38.18	1032	979	3.21	5.6E-02
RW-1	14.21	3.63	908	42	0.14	2.4E-03
RW-2	7.33	2.42	202	67	0.22	3.8E-03
RW-5	0.09	5.45	681	681	2.23	3.9E-02
VMP-1	5.56	6.67	1112	82	0.27	4.7E-03
VMP-3	0.42	13.64	1705	1137	3.73	6.5E-02
VMP-5	0.40	7.27	909	90	0.29	5.1E-03
VMP-6	1.23	19.09	1273	390	1.28	2.2E-02
500-gal	20.35	n/a	n/a	n/a	n/a	n/a

Appendix A
Similar BFA Synchroscans

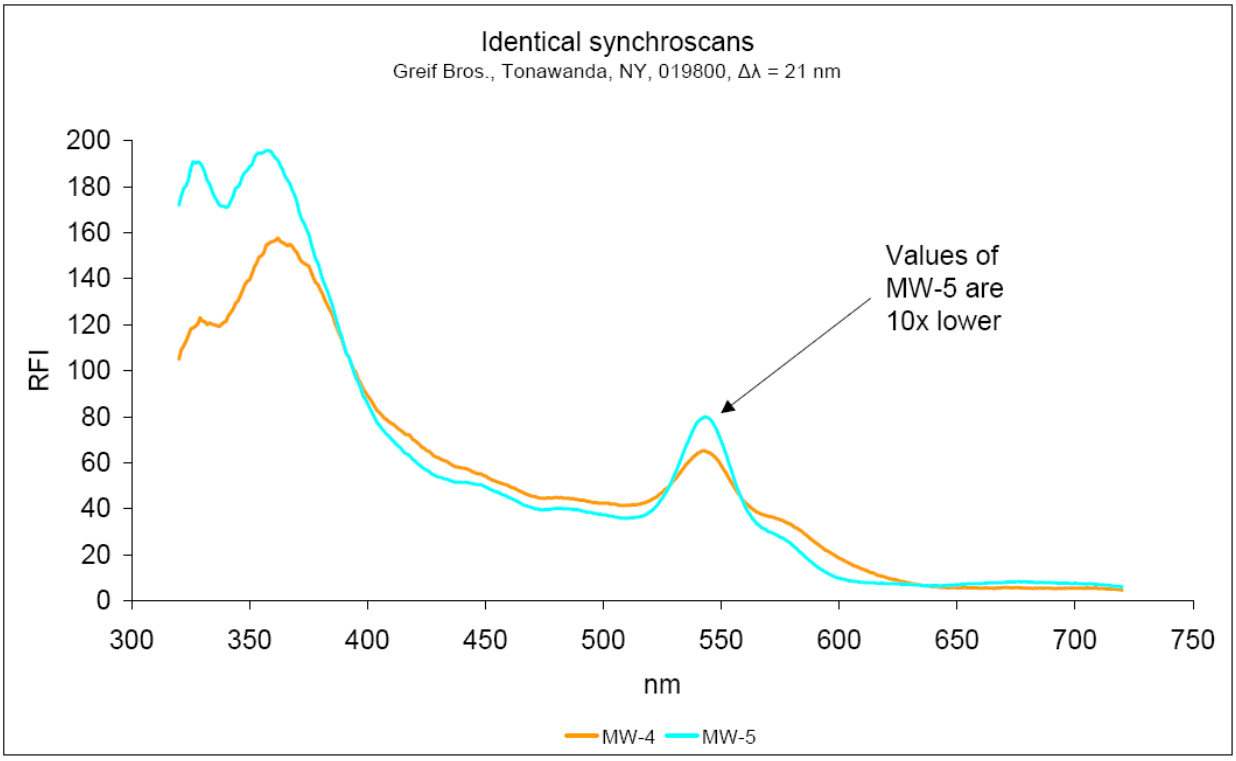

Figure A1: Comparison between well MW-4 (intermediate well) and MW-5 (intermediate well). The concentrations in MW-5 are significantly higher than in MW-4, which supports the general ground water flow (Figure 1.2). Furthermore it suggests that the ground water velocity is slow, but that enough volume causes the concentrations in MW-4 to drop or that the concentration in MW-5 does not change that much and some of it is dissolved by the main ground water flow and transported downgradient to MW-4. Non-biodegradable natural matter or traces of light non-aqueous phase liquids (LNAPLs) cause the high emission intensities around 320 nm.

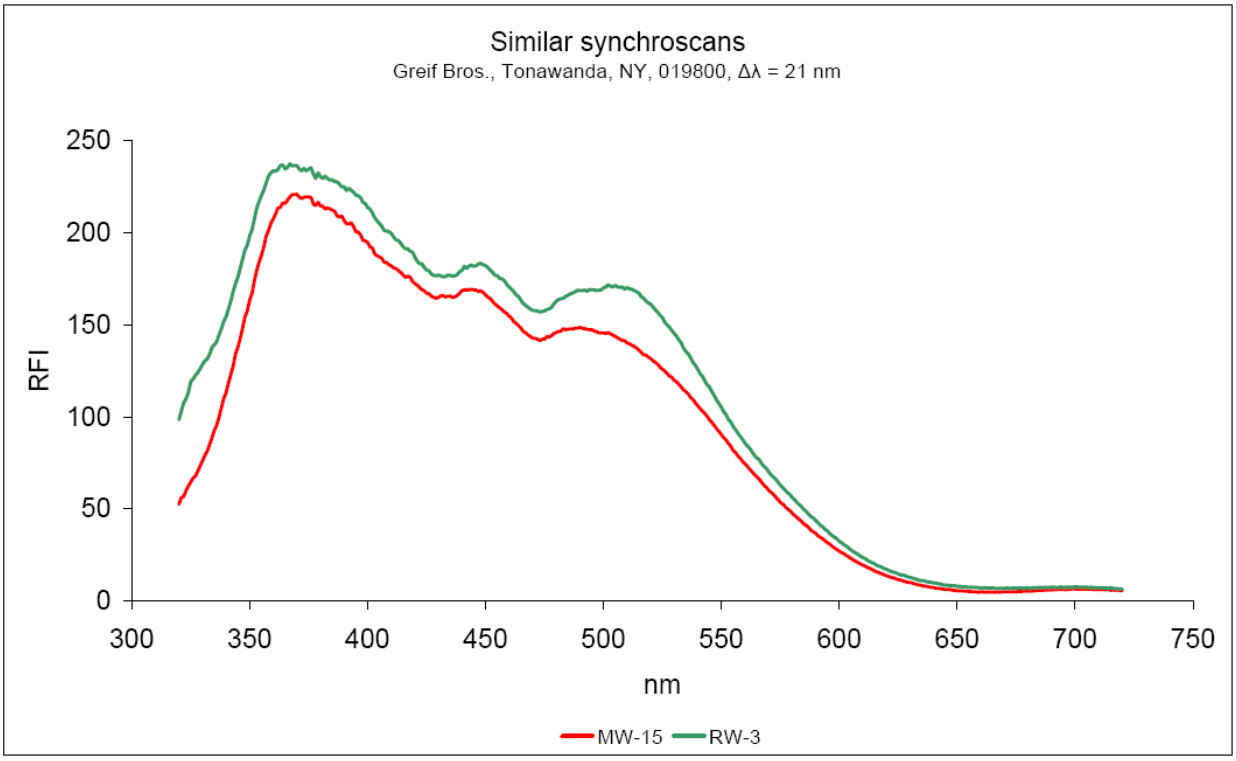

Figure A2: Comparison between well MW-15 (shallow well) and RW-3 (shallow well). Both concentrations similar, which suggests that the ground water is transported quickly between the two wells.

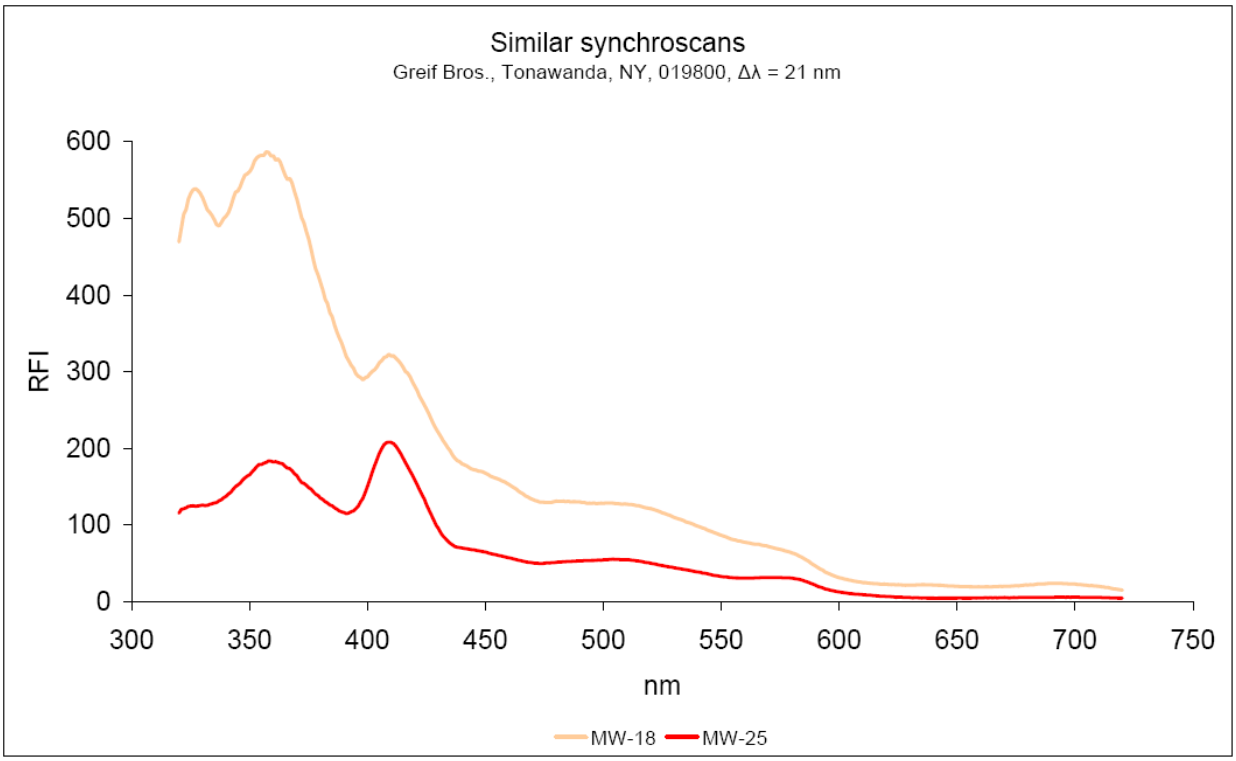

Figure A3: Comparison between well MW-18 (intermediate well) and MW-25 (shallow well).

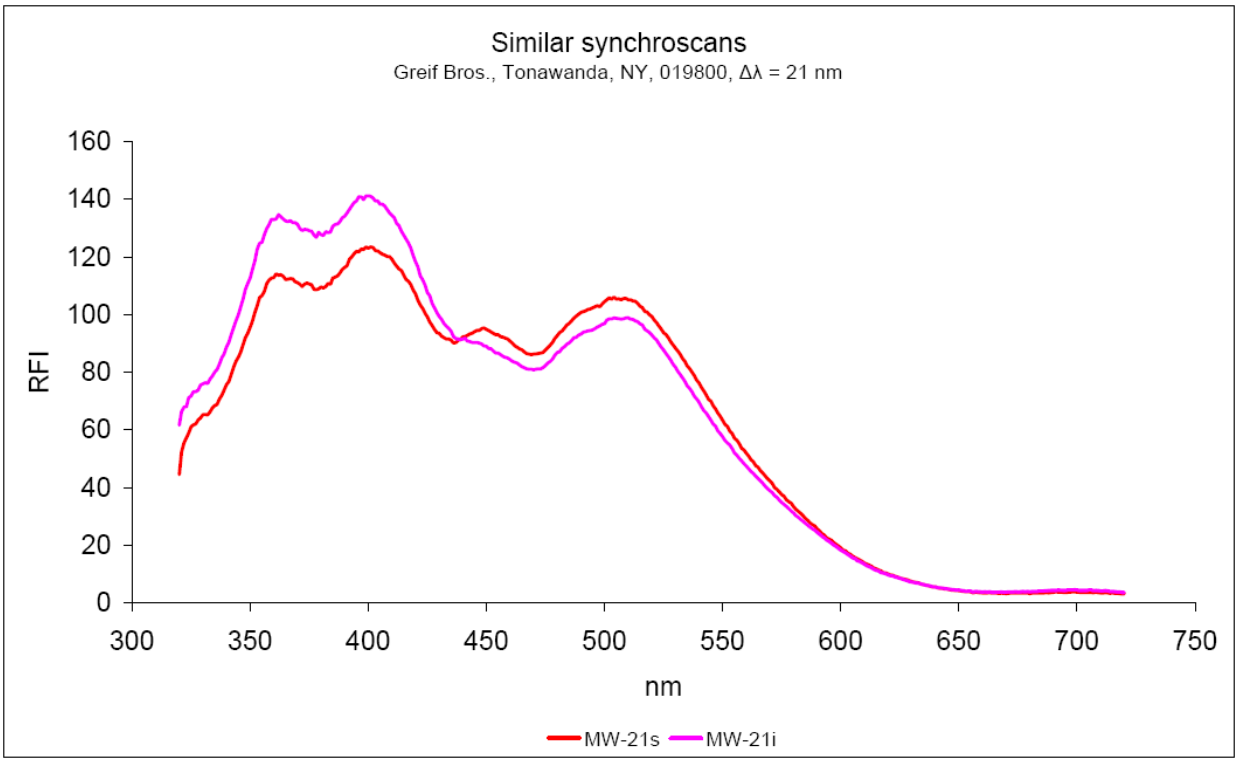

Figure A4: Comparison between well MW-21s (shallow well) and MW-21i (intermediate well).

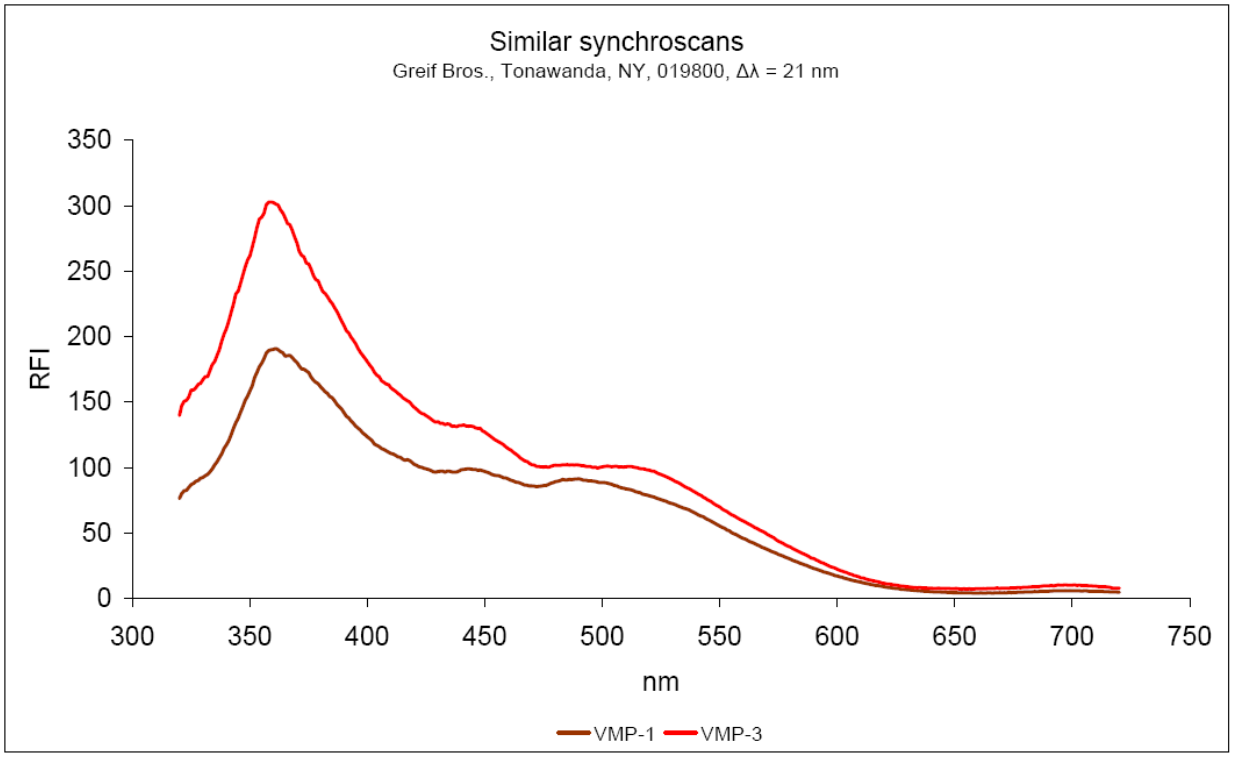

Figure A5: Comparison between well VMP-1 (shallow well) and VMP-3 (shallow well).

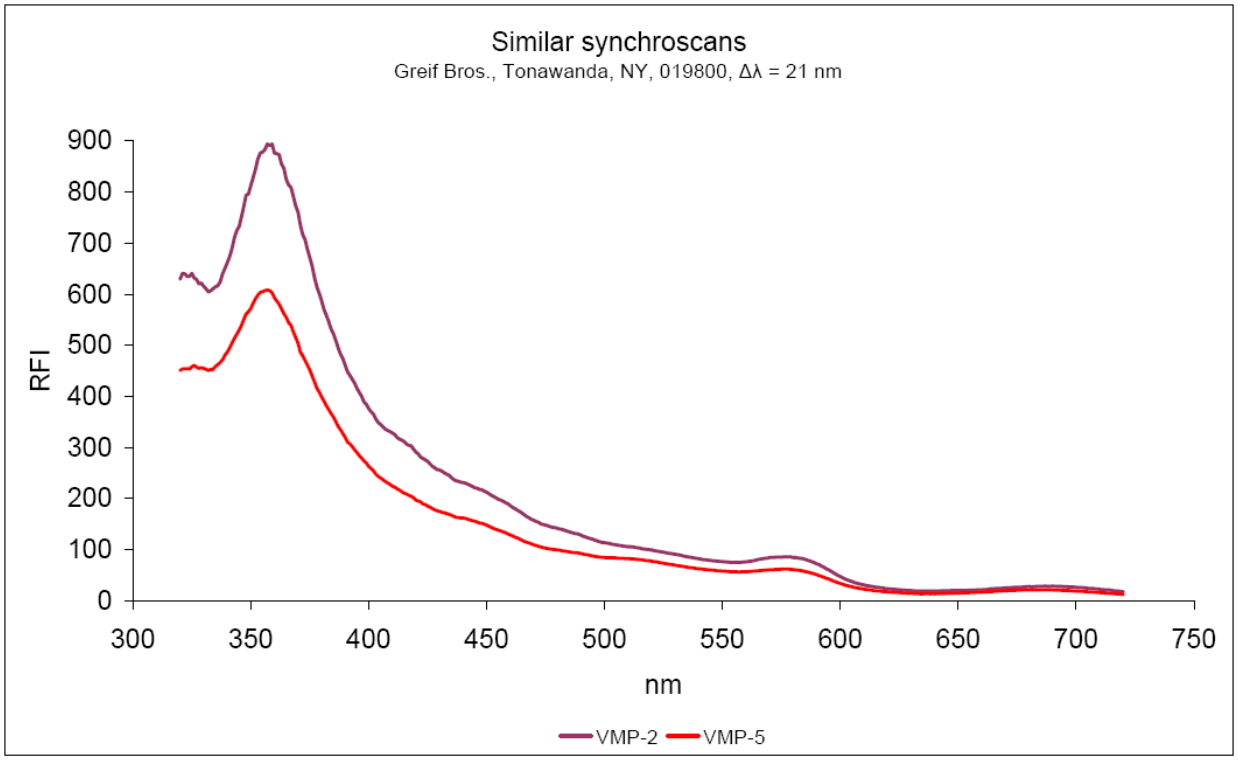

Figure A6: Comparison between well VMP-2 (shallow well) and VMP-5 (shall

Appendix B
FDT – Synchroscans

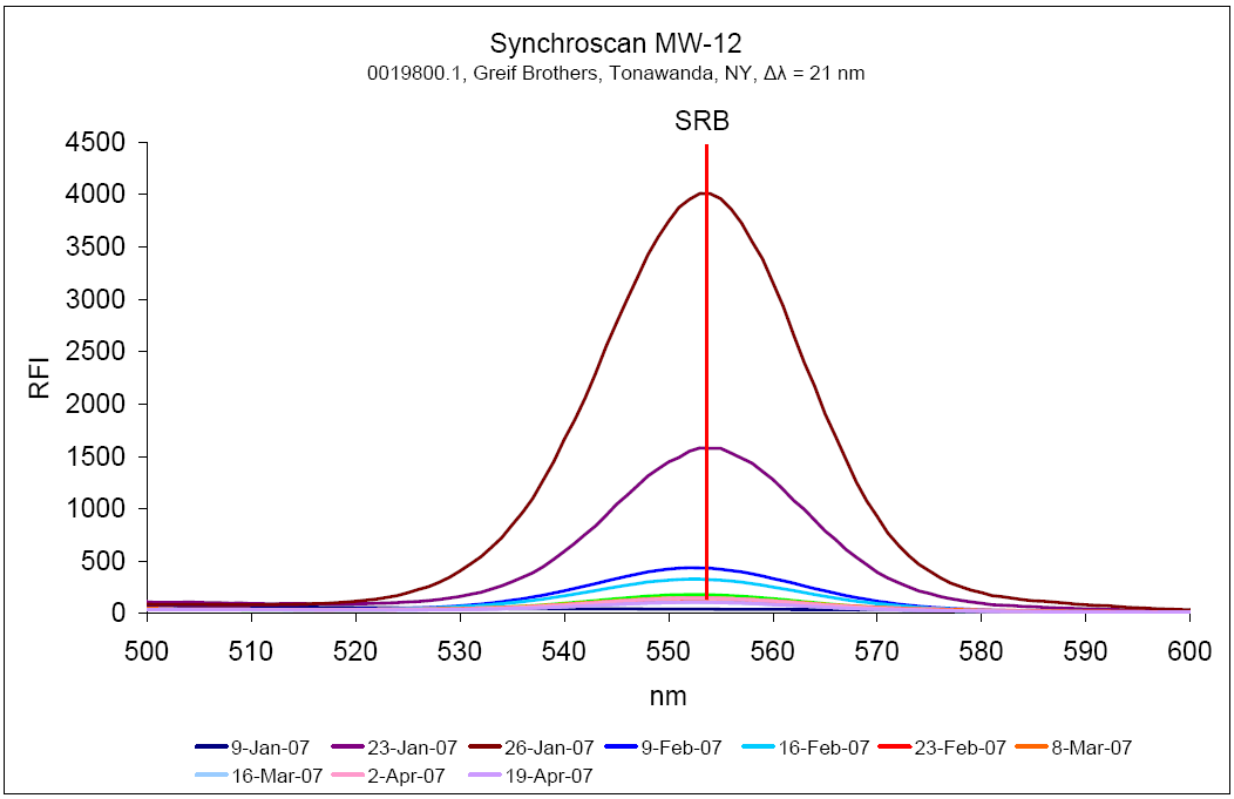

Figure B1: Sulforhodamine G dye reached this well 12 days after dye injection. The maximum concentration of the dye arrived three days later.

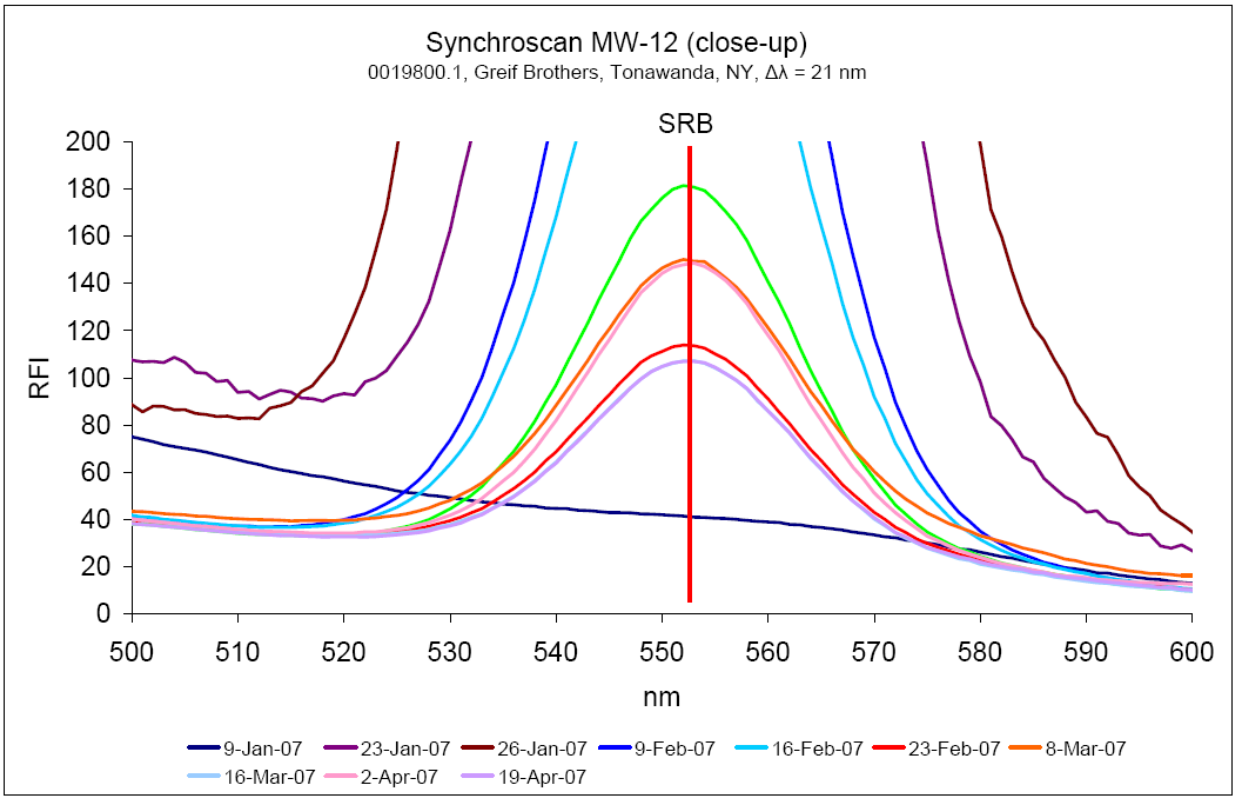

Figure B2 (close-up of Figure A1): The first sample often shows higher background fluorescence than consecutive samples.

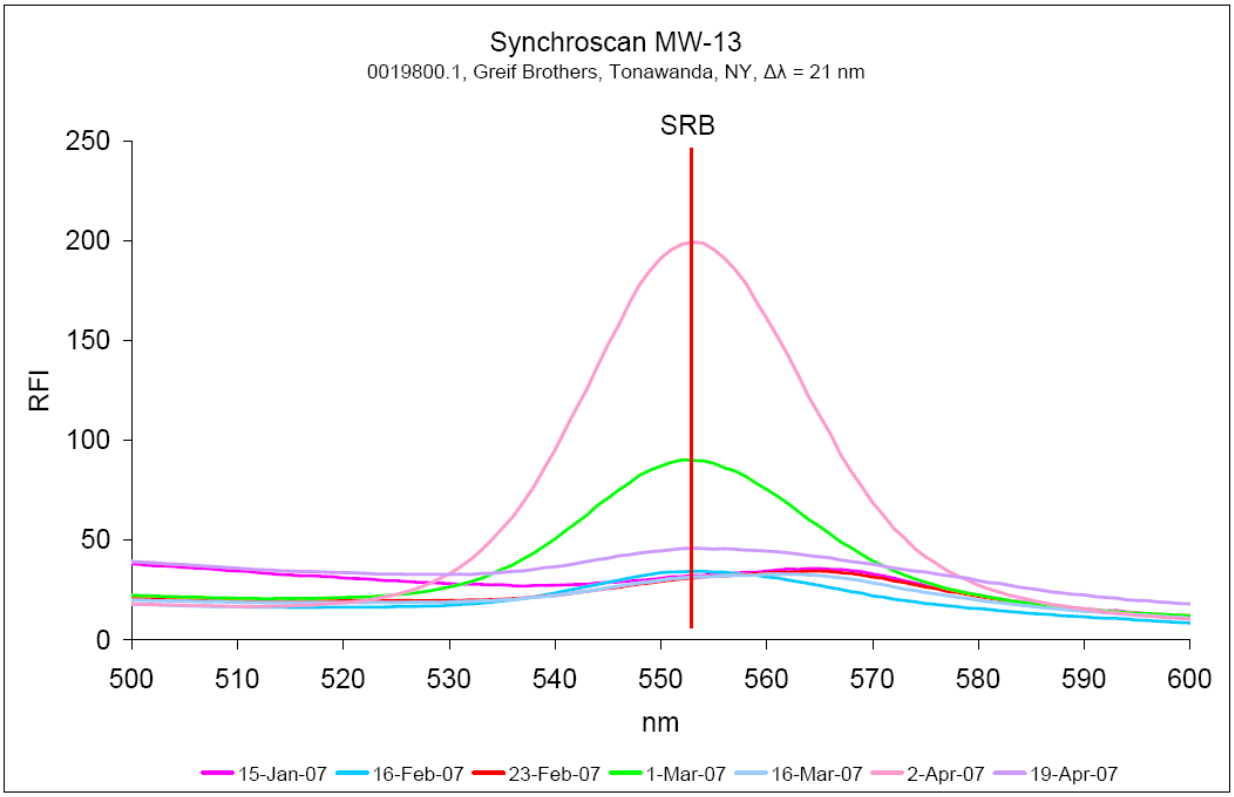

Figure B3: Sulforhodamine G dye reached this well 6 days after dye injection. The maximum concentration of the dye arrived 75 days later.

