Hudson Valley Research Park
2070 Route 52
Hopewell Junction, NY 12533-3507
S. C. Hawkins Z/325

September 12, 2011

Mr. Alex Czuhanich
Engineering Geologist
New York State Department of
Environmental Conservation
Division of Environmental Remediation
Remedial Bureau E, 12th Floor
625 Broadway
Albany, New York 12233-7017

Mr. Henry Wilkie
Environmental Engineer 1
New York State Department of
Environmental Conservation
Division of Environmental Remediation
Remedial Bureau A, 11th Floor
625 Broadway
Albany, New York 12233-7015

Subject: Report of Findings: Installation and Testing of Replacement Well GW-032B, Remediation Area D

Reference: IBM East Fishkill Corrective Action Program
IBM East Fishkill Facility
Hopewell Junction, New York
NYSDEC Part 373 Permit 3-1323-0025-00249-0
EPA ID No. NYD000707901

Dear Mr. Czuhanich and Mr. Wilkie:

The purpose of this letter is to transmit our installation and testing results for replacement well GW-032B. This well will replace GW-032A as the extraction well for IBM's Area D. The new well was installed due to an apparent break in the GW-032A well casing. A work plan for the replacement well was transmitted to your office on April 25, 2011 and was subsequently approved on May 3, 2011. Once we receive NYSDEC approval, the GW-032B pumping system will be installed and connected, GW-032B will be put online and GW-032A will be decommissioned.

If you have any questions regarding this submittal or require additional information, please contact Jackie Braungart at (845) 892-1672.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,
International Business Machines Corporation

Steven C. Hawkins, Manager
Environmental Engineering

c: K. Brezner, NYSDEC Region 3, Environmental Remediation Engineer (electronic only)
T. Killeen, RCRA Permitting Section Supervisor, Division of Environmental Remediation, NYSDEC (electronic only)
R. Schatz, ESDC (without enclosures)
Chief, RCRA Programs Branch, USEPA Region 2 (electronic only)

GROUNDWATER SCIENCES CORPORATION

2601 Market Place Street, Suite 310
Harrisburg, PA 17110-9340
(717) 652-6832
FAX (717) 657-1611

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Re: *Report of Findings*
Installation and Testing of Replacement Well GW-032B
Remediation Area D
IBM East Fishkill Facility, Hopewell Junction, New York
EPA ID No. NYD000707901

Dear Mr. Czuhanich and Mr. Wilkie:

On behalf of the IBM Corporation (IBM), Groundwater Sciences Corporation (GSC) has prepared this letter report summarizing the results of installation and testing of a new groundwater recovery well, designated as GW-032B, to serve as a replacement for existing groundwater recovery well GW-032A located within Remediation Area D of the IBM East Fishkill Facility in East Fishkill, New York (Site). Replacement of well GW-032A is necessary due to an apparent break in the lower portion of the well screen which has resulted in formation material entering the well, potentially limiting the future hydraulic effectiveness of GW-032A to maintain hydraulic containment in the Remediation Area D portion of the Site.

Overall, the findings of the well installation and testing activities indicate replacement well GW-032B exceeds the hydraulic effectiveness of well GW-032A. A review of groundwater elevation and water quality data during GW-032B extraction operations testing indicates an improvement in hydraulic containment in Remediation Area D as compared to 2010 and 2011 monitoring during GW-032A extraction operations, supporting the conclusion that well GW-032B is an adequate replacement for well GW-032A. GW-032A groundwater extraction operations have resumed following completion of the GW-032B installation and testing activities. Shut-down of well GW-032A groundwater recovery operations, start-up of well GW-032B groundwater recovery operations, and decommissioning of recovery well GW-032A awaits regulatory review and approval of this report.

The field exploration and testing activities associated with installation and testing of replacement groundwater recovery well GW-032B were performed in accordance with a GSC Work Plan[1] dated April 25, 2011, which was subsequently approved by the New York State Department of Environmental Conservation (NYSDEC) in a letter to IBM[2] dated May 3, 2011. The recovery well replacement has been completed as part of IBM's groundwater Corrective Action (CA) program which is currently regulated by NYSDEC under the Site's New York State Part 373 Permit 3-1323-0025-00249-0, EPA ID No. NYD000707901. The GW-032B well installation and testing activities were performed by GSC and others under a contract with Fluor Enterprises, Inc. (Fluor), IBM's current facilities management contractor at the East Fishkill Facility. We understand that this report is being transmitted to the NYSDEC as part of an IBM request to properly decommission recovery well GW-032A and activate well GW-032B as its replacement.

BACKGROUND

The Site consists of a semiconductor manufacturing and development facility located in south-central Dutchess County within the Town of East Fishkill, New York. As shown on the Site Location Map provided as Figure 1, the Site is located between Interstate 84, to the south, and New York State Route 52, to the north. Remediation Area D is located in the northwestern portion of the Site in the area of the wastewater treatment facility, where fire training operations were conducted in the 1970s. Groundwater recovery operations have been implemented in Area D since 1982. Groundwater extraction was initially performed using recovery well GW-032. In 1998, the well was replaced by well GW-032A, located about 40 ft to the southwest, due to construction of a new nitrification basin in the Site's wastewater treatment facility. Corrective Action implemented in Area D includes groundwater recovery from well GW-032A to hydraulically contain and remove volatile organic compound (VOC) containing groundwater from shallow perched groundwater in the area of the former fire training operations and quarterly sampling and/or groundwater level elevation monitoring of the Groundwater Monitoring Plan (GMP)[3] wells shown on the Remediation Area D Location Map provided as Figure 2.

Results of previous Site-wide investigations and Area D investigations indicate the shallow perched groundwater in Area D is located within alluvial poorly-sorted sand and gravel located above fine-grained glaciolacustrine silt and clay. The fine-grained glaciolacustrine silt and clay serves as an aquitard inhibiting the vertical downward migration of the VOC-containing groundwater. Under "static" non-pumping conditions the perched groundwater in Area D is inferred to flow in a westerly direction from the wastewater treatment area towards Gildersleeve Brook. Soil boring and well construction logs for recovery well GW-032A and other nearby wells in Area D that include descriptions of the poorly-sorted sand and gravel and fine-grained silt and clay soils are provided in Appendix A.

[1] Groundwater Sciences Corporation and IBM Environmental Engineering, April 25, 2011, Work Plan for Recovery Well GW-032A Replacement, Remediation Area D.

[2] NYSDEC, May 3, 2011, *Letter from Alex G. Czuhanich to Mr. Steven C. Hawkins, Manager, Environmental Engineering, IBM Hudson Valley Research Park*, RE: Response to Work Plan, Recovery Well GW-032A Replacement, IBM East Fishkill Facility, Hopewell Junction, New York, EPA ID No. NYD000707901.

[3] Groundwater Sciences Corporation and IBM Environmental Engineering, February 1996 (revised October 1999), Groundwater Monitoring Plan, IBM East Fishkill Facility.

SCOPE OF WORK

The scope of work completed to date has included completion of the following subtasks described in the April 25, 2011 Work Plan:

- Task 1.1 - Replacement recovery well siting and utility review field activities;
- Task 1.2 - Replacement recovery well drilling, construction and development;
- Task 1.3 - Hydraulic testing of the newly installed recovery well; and
- Task 1.4 – Data analysis and preparation of this letter report.

Descriptions of the specific field explorations and testing performed by GSC and others as part of Tasks 1.1 through 1.3 are provided in the following subsections.

Task 1.1 – Replacement Recovery Well Siting and Utility Review

On the basis of 2010 and early 2011 water level and water quality data collected in Remediation Area D, the location for groundwater recovery well GW-032B was proposed in the area between existing recovery well GW-032A and monitoring well MW-616. Prior to selecting a specific drilling location for GW-032B, the area proximate to recovery well GW-032A and monitoring well MW-616 was reviewed for the possible presence of underground utilities.

In April 2011, Underground Surveying, LLC, was contracted by Fluor Enterprises, Inc. to perform initial utility surveying and mapping in a portion of Remediation Area D using cable and pipe locators and Ground Penetrating Radar (GPR). Underground Surveying, LLC identified several underground electrical lines and a storm drain in the area of the proposed GW-032B replacement well. A copy of Underground Surveying, LLC's report is provided in Appendix B. Based on the results of the utility review activities the final location for GW-032B was sited by GSC approximately 6 feet to the south and west of GW-032A. The location of GW-032B is shown on Figure 2. Prior to drill rig mobilization to the Site, GSC's drilling subcontractor Parratt-Wolff, Inc. (PWI) of East Syracuse, New York, notified the New York Underground Facilities Protective Organization (Dig Safe). As an added factor of safety, PWI initially advanced the upper six feet of the GW-032B soil boring using vacuum extraction "air-knife" methods which confirmed the absence of subsurface utilities at the drilling location.

Task 1.2 – Replacement Recovery Well Drilling, Construction and Development

Drilling and construction of replacement recovery well GW-032B was performed by PWI on June 14, 2011. As mentioned above, the upper six feet of the GW-032B soil boring was advanced using the vacuum extraction "air-knife" method. Below a depth of six feet the wellbore was advanced by a truck-mounted drill rig using 6¼-inch inner diameter (I.D.) hollow-stem auger (HSA) drilling techniques. During advancement of the HSA boring soil samples were collected continuously using a 2-inch outer diameter (O.D.) split-spoon sampler. The drilling advancement and soil sampling was observed and logged by a GSC geologist. Advancement of the soil boring was terminated at a depth of 20.5 feet below ground surface (bgs).

The GW-032B recovery well was constructed using a 5-foot section of 4-inch I.D. 316 stainless steel sump, a 5-foot section of 4-inch I.D. No. 35 slot wire-wrapped 316 stainless steel well screen and an 11-foot section of 4-inch I.D. 316 stainless riser. The base of the sump was set at 20.5 feet bgs, with the well screen installed at depths extending from 10.5 to 15.5 feet bgs, and the stainless steel riser extending from 10.5 feet bgs to approximately six inches above the ground surface. The sump, well screen and riser were joined by threaded flush couplings. The annular space between the well and borehole wall was backfilled with Morie No. 1 filter sand to a depth of 7.5 feet bgs. The borehole annulus was backfilled with a bentonite chip seal at depths between 5.0 and 7.5 feet bgs. The remaining borehole annulus was filled temporarily with sand until the final pumping system and pitless adaptor are installed. A temporary six inch protective steel casing, well pad and locking cap were installed to protect the well. The GW-032B well log is provided in Appendix C. At the time of the pump assembly and pitless adapter installation the temporary protective steel casing will be removed and a final well completion will be constructed with a permanent steel casing, well pad and locking cap if feasible due to the proximity of the road. If a steel casing completion is not possible then the well completion will be constructed flush with the ground surface and will include a concrete manhole ring with a metal manhole cover.

Soil cuttings from drilling and well installation activities were contained in DOT-approved "ring-top" 55-gallon drums provided by IBM. The drums were labeled and transported by PWI to IBM's on-Site containerized waste storage area in Building 309. All down-hole drilling equipment was steam-cleaned by PWI prior to their mobilization to the Site and upon completion of drilling and well construction activities. Fluids generated during steam-cleaning were contained within a decontamination pad constructed near the drilling location using plastic sheeting and wood framing. The fluids generated during steam cleaning were discharged to an offline nitrification clarifier at IBM's wastewater treatment facility.

Initial well development was completed by PWI on June 15, 2011 using a manually operated surge block and an airlift system. The surge block was used until sand and silt no longer accumulated in the bottom of the well. Approximately 150 gallons of water were removed using this method. GSC conducted a second phase of development on June 17, 2011 using a Grunfos Rediflo® and a centrifugal pump. During this period of development, temperature, specific conductance, pH and turbidity were recorded periodically. Development continued until apparent stabilization of the field parameters. A total of 1,200 gallons of water, equivalent to more than 100 well volumes, were removed during the second round of development. Fluids generated during development were discharged to an offline nitrification clarifier at IBM's wastewater treatment facility. GW-032B Well Development Field Data Sheets logged by GSC are provided in Appendix D.

Task 1.3 – Hydraulic Testing

Hydraulic testing of GW-032B was performed by GSC personnel between July 8 and 15, 2011. The scope of work associated with hydraulic testing included:

- July 8, 2011 - Shutdown of recovery well GW-032A and deployment of Level Troll® 500 automated water level recorders in seven Area D wells (GW-032B, MW- 066, MW-614, MW-615, MW-757, MW-782 and MW-839). The GW-032A shutdown and datalogger installations were performed about four days prior to groundwater extraction testing of well

- GW-032B to allow for recovery of water levels to "static" non-pumping conditions and recording of "background" non-pumping water level elevation trends.

- July 11, 2011 - Installation of a temporary Grunfos Rediflo® pumping system for well GW-032B with instantaneous and totalizing flow meters and temporary above-ground discharge tubing. The pumping system was sized to allow for groundwater extraction rates between about 2 to 20 gallons per minute (gpm). The discharge tubing allowed for direct discharge of pumping test effluent to an offline wastewater treatment facility nitrification clarifier. The contents of the offline nitrification clarifier (steam cleaning fluid, well development fluid and pump testing effluent) will be tested and disposed of appropriately.

- July 12, 2011 – Performance of a step drawdown test of well GW-032B at withdrawal rates of 4 gpm, 8 gpm, 12 gpm and 16 gpm. Level Troll® 500 automated water level recorder data collected at one minute intervals were used to create a drawdown versus time graph for GW-032B that is presented in Appendix E. Pumping rates were maintained for the first three withdrawal steps, but the well cavitated after approximately ten minutes of the 16 gpm step. Based on the step drawdown test results, a rate of 7 gpm was selected for the 24 to 48 hour constant rate test. It was believed that this rate would be easily sustainable over the test period while demonstrating hydraulic capture of the Area D plume. The well was allowed to recover overnight prior to the start of the constant rate test.

- July 13 and 14, 2011 – Performance of a roughly 28 hour long constant rate pumping test of well GW-032B. During the constant rate test water levels were monitored in the pumping well and nearby wells through a combination of manual and automated means. The wells monitored included GW-032A, GW-032B, MW-066, MW-067, MW-170, MW-614, MW-615, MW-616, MW-757, MW-782 and MW-839 (See on-Site wells shown on Figure 2). Groundwater elevation graphs and plots of drawdown versus time for all monitored locations are presented in Appendix E. After a period of 24 hours, groundwater elevations at the extraction well and nearby wells had stabilized. At the 24.25 hour mark, the pumping rate was increased to 11 gpm to evaluate well performance and aquifer response at a higher extraction rate. The well was pumped at a higher extraction rate for four hours, with pumping test termination at 28.25 hours. Water quality samples for VOCs were collected at five intervals during the constant rate pumping test; at elapsed times of 30 minutes, 2 hours, 8 hours, 24 hours and 28 hours. VOC samples were analyzed by Columbia Analytical Services (CAS) of Rochester, New York. A sample for a number of inorganic water quality parameters was collected after 24 hours to provide a baseline of general GW-032B effluent water quality conditions. Inorganic parameters were analyzed by CAS and Envirotest Laboratories Inc. (ETL) of Newburgh, New York. Laboratory results can be found in Appendix F.