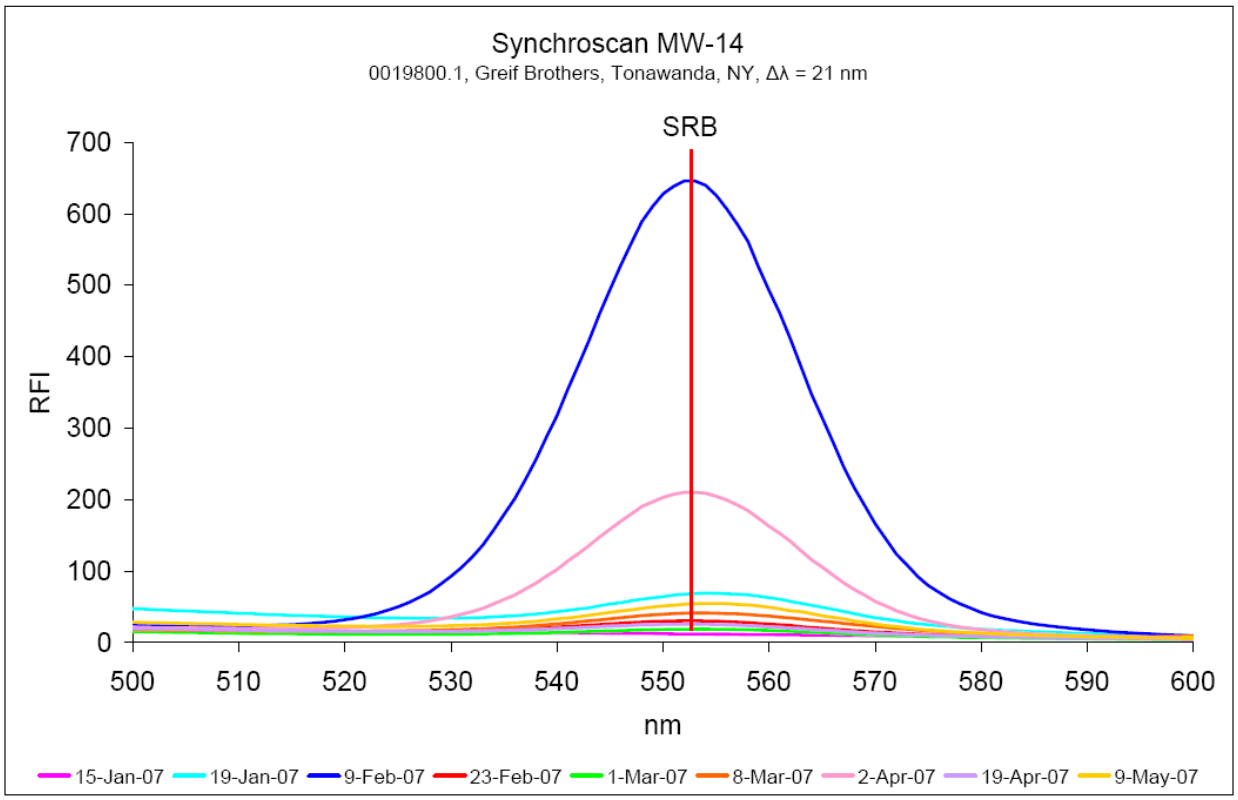

Figure B4: Sulforhodamine G dye reached this well 8 days after dye injection. The maximum concentration of the dye arrived at the well 21 days later.

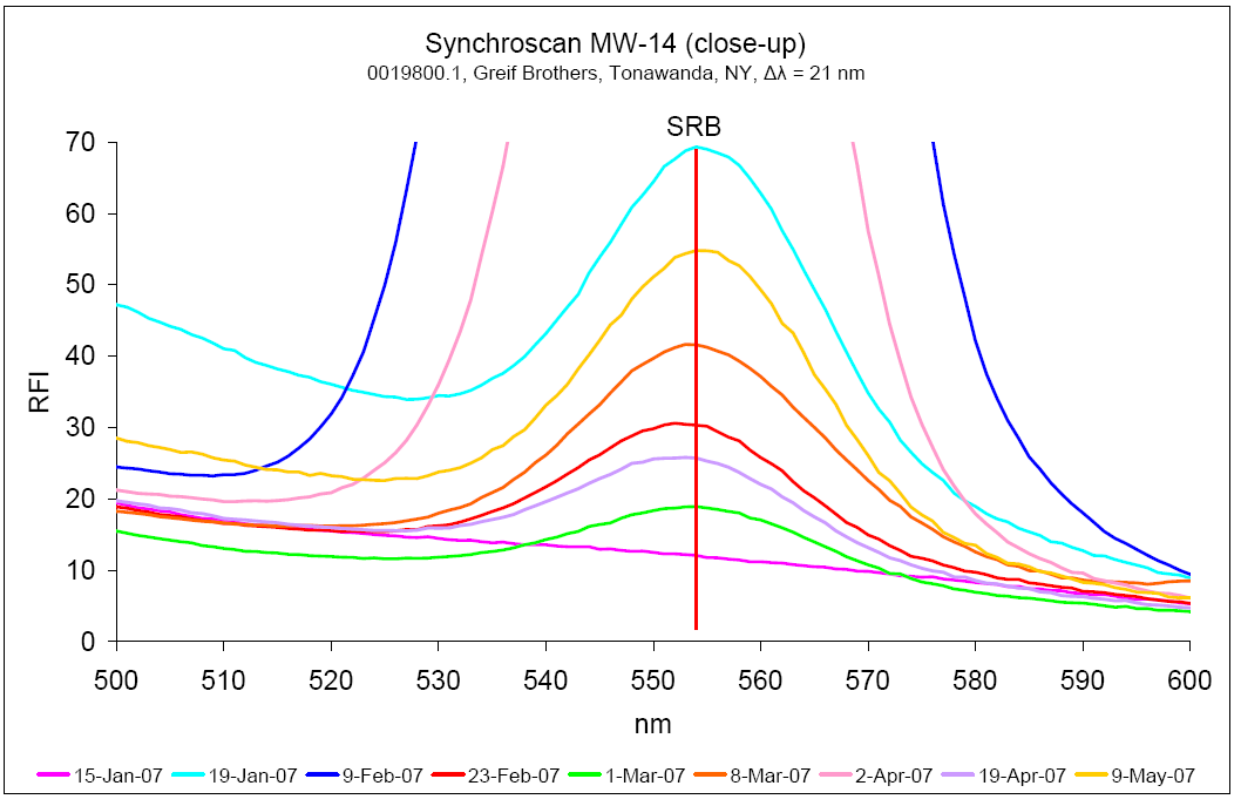

Figure B5 (close-up of Figure B4): The first sample often shows higher background fluorescence than consecutive samples.

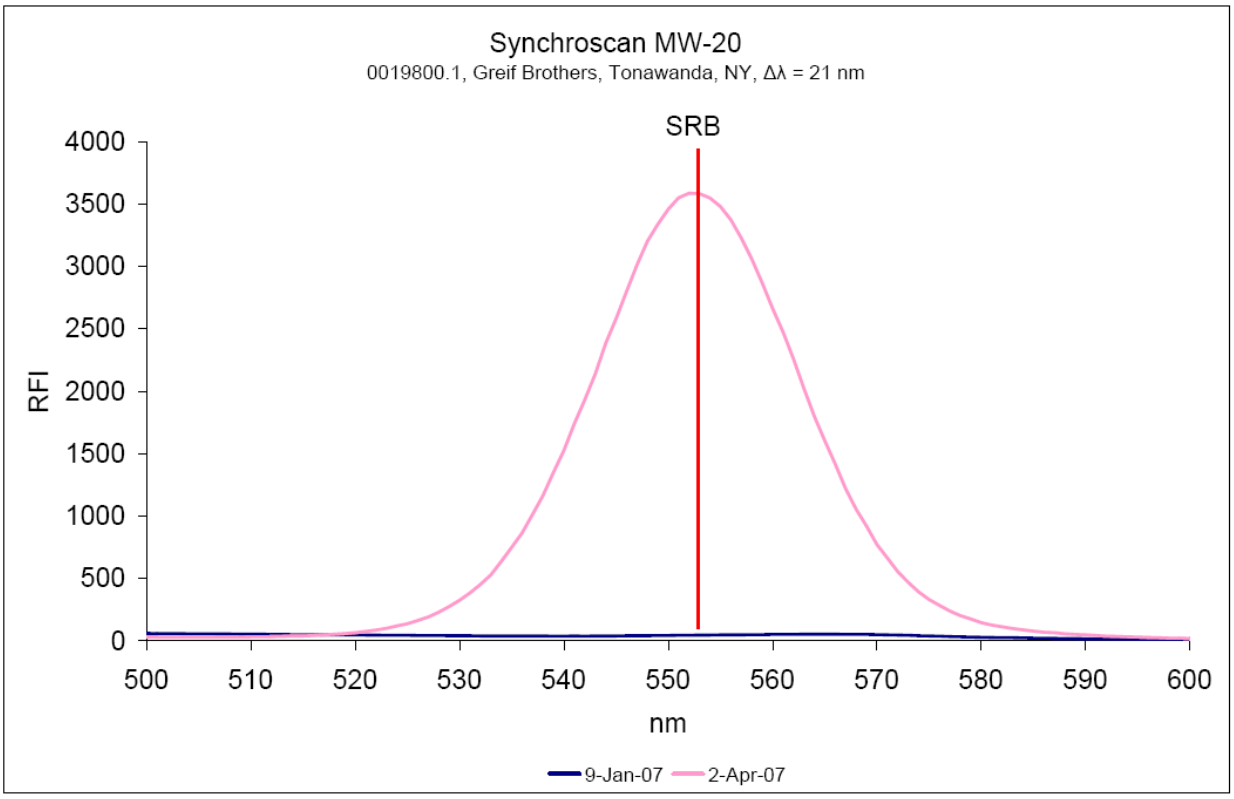

Figure B6: Sulforhodamine G dye reached this well 81 days after dye injection and the maximum in concentration of the dye arrived the same day. The “dye first arrival" and "peak concentration" travel times are similar; the arrival time appear to be the same based the frequency of sampling events. These similarities in arrival time suggest the injection and monitoring well are interconnected by a faster flowing preferential ground water flow path.

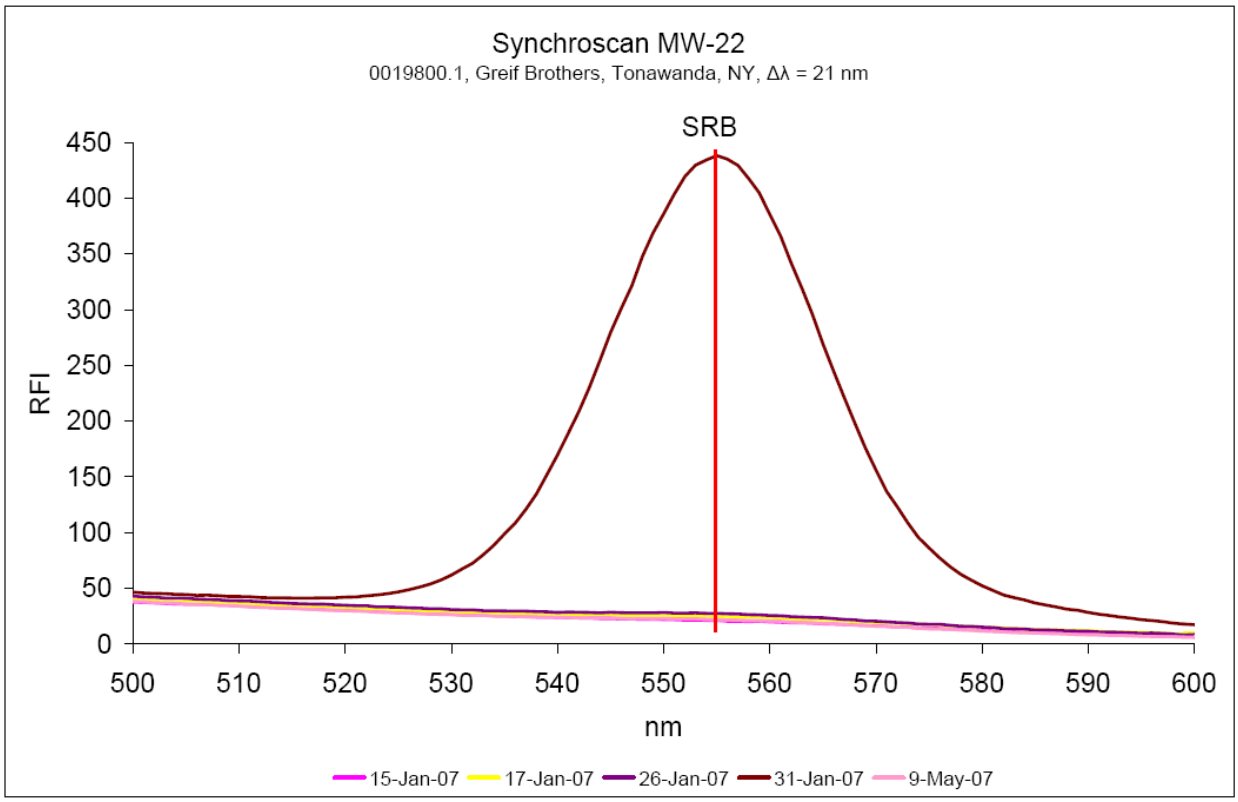

Figure B7: Sulforhodamine G dye reached this well 6 days after dye injection. The maximum concentration of dye arrived 14 days later.

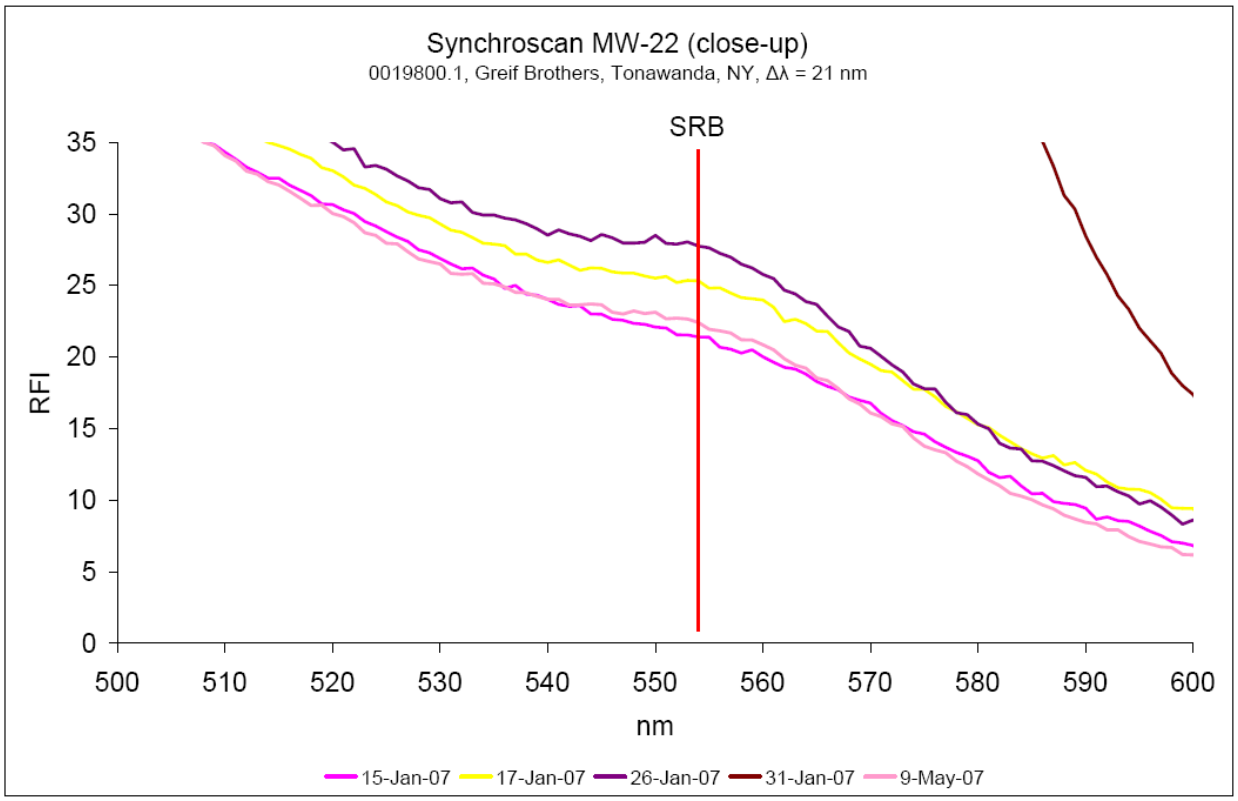

Figure B8: Close up of Figure B7.

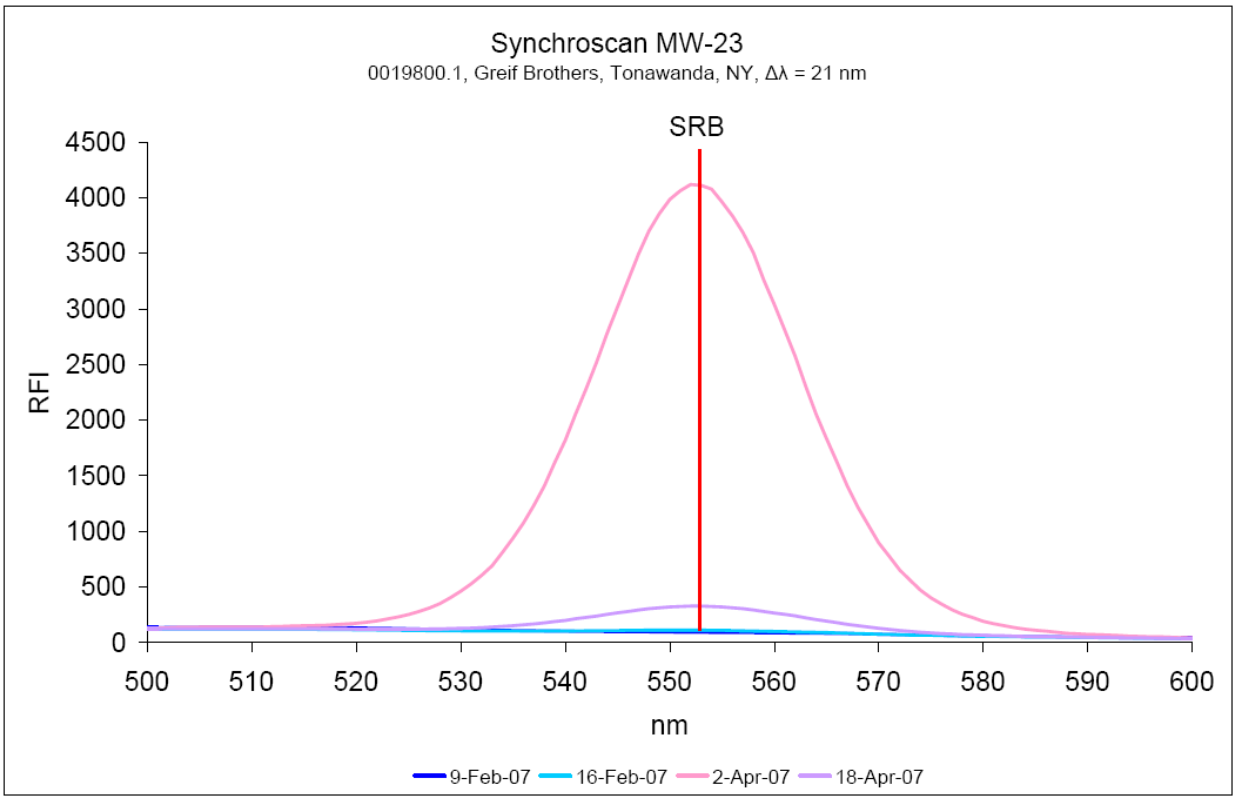

Figure B9: Sulforhodamine G dye reached this well 36 days after dye injection. The maximum concentration of the dye arrived 45 days later. The origin of the ground water in monitoring well MW-23 was the main focus of this fluorescent dye-tracing (FDT) test. Water originating adjacent to the varnish pit (VMP-2) reached MW-23 in slightly more than a month.

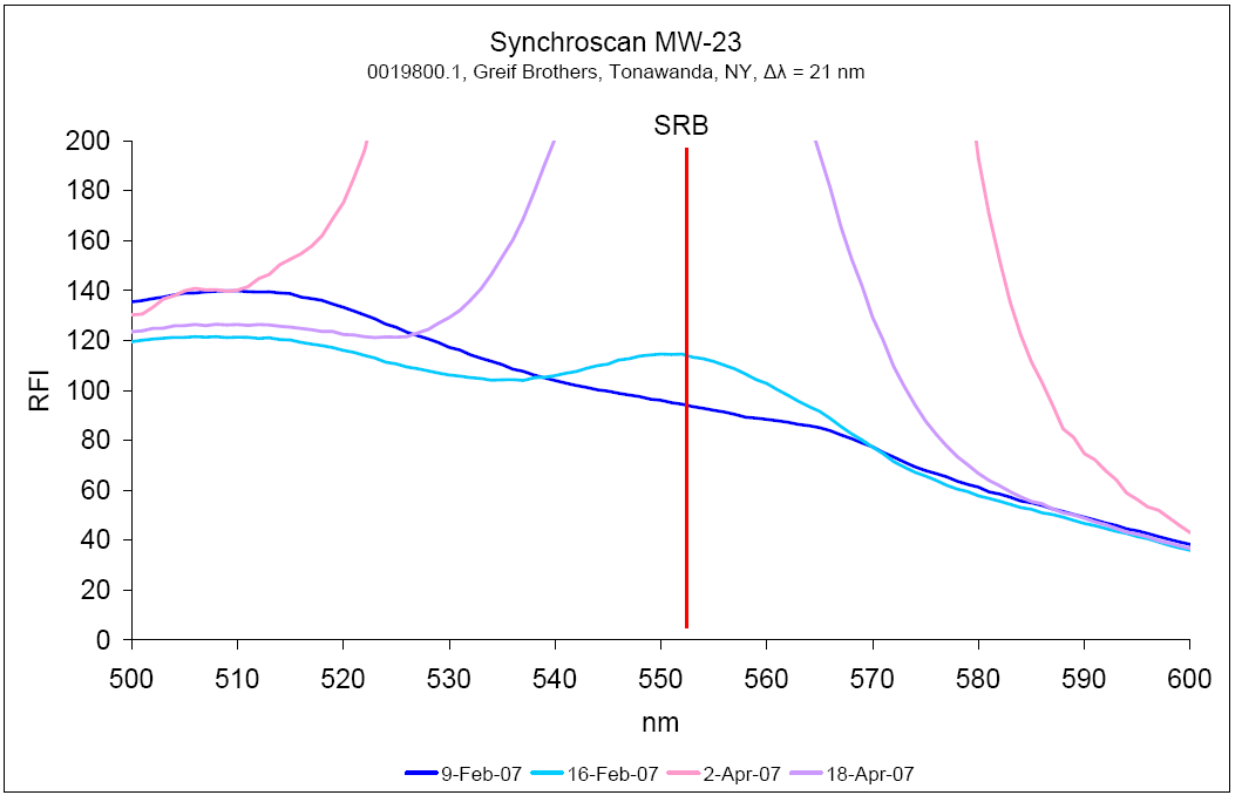

Figure B10: close-up of Figure B9.

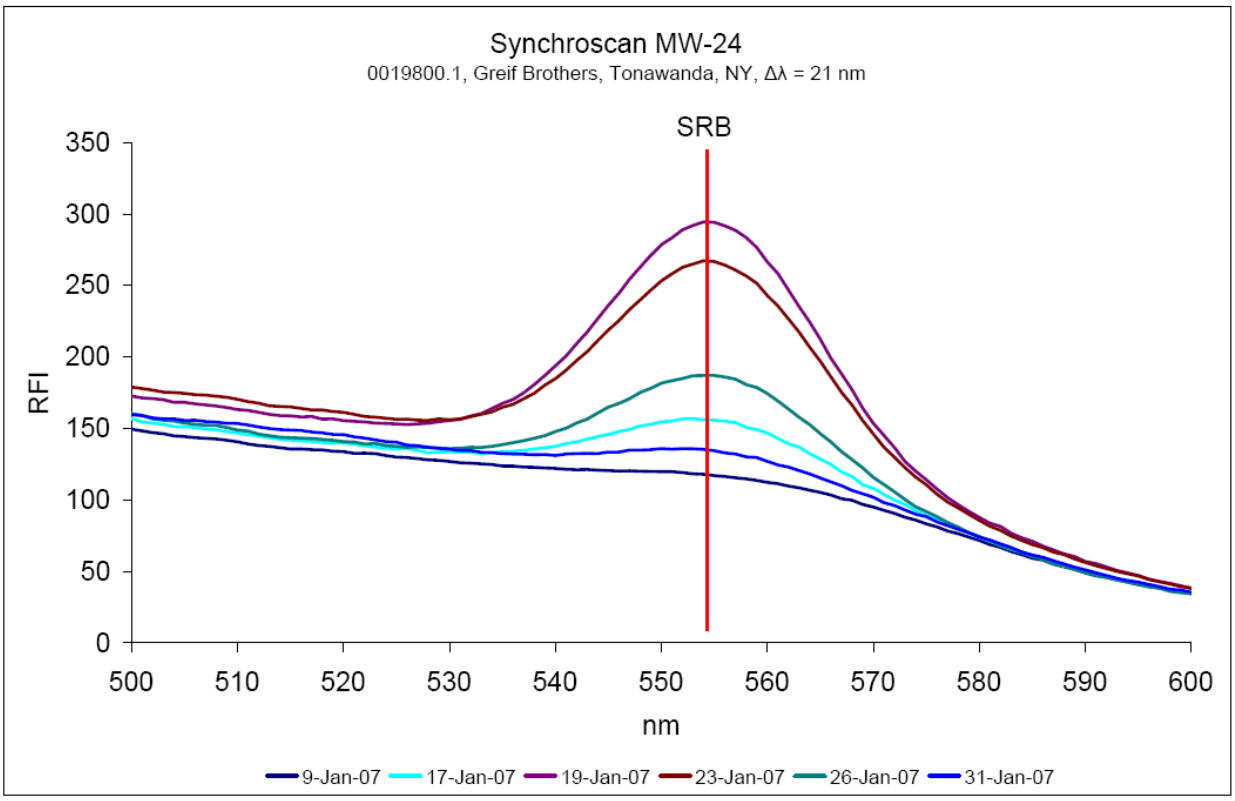

Figure B11: Sulforhodamine G dye reached this well 37 days after dye injection. The maximum concentration of the dye arrived two days later.

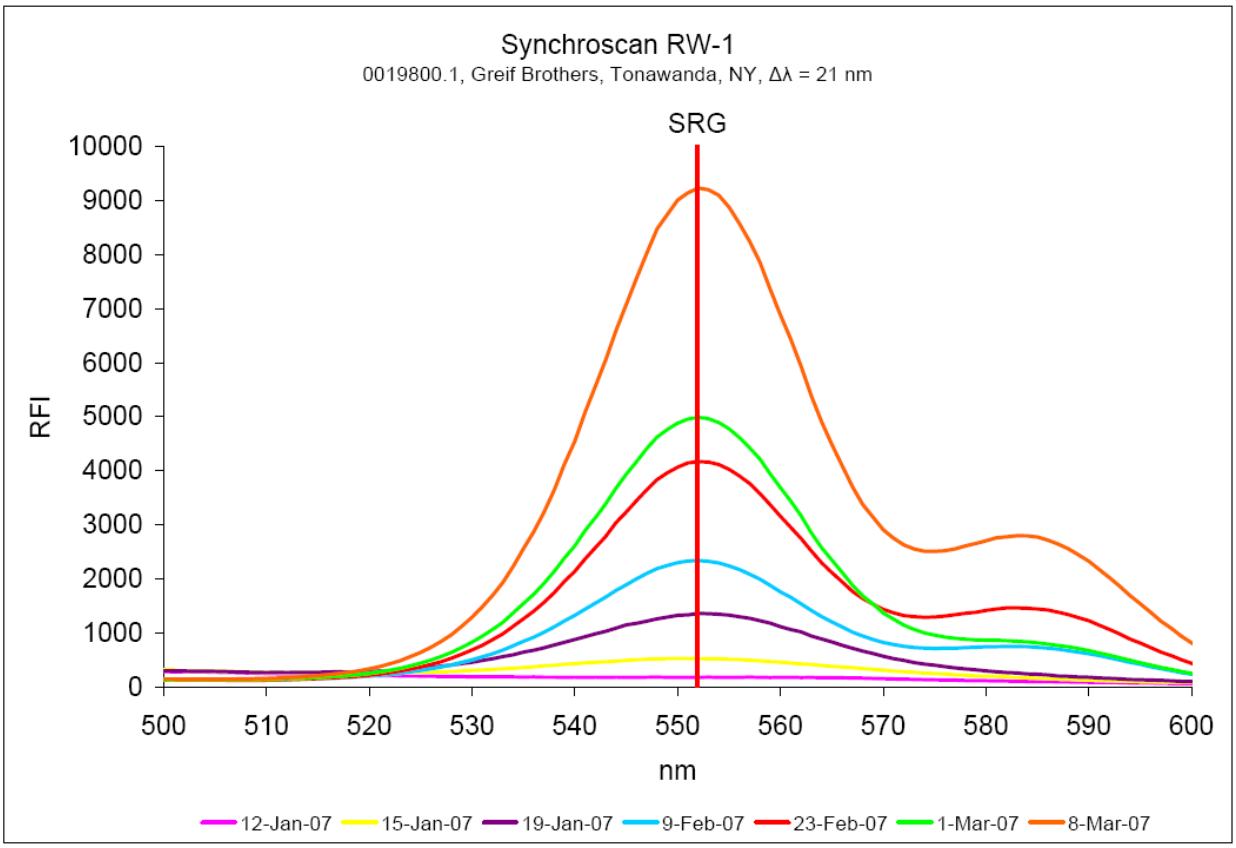

Figure B12: Sulforhodamine G dye reached this well 4 days after dye injection. The maximum concentration of dye arrived 83 days later.