- July 15, 2011 – Removal/Breakdown of GW-032B pumping system components and temporary discharge tubing, restart of recovery well GW-032A groundwater extraction operations, and removal and cleaning of Level Troll® 500 automated water level recorders. Water level recovery was monitored for approximately 24 hours before GW-032A was placed back online.

DATA ANALYSIS/FINDINGS

The field exploration and testing activities associated with installation and testing of replacement groundwater recovery well GW-032B identified geologic, hydrologic and water quality conditions that are similar to those inferred from past investigations and testing in Area D. The findings of these field activities are further described in the following subsections.

Geologic Conditions

The GW-032B soil boring encountered geologic conditions consisting of a downward sequence of soil fill, poorly-sorted sand and gravel, and silt and clay. Observations of surface soil and auger cuttings indicate the presence of granular soil fill within the upper three to five feet of soil at the GW-032B location. As described on the geologic log provided in Appendix C, results of split-spoon sampling at the GW-032B location indicate the presence of poorly-sorted olive brown, gravel, sand, and sand & gravel from six to 15 feet bgs, overlying gray, silt & clay with trace amounts of fine sand. Observations of drilling advancement and auger cuttings also indicated the presence of cobbles in portions of the sand & gravel.

The sand & gravel and the silt & clay soils and their associated depths at GW-032B are consistent with previous borings completed in Area D. The contact between the bottom of the sand & gravel and the top of the finer-grained silt & clay soils at GW-032B is estimated to be at an elevation of about 216 feet above mean sea level (amsl). For comparison, the elevation for the top of the lacustrine silt and clay unit at nearby recovery well location GW-032A and nearby monitoring well location MW-616 is estimated to be about 215 and 216 feet amsl, respectively.

Hydrologic Conditions

Water level monitoring of Area D wells was performed by GSC personnel between July 8 and 15, 2011 as part of well GW-032B hydraulic testing. As previously mentioned, a step pumping test of well GW-032B was performed on July 12, 2011, and a constant rate pumping test was performed on July 13 and 14, 2011. The only precipitation event observed by field personnel during the week long monitoring and testing period occurred late in the afternoon of July 8, 2011, shortly after the shutdown of well GW-032A groundwater extraction operations. Area D groundwater elevations under "static" non-pumping conditions on July 13th and July 15th indicate an apparent decline in static water levels of about three tenths of a foot or less, during the GW-032B constant rate pumping test period.

Based on water level elevations recorded during "static" non-pumping conditions on July 11th, July 12th and July 13th, the perched groundwater in Area D is inferred to flow in a west-northwesterly direction, from the topographically higher area of the wastewater treatment plant towards Gildersleeve Brook. Lateral hydraulic gradient values calculated based on these "static" July 2011 water levels range from 0.001 to 0.007. These lateral gradient values compare well with estimates made as part of the GW-032A hydraulic testing[4] completed in January 1998.

[4] Sanborn, Head & Associates, Inc., February 19, 1998, Letter to Ms. Michele J. West of IBM Corporation, RE: Report of Findings, Field Exploration and Testing, Well GW-032 Replacement – Remediation Area D, Wastewater Treatment Facility Expansion, IBM East Fishkill Facility, East Fishkill, New York.

Water level elevations recorded at certain hydraulic testing milestones (prior to the constant rate test, after 24 hours of GW-032B groundwater extraction and about 24 hours after GW-032B shut down) are summarized below in Table 1.

Table 1 – Summary of Water Level Elevations

Well	Approximate Distance from GW-032B (ft)	July 13, 2011 "Static" Water Level Elevation	Water Level Elevation @ 24 hrs, 7 gpm	July 15, 2011 Water Level Elevation
Monitoring Conditions		Static	Pumping	Recovery
GW-032B	-----	228.11	224.44	227.93
GW-032A	6	228.10	226.37	227.95
MW-615	9	228.39	226.60	228.18
MW-616	12	228.33	226.82	228.15
MW-614	19	228.07	226.40	227.89
MW-757	27	228.29	227.16	228.14
MW-839	182	228.64	228.26	228.47
MW-782	206	228.44	228.27	228.32
MW-067	253	226.42	226.27	226.14
MW-170	478	219.00	218.90	218.80
MW-066	512	223.97	223.87	223.82

As indicated in the table, pre-pumping test water level elevations recorded on July 13th for wells within about 200 feet of GW-032B are all within 0.57 feet of each other, ranging in elevation from 228.07 feet amsl, at well MW-614, to 228.64 feet amsl, at well MW-839. Wells located within 30 feet of GW-032B exhibit pre-pumping water level elevations within about 0.2 feet of each other. Based on an estimated top of silt and clay elevation of 216 feet amsl, the saturated thickness of the sand and gravel in the area of well GW-032B is about 12.1 feet.

Aquifer Response, Characteristics and Probable Zone of Influence

The GW-032B constant rate pumping test involved active withdrawals for about 28.25 hours between July 13th and 14th at rates of 7 and 11 gpm. The initial withdrawal rate of about 7 gpm was sustained for 24.25 hours. The withdrawal rate was increased to about 11 gpm for the remaining four hours of the test. In total, about 12,800 gallons of groundwater were withdrawn from well GW-032B.

Drawdowns over time indicate similar aquifer response to pumping with distance from well GW-032B. The aquifer testing data have been used to estimate hydraulic properties of the poorly-sorted sand and gravel aquifer, including transmissivity and specific yield. The Theis nonequilibrium equation or modified versions of this equation are typically used for the calculation. For the GW-032B pump test, the time-drawdown method was used as a solution to the Theis equation. This method uses semilogarithmic time versus drawdown plots to solve for transmissivity, specific yield and hydraulic conductivity. Time drawdown plots are presented in Appendix E. The drawdown data at the end of the 7 gpm and 11 gpm pumping stages and the aquifer properties calculated for each monitoring point are summarized in Table 2.

Table 2 – Summary of Drawdown and Aquifer Properties

Well	Approximate Distance from GW-032B (ft)	Drawdown (ft) @ 24 hrs, 7 gpm	Drawdown (ft) @ 28.25 hrs, 11 gpm	Transmissivity (ft^2/day)	Specific Yield	Hydraulic Conductivity (ft/day)
GW-032B	-----	3.67	6.61	-----	-----	-----
GW-032A	6	1.73	2.62	544	0.005	45
MW-615	9	1.79	2.59	318	0.0001	26
MW-616	12	1.51	2.19	613	0.002	51
MW-614	19	1.67	2.53	790	0.0004	65
MW-757	27	1.13	1.66	583	0.001	48
MW-839	182	0.38	0.45	331	0.002	27
MW-782	206	0.17	0.20	544	0.004	45
MW-067	253	0.15	0.22	-----	-----	-----
MW-170	478	0.10	0.10	-----	-----	-----
MW-066	512	0.10	0.11	-----	-----	-----

Well MW-066 appears to illustrate background conditions of the aquifer during the constant rate test. Review of the MW-066 groundwater elevation graph in Appendix E shows a steady decline in groundwater elevation from July 13 through July 15, with no apparent changes in slope related to pumping of GW-032B. The 0.10 feet of drawdown noted in Table 2 for MW-066 likely represents a decline in the local water table due to the lack of precipitation during this time period. Therefore drawdown listed in Table 2 is a combination of hydraulic response to pumping and a small local decline in the water table. Review of the elevation and drawdown graphs for wells near the extraction well, including GW-032A, MW-614, MW-615, MW-616 and MW-757, show clear response to pumping. Review of the groundwater elevation graph for MW-839, located to the south and east of GW-032B, shows a steady decline in elevation at the 7 gpm flow, followed by a change in slope when flow was increased to 11 gpm, and then recovery after pumping termination. Well MW-782 located to the north and east of GW-032B, shows a similar pattern. MW-782 did not appear to be in the capture zone of GW-032A during initial hydraulic testing. Historical sampling of MW-782 and MW-839 indicate they are outside the limits of Area D VOC presence in groundwater. The response observed at locations outside of the area of VOC presence indicates the well is capable of capturing the Area D groundwater plume. Figure 3 shows groundwater elevations at the end of 24 hours of pumping at 7 gpm, along with an estimated capture zone. As shown on the figure, the width of the GW-032B capture zone is estimated to be about 240 feet. The actual capture zone is expected to vary due spatially variant aquifer properties and seasonal variations in lateral hydraulic gradients due to spatially and temporally variant groundwater recharge patterns. However, based on past monitoring results of GW-032A operations, capture of the Area D VOC groundwater plume has been demonstrated under GW-032A pumping conditions with average annual yields of about 1 to 2 gpm.

Transmissivity (T) is the product of hydraulic conductivity and aquifer thickness, and is expressed in units of square feet per day (ft^2/day). Calculated aquifer transmissivity values range from roughly 300 to 800 ft^2/day. Hydraulic conductivity (K) is the measure of the ability of a porous medium to transmit water. Hydraulic conductivity values ranged from about 25 to 65 feet per day (ft/day). Specific yield is defined as the ratio of the volume of water removed from a saturated soil by gravity drainage to the total volume of the soil. Specific yield is a storage term, and is presented as a unitless ratio. Aquifer specific yield values range from 0.0001 to 0.005.

Aquifer test data sheets summarizing manual depth to water readings are presented in Appendix E, and groundwater elevation data, including data collected using transducers, is included in the enclosed CD. Where both sets of data are present, manual data was used to verify the automated readings. The transducer data was then used for making calculations and creating graphs.

Groundwater Quality

Table 3 summarizes results of field screening and analytical laboratory analyses of GW-032B effluent samples collected at five intervals during the pumping test.

Table 3 – GW-032B Constant Rate Test: Field Screening Parameters and VOC Data

Time Since Pumping Started	pH (pH units)	Temperature (°C)	Specific Conductance (umhos/cm)	Turbidity (NTU)	PCE (µg/l)	TCE (µg/l)	CIS (µg/L)	Toluene (µg/l)
0.5 hours	6.44	21.0	2490	10.3	0.97 J	2.7	0.67 J	0.64 J
2 hours	7.10	21.0	2585	0.96	1.1	2.7	0.60 J	0.27 J
8 hours	7.21	20.2	2563	0.94	1.0	2.8	0.54 J	0.21 J
24 hours	7.57	20.0	2785	0.94	0.84 J	2.8	0.60 J	ND@1.0
28 hours	7.45	20.6	2783	0.93	0.98 J	2.9	0.58 J	ND@1.0

As indicated in the table, pH values appeared to stabilize at around 7.5 to 7.6 pH units, while temperature ranged from 20.0 to 21.0 degrees Celsius (°C), and specific conductance appeared to stabilize at about 2,800 microsiemens per centimeter (umhos/com). Turbidity was highest during the first sampling event, at10.3 nephelometric turbidity units (NTU), which is consistent with removal of fine-grained material from the formation during the initial stages of groundwater withdrawal. Turbidity stabilized quickly to less than 1.0 NTU; the NYSDEC Part 703 standard for turbidity is 5.0 NTU.

Tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (CIS) and toluene were the only VOCs detected. Of the key PCE-series parameters, TCE is predominant, followed by PCE and then CIS. Concentrations of the PCE-series parameters in GW-032B remained fairly constant throughout the test, and are consistent with recent sampling of GW-032A. Median concentrations at GW-032A for samples taken in 2010 were 1.1 µg/l of PCE, 2.6 µg/l of TCE and 0.55 µg/l of CIS. Toluene, which is not typically been detected at the Area D extraction well, was detected in the first three sampling events but not in the final two samples. The toluene detections may be the result of infiltration of runoff from the adjacent roadway, and are not believed to be related to historical events in the former fire training area. TCE (0.69 µg/l) and CIS (0.34 µg/l) were both detected in the associated trip blank. The source of the trip blank contamination is unknown, but it is not believed to have had a significant effect on the results presented in Table 3.

Results of inorganic analyses on a sample of GW-032B effluent that was collected 24 hours into the pumping test are contained in the analytical laboratory report provided in Appendix F. The cation data indicate a greater relative abundance of calcium, magnesium and sodium, as compared to iron, manganese and potassium. The anion data indicate a greater relative abundance of alkalinity, chloride and hardness, relative to ammonia, fluoride and sulfate. In general, these inorganic data indicate concentrations of cations and anions that are similar to concentrations detected in a September 27, 2010 sample of GW-032A effluent. Overall, the relative abundance of calcium,

magnesium, sodium, alkalinity, chloride and hardness are likely reflective of localized impacts to groundwater quality from the nearby use of road deicing salts. The historical presence of these cations and anions in Area D groundwater may have caused corrosion of the 304 stainless steel well screen at GW-032A, resulting in an apparent break in the screen. The potential for corrosion was the reason the GW-032B well screen and riser were constructed with 316 stainless steel rather than 304 stainless steel.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the hydraulic testing discussed above, the sustainable yield of replacement well GW-032B is estimated to be about 5 to 10 gpm. The long-term yield of GW-032B is anticipated to vary during periods of greater or lesser recharge. Observed drawdown in wells outside the known area of VOC presence in Area D perched groundwater indicates operation of well GW-032B results in an apparent capture zone that encompasses Area D. Concentrations of VOCs and inorganic parameters in the replacement well are consistent with recent sampling of GW-032A. Based on these observations, we believe the GW-032B exceeds the hydraulic effectiveness of existing groundwater recovery well GW-032A and will serve as a suitable replacement.

In light of these conclusions, we recommend that Task 1.5 (Pumping System Installation and Connection), Task 1.6 (Hot Box Improvements) and Task 2 (GW-032A Decommissioning) of the NYSDEC-approved April 25, 2011 Work Plan be completed upon IBM's receipt of NYSDEC approval of this letter report.

Should you have any questions concerning the findings, conclusions and recommendations of this report please contact Jackie Braungart of IBM at (845) 892-1672.