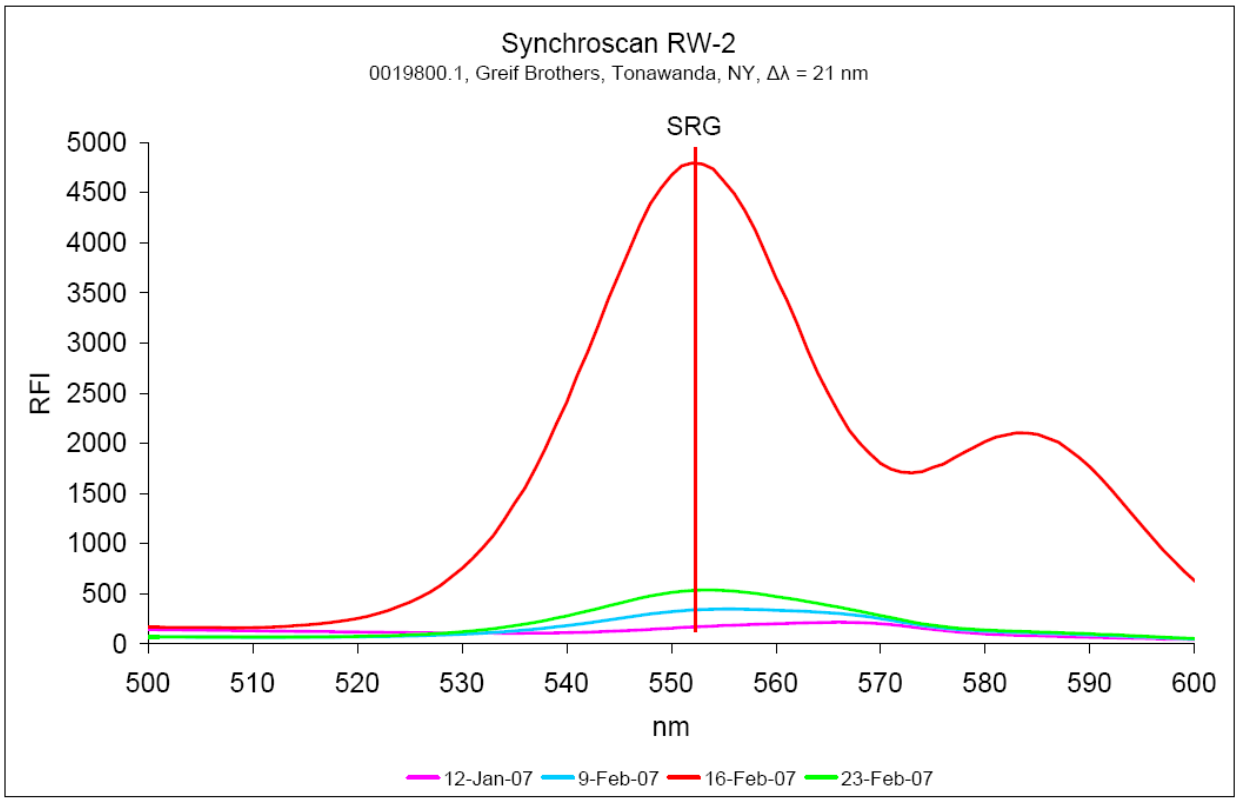

Figure B13: Sulforhodamine G dye reached this well 12 days after dye injection. The maximum concentration of dye arrived 24 days later.

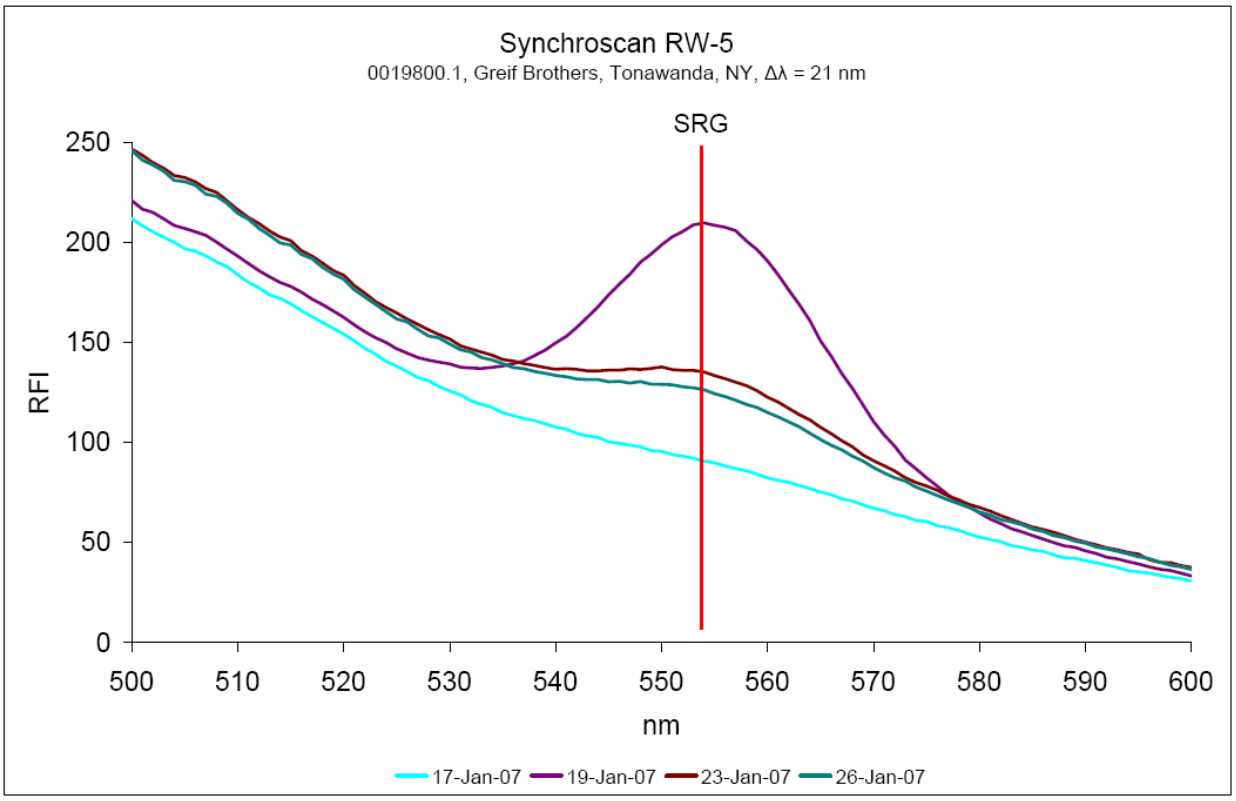

Figure B14: Sulforhodamine G dye reached this well 8 days after dye injection and the maximum concentration of dye arrived the same day.

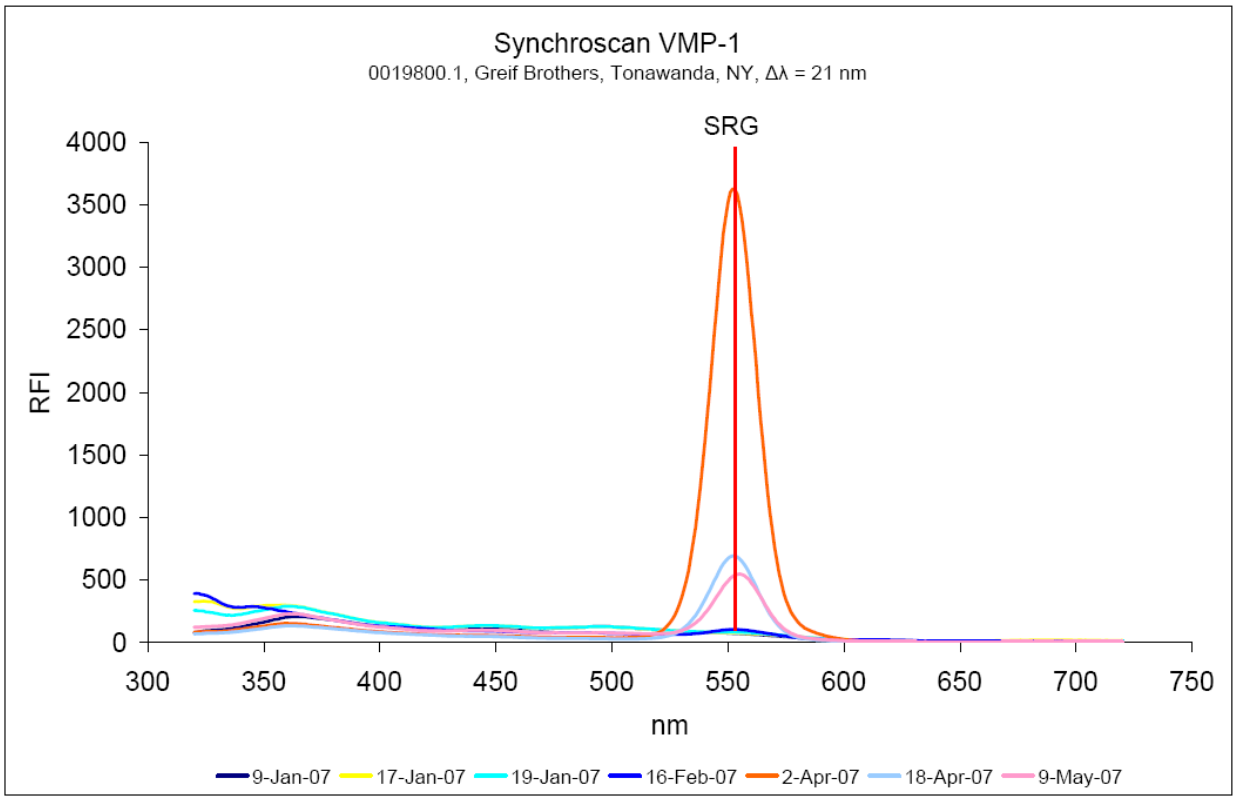

Figure B15: Sulforhodamine G dye reached this well 6 days after dye injection. The maximum concentration of dye arrived 75 days later.

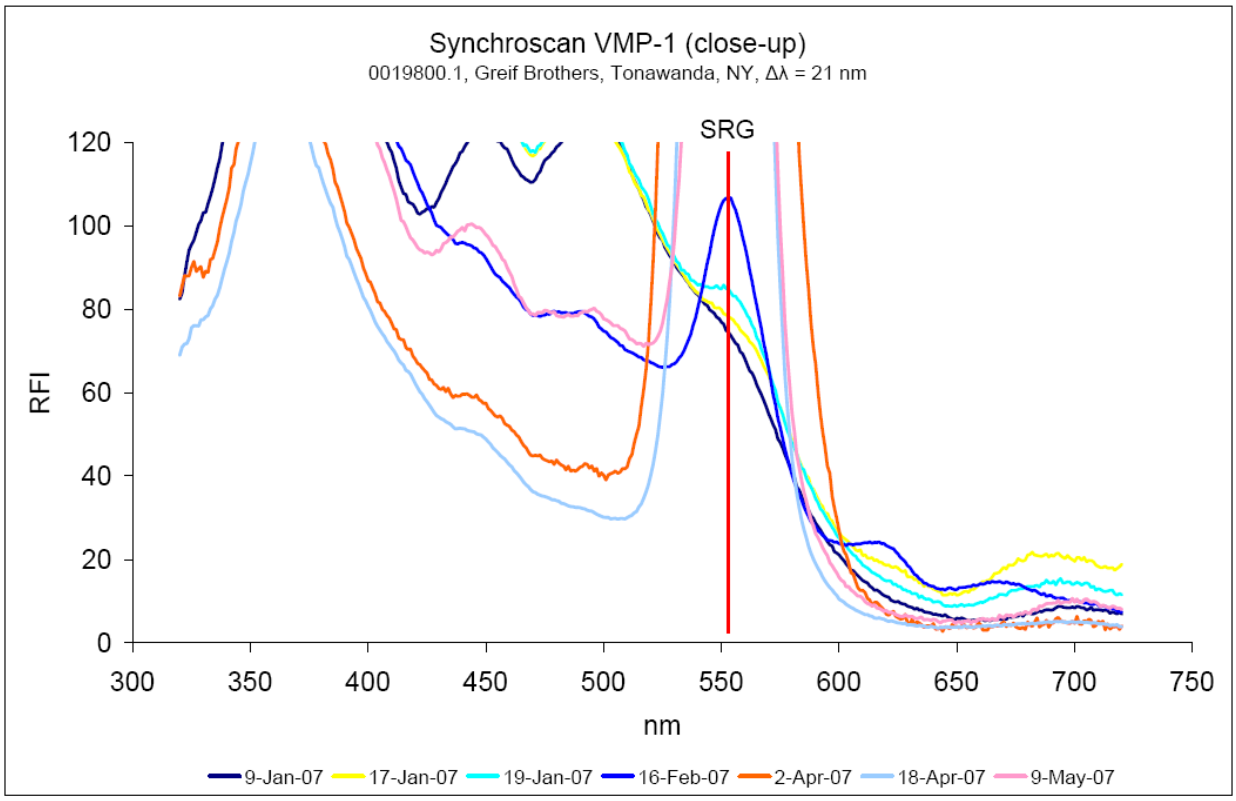

Figure B16: Close-up of figure B15

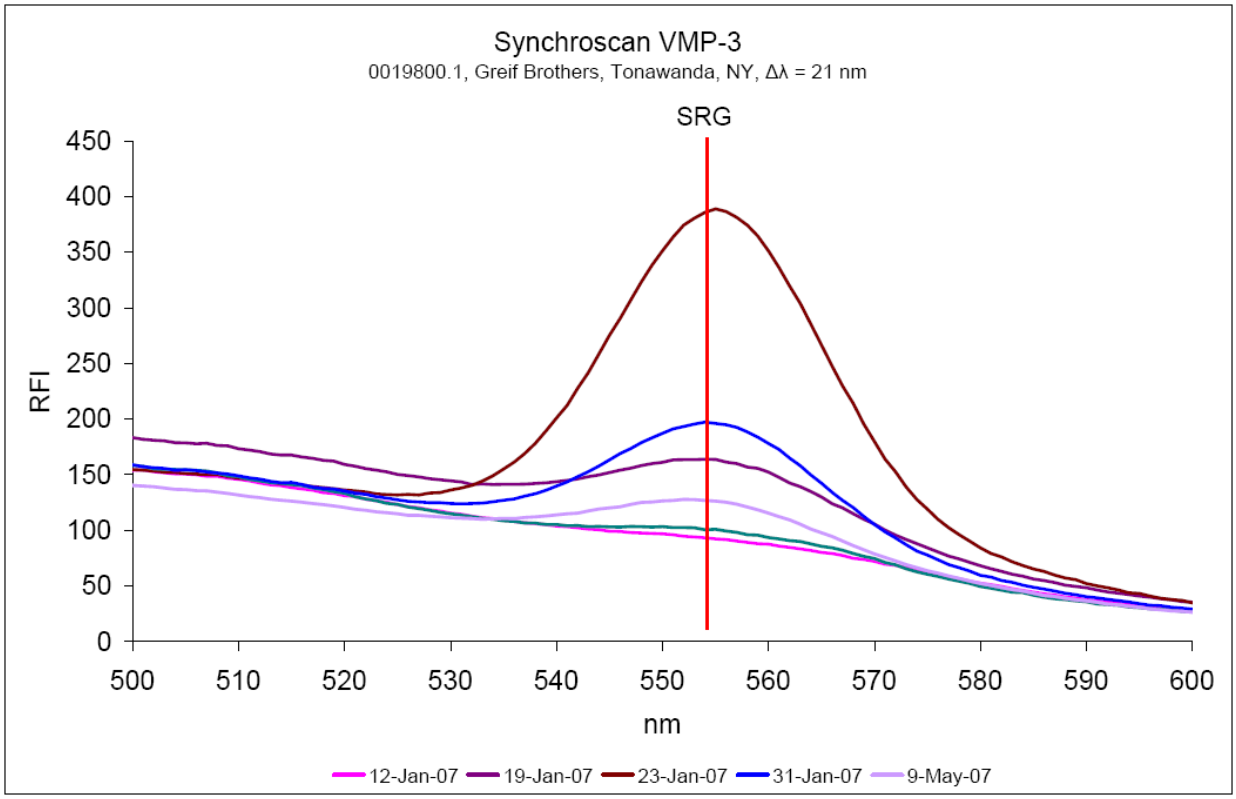

Figure B17: Sulforhodamine G dye reached this well 8 days after dye injection. The main concentration of dye arrived four days later.

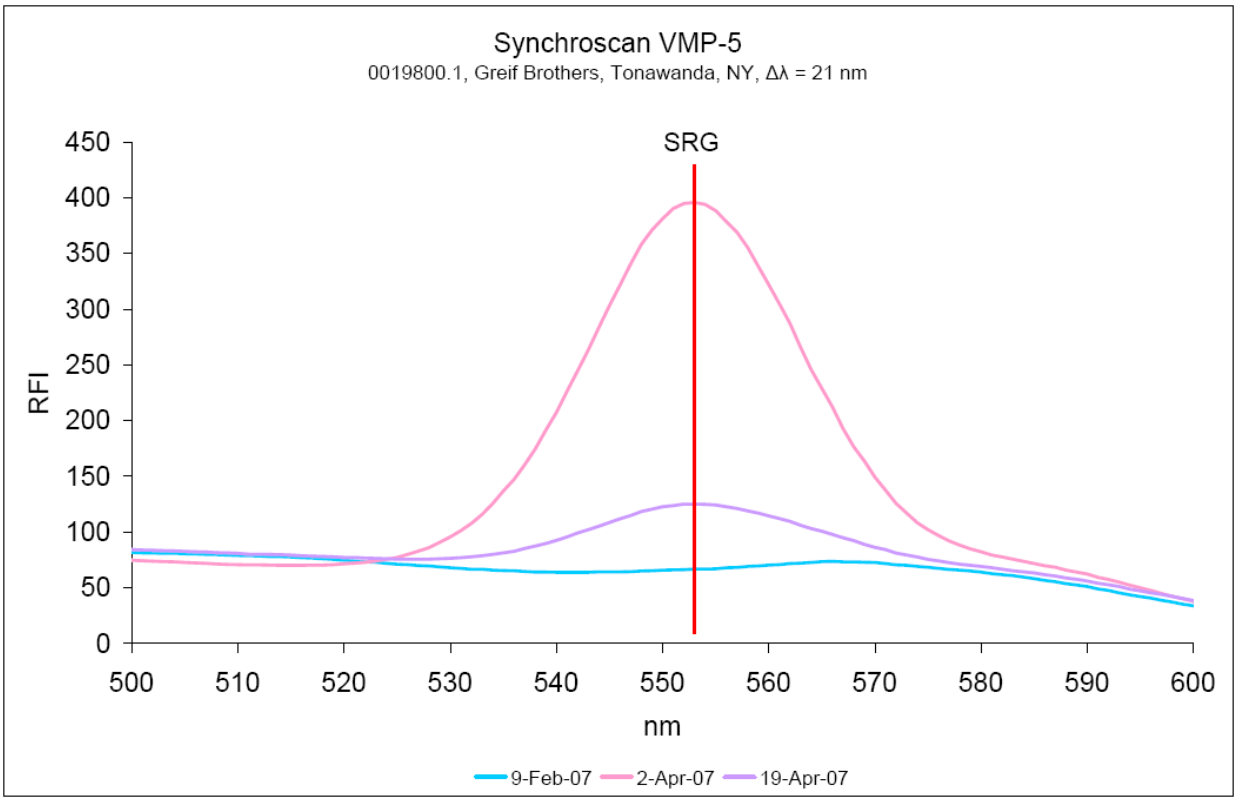

Figure B18: Sulforhodamine G dye reached this well 8 days after dye injection. The maximum concentration of dye arrived 73 days later.

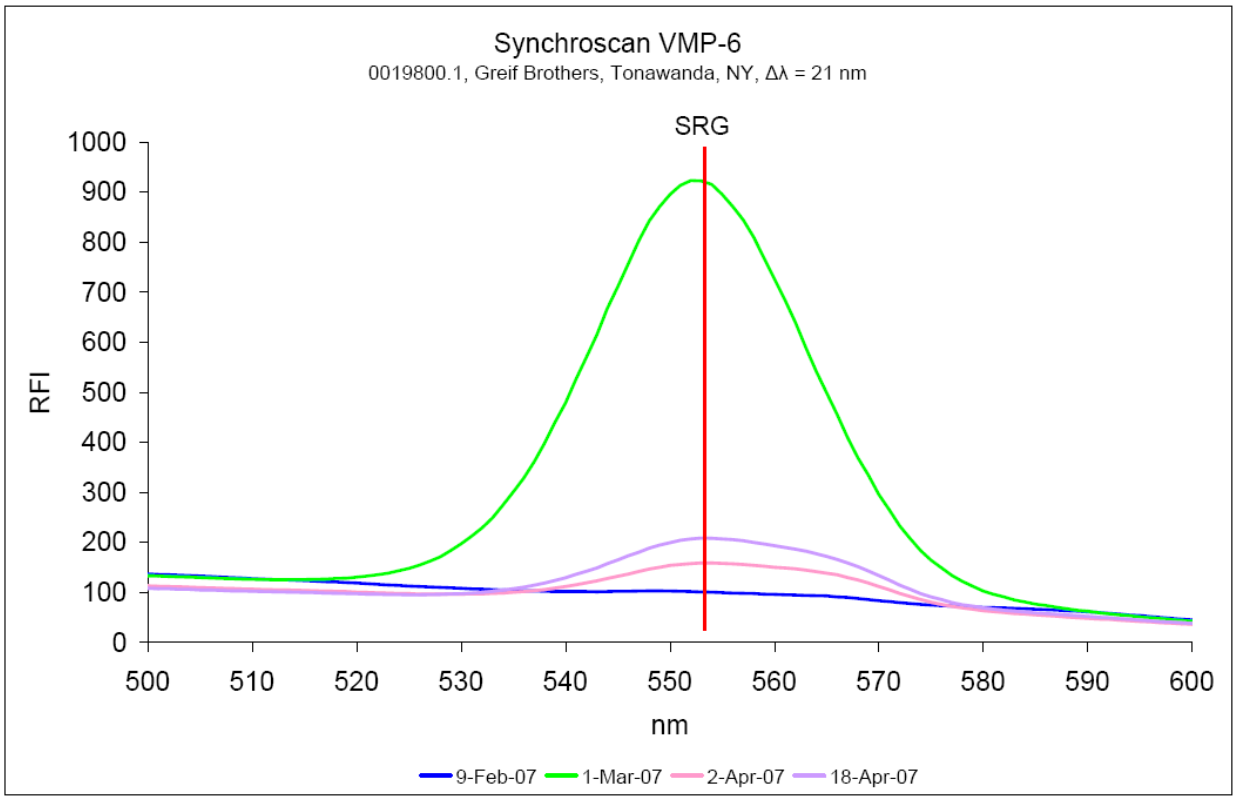

Figure B19: Sulforhodamine G dye reached this well 15 days after dye injection. The maximum concentration of dye arrived 34 days later.

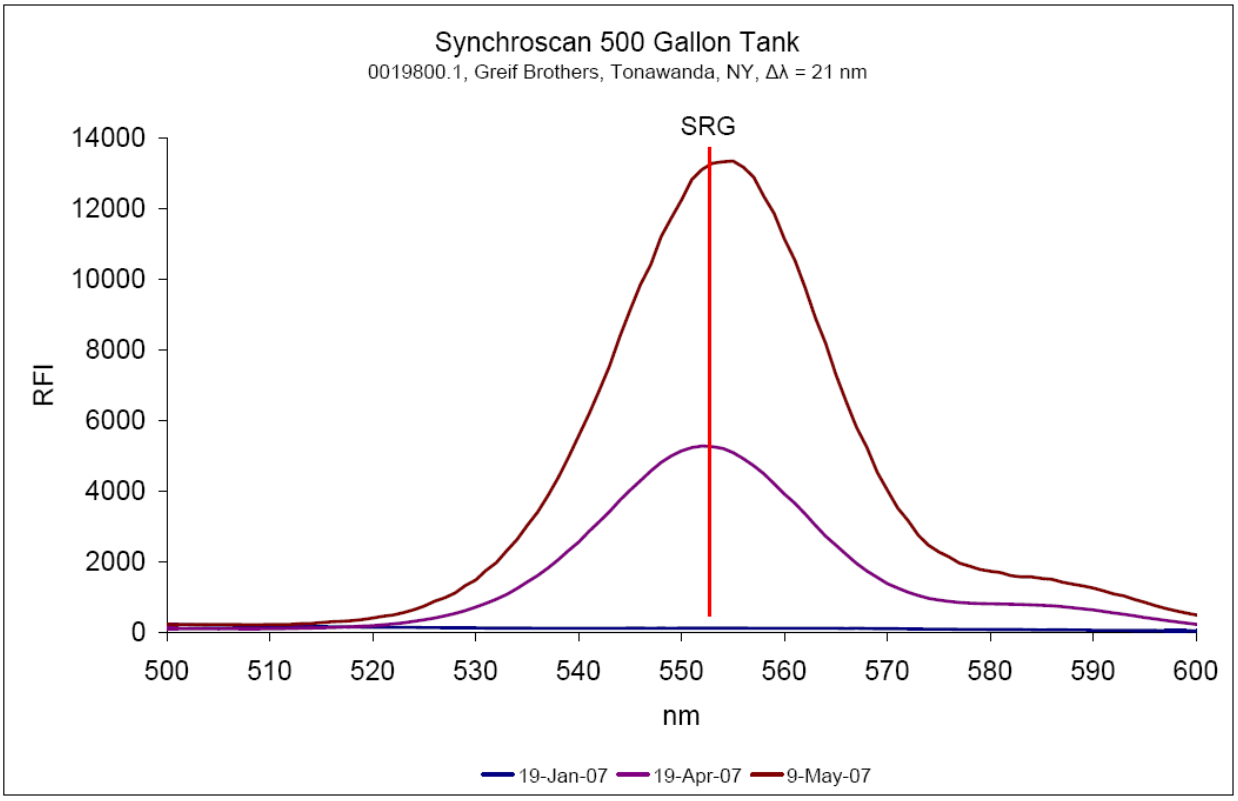

Figure B20: Sulforhodamine G dye was first detected in the liquid storage tank for the DNAPL Recovery IRM Pumping System 12 days after dye injection. However, the dye concentration had not reached its maximum after 109 days when the observation period of the dye test was ended. The liquid recovery tank collected the total fluids being pumped from recovery wells RW-1, RW-2, RW-4 and RW-5 throughout the FDT.