Very truly yours,
GROUNDWATER SCIENCES CORPORATION

C. Edward Stoner, P.G.
Project Manager

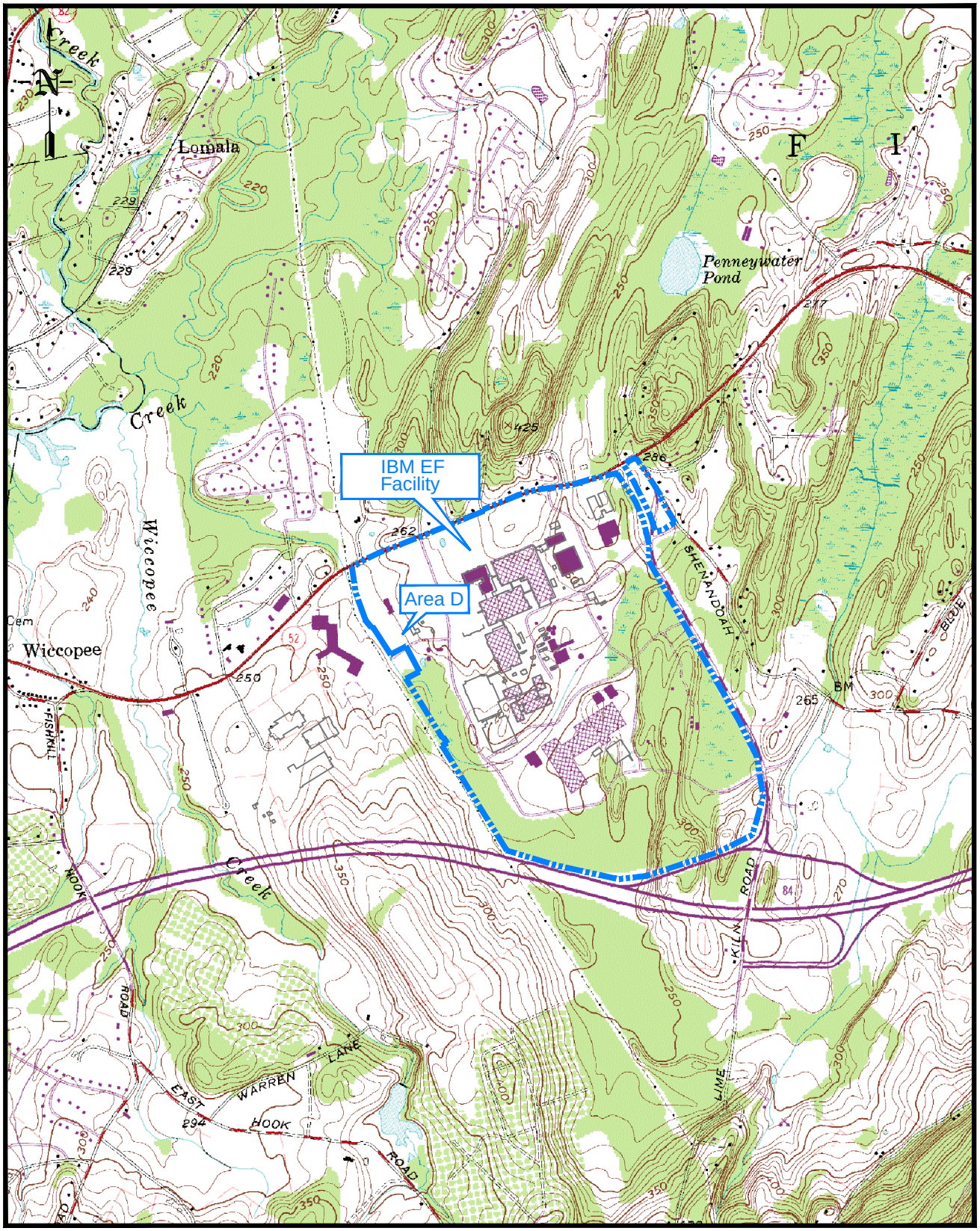
Robert C. Watson /amp
Robert C. Watson, P.G.
Vice President

RCW/CES

Attachments:

Figure 1 – Site Location Map
Figure 2 – Remediation Area D Location Map
Figure 3 – Elevation Contour Map GW-032B Constant Rate Test (7 gpm) at 24 hours, 7/14/2011
Appendix A – Remediation Area D Boring and Well Installation Logs
Appendix B – Underground Surveying, LLC – Utility Locating & Mapping Survey Report
Appendix C – GW-032B Boring and Well Installation Log
Appendix D – GW-032B Well Development Logs

Appendix E – GW-032B Step Test Graph
Groundwater Elevation Graphs
Time-Drawdown Graphs
Aquifer Test Data Sheets
Manual and Transducer Groundwater Elevation Data (see enclosed CD)
Appendix F – Groundwater Chemistry Results



Portion of the Hopewell Junction, NY
7.5-minute USGS Quadrangle
(1957, Photorevised 1981)

Figure 1

IBM
East Fishkill, New York

Site Location Map

Scale
0 1000' 2000'

GROUNDWATER SCIENCES CORPORATION

95007-044-B2 / 08-03-11

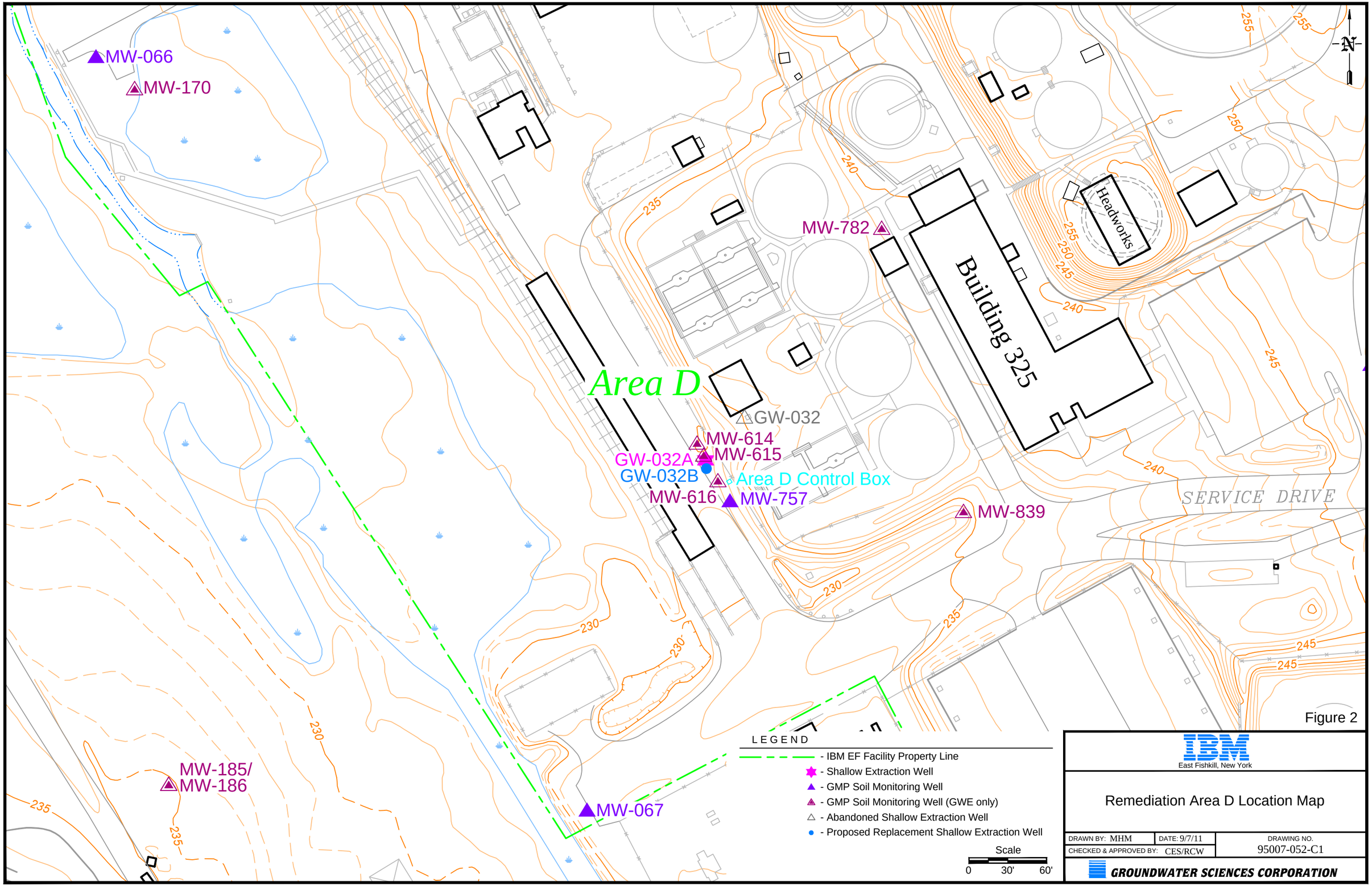


Figure 2

IBM
East Fishkill, New York

Remediation Area D Location Map

DRAWN BY: MHM	DATE: 9/7/11	DRAWING NO. 95007-052-C1
CHECKED & APPROVED BY: CES/RCW		

GROUNDWATER SCIENCES CORPORATION

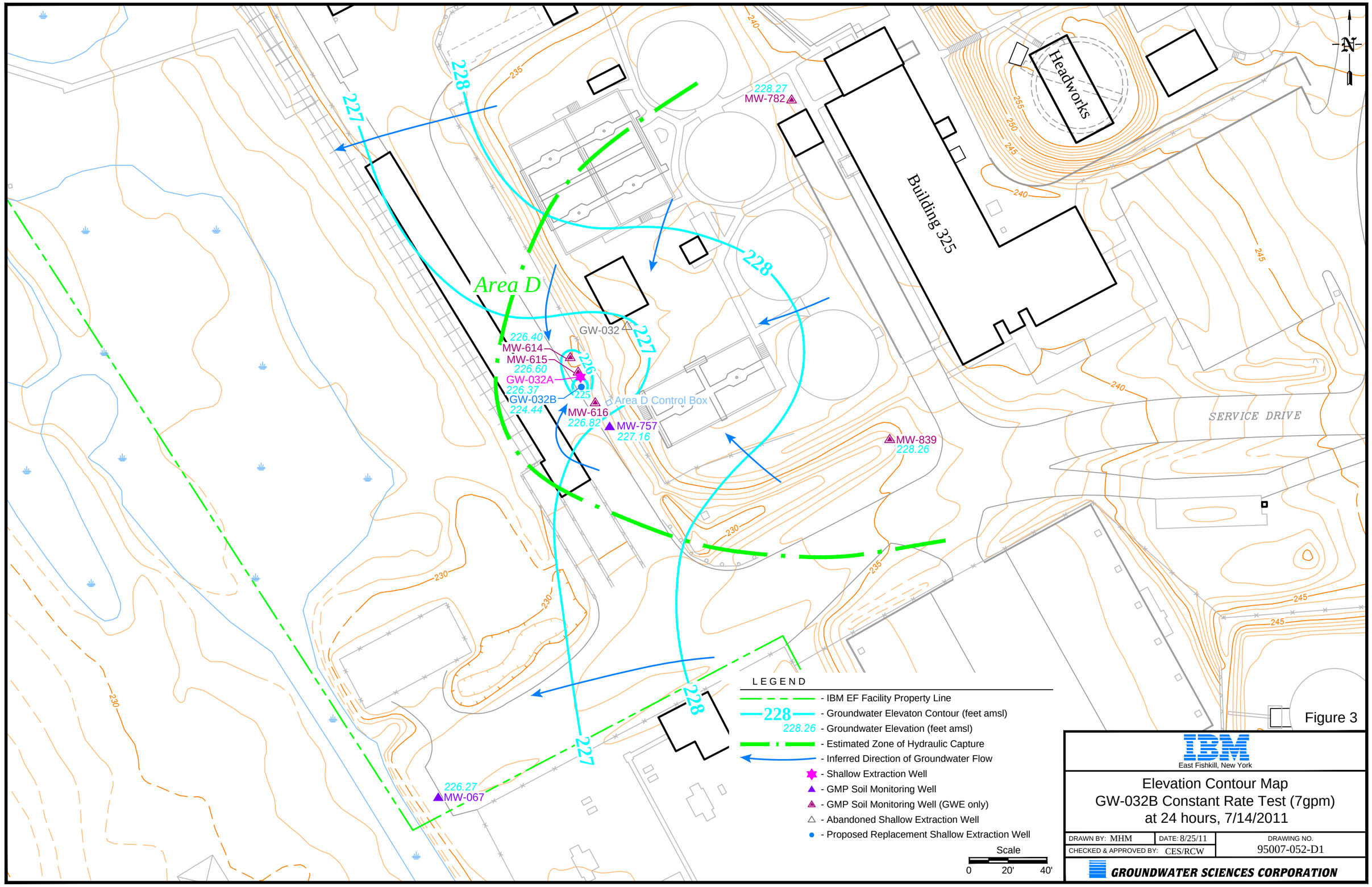


Figure 3

IBM
East Fishkill, New York

Elevation Contour Map
GW-032B Constant Rate Test (7gpm)
at 24 hours, 7/14/2011

DRAWN BY: MHM	DATE: 8/25/11	DRAWING NO. 95007-052-D1
CHECKED & APPROVED BY: CES/RCW		

GROUNDWATER SCIENCES CORPORATION

Sanborn, Head & Associates, Inc.

Log of Monitoring Well 32A

PROJECT NO.: *1486.2*

PROJECT: *Well GW-032 Replacement*

DATE STARTED: *1/14/98* DATE FINISHED: *1/14/98*

LOCATION: *Area D IBM East Fishkill, New York*

SURFACE ELEVATION: *231.0 feet AMSL*

DRILLING METHOD: *6 1/4" ID HSA*

GROUNDWATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME
1/15/98	0700	3.73' bgs	Out	15.5 hrs.
1/15/98	0700	3.73' bgs	Out	15.5 hrs.
1/15/98	1030	3.83' bgs	Out	19 hrs.
1/16/98	0655	3.62' bgs	Out	~40 hrs.

DRILLING COMPANY: *North Star Drilling, Inc.*

FOREMAN: *Jeff Thew*

LOGGED BY: *RCW* CHECKED BY: *DBC*

DEPTH feet	SAMPLE NO. Depth (ft.)	BLOWS/6"	PEN/REC (in.)	PID (ppm) VALUES	PID (ppm) PROFILE 0 200	GRAPHIC LOG	STRATUM DESCRIPTION
0							SOIL FILL
5							F/M SAND
10							F/C SAND & GRAVEL
15							M/C SAND & GRAVEL
20							SILT & CLAY
25							
30							
35							

GEOLOGIC DESCRIPTION

No samples were obtained. For soil descriptions from 0 to 6 feet, refer to test pit log TP-2.

For soil descriptions from 6 to 18 feet, refer to boring log PZ-2.

Bottom of Boring at 22'.

Notes:

1. Prior to drilling a test pit was excavated to a depth of 6 feet to confirm the absence of subsurface utilities.

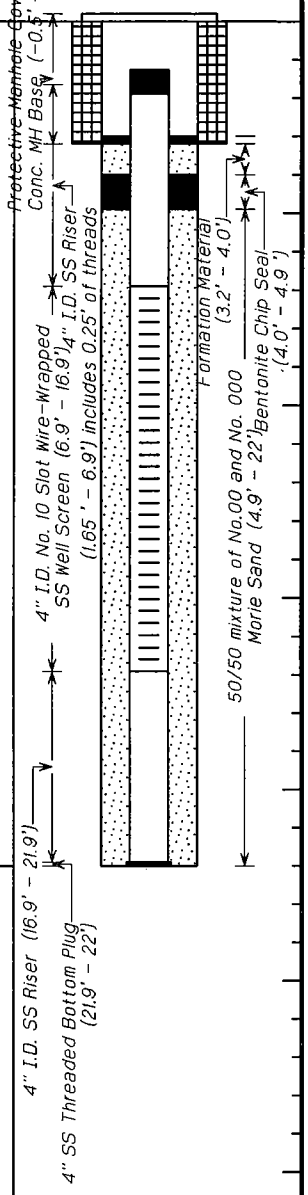
2. The boring was conducted about 3.1 feet south of piezometer PZ-2.