Appendix C
Breakthrough Curves – RFI vs. Time

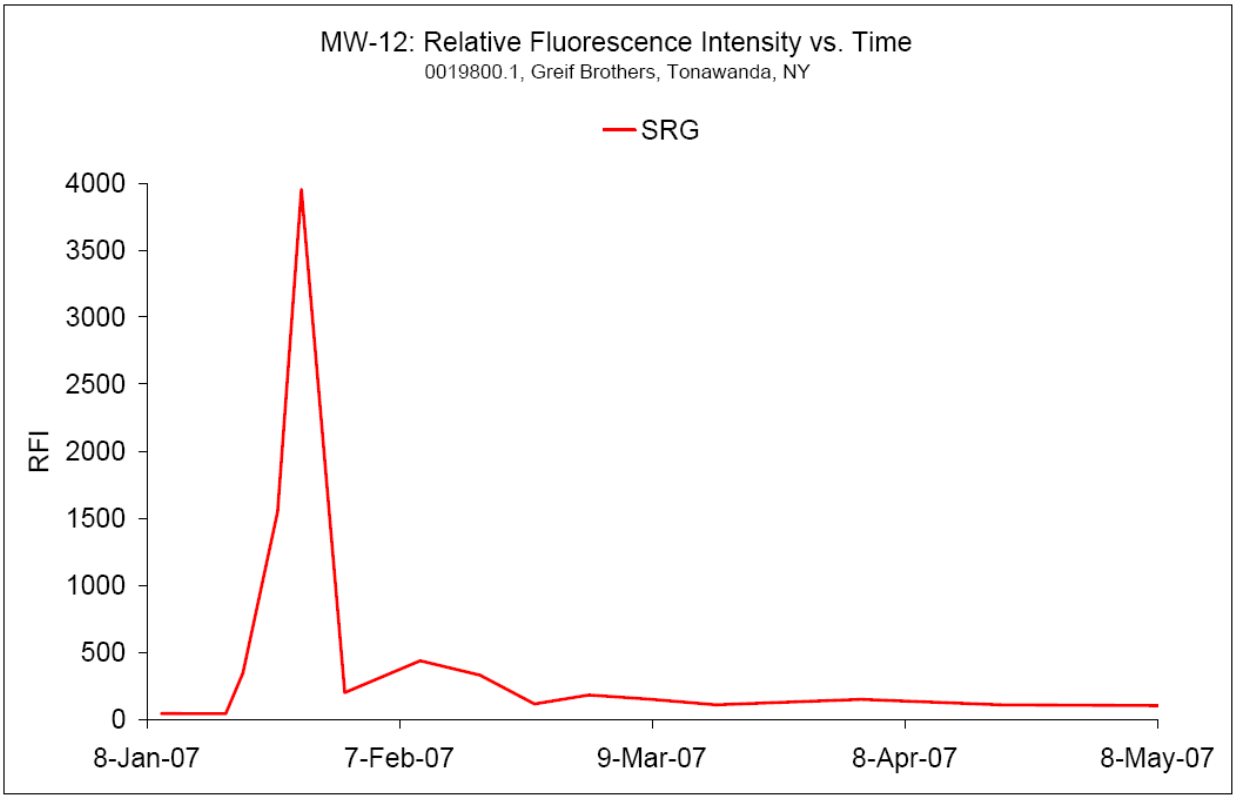

Figure C1: The dye breakthrough curve shows that the maximum dye concentration reached this well 15 days after dye injection.

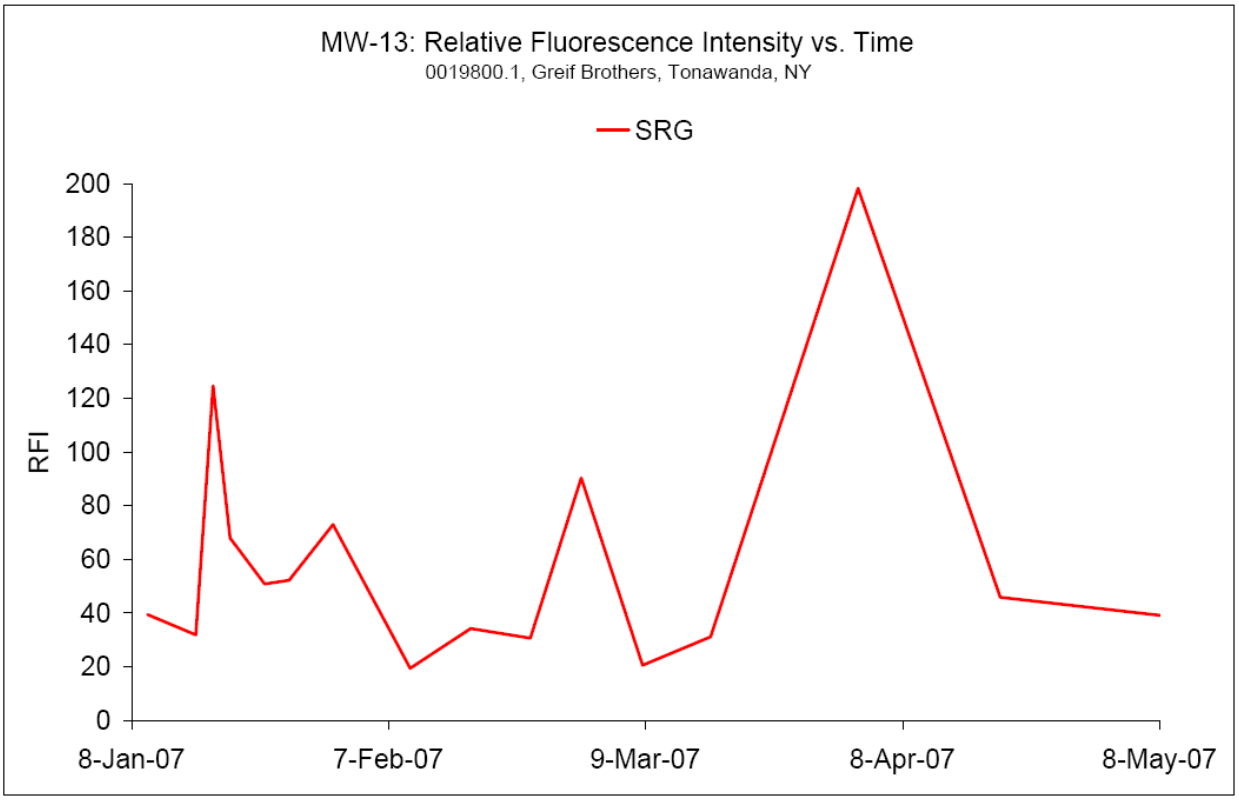

Figure C2: The dye breakthrough curve shows that the maximum dye concentration reached this well 81 days after dye injection.

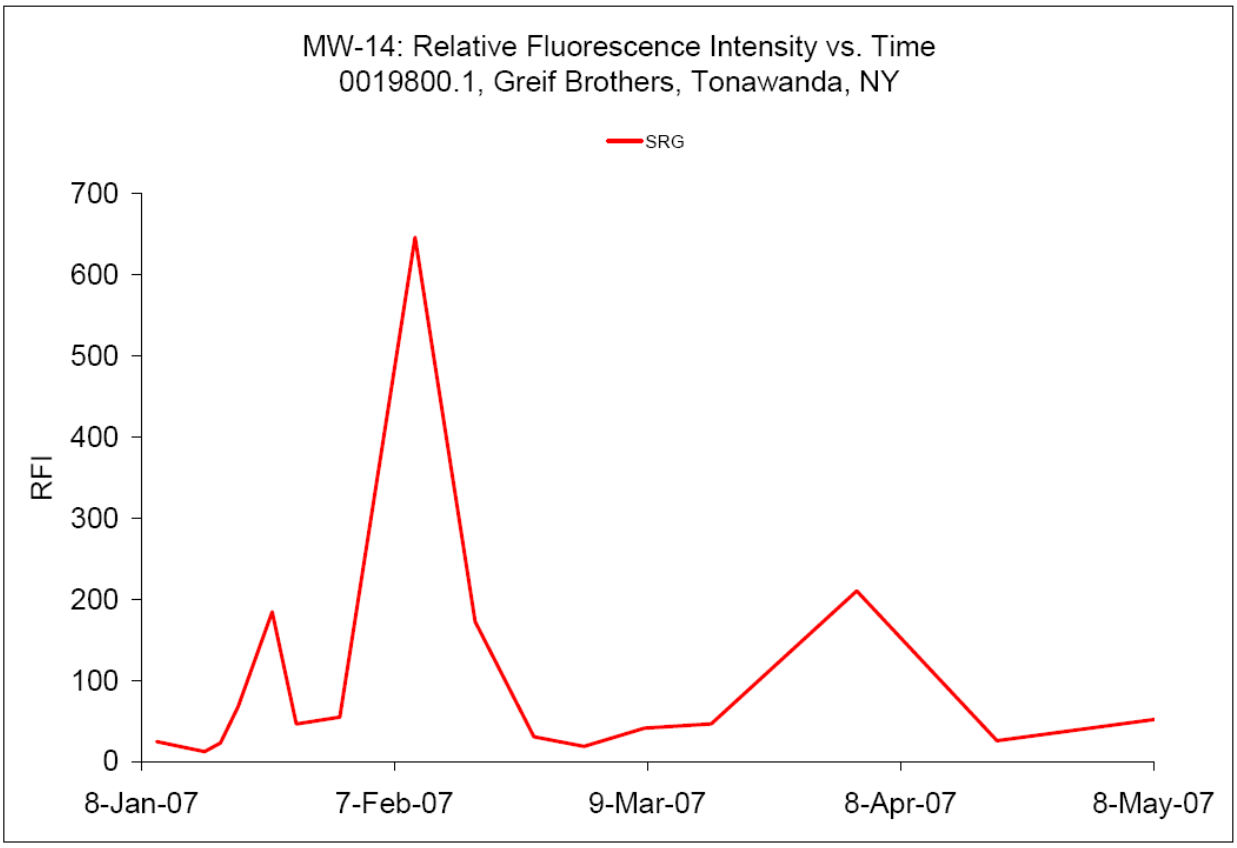

Figure C3: The dye breakthrough curve shows that the maximum dye concentration reached this well 29 days after dye injection.

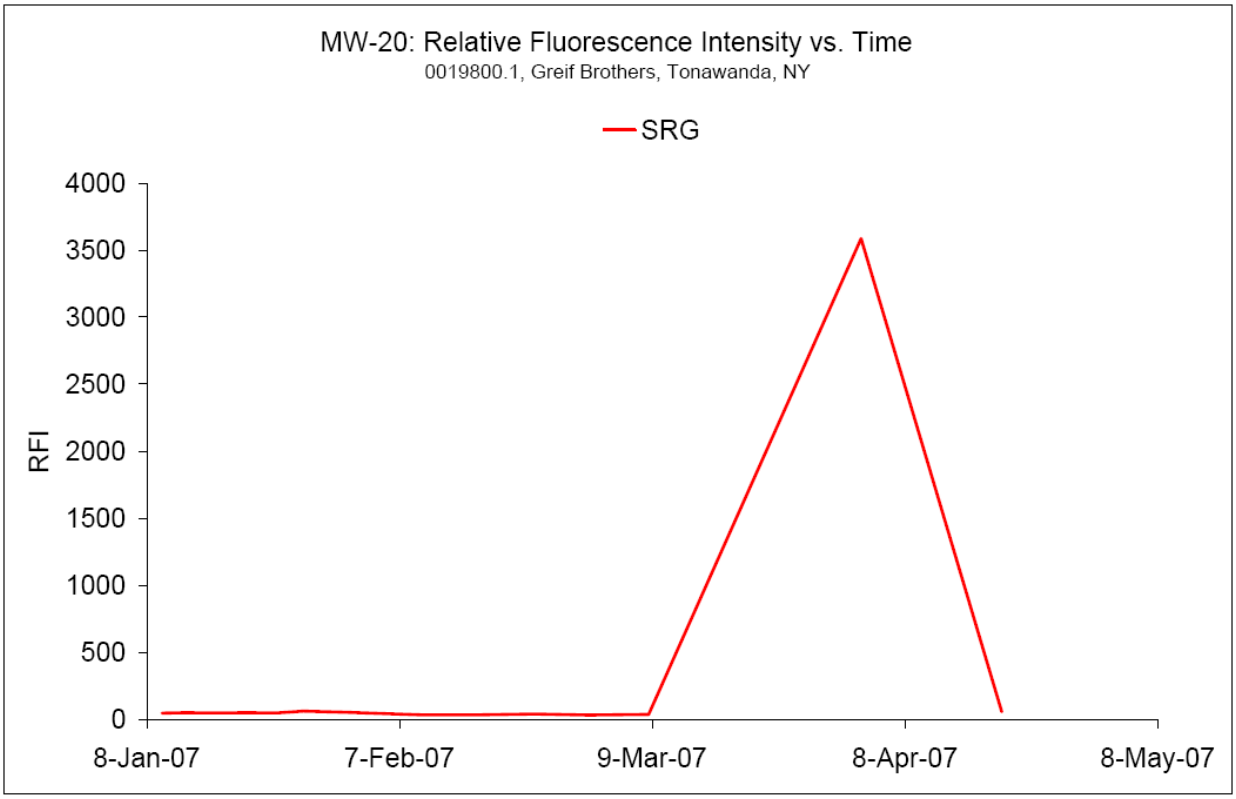

Figure C4: The dye breakthrough curve shows that the maximum dye concentration reached this well 81 days after dye injection.

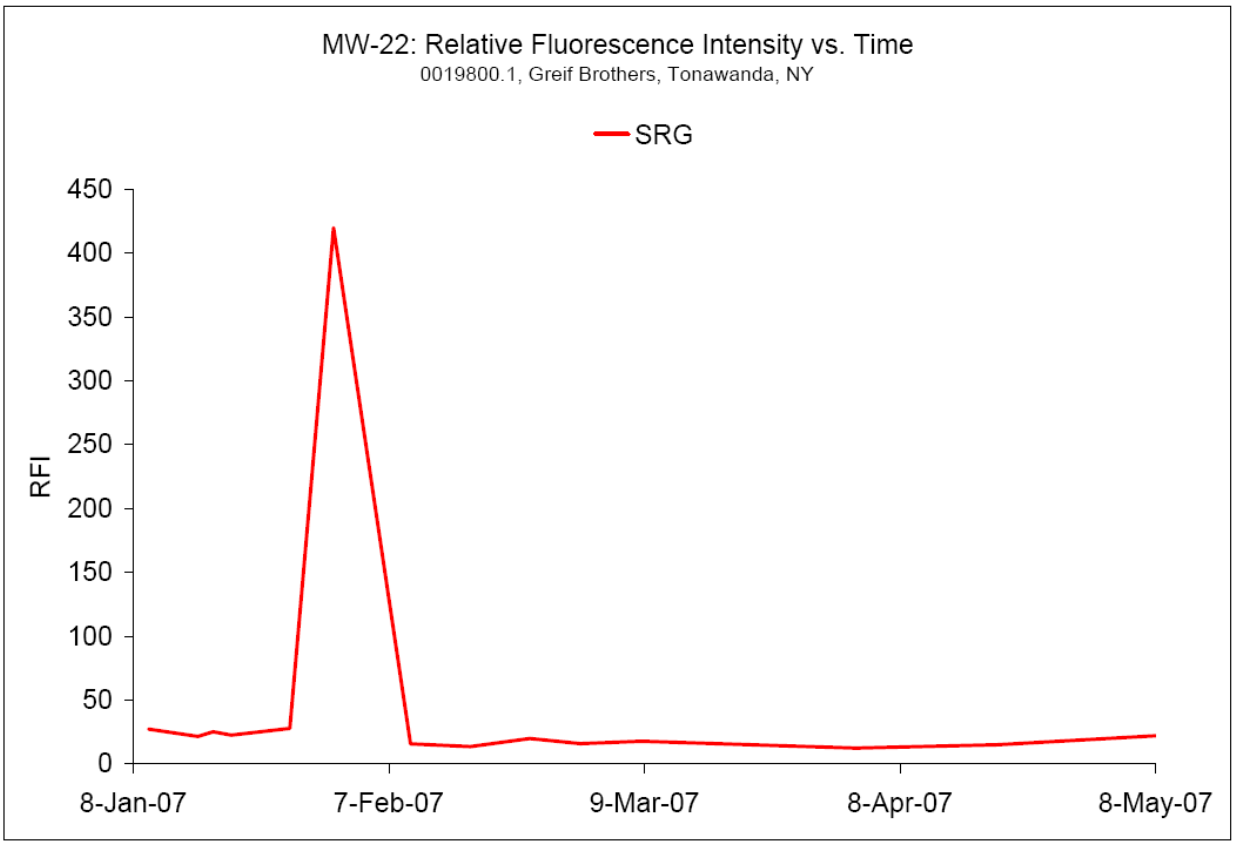

Figure C5: The dye breakthrough curve shows that the maximum dye concentration reached this well 20 days after dye injection.

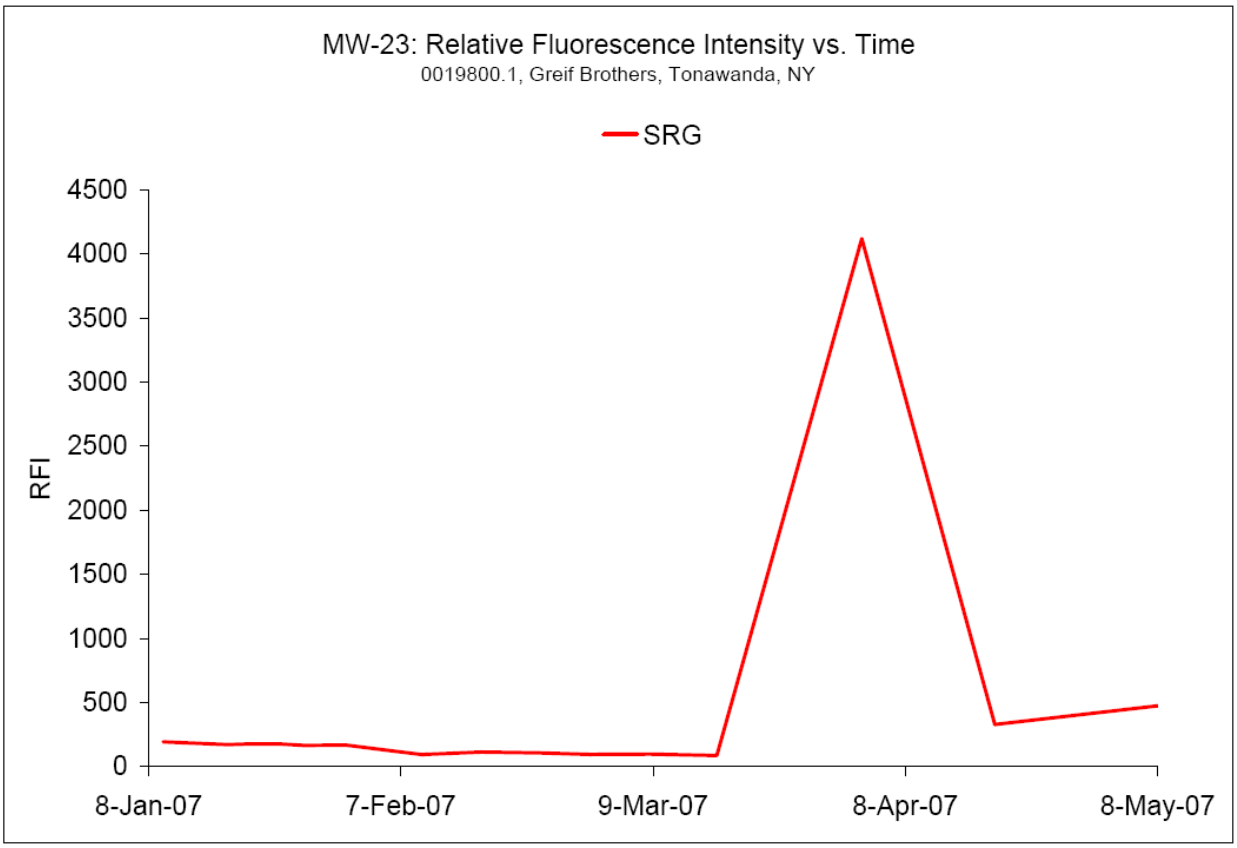

Figure C6: The dye breakthrough curve shows that the maximum dye concentration reached this well 81 days after dye injection.

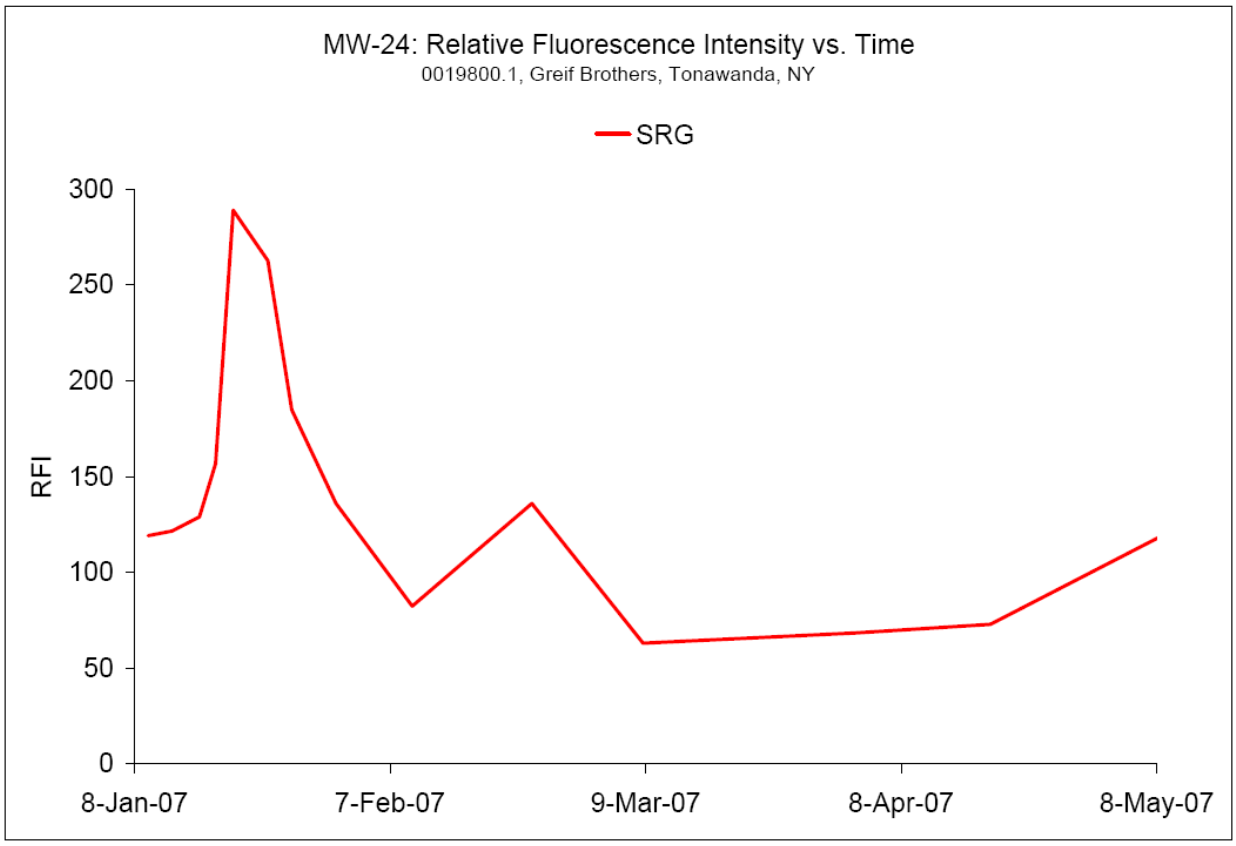

Figure C7: The dye breakthrough curve shows that the maximum dye concentration reached this well 39 days after dye injection.

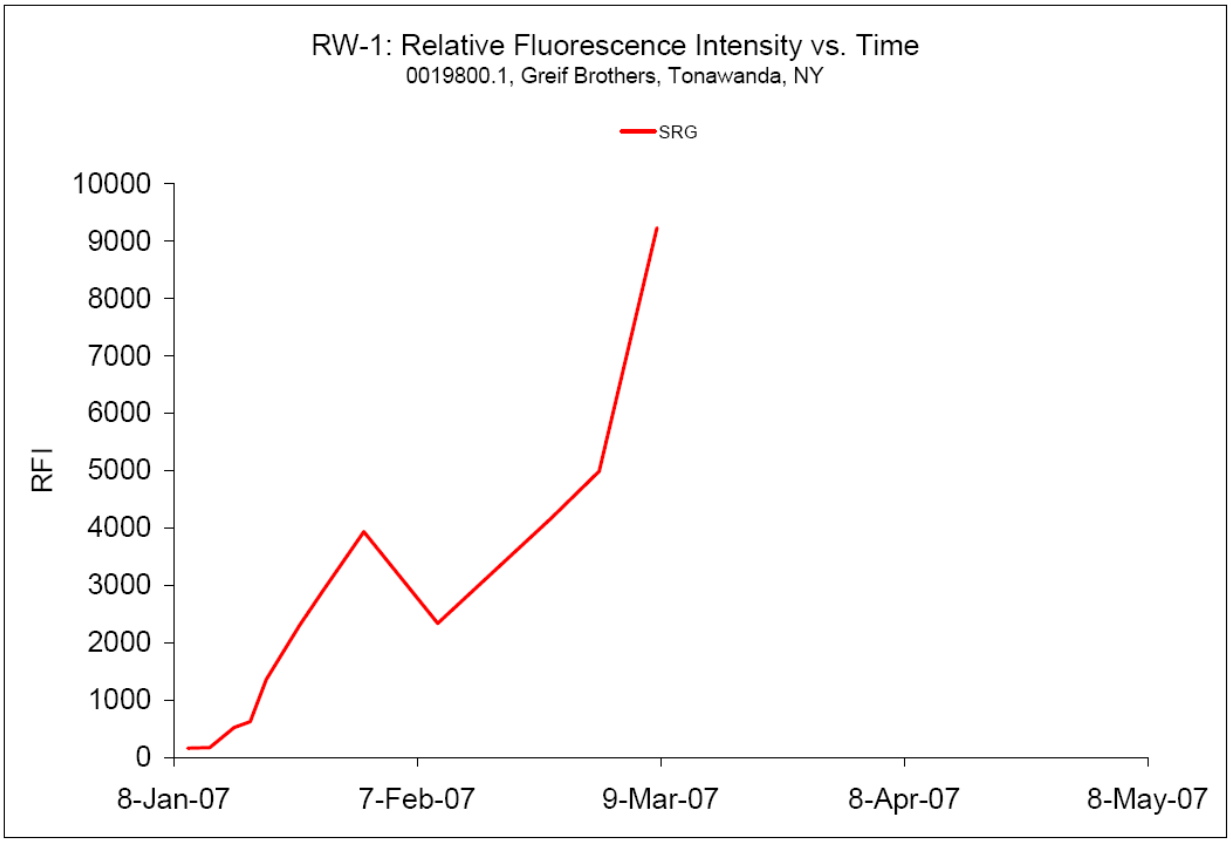

Figure C8: The dye breakthrough curve shows an increasing dye concentration through 87 days of observation following the dye injection.

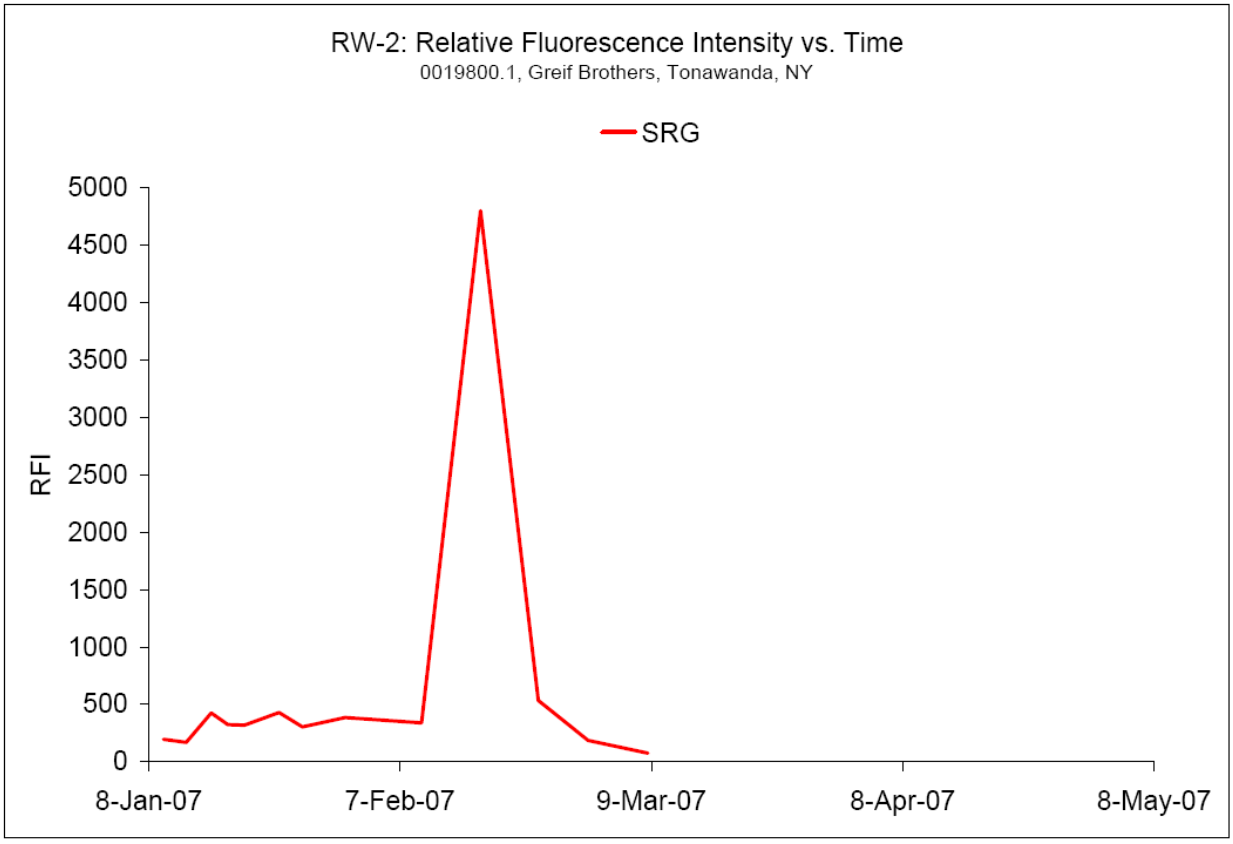

Figure C9: The dye breakthrough curve shows that the maximum dye concentration reached this well 36 days after dye injection.

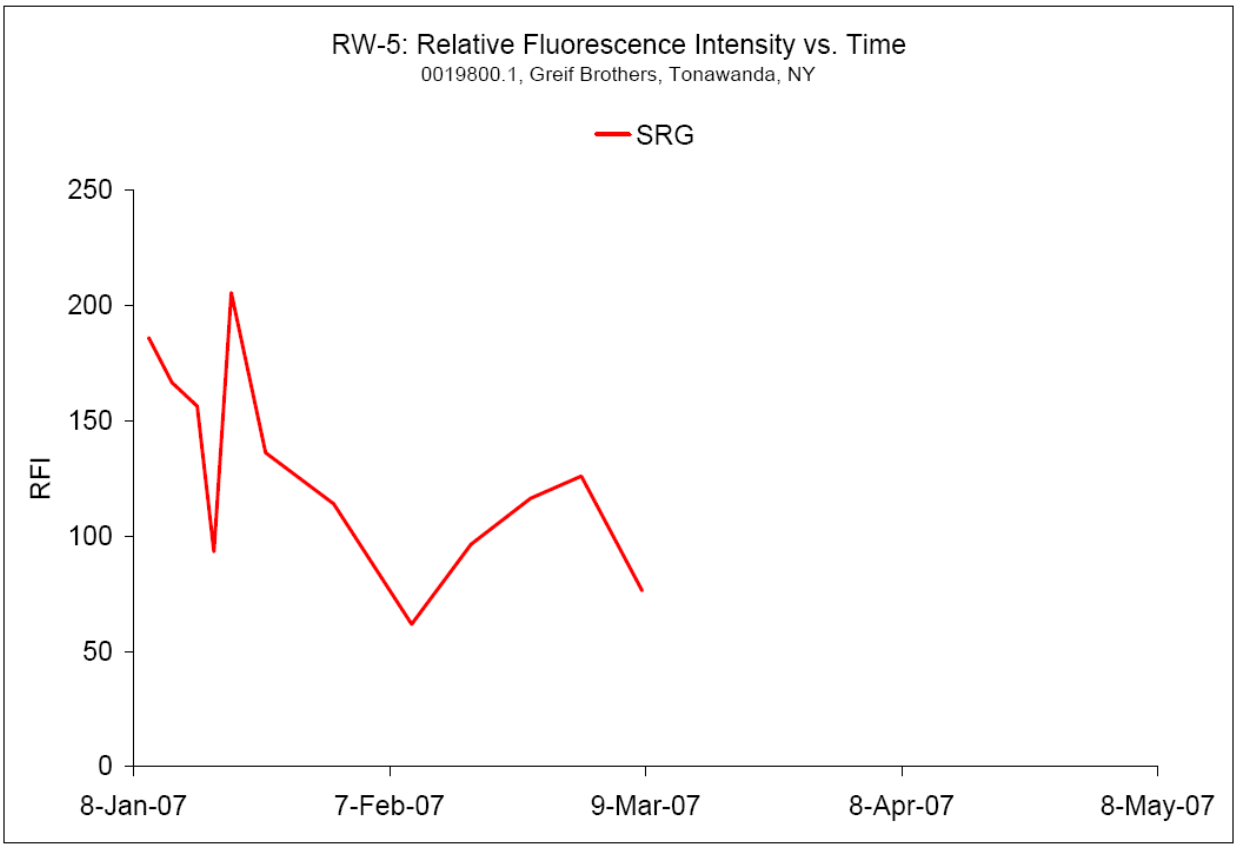

Figure E10: The dye breakthrough curve shows that the maximum dye concentration reached this well 8 days after dye injection.

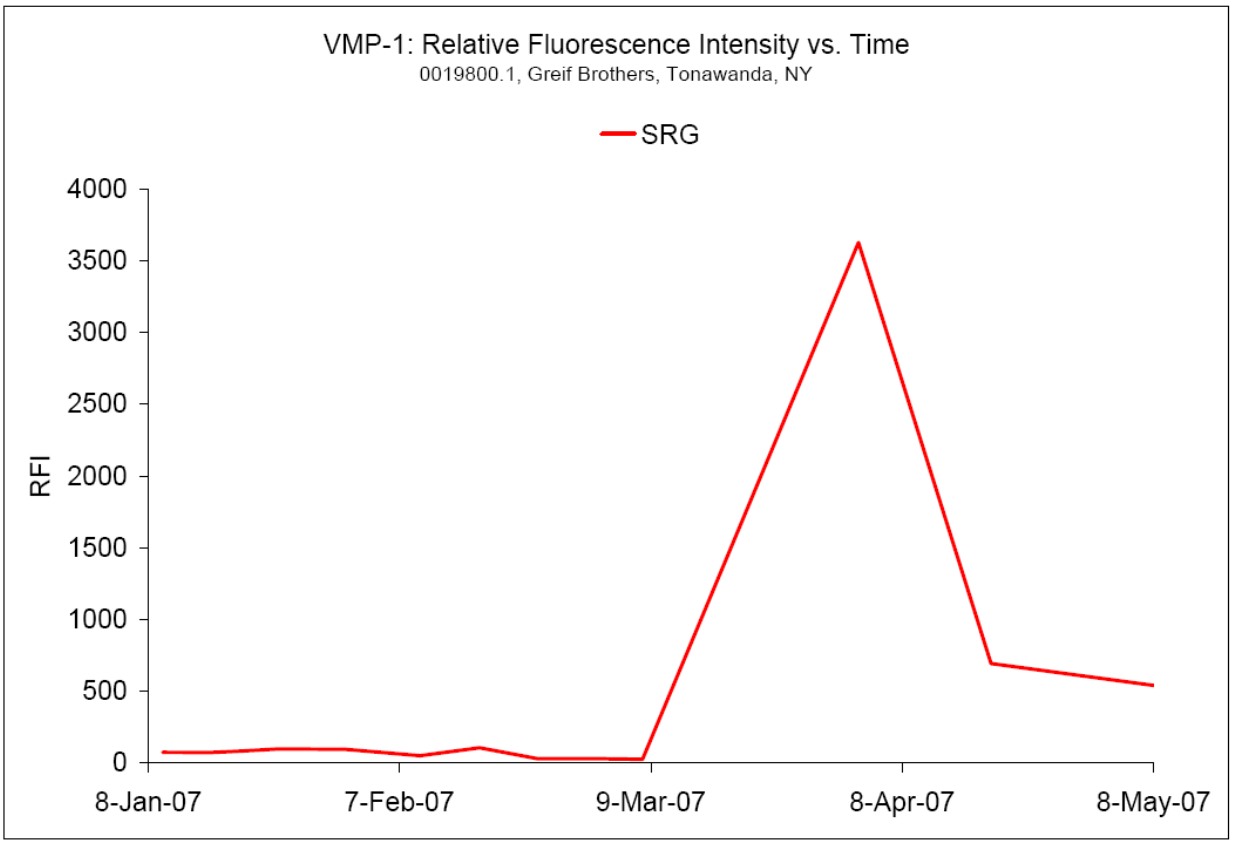

Figure C11: The dye breakthrough curve shows that the maximum dye concentration reached this well 81 days after dye injection.

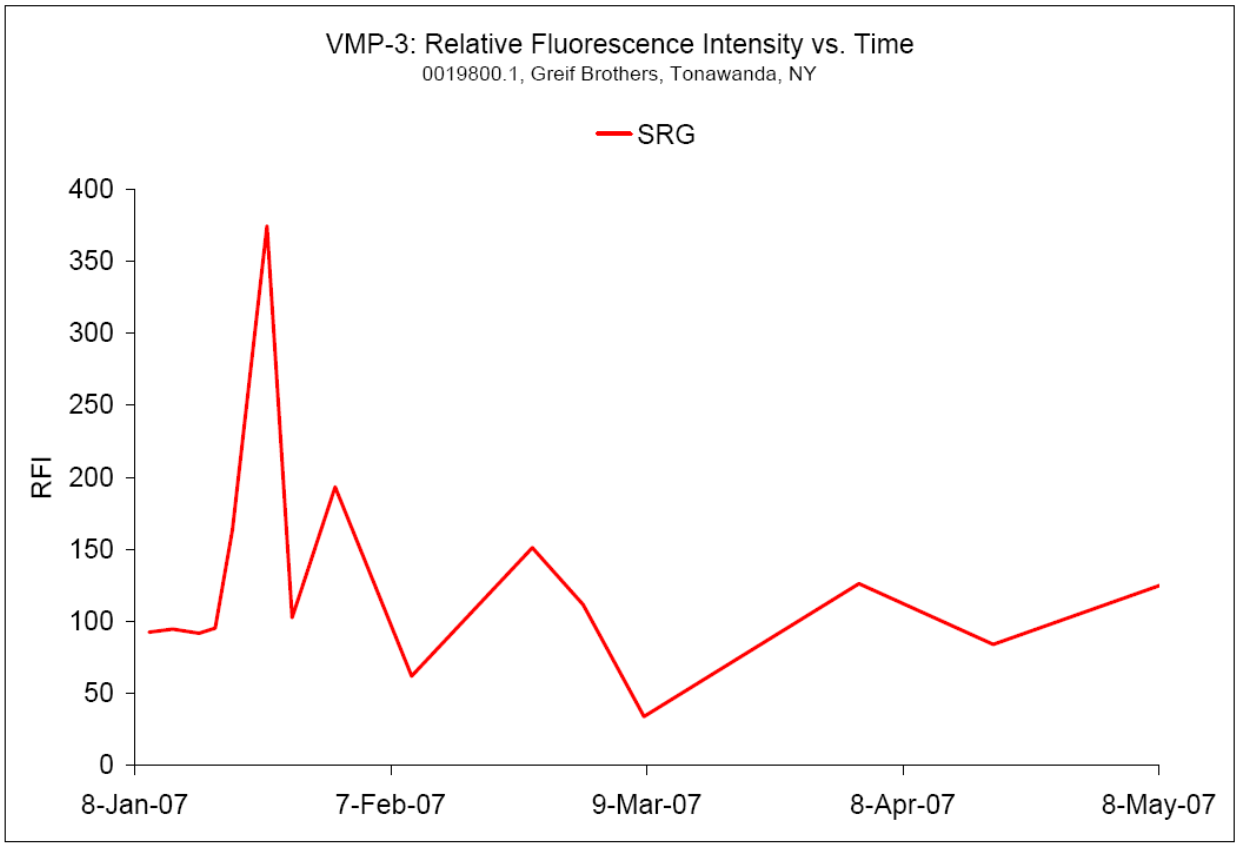

Figure C12: The dye breakthrough curve shows that the maximum dye concentration reached this well 12 days after dye injection.

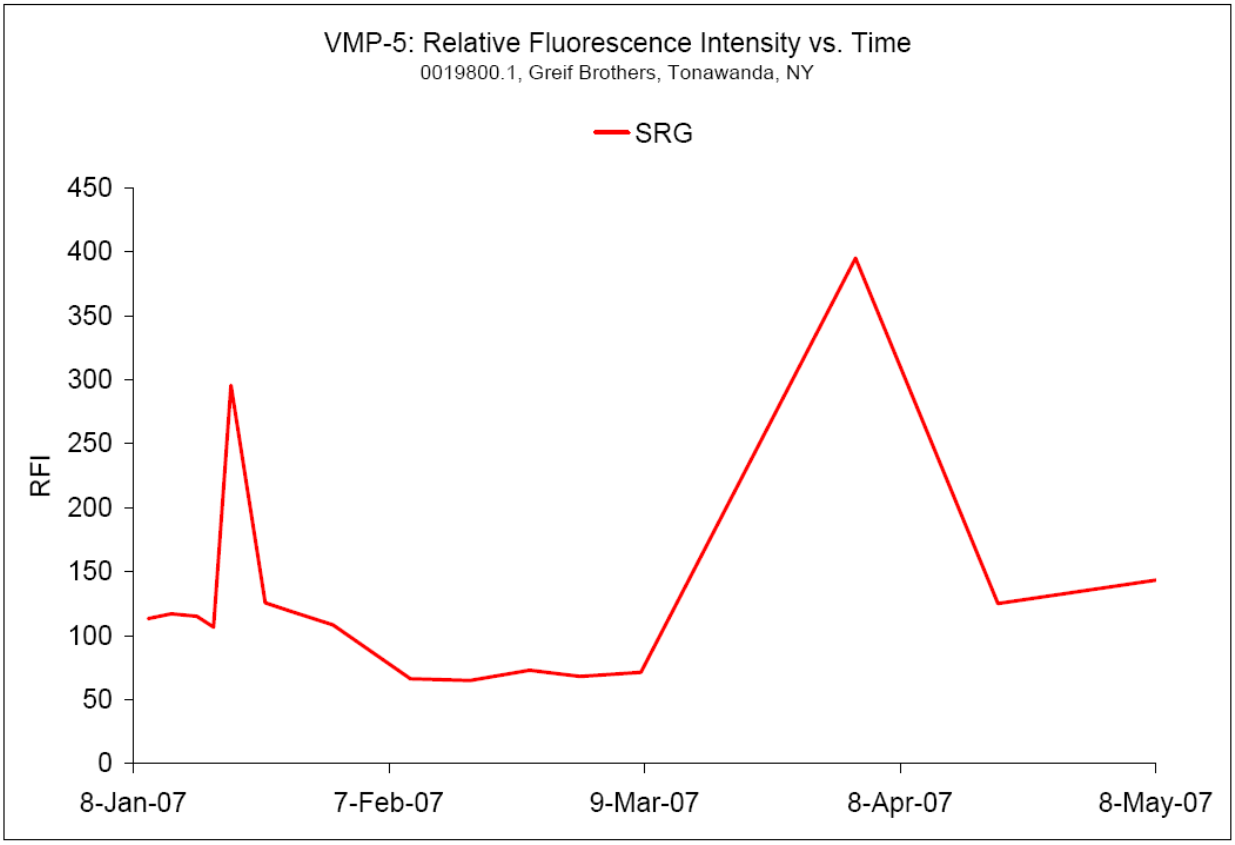

Figure C13: The dye breakthrough curve shows that the maximum dye concentration reached this well 81 days after dye injection.

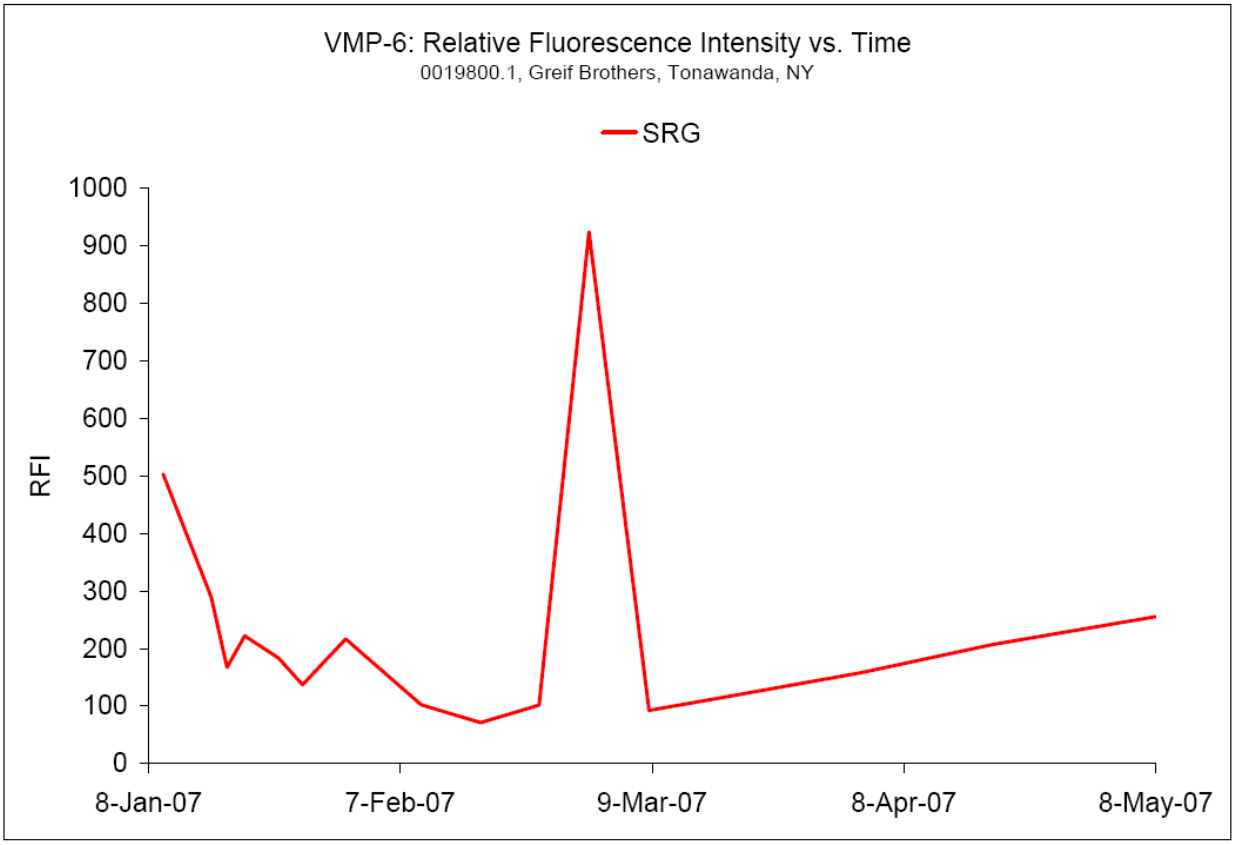

Figure C14: The dye breakthrough curve shows that the maximum dye concentration reached this well 49 days after dye injection.

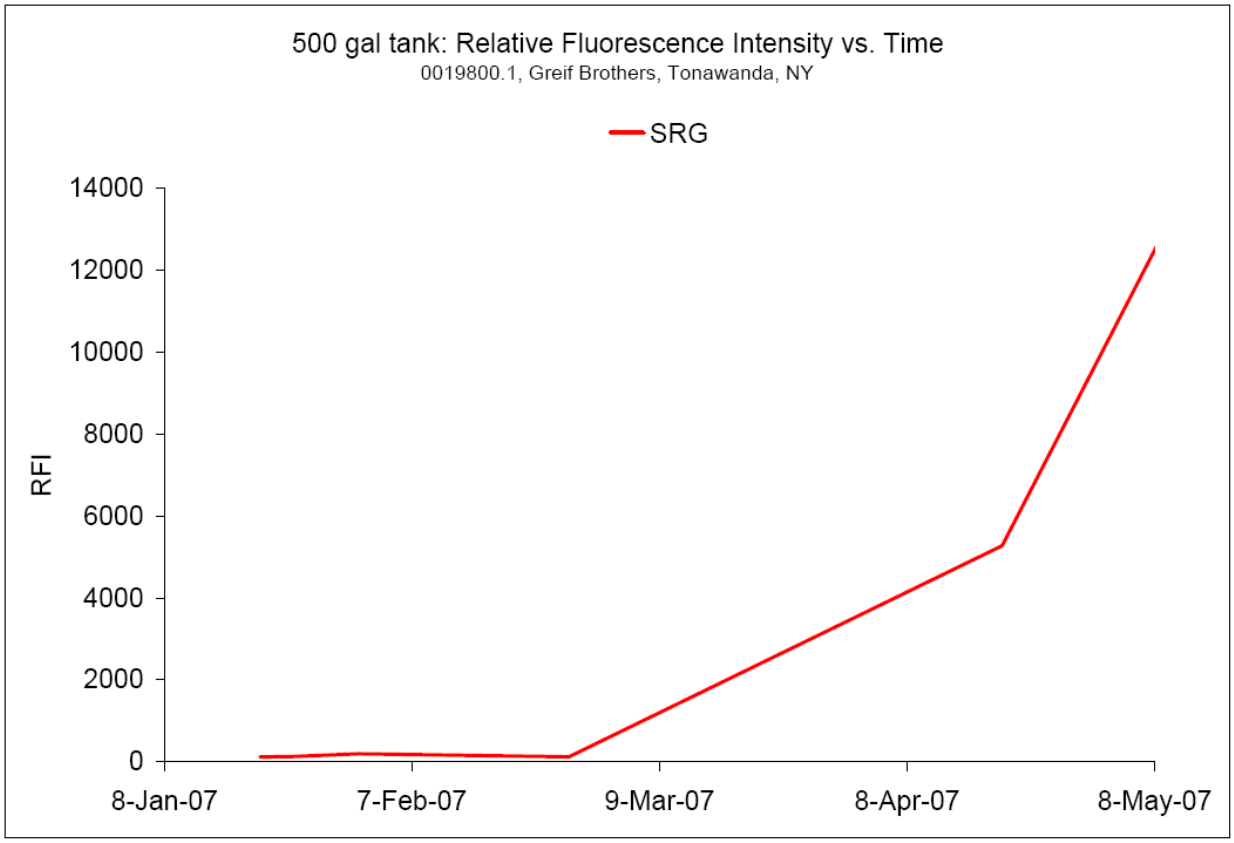

Figure E15: The dye breakthrough curve shows an increasing dye concentration in the liquid recovery tank for the DNAPL Recovery IRM System throughout the observation period of the dye-tracing test. The system was pumping total fluids from recovery wells RW-1, RW-2, RW-4 and RW-5 directly to the 500-gallon liquid recovery tank throughout the FDT. A maximum dye concentration was not reached during the observation period.

ATTACHMENT 3

SYMBOLS

THERMOSTAT	T
THERMOSTAT IN LOCK BOX	T
SENSORS, TEMPERATURE, HUMIDITY	S H
CARBON MONOXIDE SENSOR	CO
CARBON DIOXIDE SENSOR	CO2
NITROGEN OXIDE SENSOR	NO
DUCT SMOKE DETECTOR	SD
MOTOR CONTROL CENTER	MCC
ROUND MOTORIZED DAMPER	M
RECTANGULAR MOTORIZED DAMPER	M
ACCESS DOOR	
SHEET METAL DUCT WIDTH BY DEPTH	W/D
LINED SHEET METAL DUCT FREE AREA WIDTH BY DEPTH.	W/D
SQUARE SHEET METAL 90 PROVIDE WITH DOUBLE THICKNESS TURNING VANES.	
RADIUS SHEET METAL 90, R=1.5*D	
TURNING VANES DOUBLE THICKNESS	
ROUND BRANCH DUCT SADDLE ON ROUND DUCT.	
45 DEG BRANCH DUCT TAKE OFF ON RECTANGULAR.	
STRAIGHT ROUND TAP BRANCH DUCT TAKE OFF.	
MANUAL VOLUME DAMPER LOCKING WITH SHAFT	
SQUARE TO ROUND TRANSITION	
ROOF TOP UNIT	
AIR COOLED CONDENSING UNIT OR AIR COOLED HEAT PUMP	ACCU HP
VERTICAL FURNACE OR FC	
HORIZONTAL FURNACE OR FC WITH SECONDARY DRAIN PAN	FC F
HORIZONTAL AIR COOLED CONDENSING UNIT	AC
ROOF EXHAUST FAN	
CEILING MOUNTED EXHAUST FAN	EF
WALL MOUNTED EXHAUST FAN	
ELECTRIC WALL HEATER	EWH
EXHAUST GRILLE	
SUPPLY AIR DIFFUSER	
RETURN AIR REGISTER OR GRILLE	
ROUND DIFFUSER	
LINEAR OR SLOT DIFFUSER	
DIRECT DUCT MOUNTED REGISTER	
BOOT MOUNTED REGISTER	
DIFFUSER TAG	X-# MARK / XXX CFM
FIRE DAMPER	FD
COMBINATION FIRE/SMOKE DAMPER	FD SD
RADIANT FIRE DAMPER	RFD
ACCESS DOOR	

ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
ACCU	AIR COOLED CONDENSING UNIT
AHU	AIR HANDLING UNIT
AWH	ARCHITECTURAL WALL HEATER
BDD	BACK DRAFT DAMPER
BOD	BOTTOM OF DUCT
BOB	BOTTOM OF BEAM
BTUH	BRITISH THERMAL UNIT PER HOUR
CFM	CUBIC FEET PER MINUTE
CWH	COMMERCIAL WALL HEATER
DEG F	DEGREES FARENHEIT
DB	DRY BULB
Ø	ROUND DUCT
EA	EACH OR EXHAUST AIR
EG	EXHAUST GRILLE
EADB	ENTERING AIR DRY BULB
EAWB	ENTERING AIR WET BULB
EC	ELECTRICAL CONTRACTOR
ECH	ELECTRIC CEILING HEATER
EF	EXHAUST FAN
ESP	EXTERNAL STATIC PRESSURE " W.C.
EUH	ELECTRIC UNIT HEATER
EWH	ELECTRIC WALL HEATER
F	FURNACE
FC	FAN COIL
FD	FIRE DAMPER
FD/SD	FIRE AND SMOKE DAMPER
FPM	FEET PER MINUTE
FPVAV	FAN POWERED VAV
FT	FEET
FSK	FOIL SCRIM VAPOR BARRIER
GC	GENERAL CONTRACTOR
GPM	GALLONS PER MINUTE
GUH	GAS UNIT HEATER
HD	HOOD
HP	HEAT PUMP OR HORSE POWER
IN	INCHES
IR	INFRA RED
LAT	LEAVING AIR TEMPERATURE
LS	LINEAR SLOT DIFFUSER
MAN	MANUAL
MBH	1000 BTUH
MC	MECHANICAL CONTRACTOR
MCC	MOTOR CONTROL CENTER
MFR	MANUFACTURER
MUA	MAKE UP AIR
OA	OUTSIDE AIR
PC	PLUMBING CONTRACTOR
DHU	DEHUMIDIFICATION UNIT
PRV	PRESSURE RELIEF VALVE
PSI	POUNDS PER SQUARE INCH
PTAC	PACKAGED TERMINAL AIR CONDITIONER
RA	RETURN AIR
RJ	ROOF JACK
RPM	REVOLUTIONS PER MINUTE
RTU	ROOF TOP UNIT
SA	SUPPLY AIR
TCC	TEMPERATURE CONTROL CONTRACTOR
TSP	TOTAL STATIC PRESSURE
UON	UNLESS OTHERWISE NOTED
VAV	VARIABLE AIR VOLUME
WC	WALL CAP
WIC	WALK IN COOLER
WIF	WALK IN FREEZER

MECHANICAL SPECIFICATIONS

GENERAL

1. BID INSTRUCTIONS: CONTRACTORS SHALL PROVIDE BASE BID IN STRICT ACCORDANCE WITH DESIGN BASIS EQUIPMENT AND MATERIALS. PROJECT DOES ENCOURAGE COMPETITIVE PRICING AND ALLOWS FOR SUBSTITUTIONS OF EQUAL EQUIPMENT AND MATERIALS AGAINST THE BASIS OF DESIGN. SUBSTITUTE ITEMS WILL BE COMPARED AGAINST DESIGN BASIS DURING SUBMITTAL PROCESS. ENGINEER RESERVES THE RIGHT TO REJECT SUBSTITUTIONS FOUND NOT TO BE EQUAL TO ITEMS LISTED IN DESIGN BASIS.

2. PRIOR TO PROCUREMENT CONTRACTOR SHALL SUBMIT TO ARCHITECT FULL SUBMITTALS FOR ALL ENERGY CONSUMING OR PRODUCING ITEMS AND FOR ALL DUCT ACCESSORIES, INSULATION, VAV BOXES, REGISTERS, GRILLES, DIFFUSERS AND LOUVERS. SUBMITTALS SHALL BE DELINEATED WITH TAGS INDICATED ON PRINTS. CONTRACTORS NAME, PROJECT NAME. CLEARLY INDICATE ALL MODEL NUMBERS AND ALL ACCESSORIES AND OPTIONS BEING PROVIDED. SUBMISSIONS SHALL BE IN PDF FORMAT. ALL EQUIPMENT AND ITEMS SHALL BE PER DESIGN BASIS OR APPROVED EQUAL. ENGINEER RESERVES THE RIGHT TO REJECT ANY SUBSTITUTE ITEM.

3. CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE ALL REQUIRED ELECTRICAL SUPPORT NEEDED FROM THE ELECTRICAL CONTRACTOR. ENSURE ALL SUBMITTALS FOR POWERED COMPONENTS AND CONTROLS ARE PROVIDED AND FULLY COORDINATED WITH ELECTRICAL CONTRACTORS.

4. CONTRACTOR SHALL BE RESPONSIBLE TO VISIT THE SITE TO EXAMINE ALL CONDITIONS THAT MAY IN ANY WAY AFFECT THE EXECUTION OF HIS WORK. HE SHALL ALSO EXAMINE THE DRAWINGS AND SPECIFICATIONS FOR OTHER BRANCHES OF WORK MAKING REFERENCE TO THEM FOR DETAILS OF EXISTING BUILDING CONDITIONS. NO EXTRAS WILL BE ALLOWED FOR FAILURE TO INCLUDE ALL REQUIRED WORK IN THE BID. CONTRACTOR SHALL GUARANTEE ALL LABOR AND MATERIALS ENTERING INTO CONTRACT FOR A PERIOD OF ONE (1) YEAR FROM DATE OF ACCEPTANCE.

5. THE DRAWINGS IN THIS SECTION ARE DIAGRAMMATIC AND ARE NOT INTENDED TO DEFINE EXACT QUANTITIES, LOCATIONS OR CODIFIED REQUIREMENTS. DRAWINGS SHOW GENERAL INTENT OF SYSTEMS. M.C. SHALL PROVIDE AND PAY FOR ALL REQUIRED PERMITS.