3. The driller indicated a "gravelly zone" with cobbles was encountered while advancing the borehole from about 12 to 16 feet. Rounded cobbles were observed in auger cuttings while advancing the borehole from about 18 to 22 feet.

4. The borehole was terminated at a depth of 22 feet without encountering refusal.

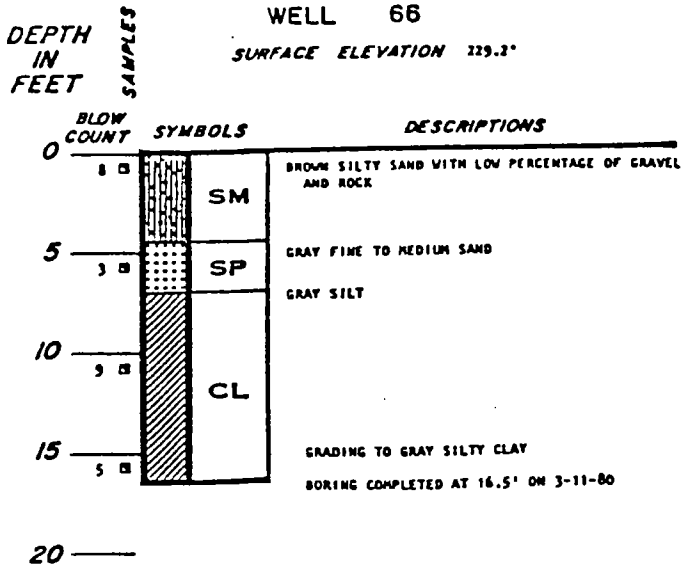
5. Upon completion of the boring, an extraction well was installed consisting of 4-inch I.D. No. 10 slot wire-wrapped stainless steel well screen and 4-inch I.D. stainless steel riser.

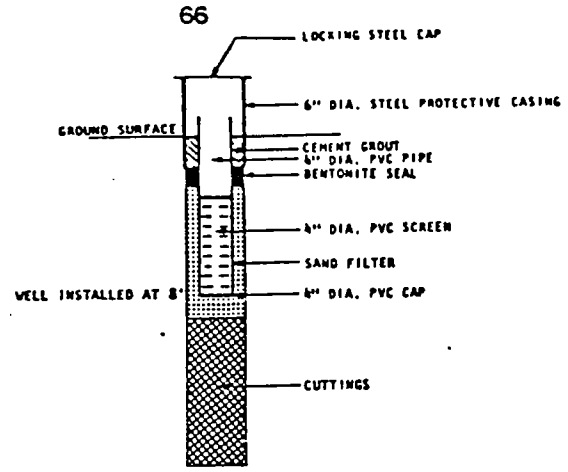
WELL DIAGRAM



WELL 66

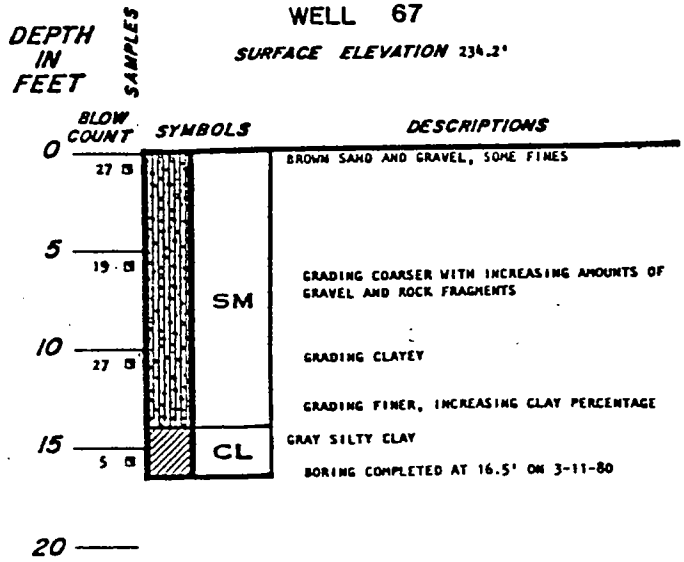
SURFACE ELEVATION 229.2'

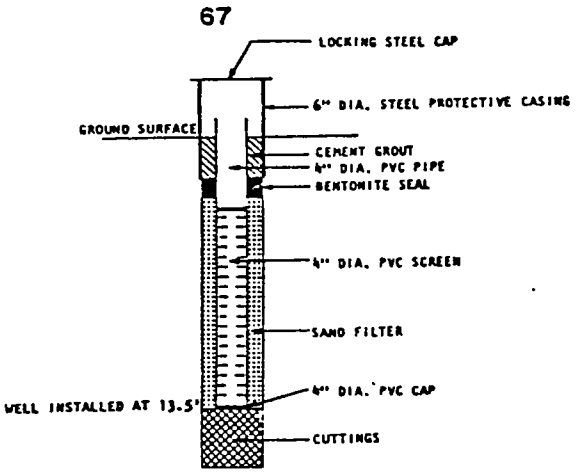




WELL 67

SURFACE ELEVATION 234.2'



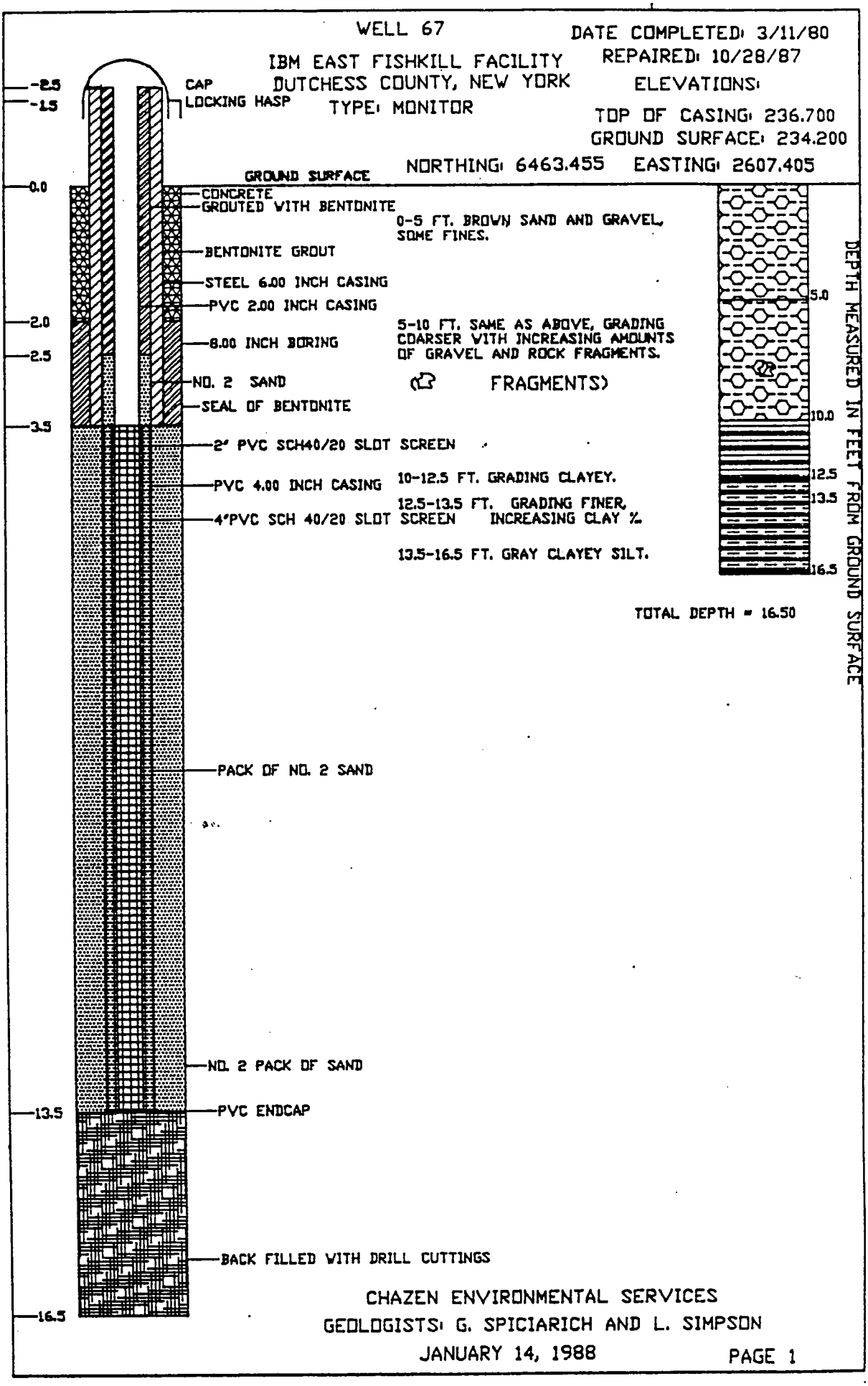


IBM-EF- 77

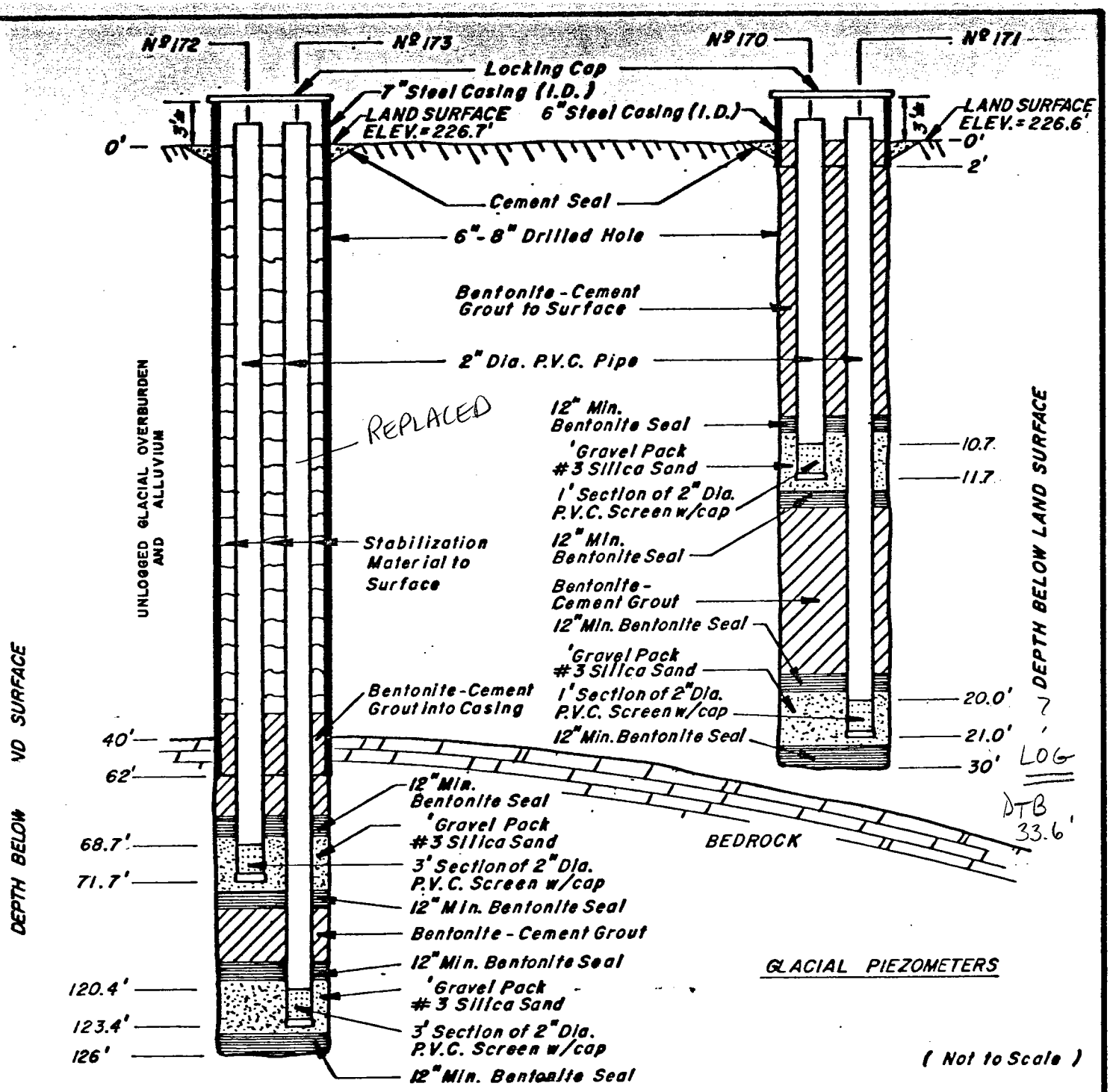
LOG AND MONITORING WELL DETAILS

IBM-EF-

IBM-EF- 77



IBM-EF- 77



BEDROCK PIEZOMETERS

The rock at this location appeared to be well fractured to friable. Numerous fracture zones were encountered. Areas of red, tight clay in the bedrock were encountered between 79' and 85', 94' and 96', and 98' and 100'. A zone of very soft rock was encountered between 105' and 119'.

Sanborn, Head & Associates, Inc.