6. PRIOR TO WORK COORDINATE ALL OPENINGS AND INSTALLATIONS OF DUCT, PIPING, EQUIPMENT, CONTROLS, DIFFUSERS AND GRILLES WITH G.C. AND OTHER TRADES. PROVIDE INSTALLATIONS WITH PROPER MANUFACTURERS RECOMMENDED CLEARANCES.

7. UPON COMPLETION OF THE MECHANICAL INSTALLATION, DEMONSTRATE TO THE ENGINEER AND THE OWNER'S SATISFACTION THAT THE SYSTEMS HAVE BEEN INSTALLED IN ACCORDANCE WITH THE DRAWINGS, SPECIFICATIONS AND APPLICABLE CODES. DEMONSTRATE THE DYNAMIC OPERATION OF EACH SYSTEM. VERIFY PROPER OPERATION OF EQUIPMENT, FILTERS ARE CLEAN AND COMPONENTS OF THE SYSTEM ARE INSTALLED AND ADJUSTED IN FULL ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.

8. ALL WORK SHALL BE IN FULL ACCORDANCE WITH 2020 NEW YORK MECHANICAL CODE (2018 INTERNATIONAL MECHANICAL CODE), NEW YORK ENERGY CODE (IECC 2018) COMPLIANCE PATH (ASHRAE 90.1-2016), 2018 NEW YORK STATE ENERGY CODE SUPPLEMENT, PERTINENT STATE, COUNTY ORDINANCES AND AMENDMENTS.

9. MECHANICAL CONTRACTOR SHALL ENSURE EMPLOYEES ARE MEETING AND DOCUMENTING ALL OSHA AND JOB SPECIFIC SAFETY REQUIREMENTS AS REQUIRED BY LAW AND BY CONTRACT. PERSONAL PROTECTIVE EQUIPMENT SHALL BE PROVIDED AND UTILIZED AS REQUIRED. MECHANICAL CONTRACTOR SHALL PAY ALL FINES LEVIED BY OSHA FOR FAILURE TO COMPLY WITH OSHA REQUIREMENTS.

10. INSTALL ALL EQUIPMENT, DUCTWORK AND PIPING AS HIGH AS POSSIBLE. PRIOR TO ROUGH-IN COORDINATE ELEVATIONS WITH OTHER TRADES. WHERE VISIBLE, ORIENT PERPENDICULAR AND/OR PARALLEL TO STRUCTURE.

EQUIPMENT

1. PROVIDE EQUIPMENT AS SHOWN ON EQUIPMENT SCHEDULES AND PLAN NOTES. SUBSTITUTIONS TO LISTED EQUIPMENT SHALL BE AT RISK OF CONTRACTOR. SUBSTITUTIONS SHALL ONLY BE ALLOWED IF ITEMS ARE EQUAL IN ALL ASPECTS.

2. PROVIDE SUBMITTALS TO ELECTRICIAN AS REQUIRED FOR COORDINATION OF ALL ELECTRICAL POWER WIRING. INCLUDE WIRING DIAGRAMS AND CABLING REQUIREMENTS FOR REFERENCE COORDINATE ALL INTERLOCKS AS NEEDED. PROVIDE SINGLE POINT CONNECTION KITS AS NEEDED.

3. INSTALL ALL EQUIPMENT IN FULL ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS AND CLEARANCE REQUIREMENTS. PROVIDE ALL REQUIRED MOUNTING OR HOUSEKEEPING PADS. G.C. SHALL PROVIDE LEVEL GRADE FOR EXTERIOR MOUNTED EQUIPMENT. M.C. SHALL PROVIDE ALL HOISTING AND RIGGING NEEDED TO SET ALL HVAC EQUIPMENT.

4. ALL EQUIPMENT SHALL BE INSTALLED AS NEEDED TO PREVENT OBJECTIONABLE NOISE AND/OR VIBRATION. M.C. SHALL PROVIDE VIBRATION PADS, SPRING ISOLATORS, ATTENUATORS AND ACCESSORIES AS NEEDED.

DUCTWORK

1. CONCEALED ROUND DUCTWORK SHALL BE CONSTRUCTED PER SMACNA LOW PRESSURE STANDARDS 1" PRESSURE CLASS, 5' MAXIMUM JOINT LENGTHS, SEAL CLASS B LONGITUDINAL SEAM SNAP LOCK PIPE AND ADJUSTABLE FITTINGS.

2. EXPOSED ROUND DUCTWORK (OR WHERE SPIRAL IS INDICATED ON THE PLANS) SHALL BE LINDAB OR EQUAL GALVANIZED STEEL CONFORMING TO ASTM STANDARDS A653 AND A924 GASKETED SPIRAL DUCTING WITH NO SEALER. EDPM RUBBER GASKET SHALL BE U.L. CLASSIFIED RATING OF FLAME SPREAD 0 AND SMOKE DEVELOPED 5 IN ACCORDANCE WITH ASTM STANDARD E84-91A SMACNA LEAKAGE CLASS 3. FITTINGS SHALL BE MANUFACTURED USING ONE OR MORE OF THE FOLLOWING CONSTRUCTION METHODS: OVERLAPPED EDGES STITCH WELDED ALONG THE ENTIRE LENGTH OF THE FITTING, STANDING SEAM GORE LOCKED AND INTERNALLY SEALED, BUTTON PUNCHED AND INTERNALLY SEALED. ELBOWS 3-INCH THROUGH 12-INCH DIAMETER WILL BE DIE STAMPED AND CONTINUOUSLY STITCH WELDED.

3. PROVIDE SHEET METAL 90 FOR ALL TURNS GREATER THAN 45 DEGREES. DO NOT USE FLEXIBLE DUCT FOR CHANGES IN DIRECTION GREATER THAN 45 DEGREES.

4. PROVIDE MANUAL BALANCING DAMPERS FOR ALL SUPPLY AIR RUNS. ROUND DAMPERS SHALL BE SECURED ON BOTH SIDES OF DUCT AND SHALL CONTAIN LOCKING HANDLE. SPIRAL DUCTS SHALL USE SPIRAL STYLE DAMPERS WITH FULL WIDTH SHAFTS AND NYLON BEARINGS AT EACH END. RECTANGULAR DUCTS SHALL USE MULTI OR SINGLE BLADE WELDED FRAMED DAMPERS WITH JACK SHAFTS AND LOCKING HANDLE. INSTALL NYLON RIBBON ON ALL DAMPER HANDLES LOCATED IN INSULATED DUCTING. DO NOT INSTALL DAMPERS IN NON ACCESSIBLE LOCATIONS. PROVIDE INTEGRAL DAMPERS WITH DIFFUSER IN NECK IF NO ACCESSIBLE LOCATION IS POSSIBLE. ALL SUPPLY AIR RUNS SHALL HAVE MEANS OF BALANCE. RETURN AND EXHAUST AIR RUNS SHALL CONTAIN DAMPERS WHERE SHOWN ON PLANS.

5. INSULATED FLEXIBLE DUCTING SHALL NOT EXCEED 25 FEET. ALL FLEX SHALL BE LISTED FLEXIBLE DUCT, FLEXIBLE CONNECTORS ARE NOT ACCEPTABLE. FLEXIBLE DUCT EQUAL TO FLEXIBLE DUCT CLASS 1 AIR DUCT, DOUBLE LAMINATED POLYESTER FILM ON STEEL WIRE REINFORCING, INSULATED WITH SCRIM REINFORCED METALIZED POLYESTER OUTER FIRE RETARDANT JACKET. R-4.2 FOR CONDITIONED SPACES AND R-6.0 FOR ANY SPACES OUTSIDE BUILDING THERMAL ENVICOPE. FLEX DUCTS SHALL NOT BE RUN THROUGH WALLS OR FLOORS. PROVIDE HARD DUCTED SLEEVES AS NEEDED.

6. RECTANGULAR DUCTWORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH SMACNA LOW PRESSURE DUCT STANDARDS, +/- 1.0" W.C. FROM ASTM A 653/A 653M G-90 COATED GALVANIZED SHEET STEEL. SEAMS SHALL BE PITTSBURGH CONSTRUCTION, NO BUTTON PUNCH OR SNAP LOCK SEAMS ARE ACCEPTABLE. SEAL ALL TRANSVERSE AND LONGITUDINAL SEAMS WITH WATER BASED DUCT SEALER, SEAL CLASS B. GAUGE AND JOINT CLASSIFICATIONS ACCEPTABLE ARE AS FOLLOWS, ALL SECTION LENGTHS ARE 48" MAXIMUM, REFER TO SMACNA RIGIDITY TABLES FOR GAUGES ON LONGER SECTIONS IF REQUIRED:

< 12"	26 GAUGE, FLAT S AND DRIVE
12"-24"	24 GAUGE, FLAT S AND DRIVE
25"-34"	22 GAUGE, STANDING S AND FLAT DRIVE
34"-40"	22 GAUGE, STANDING S AND STANDING DRIVE
>40"	REFER TO SMACNA FOR STANDARDS.

2. DUCT HANGERS: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS - METAL AND FLEXIBLE," CHAPTER 5, "HANGERS AND SUPPORTS." PROVIDE GALVANIZED MINIMUM 22 GAUGE 1" WIDE STRAP TO HANG RECTANGULAR DUCTWORK SMALLER THAN 30" WIDE. DUCT HANGERS FOR RECTANGULAR SHEET METAL DUCTS 30" AND LARGER SHALL BE TRAPEZE STYLE USING UNI-STRUT AND 3/8" OR 1/2" ROD. PROVIDE GRIPPLE, DURODYNE OR EQUAL CABLE HANGERS FOR HANGING ROUND DUCTWORK. SUPPORT ALL HANGERS FROM STRUCTURE PER SMACNA STANDARDS.HANGERS FOR SPIRAL DUCTS GREATER THAN 28" IN DIAMETER SHALL BE HUNG WITH ROD AND DUCT CLAMP. FLEXIBLE DUCTING SHALL BE SUPPORTED USING MINIMUM 2" WIDE NYLON STRAP. ALL INTERVALS ARE PER SMACNA.

3. FOR ALL RETURN AIR, PROVIDE OPENINGS, PATHWAYS, TRANSFERS, COORDINATE UNDERCUTS, ETC. AS REQUIRED TO RETURN AIR SUPPLIED TO SPACES BACK TO AIR HANDLING UNIT.

DUCT ACCESSORIES

1. COORDINATE WITH ARCHITECTURAL DRAWINGS AND PROVIDE FIRE AND FIRE AND SMOKE DAMPERS AT FIRE RATED ASSEMBLY PENETRATIONS IN ACCORDANCE WITH THE INTERNATIONAL BUILDING CODE AND WHERE SHOWN ON PLANS.

3. PROVIDE FLASHING MATERIALS AND OR SLEEVES AS REQUIRED FOR ALL DUCT PENETRATIONS OF NON RATED ELEMENTS. EXPOSED PENETRATIONS SHALL BE FLASHED WITH SHEET METAL TIGHT TO WALLS.

4. PROVIDE HIGH EFFICIENCY TAKE OFFS, PEAL AND STICK STYLE ATTACHED TO RECTANGULAR DUCTING WITH SHEET METAL SCREWS FOR ALL ROUND SUPPLY AIR TAKE OFFS AND SADDLES.

5. REGISTERS, GRILLES AND DIFFUSERS SHALL BE EQUIVALENT TO SCHEDULED PRODUCTS. SUBSTITUTION OF RESIDENTIAL STAMPED STYLE PRODUCTS FOR COMMERCIAL PRODUCTS WILL NOT BE ACCEPTED.

DUCT INSULATION

1. ALL DUCT INSULATION MATERIALS SHALL HAVE A FLAME SPREAD RATING OF 25 OR LESS (ON THE FLAME SPREAD TEST SCALE) AND SMOKE DEVELOPMENT OF 50 OR LESS (ON THE SMOKE TEST SCALE) OR AS DEFINED BY NFPA 255 STANDARD METHOD OF TESTING OF SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS, LOCAL CODES AND LOCAL AUTHORITIES HAVING JURISDICTION. DUCT WRAP SHALL BE FIBERGLASS MATERIAL PER ASTM C-411,ASTM C-1104,ASTM C665, ASTM C-1338, ASTM E-84, UL723, NFPA 90A,/DAN/ULC S102-1188,ASTM C1290, ASTM C553, ASTM C1136.

2. INSULATION: INSTALL ALL INSULATION IN STRICT ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS IN A TIGHT AND NEAT MANOR. NO SAGGING, FRAYED OR TORN INSULATION WILL BE EXCEPTED. UNLESS OTHERWISE NOTED ON PLANS DUCTWORK SHALL BE INSULATED AS FOLLOWS:

SA/RA- 1-1/2" FIBERGLASS DUCT WRAP WITH FSK FACING, 75 #/FT3 MINIMUM APPLIED R-3.5.

LINERS: PLENUMS, REGISTER BOXES, AND RTU DROPS SHALL BE MINIMUM 1" THICK 1-1/2 # DENSITY PER CU. FT., HAVING MAT FACED OR MONOLITHIC CONSTRUCTION WITH SKIN SMOOTH MICROBIAL SURFACE TO WITHSTAND VELOCITIES TO 4000 FPM. INSULATION SHALL FIT SNUGLY AGAINST THE INTERIOR DUCT SURFACES, AND BE FASTENED TO THE DUCT WITH A 50% HEAVY COAT OF RECOMMENDED ADHESIVE AND METAL FASTENERS WHICH DO NOT PIERCE THE DUCT, SPACED AT 12" CENTERS. ALL EXPOSED EDGES OF THE INSULATION SHALL BE COATED WITH MANUFACTURED RECOMMENDED ADHESIVE. SIZES ON PLANS INDICATE FREE AREA.

OA- IN UNCONDITIONED OR ATTIC SPACES OUTSIDE THE BUILDING ENVELOPE; 1-1/2" MINIMUM R-3.5 FSK DUCT WRAP.

OA- EXPOSED OR IN MECHANICAL ROOMS, 1-1/2 FIBERGLASS RIGID BOARD INSULATION WITH FOIL SCRIM LAGGED WITH 0.024 AI JACKET.

REFRIGERATION PIPING;

1. SYSTEMS 5 TONS OR LESS; MANUFACTURED REFRIGERANT LINE SETS: ANNEALED-COPPER SUCTION AND LIQUID LINES FACTORYCLEANED, DRIED, PRESSURIZED WITH NITROGEN, SEALED, AND WITH SUCTION LINE INSULATED. PROVIDE IN STANDARD LENGTHS FOR INSTALLATION WITHOUT JOINTS, EXCEPT AT EQUIPMENT CONNECTIONS OR ACCESSIBLE LOCATIONS. CONNECTIONS AND WROUGHT-COPPER FITTINGS WHERE REQUIRED SHALL BE BRAZED WITH MINIMUM 8% SIL-FLOS.

2. INSULATION; SUCTION AND ALL DUCTLESS SPLIT OR VRF LINES; MINIMUM 1/2" THICK WALL INSULATION SHALL BE A FLEXIBLE, CLOSED-CELL ELASTOMERIC PIPE INSULATION, AP ARMAFLEX OR AC ACCOFLEX. ADHESIVE SHALL BE ARMAFLEX 520, 520 BLACK OR 520 BLV ADHESIVE. THE INSULATION MUST CONFORM TO ASTM C534 GRADE 1, TYPE I ARMAFLEX AND BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS. (3/8" WALL WILL NOT BE ACCEPTED).

3. ALL INSULATION EXPOSED TO OUTDOORS SHALL BE EITHER PVC LAGGED OR SHALL BE PAINTED WITH ARMA-FINISH FR UV PROTECTING PAINT.

4. LINES SHALL BE RUN KINK FREE AND GENERALLY CONTINUOUS AND AT 90 DEGREE ANGLES TO STRUCTURE. AVOID JOINTS WHEN POSSIBLE. ALL REQUIRED JOINTS SHALL BE MADE IN ACCESSIBLE LOCATIONS OR M.C. SHALL PROVIDE ACCESS PANELS AS NEEDED. ALL BENDS SHALL BE MADE WITH LONG RADIUS FITTINGS OR WITH MECHANICAL BENDING TOOL TO PROVIDE SMOOTH LONG RADIUS TURNS. SUPPORT ALL PIPING WITHOUT CRUSHING OR DEPRESSING INSULATION. USE REFRIGERATION STYLE CUSH CLAMPS MOUNTED TO STRUT, DO NOT LAY PIPING ON STRUCTURAL BUILDING MEMBERS. SLEEVE ALL PENETRATIONS AND SEAL WATER TIGHT.

5. PRESSURE TEST, TRIPLE EVACUATE AND PREPARE ALL PIPING IN STRICT ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.

CONDENSTATE PIPING

1. PROVIDE TRAPS BUILT FROM INDIVIDUAL FITTINGS ON ALL EVAPORATOR DRAIN PANS MINIMUM DEPTH 1.5 TIMES BLOWER BLOCKED TIGHT STATIC PRESSURE. ALL TRAPS SHALL BE CONSTRUCTED WITH PVC 90S (MANUFACTURED RUNNING TRAP FITTINGS ARE NOT ACCEPTABLE). PROVIDE ALL TRAPS WITH CLEAN OUTS AND REMOVABLE CAPS AS NEEDED FOR MAINTAINING LINES.
2. HVAC CONTRACTOR SHALL COORDINATE CONDENSATE DISPOSAL POINTS WITH P.C. HVAC CONTRACTOR IS RESPONSIBLE FOR PIPING FROM EVAPORATOR COILS TO DISPOSAL POINT. P.C. IS RESPONSIBLE FOR STAND PIPES, FLOOR AND HUB DRAINS AS NEEDED.
3. MATERIALS: POLYVINYL CHLORIDE DRAIN, WASTE AND VENT PIPE (PVC) SCHEDULE 40 MINIMUM SIZE 3/4" .WRAPPED IN RETURN AIR PLENUMS WITH RA RATED MATERIAL.
4. PROVIDE CONDENSATE PUMPS AS REQUIRED WITH HIGH LEVEL SHUT DOWN SWITCHES INTERLOCKED TO A/C UNITS.
5. PITCH ALL PIPING MINIMUM $\frac{1}{4}$" PER FOOT. SUPPORT PIPING AT MINIMUM 5'-0" INTERVALS. SECURE FINAL CONNECTION AT SEWER WITH MINIMUM 1-1/2" AIR GAP CONNECTION.
6. INSULATE ALL PIPING IN RA PLENUMS AND ABOVE HARD CEILINGS WITH MINIMUM 3/8" WALL ARMAFLEX INSULATION.

FIRE STOPPING.

1. FIRE STOPPING SYSTEMS SHALL BE IN FULL COMPLIANCE WITH SECTIONS 714 AND 717 OF THE IBC AND SECTION 607 OF THE IMC.
2. CONTRACTOR SHALL MAKE REFERENCE TO ARCHITECTURAL PLANS AND PROVIDE ALL REQUIRED FIRE STOPPING.
3. CONTRACTOR SHALL PROVIDE AHJ WITH FULL SUBMITTAL INDICATING METHODS OF CONSTRUCTION AND UL LISTINGS FOR EACH PENETRATION SYSTEM USED.
4. DUCTS AND AIR TRANSFER OPENING PENETRATIONS OF ASSEMBLIES REQUIRED TO BE PROTECTED AND IN NON FIRE-RESISTANCE-RATED FLOORS SHALL COMPLY WITH SECTIONS 717.

5. FIRE DAMPERS, SMOKE DAMPERS, COMBINATION FIRE/SMOKE DAMPERS AND CEILING RADIATION DAMPERS LOCATED WITHIN AIR DISTRIBUTION AND SMOKE CONTROL SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 607 OF THE IMC, AND THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND LISTING.
6. ACCESS DOORS SHALL BE PERMITTED IN CEILINGS OF FIRE-RESISTANCE-RATED FLOOR/CEILING AND ROOF/CEILING ASSEMBLIES PROVIDED SUCH DOORS ARE TESTED IN ACCORDANCE WITH ASTM E 119 OR UL 263 AS HORIZONTAL ASSEMBLIES AND LABELED BY AN *APPROVED AGENCY* FOR SUCH PURPOSE. ALL ACCESS DOORS SHALL BE PROVIDED BY TRADE MAKING PENETRATIONS.

CHECK TEST AND START UP REQUIREMENTS

1. ALL HVAC EQUIPMENT INSTALLATIONS SHALL BE VERIFIED AND STARTED UP PER MANUFACTURERS RECOMMENDATIONS. VERIFY ALL MODES OF OPERATION. CONFIGURE ALL CONTROLS AND PROGRAM OCCUPANCIES PER OWNER PROVIDED SCHEDULES.

2. LABEL ALL MAJOR PIECES OF EQUIPMENT WITH LAMACOID PLASTIC, BLACK WITH WHITE LETTERS. SIZE TO BE CONSISTENT WITH EQUIPMENT BEING LABELED. LENGTH AND WIDTH VARY FOR REQUIRED LABEL CONTENT. THERMOSTAT AND SENSOR LABELS SHALL BE ADJUSTED TO PROVIDE ESTHETIC APPEARANCE.

3. PROVIDE AIR BALANCE BY CONTRACTOR. CONTRACTOR SHALL BALANCE SUPPLY, RETURN, OUTSIDE, RELIEF AND EXHAUST AIR SYSTEMS IN ACCORDANCE WITH CURRENT SMACNA, NEEB OR AABC STANDARDS TO DESIGN VALUES AND PROVIDE WRITTEN REPORT TO ARCHITECT. MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL DEVICES, DRIVES, SHEAVES, MOTOR CHANGES AND REWORK AS REQUIRED TO MEET DESIGN REQUIREMENTS.

4. TEMPERATURE CONTROL WORK SHALL BE THE RESPONSIBILITY OF THE HVAC CONTRACTOR. PROVIDE ALL COMPONENTS INCLUDING T/S, T/S WIRE (PLENUM RATED IN RA PLENUMS), SWITCHES, ACTUATORS ETC. AS REQUIRED FOR A COMPLETE SYSTEM. PRIOR TO ROUGH-IN COORDINATE FINAL LOCATION IN IT ROOM FOR ALL CONTROLS WITH OWNERS REPRESENTATIVE.

5. CLOSE OUT: PROVIDE MANUFACTURERS OPERATION AND MAINTENANCE MANUALS, AIR BALANCE REPORT AND AS BUILT DRAWINGS. PROVIDE (1) TRAINING SESSION TO OWNER SELECTED PERSONNEL AS REQUESTED AND PROVIDE WARRANTY INFORMATION FOR ALL MANUFACTURERS WARRANTED EQUIPMENT.

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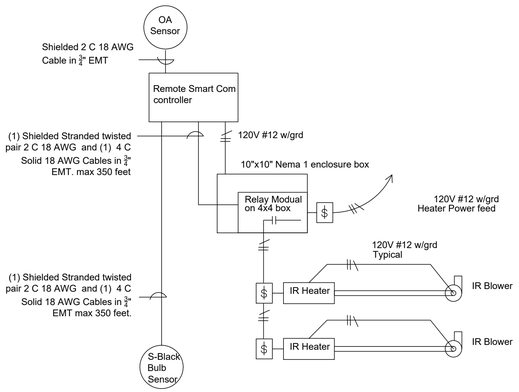
HVAC ABBREVIATIONS, SYMBOLS, & SPECIFICATIONS

M001



A IR HEATER WIRING DIAGRAM
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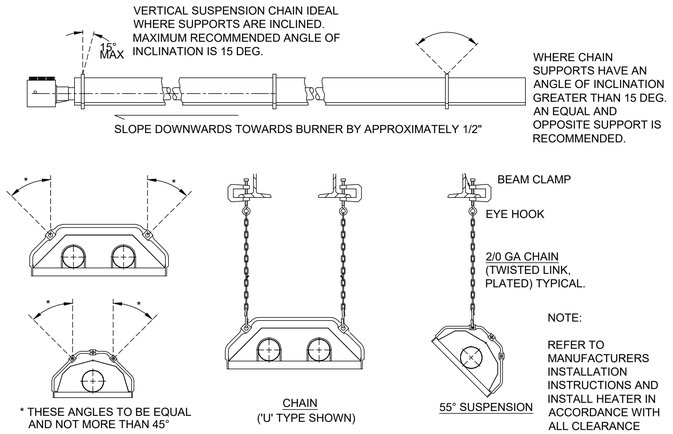
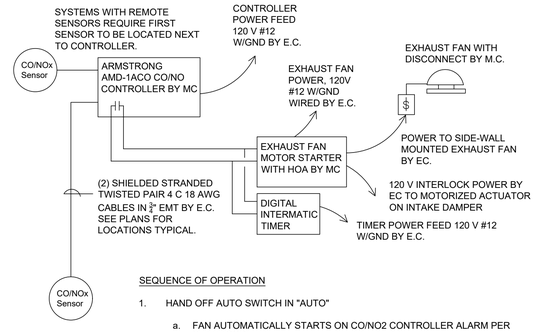
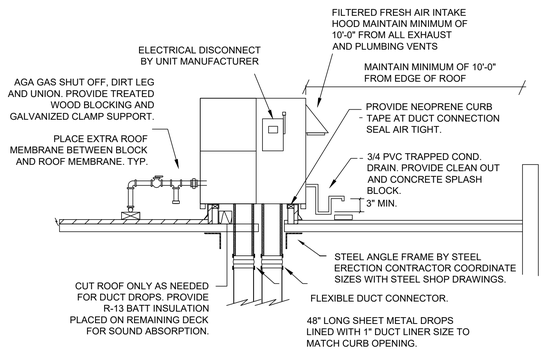


B IR HEATER DETAIL
SCALE: NONE

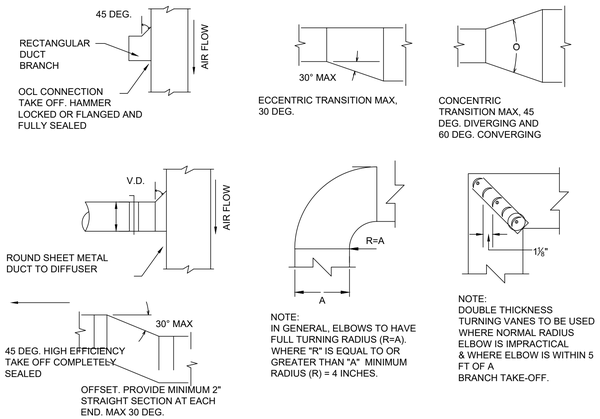


C CO/NO CONTROLLER WIRING DETAIL
SCALE: NONE

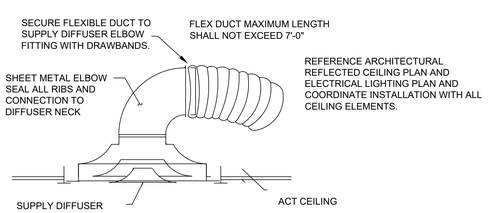
D DUCT MOUNT REGISTER
SCALE: NONE



E ROOF TOP UNIT DETAIL
SCALE: NONE



F DUCT CONSTRUCTION DETAILS
SCALE: NONE



G LAY-IN DIFFUSER DETAIL
SCALE: NONE

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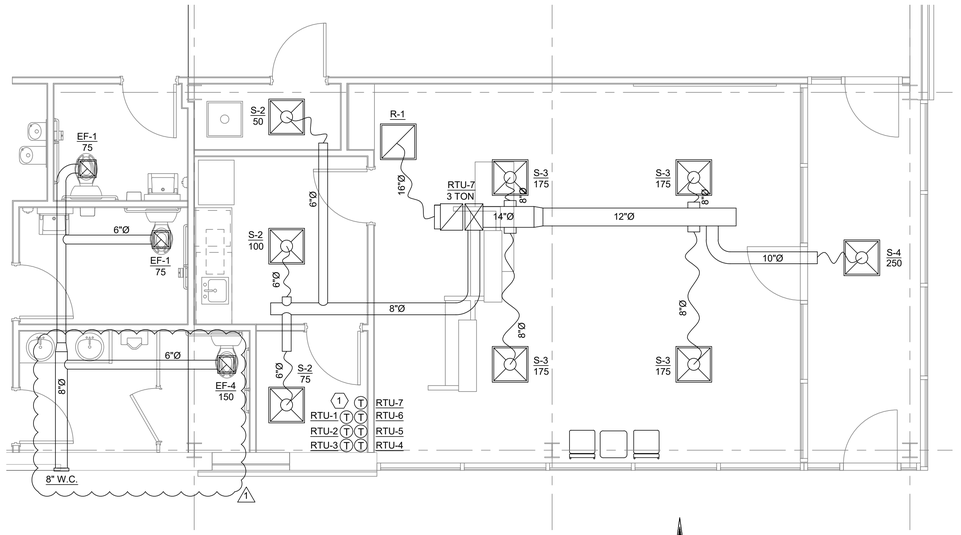
HVAC DETAILS

M002



1 ENLARGED OFFICE HVAC PLAN
SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. REFERENCE SHEET M001 FOR LEGENDS, ABBREVIATIONS, SPECIFICATIONS AND NOTES.
2. REFERENCE SHEET M002 AND M003 FOR DETAILS AND SCHEDULES.