Log of Monitoring Well 614

PROJECT NO.: *1486.2*

PROJECT: *Well GW-032 Replacement*

DATE STARTED: *1/13/98* DATE FINISHED: *1/13/98*

LOCATION: *Area D IBM East Fishkill, New York*

SURFACE ELEVATION: *231.0 feet AMSL*

DRILLING METHOD: *4 1/4" ID HSA*

GROUNDWATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME
1/14/98	0710	3.47' bgs	Out	15.5 hrs.
1/15/98	0700	3.40' bgs	Out	~ 40 hrs.
1/16/98	0655	3.12' bgs	Out	~2.7 days
1/19/98	1745	3.34' bgs	Out	~6 days

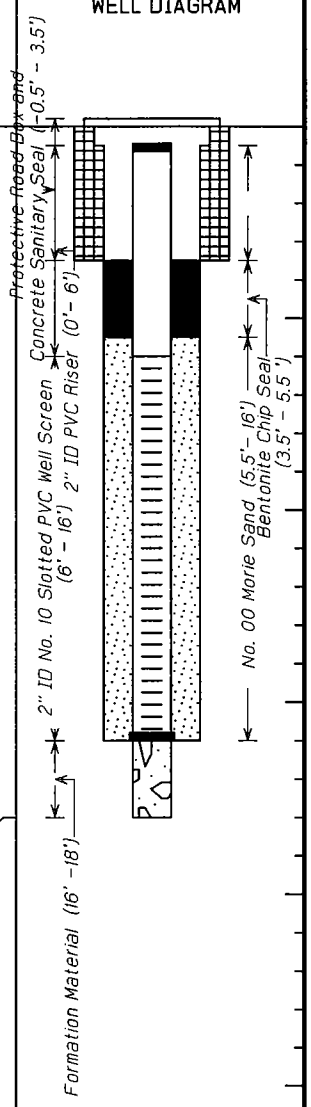
DRILLING COMPANY: *North Star Drilling, Inc.*

FOREMAN: *Jeff Thew*

LOGGED BY: *RCW* CHECKED BY: *DBC*

DEPTH feet	SAMPLE NO. Depth (ft.)	BLOWS/6"	PEN/REC (in.)	PID (ppm) VALUES	PID (ppm) PROFILE 0 200	GRAPHIC LOG	STRATUM DESCRIPTION	GEOLOGIC DESCRIPTION
5							SOIL FILL	No samples were obtained from the ground suface to a depth of about 6 feet. For soil descriptions from 0 to 6 feet. Refer to test pit log TP-2.
							F/M SAND	
	S-1 6-8'	3-5 10-10	24/15	1.4			F/C SAND & GRAVEL	S-1: Medium dense, olive-brown, GRAVEL, some fine to coarse SAND, little Silt, trace Clay. Wet.
	S-2 8-10'	15-17 14-15	24/11	1.3				S-2: Dense, olive-brown to brown, fine to coarse SAND, some Gravel, little Silt, trace Clay. Wet. Mottled.
10	S-3 10-12'	5-10 12-6	24/6	0.9			GRAVEL	S-3: Medium dense, brown, GRAVEL, little fine to coarse Sand, trace Clayey Silt. Wet. Mottled.
	S-4 12-14'	9-10 12-15	24/9	1.7			M/C SAND & GRAVEL	S-4: Medium dense, brown, medium to coarse SAND, some Gravel, little Clayey Silt. Wet.
	S-5 14-16	6-9 9-7	24/7	1.4			M/C SAND	S-5: Medium dense, brown, medium to coarse SAND, little Gravel, little Clayey Silt. Wet.
15	S-6/6A 16-18'	7-10 10-12	24/10	2.6 1.2			SILT & CLAY	S-6: Very stiff, olive-brown, SILT & CLAY, trace fine Sand. Wet.
								Change at approximately 16.2 feet to gray CLAY & SILT, trace fine Sand. Wet.
								Bottom of Boring at 18'.
20								**Notes:**
								1. Prior to drilling a test pit was excavated to a depth of 6 feet to confirm the absence of subsurface utilities.
								2. The headspace of soil samples was screened for volatile organic compounds (VOCs) using a Photovac Model MP-1000 Microtip Photoionization Detector (PID) with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard. Background PID readings in ambient air typically were 0.6 to 3.0 ppmv during drilling.
25								3. The driller indicated a "gravelly zone" was encountered while advancing the borehole from about 12 to 14 feet.
								4. The borehole was terminated at a depth of 18 feet without encountering refusal.
30								5. Upon completion of the boring, a piezometer was installed consisting of 2-inch I.D. No. 10 slot PVC well screen and 2-inch I.D. Schedule 40 PVC Riser. A 0.51 foot extension was added to the PVC Riser during installation of the protective roadbox and concrete sanitary seal.
35								

WELL DIAGRAM



Sanborn, Head & Associates, Inc.

Log of Monitoring Well 615

PROJECT NO.: *1486.2*

PROJECT: *Well GW-032 Replacement*

DATE STARTED: *1/13/98* DATE FINISHED: *1/13/98*

LOCATION: *Area D IBM East Fishkill, New York*

SURFACE ELEVATION: *231.0 feet AMSL*

DRILLING METHOD: *4 1/4" ID HSA*

GROUNDWATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME
1/13/98	1233	2.16' bgs	Out	40 mins.
1/13/98	1253	2.45' bgs	Out	~ 1 hr.
1/14/98	0710	3.92' bgs	Out	~18.3 hrs.
1/19/98	1743	3.28' bgs	Out	~6 days

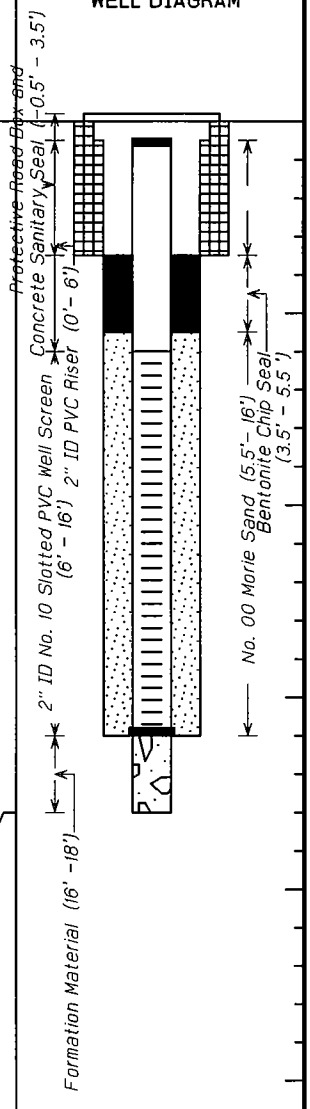
DRILLING COMPANY: *North Star Drilling, Inc.*

FOREMAN: *Jeff Thew*

LOGGED BY: *JCC/RCW* CHECKED BY: *DBC*

DEPTH feet	SAMPLE NO. Depth (ft.)	BLOWS/6"	PEN/REC (in.)	PID (ppm) VALUES	PID (ppm) PROFILE 0 200	GRAPHIC LOG	STRATUM DESCRIPTION	GEOLOGIC DESCRIPTION
5							SOIL FILL	No samples were obtained from the ground suface to a depth of about 6 feet. For soil descriptions from 0 to 6 feet. Refer to test pit log TP-2.
							F/M SAND	
	S-1 6-8'	3-7 8-9	24/2	3.0				S-1: Medium dense, olive-brown, GRAVEL, little fine to coarse Sand, trace Clayey Silt. Wet. (Poor recovery due to large piece of angular gravel in bottom of split spoon).
	S-2 8-10'	9-10 11-11	24/16	1.6			F/C SAND & GRAVEL	S-2: Medium dense, olive-brown, fine to coarse SAND and Gravel, little Clayey Silt. Wet.
10	S-3 10-12'	14-15 12-14	24/9	1.4				S-3: Medium dense, olive-brown, GRAVEL, some coarse Sand, little Clayey Silt. Wet.
	S-4 12-14'	15-14 8-10	24/14	0.7				S-4: Medium dense, olive-brown, GRAVEL, and medium to coarse Sand, little Clayey Silt. Wet.
	S-5 14-16	15-14 14-12	24/12	1.4			M/C SAND & GRAVEL	S-5: Medium dense, olive-brown, GRAVEL, some medium to coarse Sand, trace Clayey Silt. Wet. (Gravel is subangular to subrounded and appears to be pieces of rounded cobbles).
15	S-6 16-18'	10-9 9-12	24/16	0.9 0.6			SILT & CLAY	S-6: Very stiff, olive-gray to gray, SILT & CLAY, trace Gravel, trace fine Sand. Moist to wet. (Clay content increasing with depth).
20								Bottom of Boring at 18'.
25								**Notes:**
30								1. Prior to drilling a test pit was excavated to a depth of 6 feet to confirm the absence of subsurface utilities.
35								2. The headspace of soil samples was screened for volatile organic compounds (VOCs) using a Photovac Model MP-1000 Microtip Photoionization Detector (PID) with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard. Background PID readings in ambient air typically were 0.6 to 3.0 ppmv during drilling.
								3. The driller indicated a "gravelly zone" with cobbles was encountered while advancing the borehole from about 12 to 16 feet.
								4. The borehole was terminated at a depth of 18 feet without encountering refusal.
								5. Upon completion of the boring, a piezometer was installed consisting of 2-inch I.D. No. 10 slot PVC well screen and 2-inch I.D. Schedule 40 PVC Riser.

WELL DIAGRAM



Sanborn, Head & Associates, Inc.

Log of Monitoring Well 616

PROJECT NO.: *1486.2*

PROJECT: *Well GW-032 Replacement*

DATE STARTED: *1/14/98* DATE FINISHED: *1/14/98*

LOCATION: *Area D IBM East Fishkill, New York*

SURFACE ELEVATION: *231.3 feet AMSL*

DRILLING METHOD: *4 1/4" ID HSA*

DRILLING COMPANY: *North Star Drilling, Inc.*

FOREMAN: *Jeff Thew*

LOGGED BY: *RCW* CHECKED BY: *DBC*

GROUNDWATER READINGS

DATE	TIME	DEPTH	CASING	STAB. TIME
1/14/98	1125	4.35' bgs	Out	25 mins.
1/14/98	1604	4.21' bgs	Out	~ 5 hrs.
1/15/98	0700	4.16' bgs	Out	~20 hrs.
1/19/98	1712	3.74' bgs	Out	~4 days

DEPTH feet	SAMPLE NO. Depth (ft.)	BLOWS/6"	PEN/REC (in.)	PID (ppm) VALUES	PID (ppm) PROFILE 0 200	GRAPHIC LOG	STRATUM DESCRIPTION
5	S-1 6-8'	5-8 14-10	24/7	0.1			SOIL FILL
							M/C SAND & GRAVEL
	S-2 8-10'	8-6 6-8	24/5	0.0			F/C SAND
10	S-3 10-12'	5-6 10-12	24/6	0.4			F/C SAND & GRAVEL
	S-4 12-14'	6-7 10-8	24/9	0.1			M/C SAND & GRAVEL
15	S-5/5A 14-16	6-6 7-12	24/14	0.4 0.2			S & GRVL
							SILT & CLAY
20							
25							
30							
35							

GEOLOGIC DESCRIPTION

No samples were obtained from the ground suface to a depth of about 6 feet. For soil descriptions from 0 to 6 feet. Refer to test pit log TP-1.

S-1: Medium dense, olive-gray to olive-brown, fine to coarse SAND, little Gravel, trace Clayey Silt. Wet. Mottled.

S-2: Medium dense, olive-brown, GRAVEL, some fine to coarse SAND, trace Clayey Silt. Wet.

S-3: Medium dense, olive-brown, fine to coarse SAND and Gravel, little Clayey Silt. Wet.

S-4: Medium dense, olive-brown, medium to coarse SAND, some Gravel, trace Clayey Silt. Wet. Coarse Sand is subangular.

S-5: Medium dense, olive-brown, Clayey SILT, some Gravel, trace fine to coarse Sand.

Change at approximately 15 feet to gray, SILT & CLAY, trace coarse Sand, trace Gravel. Wet.

Bottom of Boring at 16'.

Notes:

1. Prior to drilling a test pit was excavated to a depth of 7 to 8 feet to confirm the absence of subsurface utilities.

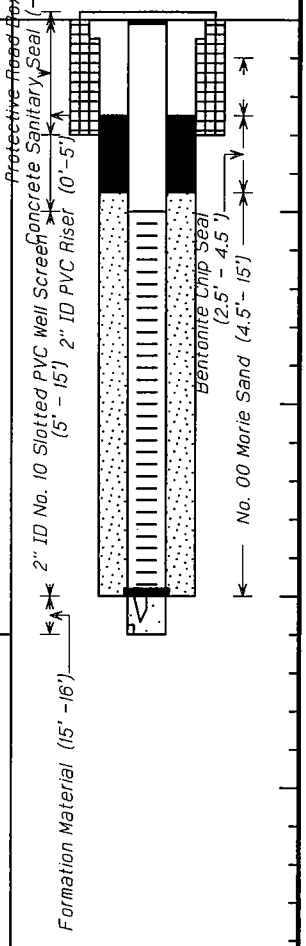
2. The headspace of soil samples was screened for volatile organic compounds (VOCs) using a Photovac Model MP-1000 Microtip Photoionization Detector (PID) with a 10.6 eV lamp calibrated to a 100 ppm isobutylene standard. Background PID readings in ambient air typically were 0.0 to 0.4 ppmv during drilling.

3. The driller indicated a "gravelly zone" was encountered while advancing the borehole from about 12 to 14 feet.

4. The borehole was terminated at a depth of 16 feet without encountering refusal.

5. Upon completion of the boring, a piezometer well was installed consisting of 2-inch I.D. No. 10 slot PVC well screen and 2-inch I.D. Schedule 40 PVC Riser.

WELL DIAGRAM



IBM-EF-

Phone
(203) - 888-4531

MONITOR WELL INSTALLATION DETAIL

SOILTESTING, INC.

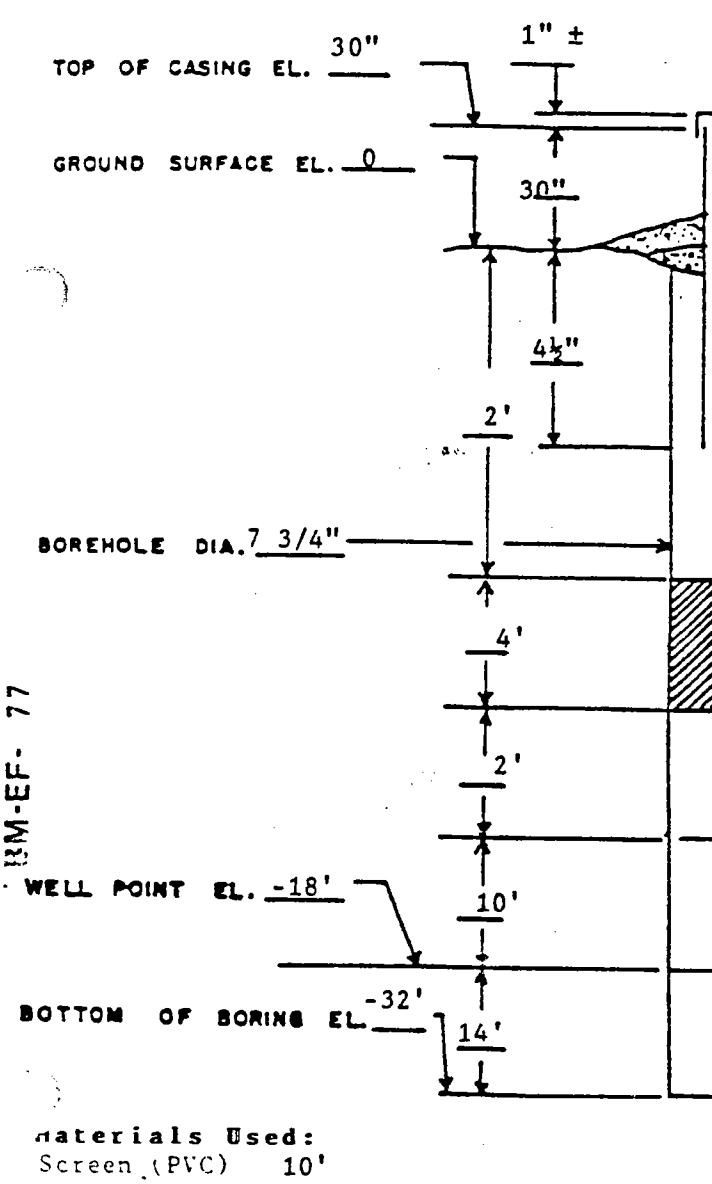
140 OXFORD ROAD - OXFORD, CONN. 06483

SUBSURFACE INVESTIGATIONS - ENVIRONMENTAL/GEOTECHNICAL SITE ASSESSMENTS - Test Borings
Core Drilling - Monitoring Wells - Resistivity Tests