KEY NOTES:

1. PROVIDE AND INSTALL ALL HVAC CONTROLLERS IN IT ROOM

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HVAC SCHEDULES AND ENLARGED OFFICE PLAN

M003

LOUVERS, INTAKES, RELIEFS

TAG	MAKE AND MODEL #	LOCATION	SERVICE	SIZE	CFM	MIN FREE ARA (FT2)	PSI DROP (IN.WG.)	FREE AREA VEL. FPM/MAX	NOTES
LV-1	GREENHECK ESD-435	DRIVE THRU	INTAKE	52X78	11,250	16	0.08	705	1,2,3,4

NOTE: ADJUST LOUVER SIZES TO MEET FIELD CONDITIONS, MAINTAINING LISTED FREE AREA.

ACCESSORIES

1	PROVIDE PROVIDE WITH MANUFACTURE COLOR MATCH BY ARCHITECT
2	PROVIDE WITH INTERNAL ALUMINUM BIRD SCREEN
3	PROVIDE WITH MOTORIZED DAMPER.
4	INTERLOOK LV-1 WITH EF-3 SEE CO CONTROLLER WIRING DETAIL FOR SEQUENCE OF OPERATIONS

ROOFTOP UNIT SCHEDULE

TAG	MANUFACTURER OR EQUAL	MODEL	WEIGHT	SEER/ EER	CFM	O.A. CFM	E.S.P. (IN W.G.)	GAS HEAT		COOLING		REHEAT		ELECTRICAL DATA			NOTES
								INPUT CAPACITY	OUTPUT CAPACITY	TOTAL MBH	NOM. TONS	MBH	GPH	VOLTS/ PH/HZ	MCA	MOCP	
RTU-1	JOHNSON CONTROLS	J20ZRN40R4B2HAA2C1	3095	11.0	8,000	2440	1	400	320	258	20.0	118.9	13.57	460/3/60	54.5	70	1,2,3,4
RTU-2	JOHNSON CONTROLS	J20ZRN40R4B2HAA2C1	3095	11.0	8,000	2440	1	400	320	258	20.0	118.9	13.57	460/3/60	54.5	70	1,2,3,4
RTU-3	JOHNSON CONTROLS	J20ZRN40R4B2HAA2C1	3095	11.0	8,000	2440	1	400	320	258	20.0	118.9	13.57	460/3/60	54.5	70	1,2,3,4
RTU-4	JOHNSON CONTROLS	J20ZRN40R4B2HAA2C1	3095	11.0	8,000	2440	1	400	320	258	20.0	118.9	13.57	460/3/60	54.5	70	1,2,3,4
RTU-5	JOHNSON CONTROLS	ZR049N08B4B2HAA2A2	880	14.5	1,600	488	1	80	65	48	4.0	22.2	1.72	460/3/60	11.2	15	1,2,3,4
RTU-6	JOHNSON CONTROLS	ZR049N08B4B2HAA2A2	880	14.5	1,600	488	1	80	65	48	4.0	22.2	1.72	460/3/60	11.2	15	1,2,3,4
RTU-7	JOHNSON CONTROLS	ZR037N08B4B2HAA2A2	1052	12.2	1,200	100	1	80	65	33	3.0	18.3	7.10	460/3/60	11.2	15	1,2,3,4

NOTES:

1	PROVIDE PACKAGED UNIT WITH LOW LEAKAGE ENTHALPY ECONOMIZER, HAIL GAURDS, UNIT DISCONNECT AND FLAT ROOF CURB.
2	PROVIDE WITH RA SMOKE DETECTOR WITH TEST AND RESET.
3	PROVIDE WITH TWO STAGE COOLING.
4	UNIT START-UP TO BE PERFORMED BY JCI SERVICE DEPARTMENT TO ENSURE PROPER OPERATING CONDITIONS. ALL UNITS SHALL BE PROGRAMMED FOR ALTERNATE MODE IN THE DE-HUMIDIFICATION CYCLE TO ENSURE BOTH COMPRESSORS OPERATE DURING DE-HUMIDIFICATION. SET POINTS AS FOLLOWS, 78 DEGREES - COOLING, 68 DEGREES - HEATING, AND 55 PERCENT RH.

IR HEATER SCHEDULES

TAG	MODEL NUMBER	QTY.	CONFIGURATION	HEATING DATA			ELECTRICAL DATA			UNIT WEIGHT (LBS)	NOTES
				INPUT MBH	FUEL TYPE	LENGTH (FT)	AMPS	VOLTS	PH		
RH-1	ES80-S30	2	STRAIGHT TUBE	80	NAT. GAS	30	1.2	120	1	165	1,2,3,4,5,6,7,8

ACCESSORIES

1	BALL VALVE AND STAINLESS STEEL FLEX GAS CONNECTOR
2	4", 16 GA. ALUMINIZED STEEL TUBING (COMBUSTION AND RADIANT)
3	STAINLESS STEEL REFLECTORS
4	STAINLESS STEEL REFLECTORS END CAPS
5	BOX IRON, BOLT IN PLACE BRACKETS
6	SMARTCOM CONTROLLERS WITH BLACK BULB SENSORS
7	4" VENT ADAPTER
8	HANGING CHAIN SETS (CHAIN, KARABINER CLIPS, BEAM CLAMPS, EYE BOLTS)

ELECTRIC HEATER SCHEDULE

MARK	MANUFCTR	MODEL NO.	HEATING KW	VOLTAGE	PHASE	AMPS	ACCESSORIES /REMARKS
EWH-1	QMARK	AWH4407	4	277	1	15	1

1 RECESSED WALL HEATER, PROVIDE WITH INTEGRAL THERMOSTAT.

DIFFUSERS, REGISTERS AND GRILLES

TAG	DESCRIPTION	MFR	MODEL	MAT'L	CFM	MOUNTING STYLE	NOTES
S-1	14X4 DOUBLE DEFECTION REGISTER	PRICE	520	STEEL	0-300	SURFACE	
S-2	24"X24" LAY-IN DIFFUSER - 6" NECK	PRICE	SCD	STEEL	0-120	LAY-IN	
S-3	24"X24" LAY-IN DIFFUSER - 8" NECK	PRICE	SCD	STEEL	130-220	LAY-IN	
S-4	24"X24" LAY-IN DIFFUSER - 10" NECK	PRICE	SCD	STEEL	230-400	LAY-IN	
R-1	24X24 FIXED BLADE GRILLE	PRICE	530	STEEL	0-2000	LAY-IN	

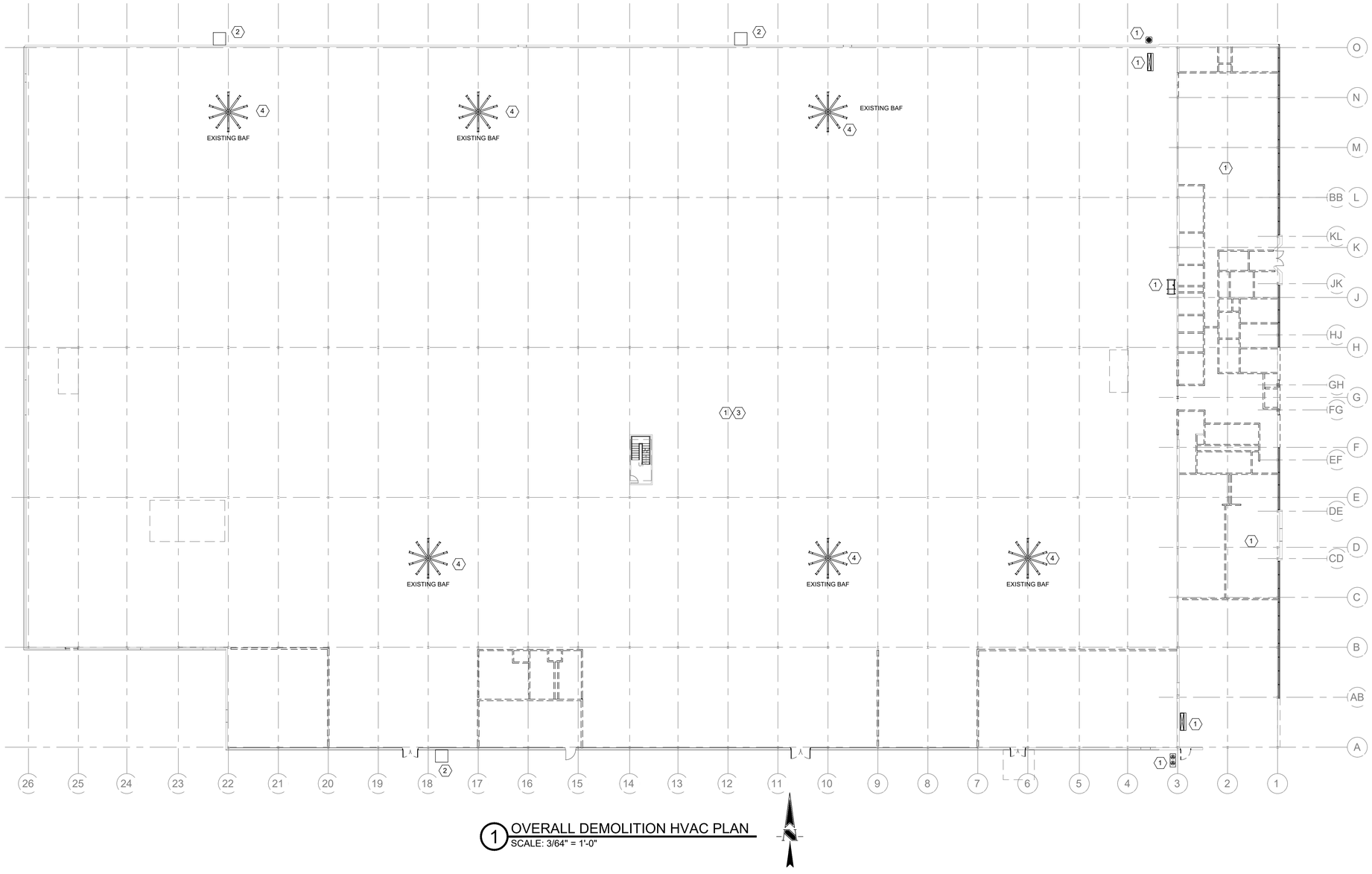
EXHAUST FAN SCHEDULE

TAG	GREENHECK MODEL #	LOCATION	TYPE FAN AND DESCRIPTION	FAN DATA			MOTOR DATA			NOTES
				CFM	ESP	SONES	HP WATTS	VOLT	FLA	
EF-1	SP-A90	RESTROOM	CABINET	75	0.25	0.4	15	115	0.34	1
EF-2	G-099-A	DRIVE	ROOF	900	0.39	13.1	1/4	115	5.8	2
EF-3	G-300-VG	DRIVE	ROOF	11250	0.25	21	5	460/3/60	7.4	3
EF-4	SP-A190	RESTROOM	CABINET	150	0.25	2.5	113	115	1.3	1

1	FAN SHALL RUN WITH LIGHTS, COORDINATE WITH E.C
2	FAN SHALL RUN CONTINUOUS, COORDINATE WITH E.C
3	FAN SHALL RUN WITH CO SYSTEM, COORDINATE WITH E.C

VENTILATION AIR CALCULATIONS (Per Table 403.3)

AREA TYPE	PEOPLE					AREA		EXHAUST			TOTAL VENTILATION	
	TOTAL NET AREA	OCCUPANTS PER 1000 FT	CALCULATED OCCUPANTS	CFM/PERSON REQUIRMENT	PEOPLE CFM REQUIRED	AREA CFM RQUIRMENT CFM/FT2	AREA CFM REQUIRED	# TOILETS OR EXHAUSTED AMOUNT	EXHAUST REQUIRED CFM EACH	EXHAUST REQUIRED CFM TOTAL	TOTAL UNCORECTED CFM	TOTAL CORRECTED CFM
OFFICE	829	5	5	5	25	0.06	50	-	0	0	75	94
STORAGE	139587	0	0	0	0	0.06	8376	-	0	0	8376	10470
TOTALS	140416		5		25		8426	0		0	8451	10564



1 OVERALL DEMOLITION HVAC PLAN
SCALE: 3/64" = 1'-0"

GENERAL NOTES:

1. REFERENCE SHEET M001 FOR LEGENDS, ABBREVIATIONS, SPECIFICATIONS AND NOTES.
2. REFERENCE SHEET M002 AND M003 FOR DETAILS AND SCHEDULES.
3. DEMOLITION PLANS ARE DIAGRAMMATIC AND BASED ON LIMITED SURVEY DATA. HVAC CONTRACTOR SHALL VISIT SITE, EXAMINE ALL PLANS AND DETERMINE EXISTING ELEMENTS TO REMAIN AND EXISTING TO BE REMOVED AS NEEDED TO MEET DESIGN INTENT. HVAC CONTRACTOR SHALL RECOVER ALL REFRIGERANTS AND DISPOSE OF ALL HVAC SYSTEMS PER EPA REQUIREMENTS. HVAC CONTRACTOR SHALL MAP OUT EXISTING DUCTWORK TO REMAIN, SEAL AND INSULATE PER SPECIFICATIONS AND REMOVE ALL UNUSED BRANCHES.

KEY NOTES:

1. REMOVE ALL EXISTING HVAC EQUIPMENT, DUCT WORK, AND DIFFUSERS
2. REMOVE ALL EXISTING VENTILATION EQUIPMENT.
3. REMOVE EXISTING STEAM HEATING SYSTEM. INCLUDING PIPING AND RADIANT HEATERS
4. REMOVE EXISTING FAN LOCATIONS.

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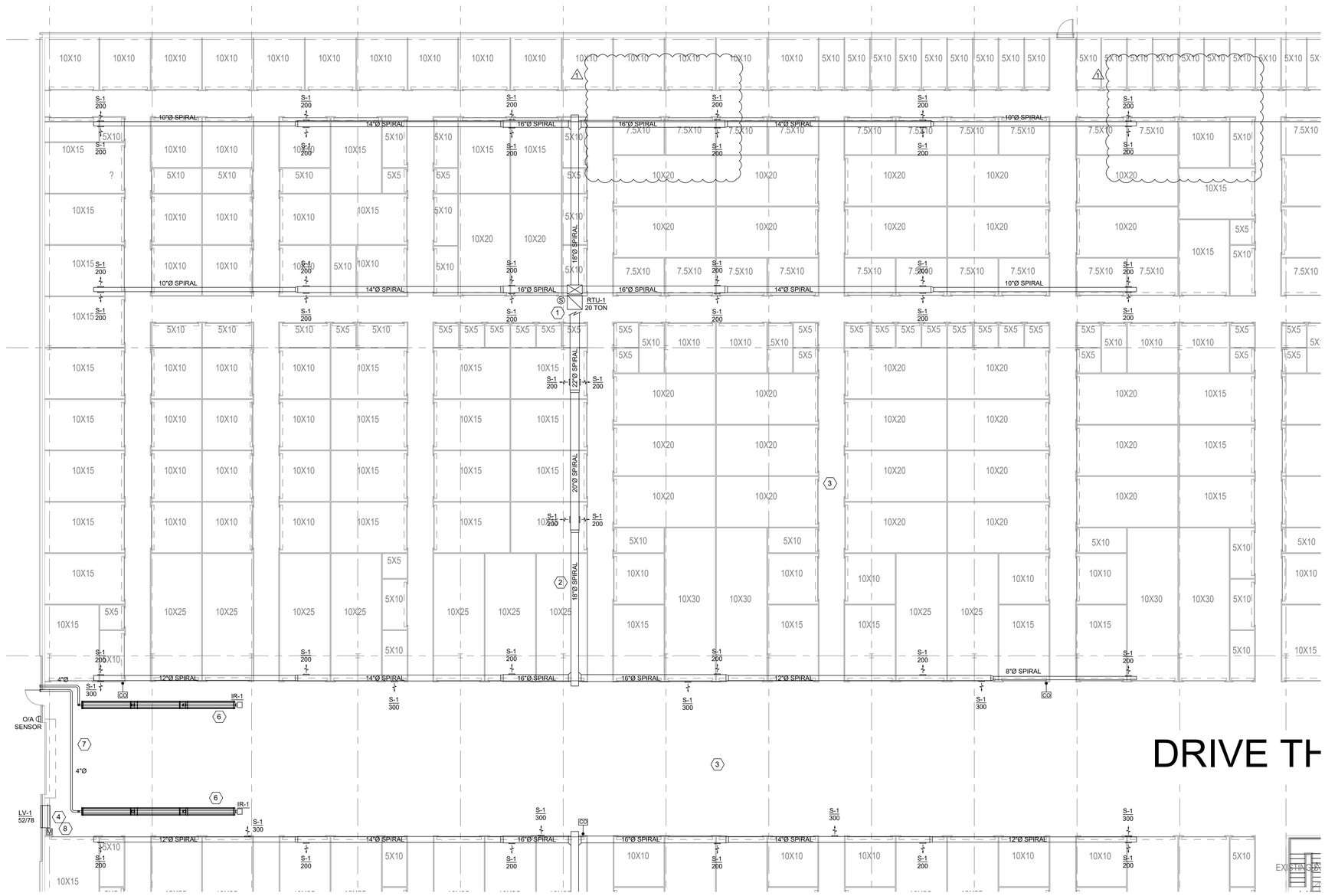
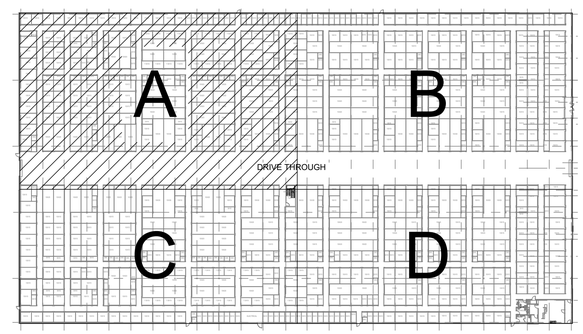
OVERALL DEMOLITION HVAC PLAN

MD100



1 FIRST FLOOR HVAC PLAN - SECTION A
SCALE: 3/32" = 1'-0"



A KEY PLAN
SCALE: NO SCALE

GENERAL NOTES:

1. REFERENCE SHEET M001 FOR LEGENDS, ABBREVIATIONS, SPECIFICATIONS AND NOTES.
2. REFERENCE SHEET M002 AND M003 FOR DETAILS AND SCHEDULES.

KEY NOTES:

1. PROVIDE AND INSTALL SCREEN ON RETURN OPENING.
2. ROUTE SUPPLY DUCT WORK THROUGHOUT AT 15'-0 ABOVE FINISHED FLOOR.
3. NO WORK IN MEZZANINE AREA
4. PROVIDE DRIVE AISLE VENTILATION SYSTEM FANS, INTAKES AND CONTROLLERS. COORDINATE INSTALLATION WITH E.C.
5. NOTE NOT USED. ⚠1
6. IR HEATER SHALL BE CONTROLLED BY SMARTCOM IR TEMPERATURE CONTROL PANEL WITH REMOTE BLACK BULB AND OA SENSOR. RACEWAYS FOR TCC AND BURNER/BLOWER INTERLOCKS ARE BY E.C. ALL CONTROLS AND HEATER COMPONENTS BY M.C. SEE SHEET M002 FOR DETAILS.
7. FIELD ROUTE 4" IR HEATER FLUES TO SIDE WALL. MAINTAIN MINIMUM OF 10' BETWEEN INTAKES AND EXHAUSTS.
8. INSTALL LOUVER @ 36" ABOVE FINSHED FLOOR

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088007
LICENSED
PROFESSIONAL ENGINEER

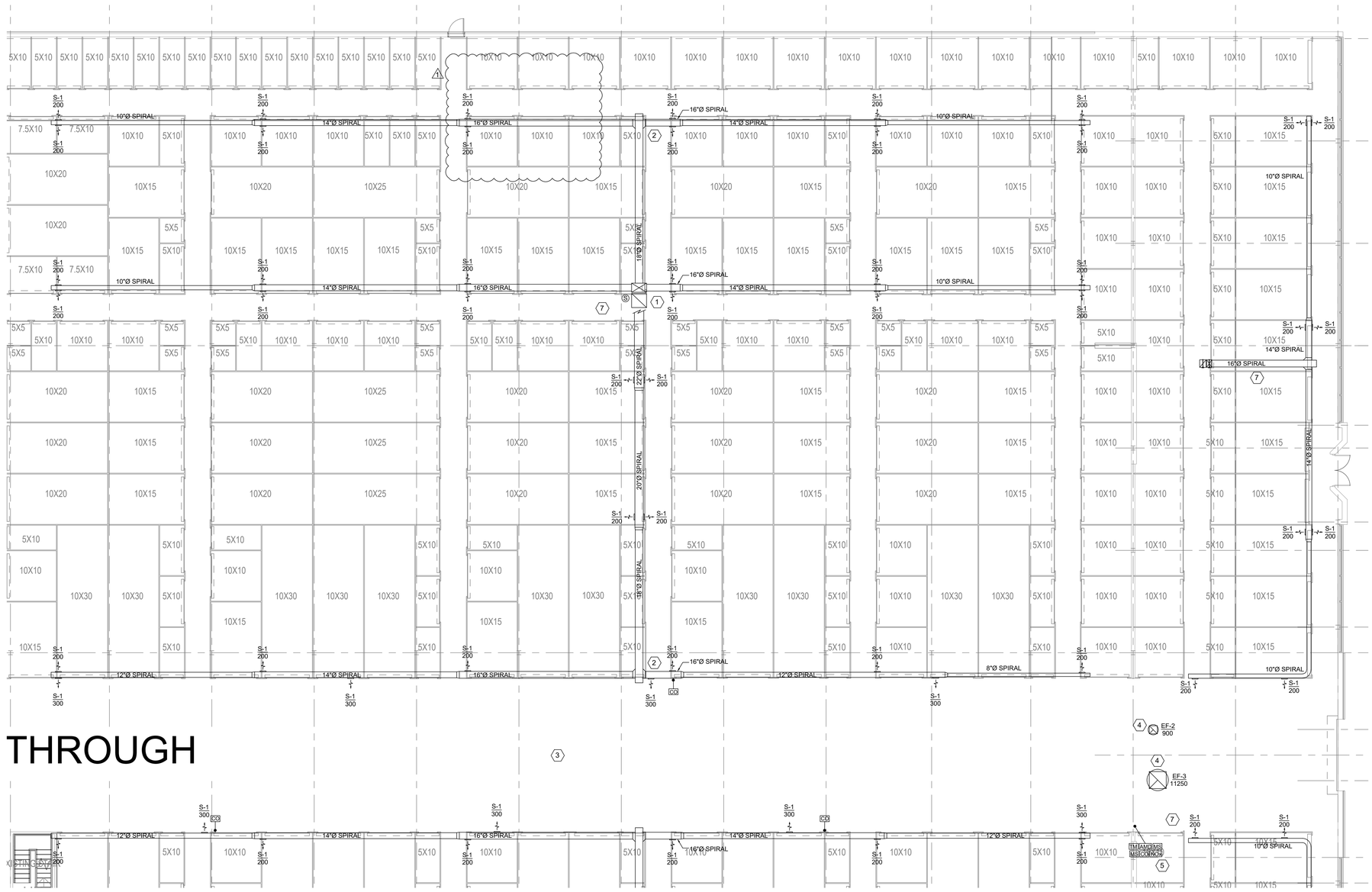
LIFE STORAGE

2122 COLVIN BOULEVARD
TONAWANDA, NY

DATE	ISSUE
8/27/21	PERMIT SET
4/15/22	⚠1 MECHANICAL CLARIF.

FIRST FLOOR HVAC PLAN - SECTION A

M100



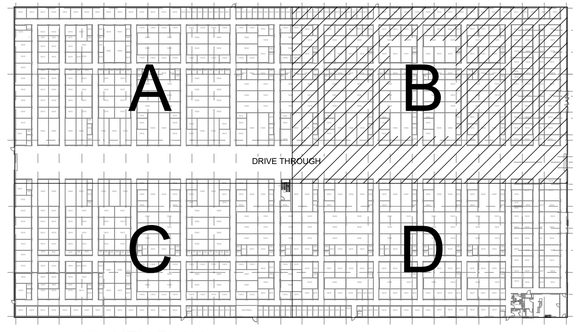
1 FIRST FLOOR HVAC PLAN - SECTION B
SCALE: 3/32" = 1'-0"

GENERAL NOTES:

1. REFERENCE SHEET M001 FOR LEGENDS, ABBREVIATIONS, SPECIFICATIONS AND NOTES.
2. REFERENCE SHEET M002 AND M003 FOR DETAILS AND SCHEDULES.

KEY NOTES:

1. PROVIDE AND INSTALL SCREEN ON RETURN OPENING.
2. ROUTE SUPPLY DUCT WORK THROUGHOUT AT 15'-0 ABOVE FINISHED FLOOR.
3. NO WORK IN MEZZANINE AREA
4. PROVIDE DRIVE AISLE VENTILATION SYSTEM FANS, INTAKES AND CONTROLLERS. COORDINATE INSTALLATION WITH E.C.
5. PROVIDE AND INSTALL ARMSTRONG AMD-1ACO CO/NO2 CONTROLLER WITH COMBINATION CO/NO2 SENSOR INTERLOCKED TO AUTOMATICALLY START EXHAUST FAN WHEN MOTOR STARTER IS IN AUTO. FAN SHALL ALSO RUN WITH MOTOR STARTER IN HAND. INTAKE DAMPER SHALL OPEN ANYTIME FAN IS RUNNING. COORDINATE INSTALLATION WITH E.C. SEE DETAIL ON SHEET M002.
6. NOTE NOT USED.
7. ROUTE SUPPLY DUCT WORK TIGHT TO STRUCTURE



A KEY PLAN
SCALE: NO SCALE

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DATE	ISSUE
8/27/21	PERMIT SET
4/15/22	1 MECHANICAL CLARIF.

FIRST FLOOR HVAC PLAN - SECTION B

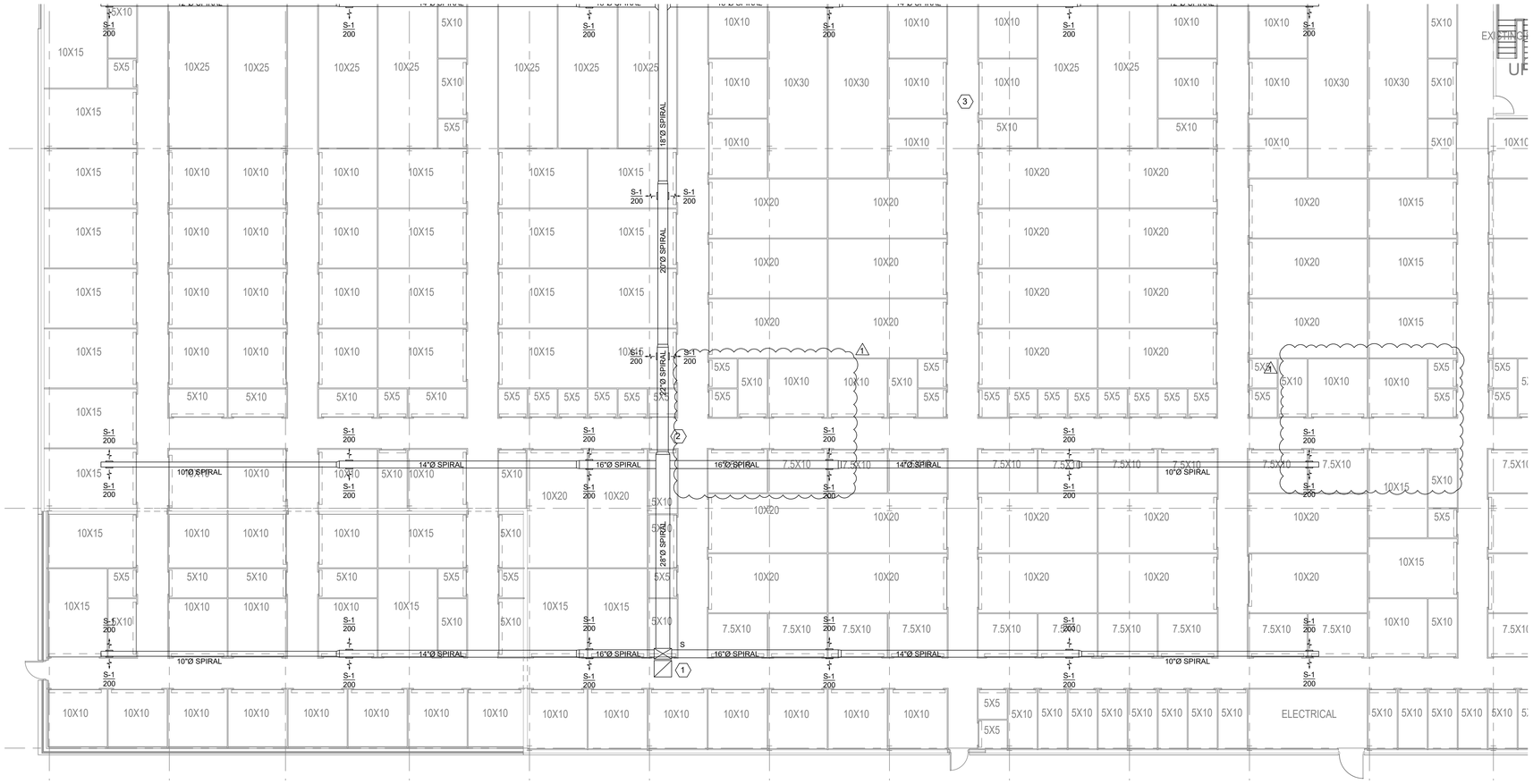
M101

GENERAL NOTES:

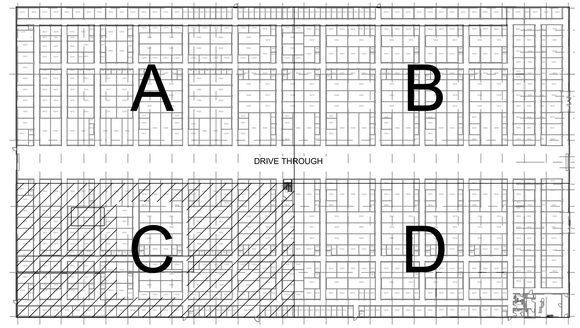
1. REFERENCE SHEET M001 FOR LEGENDS, ABBREVIATIONS, SPECIFICATIONS AND NOTES.
2. REFERENCE SHEET M002 AND M003 FOR DETAILS AND SCHEDULES.