MONITOR WELL # Adj Well 32

Client: Whiting Turner/Chazen
Job #: E24-1947-87 (@IBM)

#757



VENTED LOCKING STEEL CAP: x YES ___ NO

PROTECTIVE STEEL CASING: x YES ___ NO

MOUNDED BACKFILL: x YES ___ NO

CONCRETE COLLAR: ___ YES x NO

BACKFILL MATERIAL: drill cuttings

TYPE OF CASING & SCREEN: 2" SCH 40 PVC

I.D. 2.067" O.D. 2.375"

JOINT TYPE: threaded flush joint

IMPERMEABLE BACKFILL: Bentonite

BACKFILL MATERIAL: #1 Silica Sand & drill cuttings

SCREEN PACKING: #1 Silica Sand & drill cuttings

FILTER FABRIC: ___ YES x NO

IF YES, TYPE: ___

SCREEN SLOT SIZE: #20

BACKFILL MATERIAL: bentonite slurry/ coarse grade bentonite

REFUSAL: ___ YES x NO

IBM-EF- 77

Materials Used:

Screen (PVC)	10'
Riser (PVC)	10'
Plug (PVC)	1
Filter Fabric	n/a
Silica Sand	3 bags
Powdered Bentonite	1 bag
Bentonite Pellets	
Granular C/G Bentonite	6 bags
Protective Casing w/cap	7'

IBM-EF-

SOILTESTING, INC.
140 OXFORD ROAD
OXFORD, CONN. 06483

CLIENT: Whiting Turner

SHEET 1 OF 1
HOLE NO: adj well #32

PROJECT NO: E24-1947-87

BORING LOCATIONS: per instructions

PROJECT NAME: IBM

#757
OFFSET

FOREMAN - DRILLER: MC km bm jad

INSPECTOR: G Spiciarich (MC)

LOCATION: East Fishkill Facility, NY

GROUND WATER OBSERVATIONS
AT 6 ± FT AFTER 0 HOURS
AT ____ FT AFTER ____ HOURS

	CASING	SAMPLER	CORE BAR
TYPE	HSA	SS	
SIZE I.D	3 3/4"	1 3/8"	
HAMMER WT		140#	BIT
HAMMER FALL		30"	

Date Start 9-25 Date Fin. 9-25-87
SURFACE ELEV
GROUND WATER ELEV

DEPTH	CASING BLOWS PER FOOT	SAMPLE NO	TYPE	PEN	REC	DEPTH @ BOT	BLOWS PER 6 ON SAMPLER (FORCE ON TUBE) 0-6	6-12	12-18	CORING TIME PER FT (MIN)	DENSITY OR CONSIST / MOIST	STRATA CHANGE DEPTH ELEV	FIELD IDENTIFICATION OF SOIL REMARKS INCL COLOR, LOSS OF WASH WATER, BEANS IN ROCK, ETC
													brn SILT, lit cF gravel, tr f-sand
											dense		
		1	SS	17"	5"	6'5"	9	25	50/5"		wet	5'	
5													brn SILT, lit f-sand, tr cF gravel
		2	SS	24"	12"	9'	9	8			med		
							8	10			wet	10'	
		3	SS	24"	12"	11'	5	6				10'6"	grey F SAND
10							6	6					grey CM SAND, lit silt, cF gravel
		4	SS	12"	12"	12'	4	4					
		5	SS	24"	16"	14'	8	12					grey CMf SAND, some cF gravel, tr silt
							15	15					
		6	SS	24"	3"	16'	9	10					
							11	16					
		7	SS	24"	10"	18'	6	8			moist	17'	
							10	13			med		grey SILTY CLAY
		8	SS	24"	12"	20'	5	8					
							7	12					
		9	SS	24"	18"	22'	8	8					
							11	10					
		10	SS	24"	24"	24'	9	9					
							10	8					
		11	SS	24"	24"	26'	6	29			dense	25'6"	
							12	13					dk grey Cf GRAVEL, lit cm sand, clay
		12	SS	24"	24"	28'	44	43			dense	27'	
							29	28			moist/wet		grey FM SAND, lit silt, tr cF gravel, lit cobbles, boulders
		13	SS	24"	24"	30'	24	25					
							25	20			moist		
		14	SS	24"	24"	32'	19	19				31'	
							20	19					grey MF SAND, lit cF gravel, tr silt
												32'	
													End of Boring 32'

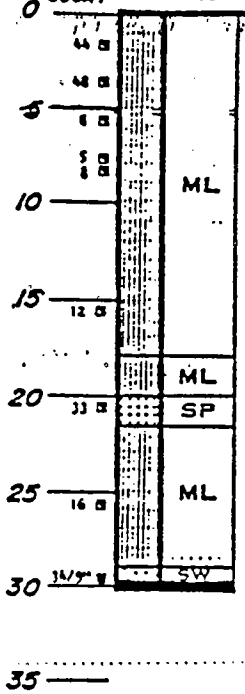
HOLE NO Adj. Well #32

RFACE TO ____ FT. USED ____ CASING THEN ____ CASING TO ____ FT

W: WASHED P: PIT A: AUGER UP: UNDISTURBED PISTON C = COARSE
UB UNDISTURBED BALL CHECK T: THINWALL V: VANE TEST M = MEDIUM
OE OPEN END SAMPLER SS SPLIT TUBE SAMPLER H.S.A. - HOLLOW STEM AUGER F = FINE
PROPORTIONS USED: TRACE 0-10%, LITTLE 10-20%, SOME = 20-35%, AND = 35-50%.

BORING 718 TBM-[illegible] 59

SURFACE ELEVATION 239.2± FEET
COORDINATES: N 6868.9
E 2812.4



DESCRIPTIONS

BROWN SANDY SILT WITH FINE TO COARSE GRAVEL, DRY (DENSE)
BECOMING SLIGHTLY MOIST

CAVING LOOSE (MEDIUM STIFF)

GW 782

BECOMING VERY MOIST

BROWN SILTY CLAY WITH FINE SAND, MOIST (STIFF)

BROWN FINE SAND, VERY MOIST (DENSE)

GRAY SILT, VERY MOIST (VERY STIFF)

GRAY GRAVEL WITH SOME SAND, VERY MOIST (VERY DENSE)

NOTES:
1. BORING COMPLETED TO A DEPTH OF 29.8 FEET ON 5/15/85.
2. 4" CASING USED TO 20 FEET.
3. NO DRILLING MUD USED.
4. MONITORING WELL INSTALLED ON 5/15/85. SCREENED PVC 10.9' TO 20.9' FEET UNSCREENED PVC 0' TO 10.9'
5. WATER LEVEL RECORDED AT 11.7 FEET ON 5/17/85 AND 11.1 FEET ON 7/1/85.

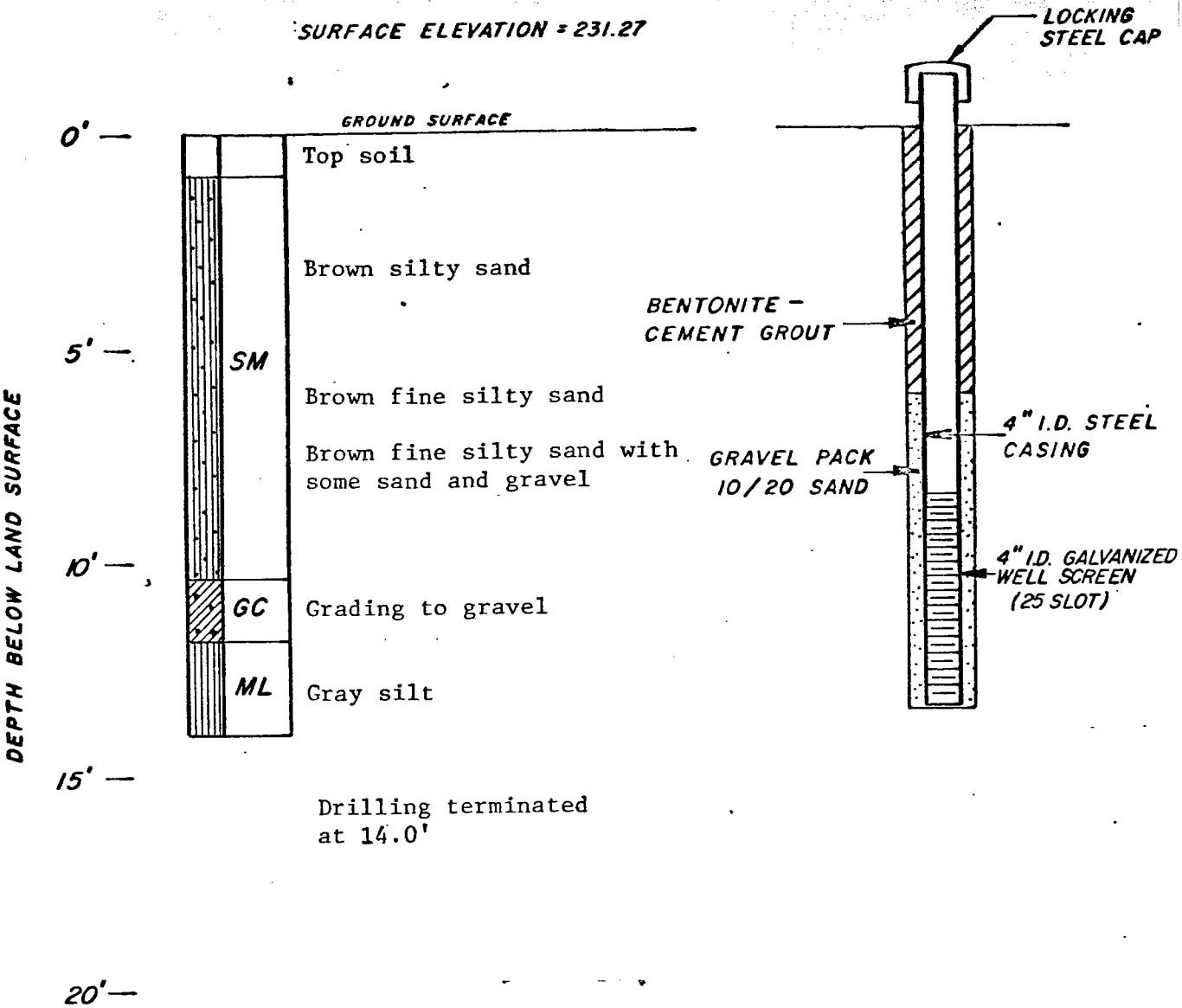
603

Dames & Moore

FIGURE 5

MONITOR WELL Nº 839

SURFACE ELEVATION = 231.27



CONTAMINATION AREA "D"

LOG AND MONITORING WELL DETAILS

IBM CORP. EAST FISHKILL FACILITY
DUTCHESS COUNTY, NEW YORK

RESOURCE CONSULTANTS INC.
Fort Collins, Colorado

UNDERGROUND
SURVEYING

Utility Locating & Mapping Survey Report

B325 Well 032A
IBM East Fishkill
2070 Route 52
Hopewell Junction, NY 12533

Prepared for Fluor Enterprises, Inc.

INTRODUCTION

A utility locating and mapping survey was performed by Underground Surveying, LLC of 152 Deer Hill Avenue, Suite 207, Danbury, CT for Fluor Enterprises, Inc. of IBM East Fishkill, 2070 Route 52, B/334, Hopewell Junction, NY. The survey was performed on April 19, 2011 at IBM East Fishkill, 2070 Route 52, Hopewell Junction, NY. The purpose of the survey was to map the location of underground utilities running through the area shown on Drawing A1.

The following survey was performed with cable and pipe locators and ground-penetrating radar (GPR). Before reading the full report, we advise that you read the following paragraphs to gain a basic understanding of the technology and to understand its limitations.

Cable and Pipe Locators

The science of cable and pipe locating is based on the principal that a current flowing along a conductor creates a magnetic field, and that magnetic field or signal, which is either passive or active in nature, can be detected via a receiver.

A passive signal is one that is naturally occurring around a conductor, or in this case an underground utility. Some examples of passive signals include the following:

1. Current flowing in an electric supply cable.
2. Earth return current from power systems that use metal pipes or cable sheaths as a convenient conductor.
3. Radio frequency currents from very low frequency (VLF) radio transmissions that have penetrated the ground and flow along a buried utility.

A passive sweep is performed to search for inaccessible, abandoned or unknown utilities using only a receiver. To perform a passive sweep, a survey grid is traversed in “power” mode, with the receiver blade in line with the direction of movement and at right angles to any utilities that may be crossed. When the receiver indicates the presence of a utility, it is pinpointed, traced and marked. The sweep is then continued until all detected utilities have been marked and the entire grid has been traversed in both directions. After completing the sweep, the entire process is repeated in “radio” mode to search for utilities that radiate VLF radio signals.

Passive signals enable utilities to be located, but not identified, because the same signal may appear on multiple utilities within the grid. To solve this problem, an active signal must be applied to each individual utility line.

An active signal is one that is intentionally generated by a transmitter. In this mode, the signal can be applied directly to the utility via direct connection or induction. This enables utilities to be identified, traced and their depth determined with a receiver.

Direct connection involves plugging a connection cable into a transmitter output socket and connecting directly to the target line. This can be accomplished with connection leads or with a transmitter clamp. Connection leads are generally used to apply a signal to metallic conduits,

sight lighting structures and metallic pipes. This is the preferred method for locating secondary electric, water and gas.

Many electric, telephone and cable lines are housed within plastic conduits or buried into the ground without protection. In addition, directly connecting to these lines is usually too risky or forbidden. In such instances, a transmitter clamp is used to apply a signal to the cable without interrupting service to the line. The clamp is easy to apply, but the signal may not travel as far as it does with connection leads, and works best if the target line is grounded at each end .This is the method of choice for locating primary electric, telephone and cable lines.

If an active signal cannot be applied to a line because it is inaccessible, an induction sweep must be performed. The transmitter contains an antenna, that when placed on the ground directly on top of a utility line, can induce a signal into it. The advantage of using induction is that a signal can be applied without access to the line and it is very quick and easy to use. The disadvantages are that induction efficiency is poor on deep targets, it is only useful at depths down to 6 feet and the signal can induce into lines other than the target. In addition, signal strength is often lost in the surrounding soil, the signal is shielded by reinforced concrete and a signal will not apply to a well-insulated line unless it is effectively grounded at each end. Despite its shortcomings, an induction sweep can sometimes successfully locate unknown or abandoned utilities when GPR results are inconclusive.

An active signal cannot be applied to non-conductive (non-metallic) utility lines. To combat this, a detectable duct rod or self contained transmitting sonde must be inserted into the line via a manhole, handhole, cleanout or catch basin. The disadvantages of this method are that some non-metallic utility lines do not have access points or might be obstructed by detritus. Nonetheless, this is the best method for locating fiber optics, future use lines, sanitary sewer and storm sewer.

Ground Penetrating Radar (GPR)

Quite often, non-metallic, inaccessible, unknown or abandoned utilities cannot be located with traditional cable and pipe locators. When this occurs, Ground Penetrating Radar (GPR) must be used in conjunction. GPR is a non-invasive, non-destructive geophysical surveying technique that is used to produce a cross-sectional view of objects embedded within the subsurface.

All GPR units consist of three main components: a power supply, control unit and antenna.

To understand how GPR works, we must first understand the performance of a scan is. A scan is performed by moving the antenna across the surface linearly to create a series of electromagnetic pulses over a given area. During a scan, the control unit produces and regulates a pulse of radar energy, which is amplified and transmitted into the subsurface at a specific frequency by the antenna. Antenna frequency is inversely proportional to penetration depth, which makes antenna selection the most important step in the survey design process. Below is a list of antenna frequencies, their application and maximum penetration depth.

Frequency (MHz)	**Sample Applications**	**Max Penetration Depth (ft.)**
2600	Concrete, Roadways, Bridge Decks	1
1600	Concrete, Roadways, Bridge Decks	1.5
900	Concrete, Shallow Soil, Archaeology	3
400	Shallow Geology, Utility Locating, Environmental, Archaeology	9
200	Geology, Environmental	25
100	Geology, Environmental	60

During a scan, the control unit records the strength and time required for the return of any reflected energy. Reflections are produced in the data screen profile (on the control unit) whenever the energy pulse enters and exits contrasting subsurface materials. The way it responds to each material is determined by two physical properties: **dielectric constant** and **electrical conductivity**.

The **dielectric constant** is a descriptive number that indicates how fast electromagnetic energy travels through a material. Energy always moves through a material as quickly as possible, but certain materials slow down the energy more than others. The higher the dielectric, the slower the energy will move through the material, and vice versa. Below is a list of some common materials with their corresponding dielectric constants and velocity values.

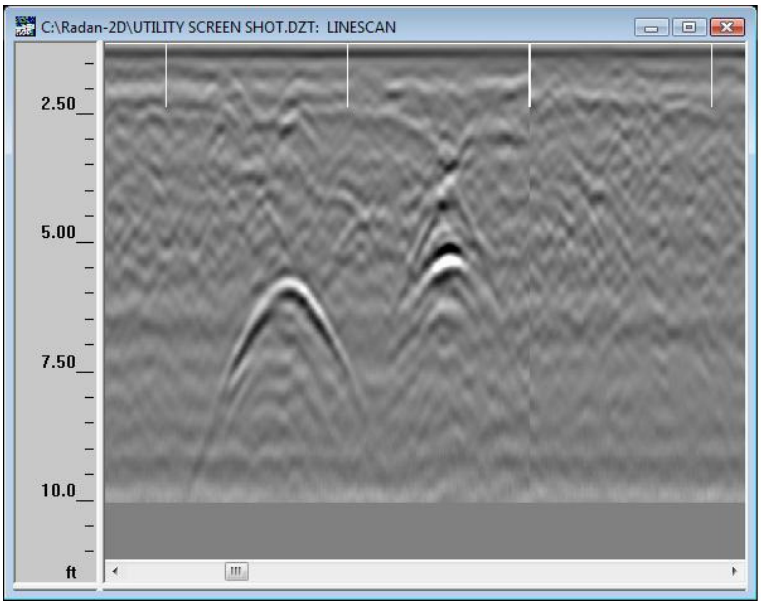
Material	Dielectric	Velocity (mm/ns)
Air	1	300
Fresh Water	81	33
Ice	3	167
Dry Sand	3 – 6	120 – 170
Wet Sand	25 – 30	55 – 60
Silt	10	95
Wet Clay	8 – 15	86 – 110
Dry Clay	3	173
Marsh	12	86
Average Soil	16	75
Granite	5 – 8	106 – 120
Limestone	7 – 9	100 – 113
Concrete	5 – 8	55 – 120
Asphalt	3 – 5	134 – 173
PVC	3	173

To determine the location of a subsurface target in the data screen profile, there must be a contrast between the dielectric values of the material one is scanning through and the target one is searching for. For example, a pulse moving from dry sand (dielectric of 5) to wet sand (dielectric of 30) will produce a strong, highly visible reflection, while moving from dry sand (5) to limestone (8) will produce a weak one. In addition, if one knows the dielectric value of the subsurface material one is scanning through, the control unit can measure the amount of time required to receive the reflected signal and convert this to depth.

Since the GPR emits electromagnetic energy, it is subject to attenuation (natural absorption) as it moves through a material. Energy moving through resistive (less conductive) materials such as dry sand, ice or dry concrete will penetrate much further than energy moving through absorptive (more conductive) materials such as salt water or wet concrete. As a result, the greater the contrast in **electrical conductivity** between the material one is scanning through and the target one is searching for, the brighter the reflection; high conductive materials such as metals produce the brightest reflections.

To understand how dielectric and electrical conductivity differences translate into visual data requires an understanding of how the antenna emits energy. Imagine the antenna scanning perpendicular to a pipe. Energy emits from the antenna in a 3-dimensional cone shape, not in a straight line as one might think. The two-way travel time for energy at the leading edge of the cone is longer than for energy directly below the antenna. Because it will take longer for energy at the leading edge to be captured, when the antenna first approaches the pipe, it will appear low in the data screen profile. As the antenna moves closer to the pipe and the distance between them

decreases, the reflections will appear higher in the profile. At the point where the antenna is located directly above the pipe, the minimum distance of separation is reached and the reflections reach their zenith. As the antenna moves away from the pipe and the distance between them increases, the reflections appear lower in the profile once again. After the scan is completed, the center of the pipe will appear in the data screen profile as an upside down U, which is referred to as a hyperbola.



To gather, organize and present the data, a series of scans are performed within an orthogonal survey grid. At the end of each scan, the data screen profile is reviewed for the presence of hyperbolic targets. If present, the antenna is moved backward to place a cursor (which depicts the center of the antenna) on the center of the targets. The location and depth of the targets are then marked on the surface with chalk, paint and/or flags. Once the entire survey grid has been scanned, the marks are reviewed to search for patterns similar to that of the desired targets, in this case a pipe. Any marks that run in straight line and whose hyperbolas appear to be highly conductive metal targets are then connected, thereby displaying the location and depth of the pipe.

MATERIALS

Cable and pipe locating was performed with an RD4000Rx receiver and RD4000T10 transmitter, both of which were manufactured by the Radiodetection Corp., of Bridgton ME. The GPR survey was performed with the SIR-3000, which was manufactured by Geophysical Survey Systems, Inc., of Salem, NH.

METHODS

A visual inspection was performed to search for utility poles, manholes, handholes, catch basins, drains, conduits, cleanouts, water valves, gas valves, tank pads and vents located within or near the survey area. Active mode cable and pipe locating was performed by directly applying a radio signal to all nearby electric lines, telecommunication lines, and water valves. A detectable duct rod was snaked through all nearby future use conduits and conduits that could not be induced with a signal. Passive mode cable and pipe locating was performed within the entire survey area to search for inaccessible high voltage electric lines and telecommunication lines. Lastly, a ground penetrating radar (GPR) survey was performed within the entire survey area, to more accurately determine the location and depth of each line, and to search for non-metallic, unknown and abandoned utilities.

RESULTS

Underground utilities were marked on the ground with paint and/or flags, using standard American Public Works Association (APWA) color codes. Electric was marked with *red,* storm sewer with *green* and future use lines with *pink*. The results of the survey are shown on Drawing A1.

DISCUSSION

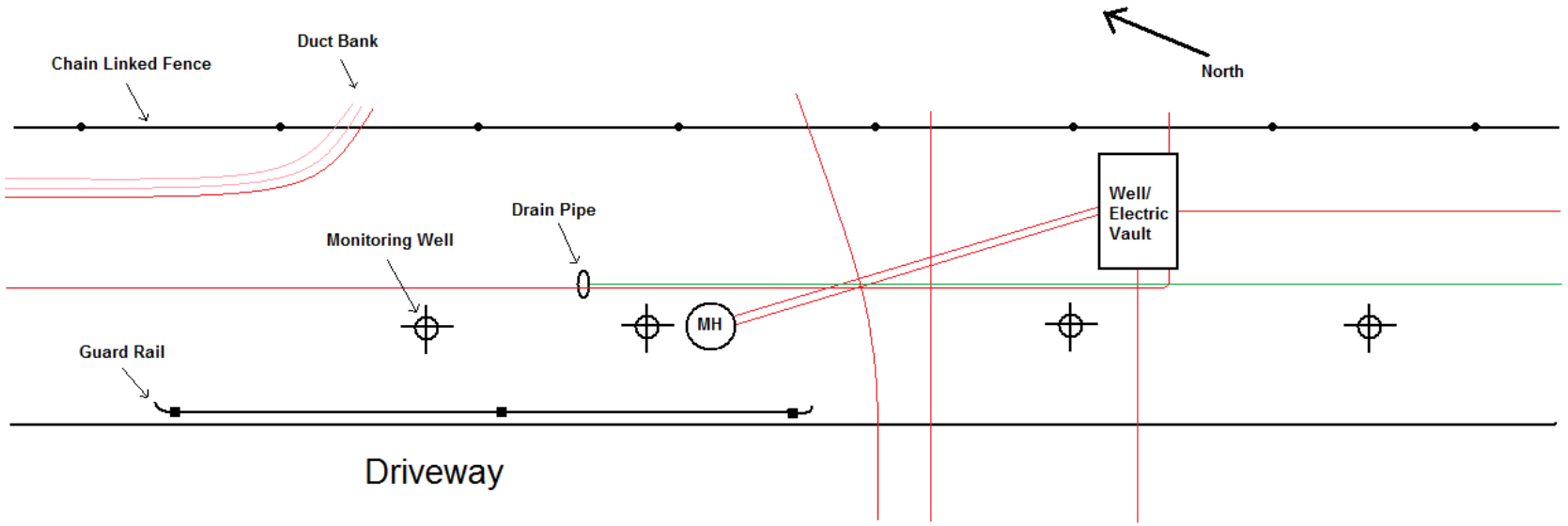
The results of the survey were good, enabling us to locate eight electric lines, one drain line, and two future use lines within the survey area; all lines appear to be located between the depths of 1-2 feet. There appear to be four electric lines emanating from the Well/Electric Vault: two that run parallel to one another toward the northwest, to the Manhole housing a monitoring well; one that runs southeast, parallel to the storm sewer line; and another that runs to the southwest, toward the storage building. Two electric lines emanate from the storage building and run parallel to one another toward the northeast. After passing the roadway, one of these lines continues running in the same direction; however, the other curves toward the North. The electric line running parallel to the drain line emanates from the hypochlorite drain facility at the end of the driveway. Although from the map it appears as if this line runs to the Well/Electric Vault, this is not the case. It actually runs toward the concrete handhole located on the other side of the chain linked fence. At the top left corner of Drawing A1, as was noted on the map, there appears to be a duct bank running toward the southeast, parallel to the chain linked fence; it turns toward to the East as it crosses the fence, and appears to contain one live electric line and two future use PVC

conduits. As noted earlier, there also appears to be a drain line running through the survey area. This line runs down the center of the survey area toward the southeast. Lastly, please be aware that if any drilling is to be performed on the other side of the fence, another survey would have to be performed, because multiple electric, telecommunication, and water lines appear to run through that area.

If you have any questions, comments or concerns regarding our findings, please don't hesitate to contact us at 203.312.9844 or info@undergroundsurveying.com.

Submitted on April 21, 2011

Peter C. Viola
Underground Surveying, LLC



Underground Surveying
152 Deer Hill Avenue, Suite 207, Danbury, CT 06810
Tel: 203.312.9844 Fax: 203.663.8330
www.UndergroundSurveying.com

B325 Well 032A

IBM East Fishkill
2070 Route 52, Hopewell Junction, NY

Prepared for:
Fluor Enterprises, Inc.
2070 Route 52, B/344
Hopewell Junction, NY

A1
Scale: NTS
Drawn by: PV
Date: 4/19/11

GROUNDWATER SCIENCES CORPORATION

GEOLOGIC LOG: GW-032B

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	***GW-032A Well Replacement***	DRILLING CO.:	***Parratt Wolff***
SITE LOCATION:	***East Fishkill***	DRILLER:	***Mark Eaves***
JOB NO.:	***95007.21***	RIG TYPE:	***HSA***
LOGGED BY:	***CES***	DRILLING METHOD:	***6 1/4" Hollow Stem Auger***
DATES DRILLED:	***6/14/2011***	DEVELOPMENT DATE:	***6/17/2011***
		LOCATION:	***Area D AOC, Access Road West of B/325***
NOTES: SWL: 3.08 ft, 6/15/2011 Elevation TOC ~231.6		SURFACE ELEVATION	~231.1
		EASTING	N/A
		NORTHING	N/A

DEPTH FEET	BLOW COUNTS	PID (ppm)	RECOV.	SAMP.	SOIL DESCRIPTION	GRAPHIC	DEPTH FEET	WELL CONSTRUCTION	WELL CONSTRUCTION DETAILS
0					GRAVEL AND SAND: 0'-6' Soft Dig, no sampling (Sand & Gravel, moist)		0		Temporary 6-inch steel protective casing with locking well cap
2							2		Temporary 4-inch expansion cap
4							4		Temporary sand fill 5.0' to surface
6					GRAVEL AND SAND: [difficult augering 6-10', cobbles present]		6		4-inch 316 stainless steel riser to 10.5 to +0.5' above surface
8	N/A		0		GRAVEL: Olive brown, GRAVEL, some coarse Sand, little Silt, trace Clay, wet		8		Bentonite chips 5.0 - 7.5'
10	N/A		1"		GRAVEL: Olive brown, GRAVEL, some coarse Sand, little Silt, trace Clay, wet, gravel subrounded with 1" intermediate axis		10		Sump, well screen and riser are joined by threaded couplings
12	N/A		10"		SAND: Olive brown, coarse SAND, trace Silt, wet, cobbles present during augering		12		4-inch No. 35 wire-wrapped 316 stainless steel screen 10.5 - 15.5'
14	N/A		3"		GRAVEL: (Gravel & Sand, wet)		14		
16	N/A		2"		CLAY AND SILT: cobble at base of spoon 14' to 16' sample, easier penetration at 15' (Gray SILT & CLAY, wet)		16		#1 Sand Pack 7.5 - 20.5'
18	N/A		12"		CLAY AND SILT: Gray, SILT & CLAY, trace fine Sand, wet		18		4-inch 316 stainless steel sump 15.5 - 20.5'
20	N/A		1"		CLAY AND SILT: Gray, SILT & CLAY, trace fine Sand, wet		20		
22							22		

Well Development Field Data Sheet

Well GW-032B Site East Fishkill

Well Deveopment Personnel Parratt-Wolff Pump Type Air Lift (Also used hand-operated surge block)