KEY NOTES:

1. PROVIDE AND INSTALL SCREEN ON RETURN OPENING.
2. ROUTE SUPPLY DUCT WORK THROUGHOUT AT 15'-0 ABOVE FINISHED FLOOR.
3. NO WORK IN MEZZANINE AREA



1 FIRST FLOOR HVAC PLAN - SECTION C
SCALE: 3/32" = 1'-0"



A KEY PLAN
SCALE: NO SCALE

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DATE	ISSUE
8/27/21	PERMIT SET
4/15/22	1 MECHANICAL CLARIF.

FIRST FLOOR HVAC PLAN - SECTION C

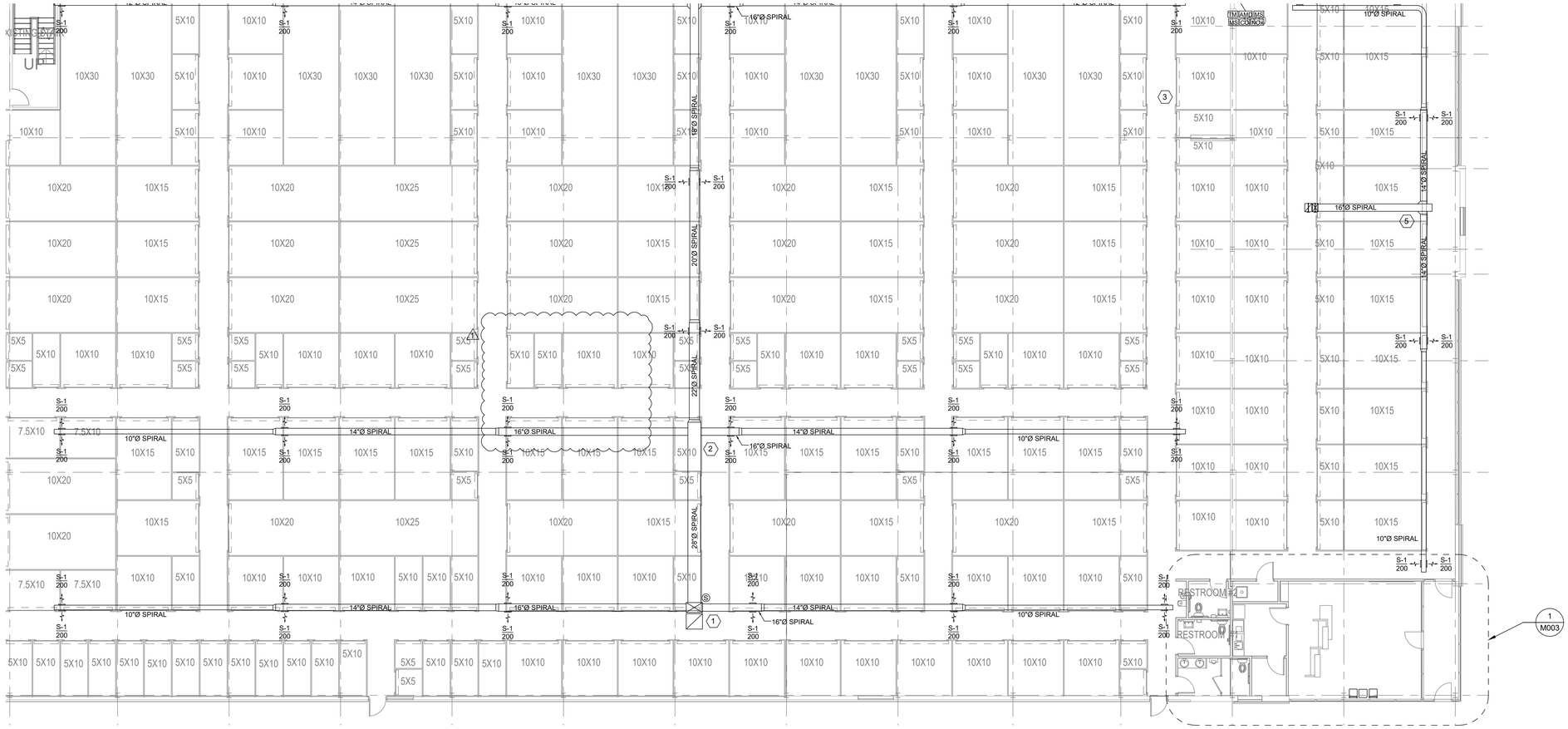
M102

GENERAL NOTES:

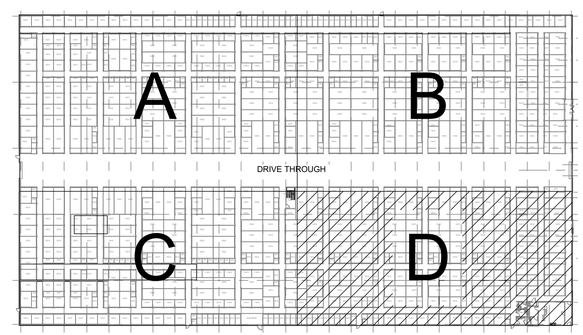
1. REFERENCE SHEET M001 FOR LEGENDS, ABBREVIATIONS, SPECIFICATIONS AND NOTES.
2. REFERENCE SHEET M002 AND M003 FOR DETAILS AND SCHEDULES.

KEY NOTES:

1. PROVIDE AND INSTALL SCREEN ON RETURN OPENING.
2. ROUTE SUPPLY DUCT WORK THROUGHOUT AT 15'-0 ABOVE FINISHED FLOOR.
3. NO WORK IN MEZZANINE AREA
4. NOTE NOT USED.
5. ROUTE SUPPLY DUCT WORK TIGHT TO STRUCTURE



1 FIRST FLOOR HVAC PLAN - SECTION D
SCALE: 3/32" = 1'-0"



A KEY PLAN
SCALE: NO SCALE

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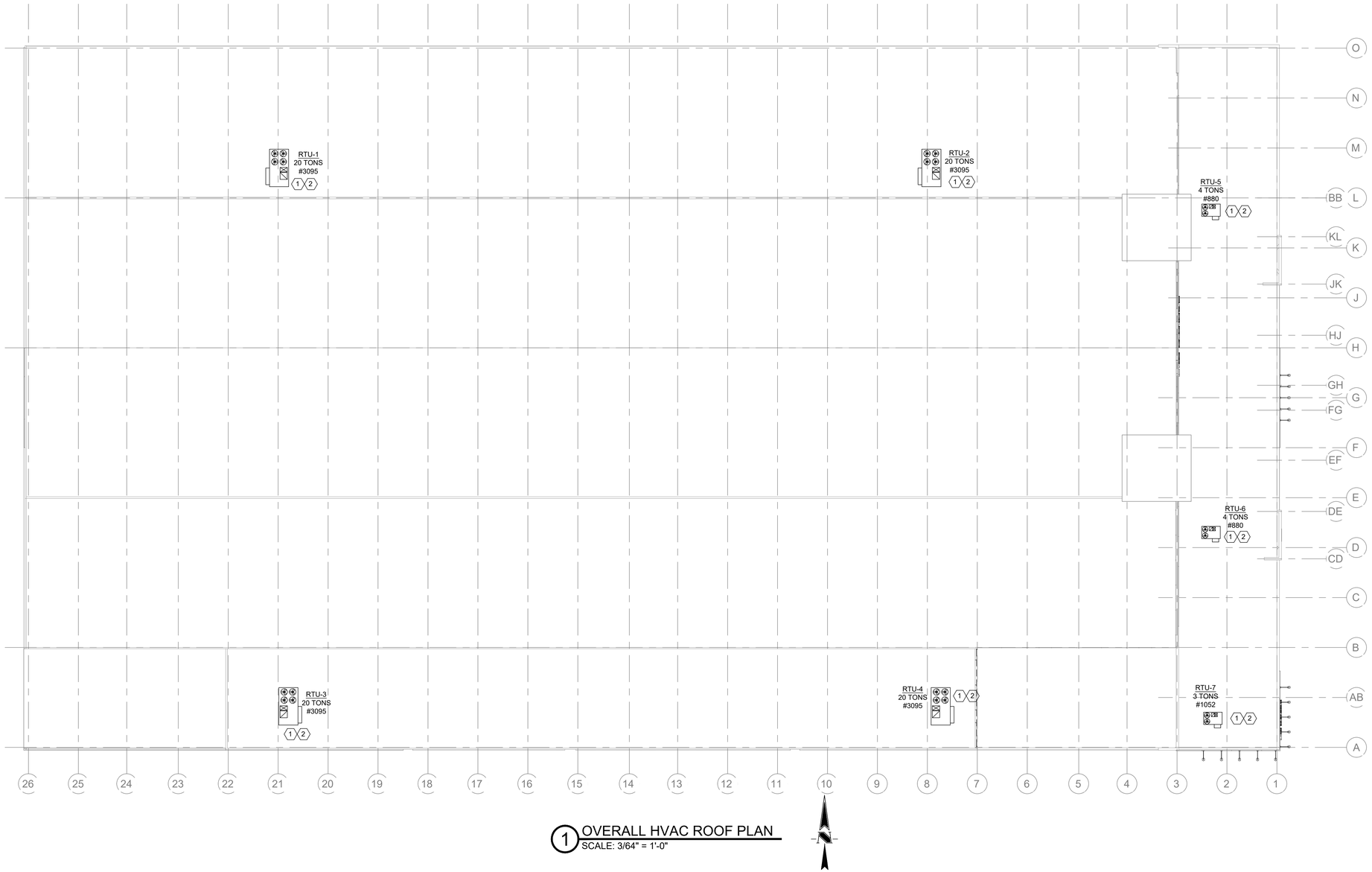
DATE	ISSUE
8/27/21	PERMIT SET
4/15/22	1 MECHANICAL CLARIF.

FIRST FLOOR HVAC PLAN - SECTION D

M103



1 OVERALL HVAC ROOF PLAN
SCALE: 3/64" = 1'-0"

GENERAL NOTES:

1. REFERENCE SHEET M001 FOR LEGENDS, ABBREVIATIONS, SPECIFICATIONS AND NOTES.
2. REFERENCE SHEET M002 AND M003 FOR DETAILS AND SCHEDULES.

KEY NOTES:

1. COORDINATE ALL LOCATIONS OF RTU'S WITH STRUCTURAL ENGINEER. G.C. IS RESPONSIBLE FOR ALL STEEL WORK.
2. PROVIDE AND INSTALL CONDENSATE DRAINS ON ALL RTU'S. DRAIN CONDENSATES ON TO ROOF.

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2122 COLVIN BOULEVARD
TONAWANDA, NY

DATE	ISSUE
8/27/21	PERMIT SET

OVERALL HVAC ROOF PLAN

M200

ATTACHMENT 4

Table 4
Summary of Historical Non-Aqueous Phase Liquid Thicknesses in Wells
Greif Facility - Tonawanda, New York
NYSDEC VCP Number V00334-9

WELL	RW-1 (ft.) (DNAPL)	RW-2 (ft.) (DNAPL)	RW-4 (ft.) (DNAPL)	RW-5 (ft.) (LNAPL)	RW-6 (ft.) (DNAPL)	VMP-2 (ft.) (DNAPL)	VMP-5 (ft.) (DNAPL)	MW-20 (ft.) (DNAPL)	MW-23 (ft.) (LNAPL)
Date									
19-May-08	0.00	0.00	0.00	0.00	NI	0.00	HS	0.09	0.14
30-May-08	0.00	0.16	0.00	0.00	NI	0.00	HS	0.03	0.14
16-Jun-08	0.00	0.14	0.00	0.02	NI	0.00	0.02	0.07	0.13
25-Jun-08	0.00	0.16	0.00	0.02	NI	0.00	HS	0.07	0.26
3-Jul-08	0.00	0.16	0.00	0.02	NI	0.00	HS	0.09	0.18
23-Jul-08	0.00	0.16	0.00	0.02	NI	0.00	HS	0.10	0.09
6-Aug-08	0.03	0.16	0.00	0.04	NI	0.00	HS	0.11	0.09
19-Aug-08	0.03	0.16	0.00	0.04	NI	0.00	HS	0.13	0.11
21-Nov-08	HS	0.11	0.00	0.00	NI	0.00	HS	0.22	0.29
17-Dec-08	HS	0.11	0.00	0.00	NI	0.00	HS	0.24	0.29
14-Jan-09	0.00	0.00	0.00	0.00	NI	0.00	0.00	HS	0.13
26-Feb-09	0.00	0.00	0.00	0.00	NI	0.00	0.00	0.01	0.24
12-Mar-09	0.00	0.00	0.00	0.00	NI	0.00	0.00	0.00	0.09
22-Apr-09	0.00	0.00	0.00	0.00	NI	0.00	0.00	0.00	0.11
13-May-09	0.00	0.00	0.00	0.00	NI	0.00	0.00	0.00	0.09
25-Jun-09	NM	0.00	NM	0.00	NI	0.00	0.00	NM	0.12
17-Jul-09	NM	0.00	NM	0.00	NI	0.00	0.00	NM	0.11
27-Aug-09	0.00	0.00	0.00	0.00	NI	0.00	NM	NM	0.09
25-Sep-09	0.00	0.00	0.00	0.00	NM	0.00	NM	0.04	0.11
16-Oct-09	NM	0.00	0.00	0.00	NM	0.00	NM	NM	0.11
19-Nov-09	NM	0.00	NM	NM	NM	0.00	NM	NM	0.21
17-Dec-09	0.00	0.00	NM	NM	NM	0.00	0.00	0.01	0.23
14-Jan-10	0.00	0.00	0.00	NM	NM	0.00	0.00	0.01	0.21
17-Feb-10	0.00	0.00	NM	NM	NM	0.00	0.00	0.01	0.17
18-Mar-10	0.00	0.00	0.00	0.00	NM	0.00	0.00	0.01	0.09
13-Apr-10	0.00	0.00	0.00	0.00	0.49	0.00	0.00	0.01	0.12
18-May-10	0.00	0.00	0.00	0.00	0.53	0.00	NM	0.01	0.08
15-Jun-10	0.00	0.00	0.00	NM	0.01*	0.00	0.00	0.01	0.07
14-Jul-10	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.07
13-Aug-10	0.00	NM	0.00	NM	0.08	0.00	0.00	HS	0.10
14-Sep-10	0.00	NM	0.00	NM	0.04	0.00	0.00	NM	0.06
14-Oct-10	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.01	0.08
22-Nov-10	0.00	0.00	NM	0.00	0.04	0.00	0.00	0.01	0.14
15-Dec-10	0.00	0.00	0.00	NM	0.01	0.00	NM	0.01	0.09
18-Jan-11	0.00	0.00	0.00	NM	HS	0.00	NM	0.02	0.09
21-Feb-11	NM	0.00	0.00	0.00	0.03	0.00	0.00	0.03	0.04
11-Mar-11	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.04	0.03
21-Apr-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
24-May-11	0.00	0.00	0.00	NM	0.15	0.30	0.00	0.10	0.10
21-June-11	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.03	0.08
21-July-11	0.00	0.00	0.00	NM	HS	0.00	0.00	0.01	0.06
29-Aug-11	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	HS
26-Sept-11	0.00	NM	0.00	0.00	0.10	0.00	NM	0.04	HS

Table 4
Summary of Historical Non-Aqueous Phase Liquid Thicknesses in Wells
Greif Facility - Tonawanda, New York
NYSDEC VCP Number V00334-9

WELL	RW-1 (ft.) (DNAPL)	RW-2 (ft.) (DNAPL)	RW-4 (ft.) (DNAPL)	RW-5 (ft.) (LNAPL)	RW-6 (ft.) (DNAPL)	VMP-2 (ft.) (DNAPL)	VMP-5 (ft.) (DNAPL)	MW-20 (ft.) (DNAPL)	MW-23 (ft.) (LNAPL)
Date									
28-Oct-11	0.00	0.00	NM	0.00	0.03	0.00	0.00	0.02	HS
18-Nov-11	0.00	0.00	NM	NM	HS	0.00	0.00	0.01	0.04
22-Dec-11	0.00	0.00	NM	NM	0.03	0.00	0.00	0.02	0.06
20-Jan-12	0.00	0.00	0.00	0.00	HS	0.00	0.00	0.02	HS
21-Feb-12	0.00	0.00	0.00	0.00	HS	0.00	0.00	0.03	HS
16-Mar-12	0.00	0.00	0.00	0.00	HS	0.00	0.00	HS	0.15
20-Apr-12	0.00	0.00	NM	NM	HS	0.00	0.00	0.02	0.02
17-May-12	0.00	0.00	0.00	0.00	1.06	0.00	0.00	0.01	0.03
20-Jun-12	0.00	0.00	0.00	0.00	HS	0.00	0.00	0.01	0.04
20-Jul-12	NM	0.00	NM	0.00	HS	0.00	0.00	NM	0.02
21-Aug-12	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.12	0.19
14-Sept-12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.09
17-Oct-12	0.00	0.00	0.00	0.00	0.11	0.00	NM	0.14	0.09
20-Nov-12	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.02	HS
19-Dec-12	0.00	0.00	NM	0.00	HS	0.00	0.00	0.03	0.06
24-Jan-13	0.00	0.00	0.00	0.00	HS	0.00	0.00	0.03	0.09
22-Feb-13	NM	NM	NM	NM	NM	NM	NM	NM	NM
25-Mar-13	0.00	0.00	NM	NM	0.04	0.00	0.00	0.04	HS
3-May-13	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.02	0.00
31-Jul-13	0.00	0.00	NM	NM	HS	0.00	0.00	0.04	0.03
25-Sept-13	0.00	0.00	0.00	0.00	HS	0.00	0.00	0.06	HS
20-Nov-13	0.00	0.00	0.00	NM	0.09	0.00	0.00	0.00	0.12
7-Jul-14	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.08	0.12
22-Oct-14	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.03	0.06
27-Mar-15	0.00	0.00	0.00	NM	0.04	0.00	0.00	0.12	0.12
10-June-15	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.13	0.12
25-Sept-15	0.00	0.00	NM	NM	0.02	0.00	0.00	0.02	0.05
11-Dec-15	0.00	0.00	NM	NM	0.16	0.00	0.00	0.03	0.12
31-Mar-16	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.02	0.10
2-June-16	0.00	0.00	NM	NM	0.02	0.00	0.00	0.02	0.11
26-Sept-16	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.03	0.06
28-Dec-16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.15
31-Mar-17	0.00	0.00	NM	0.00	0.04	0.00	0.00	0.02	0.10
15-Jun-17	0.00	0.00	NM	0.00	0.04	0.00	0.00	0.01	0.05
22-Aug-17	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.02	0.07
18-Dec-17	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.02	0.06
29-Mar-18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.15
23-Jun-18	0.00	NM	NM	NM	0.03	0.00	0.00	0.01	0.10
19-Sept -18	0.00	0.00	0.00	0.00	HS	0.00	0.00	0.02	0.09
13-Dec-18	0.00	0.00	0.00	0.00	0.04	0.00	0.00	HS	0.07
29-Mar-19	0.00	0.00	0.00	0.00	HS	0.00	0.00	0.00	NM
27-Mar-19	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	NM
27-Jun-19	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	NM
13-Sep-19	0.00	0.00	0.00	0.00	HS	0.00	0.00	HS	0.00
29-Dec-19	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00
30-Jun-20	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.32
18-Dec-20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28-Jun-21	0.00	0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.08
22-Jun-22	0.02	0.10	0.00	0.00	Present	0.00	0.11	0.00	0.00

Notes:

22-June-22 RW-6 NAPL present but measured incorrectly.

All values are reported in feet as measured with an electronic interface probe.

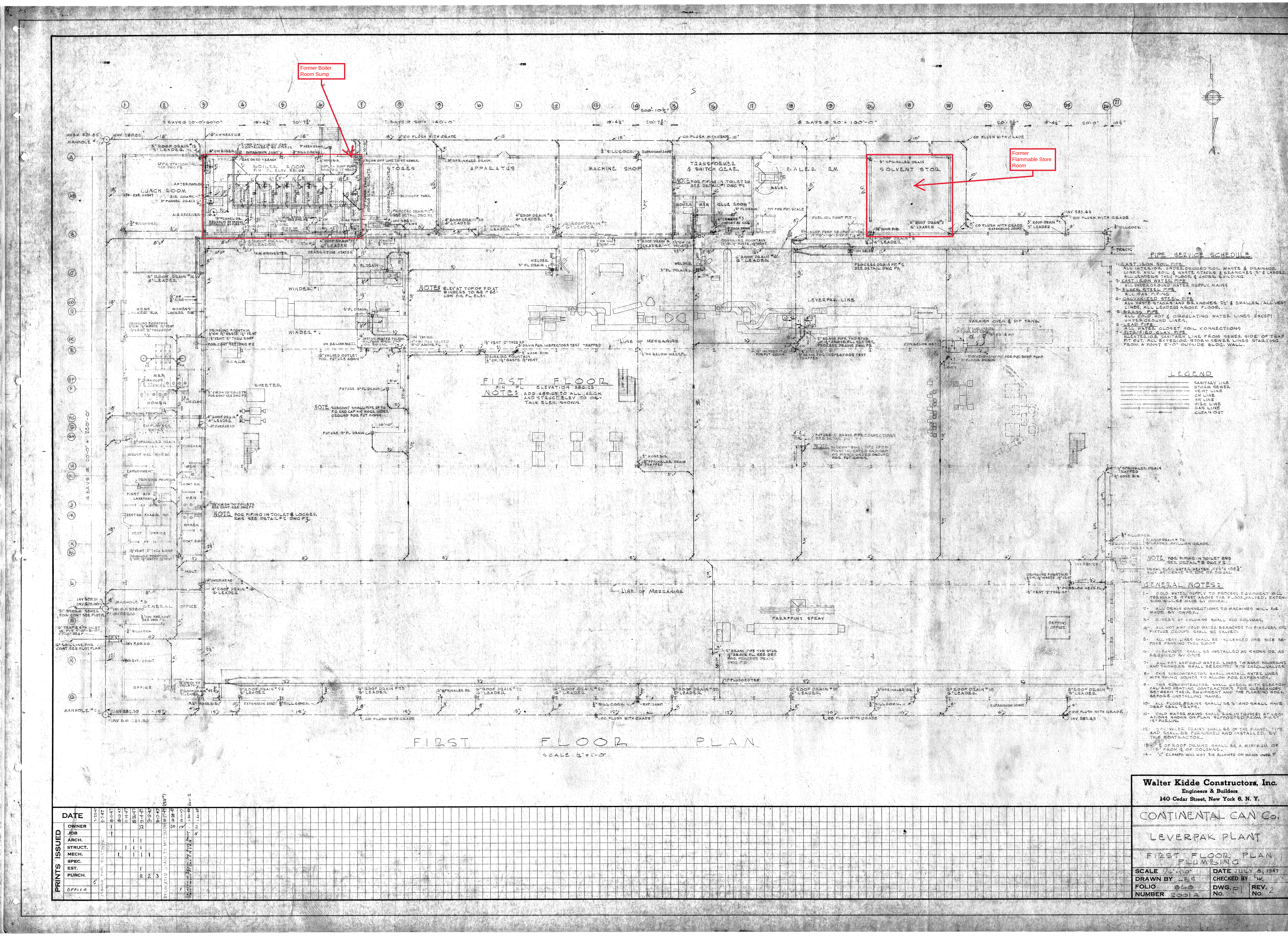
HS - heavy sheen but no measureable thickness.

NM - not measured

NI - not installed as of this date.

* - Product level after ERM initiated DNAPL recovery test

ATTACHMENT 5


Former Boiler Room Sump
Former Flammable Store Room
BOILER ROOM
STORES
APPARATUS
MACHINE SHOP
TRANSFORMER & SWITCH GEAR
BALER RM
SOLVENT STOR
LUNCH ROOM
WOMEN
MEN
GLUE ROOM
LEVERPAK LINE
WINDER #1
WINDER #2
VARNISH OVEN & DIP TANK
SCALE
SHELTER
FIRST FLOOR
FIN. FL. ELEVATION 586.63
NOTES: ADD 486.63 TO ALL ARCH. AND STRUCT. ELEV. TO OBTAIN ELEV. SHOWN.
LINE OF MEZZANINE
PARAFFINE SPRAY
GENERAL OFFICE
OFFICE
SHIPPING OFFICE
FIRST FLOOR PLAN
SCALE 1/16" = 1'-0"
PIPE SERVICE SCHEDULE
1- CAST IRON SOIL PIPE
ALL INTERIOR, UNDERGROUND SOIL WASTE & DRAINAGE LINES. ALL SOIL & WASTE STACKS & BRANCHES 3" & LARGER. ALL LEADERS THRU FLOOR & UNDER BUILDING.
2- CAST IRON WATER PIPE
ALL UNDERGROUND WATER SUPPLY MAINS
3- BLACK STEEL PIPE
ALL GAS PIPING
4- GALVANIZED STEEL PIPE
ALL WASTE STACKS AND BRANCHES 2½" & SMALLER. ALL VENT LINES, ALL LEADERS ABOVE FLOOR.
5- BRASS PIPE
ALL COLD, HOT & CIRCULATING WATER LINES, EXCEPT UNDERGROUND LINES.
6- LEAD PIPE
ALL WATER CLOSET SOIL CONNECTIONS
7- VITRIFIED CLAY PIPE
ALL EXTERIOR SANITARY LINE FROM SEWER SIDE OF TRAP PIT OUT. ALL EXTERIOR STORM SEWER LINES STARTING FROM A POINT 5'-0" OUTSIDE BLDG. WALL.
LEGEND
SANITARY LINE
STORM SEWER
VENT LINE
CW LINE
HW LINE
CIRC LINE
GAS LINE
CLEAN OUT
NOTE FOR PIPING IN TOILET RMS SEE DETAIL #3 DWG P2
GENERAL NOTES:
1- COLD WATER SUPPLY TO PROCESS EQUIPMENT WILL TERMINATE 9 FEET ABOVE THE FLOOR, VALVED. EXTENSION WILL BE MADE BY OWNER.
2- ALL DRAIN CONNECTIONS TO MACHINES WILL BE MADE BY OWNER.
3- RISERS AT COLUMNS SHALL HUG COLUMNS.
4- ALL HOT AND COLD WATER BRANCHES TO FIXTURES OR FIXTURE GROUPS SHALL BE VALVED.
5- ALL VENT LINES SHALL BE INCREASED ONE SIZE BEFORE PASSING THRU ROOF
6- CLEANOUTS SHALL BE INSTALLED AS SHOWN OR AS REQUIRED BY CODE
7- ALL HOT AND COLD WATER LINES TO WASH FOUNTAINS AND SHOWERS SHALL BE EQUIPPED WITH CHECK VALVES.
8- THIS SUBCONTRACTOR SHALL INSTALL WATER LINES WITH SWING JOINTS TO ALLOW FOR EXPANSION.
9- THIS SUBCONTRACTOR SHALL CHECK WITH ELECTRICAL AND HEATING CONTRACTORS FOR CLEARANCES BETWEEN THEIR EQUIPMENT AND THE PLUMBING WORK BEFORE INSTALLING SAME.
10- ALL FLOOR DRAINS SHALL BE 3" AND SHALL HAVE DEEP SEAL TRAPS.
11- COLD WATER MAINS SHALL RUN IN TRUSSES AT LOCATIONS SHOWN ON PLAN SUPPORTED FROM FIRST 12" PURLIN.
12- SPRINKLER DRAINS SHALL BE OF THE FUNNEL TYPE AND SHALL BE FURNISHED AND INSTALLED BY THIS CONTRACTOR.
13- ℄ OF ROOF DRAINS SHALL BE A MINIMUM OF 1'-5" FROM ℄ OF COLUMNS.
14- "C" CLAMPS WILL NOT BE ALLOWED ON MAINS OVER 3"
Walter Kidde Constructors, Inc.
Engineers & Builders
140 Cedar Street, New York 6, N. Y.
CONTINENTAL CAN Co.
LEVERPAK PLANT
FIRST FLOOR PLAN PLUMBING
SCALE 1/16" = 1'-0"
DATE JULY 8, 1947
DRAWN BY LBS
CHECKED BY HK
FOLIO NUMBER 868 2001A
DWG. No. P1
REV. No. 2
DATE
PRINTS ISSUED
OWNER
JOB
ARCH.
STRUCT.
MECH.
SPEC.
EST.
PURCH.