Casing Diameter (in) 4" DTW 3.08 TOC at 0803 DTB 20.95

Well Volume = 0.653 gal/ft* x (DTB-DTW) = 11.70

x 3 = 35.1

x 10 = 117.0

Date	Time	WL (ft)	Flow Rate	Temp.	Temp. Change (units)	pH	ph Change (units)	Cond.	Cond. Change (%)	Turb.	Turb. Change (units)	(Gallons) Total Volume	Remarks
6/15/11	0824												Start Airlift
	0830	6.00	1.25										Muddy water
	0840	5.35	1.20										
	0900												Start Surge Block
	0919												End Surge Block
	0922												Start Airlift
	0935												End Airlift DTB=20.95
	0939												Start Surge Block
	0954												End Surge Block, DTB=20.85
	0956												Start Surge Block
	1011												End Surge Block
	1015												Start Airlift
	1030												End Airlift
	1046												Start Surge Block
	1101												End Surge Block
	1105												Start Airlift
	1125											150	End Airlift

* gal/ft: 1.5" = 0.092; 2" = 0.163; 4" = 0.65; 6" = 1.45; 8" = 2.61

Well Development Field Data Sheet

Well GW-032B Site East Fishkill

Well Deveopment Personnel CES/MWR Pump Type Rediflo, Centrifugal

Casing Diameter (in) 4" DTW 3.29 TOC at 0912 DTB 20.95

Well Volume = 0.653 gal/ft* x (DTB-DTW) = 11.53

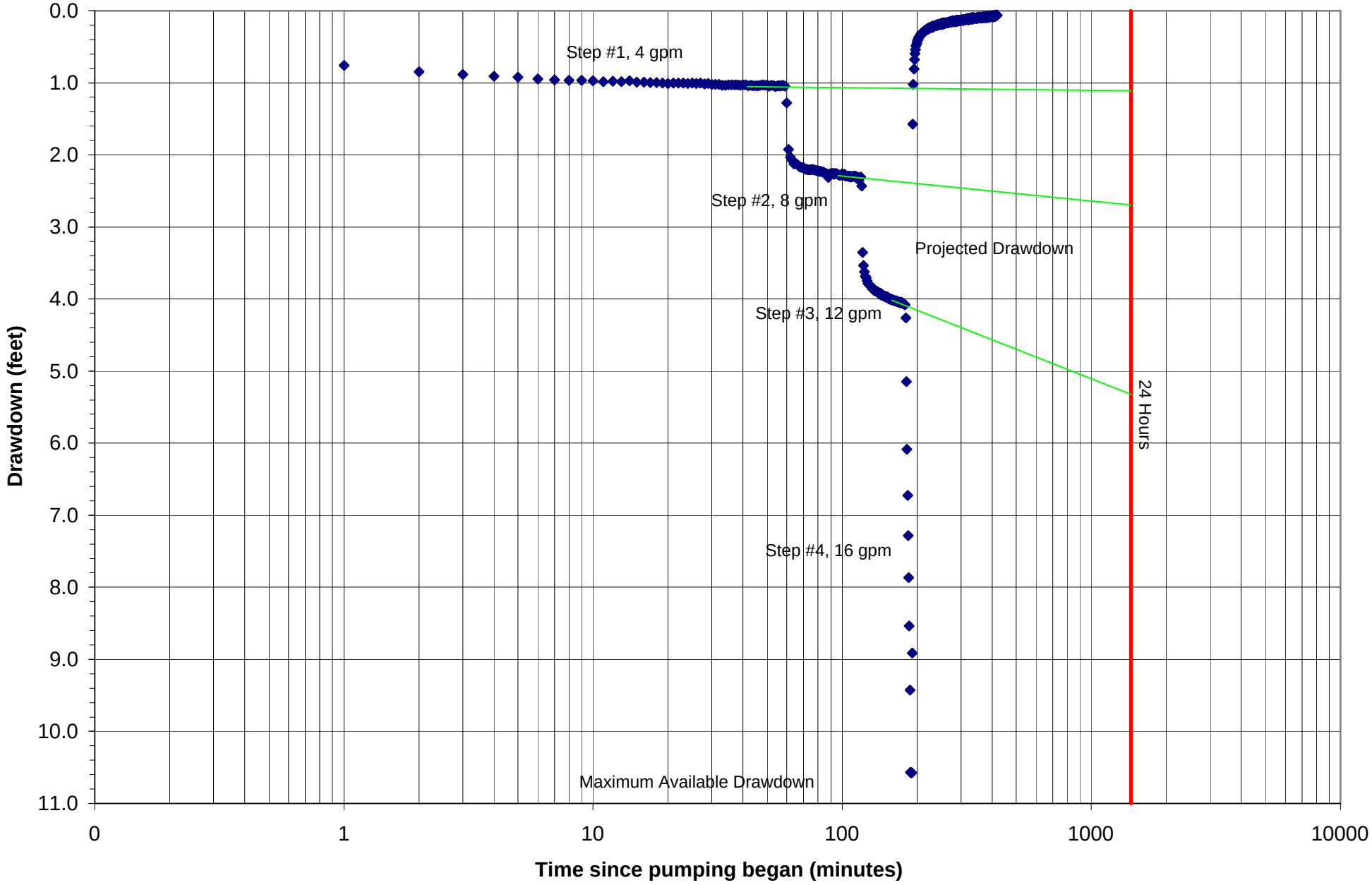
x 3 = 34.6

x 10 = 115.3

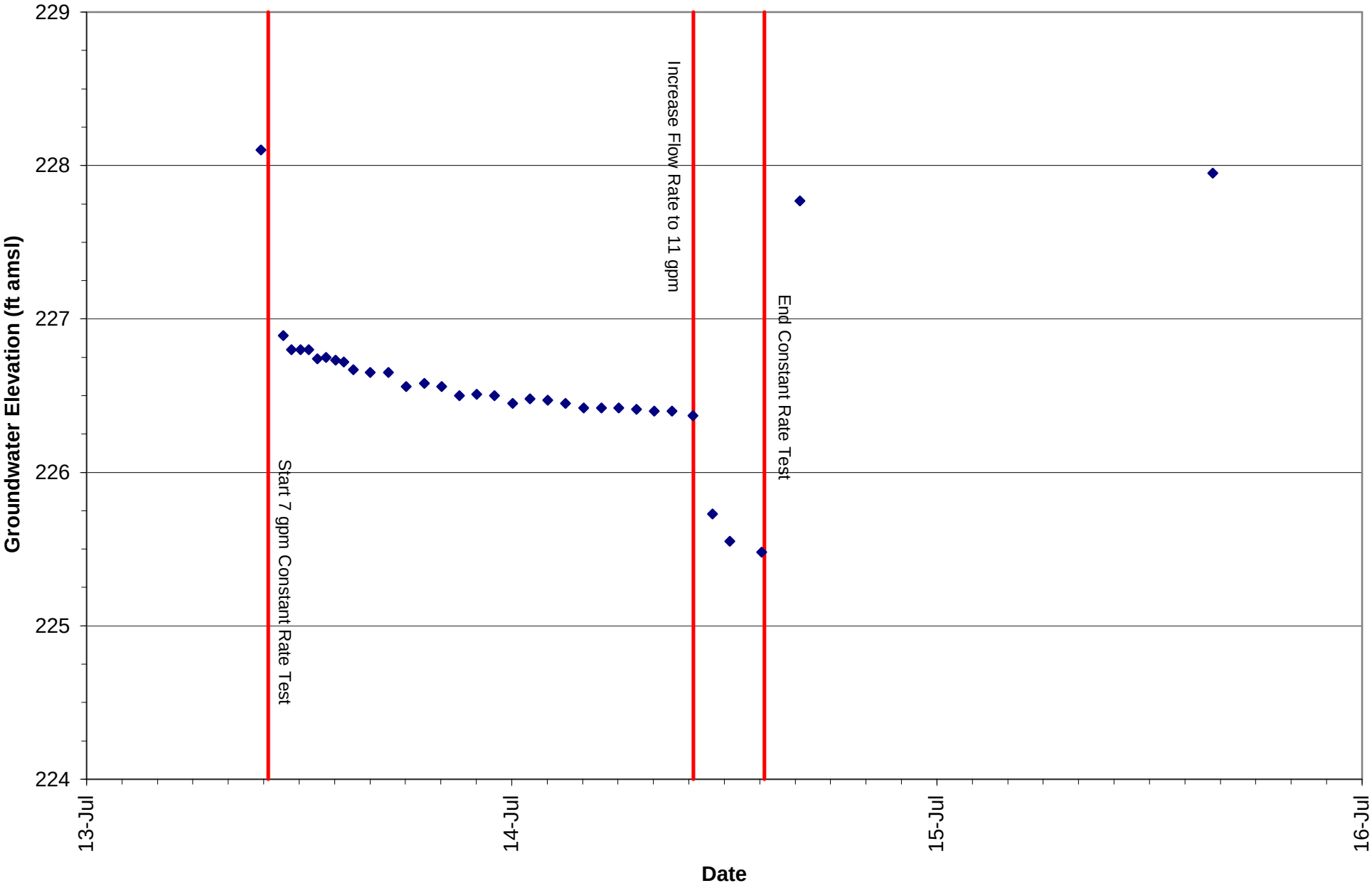
Date	Time	WL (ft)	(GPM) Flow Rate	Temp.	Temp. Change (units)	pH	ph Change (units)	Cond.	Cond. Change (%)	Turb.	Turb. Change (units)	(Gallons) Total Volume	Remarks
6/17/11	0951	3.29	2.1										Rediflo, Hazy/muddy
	0958	3.25	2.0										water clears ~ 20gal
	1016	3.25	2.0	18.8		7.09		2602		3.80		50	
	1028	3.25	2.0	18.3		7.18		2635		920		75	Agitate Screen, Increase rate
	1041	3.50	3.2										Agitate Screen
	1052	3.53	3.2	21.1		6.72		1290		27.0		140	Increase flow rate
	1104		0/~7										Pump fault
	1111	4.65	~7										Agitate Screen to 11:28
	1130		off										Pump fault / off to 1134
	1137	3.25	~7	19.9		7.13		1320		83.0		300	Stop - Empty Tank
	1220		9.4										Start Suction Pump
	1227	6.28	9.4	18.7		7.34		1439		340		350	Start Agitating Screen
	1237	6.32	9.4	18.5		7.40		2100		80.5		470	After Agitation stopped
	1256	6.00	9.0	18.7		7.44		1427		27.3		600	Stop - Empty Tank
	1331	2.79	0										
	1359		9.4										Start Rediflo
	1402	5.37	10.7	20.5		6.94		2820		206		640	
	1411	6.30	11.1	18.9		6.94		1599		774		720	During Agitation
	1420	6.35	10.7	18.9		6.97		1451		32.3		800	
	1432	6.68	10.7	18.7		7.26		2682		27.1		950	Stop - Empty Tank
	1505	2.81	10.7										Start Rediflo
	1509	6.03	10.7	18.9		6.64		2698		370		990	At end of agitation
	1515	6.15	10.7	18.9		6.80		2701		27.0		1050	No agitation prior 5min Agitate to ~1520
	1535	6.78	10.7	18.5		6.69		2747		26.0		1200	Stop - Empty Tank
													Lightning - End Work

* gal/ft: 1.5" = 0.092; 2" = 0.163; 4" = 0.65; 6" = 1.45; 8" = 2.61

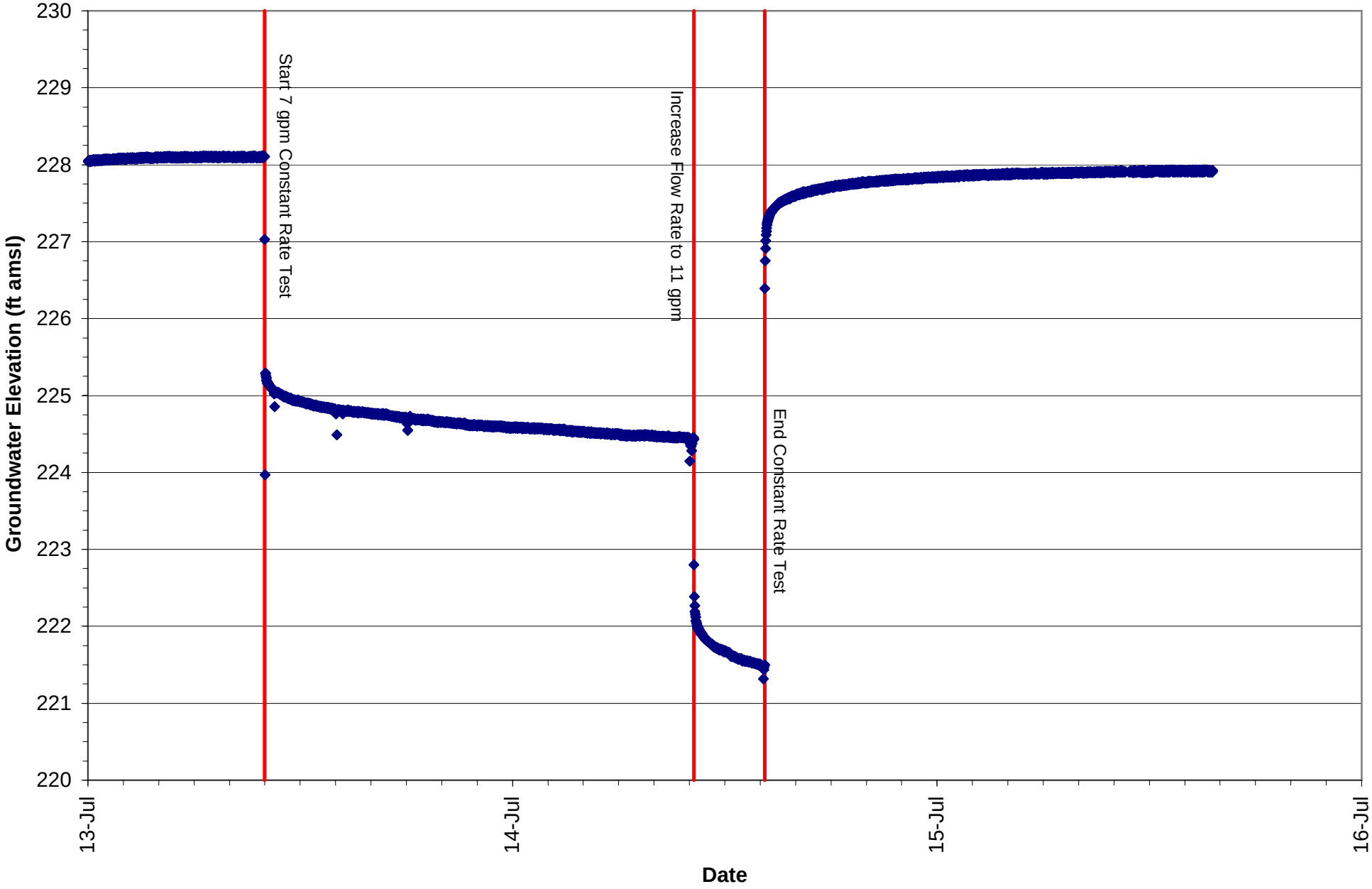
GW-032B Drawdown vs. Time
GW-032B Step Test
July 12, 2011



GW-032A Water Levels
GW-032B Constant Rate Test
July 13-14, 2011



GW-032B Water Levels
GW-032B Constant Rate Test
July 13-14, 2011



MW-066 Water Levels
GW-032B Constant Rate Test
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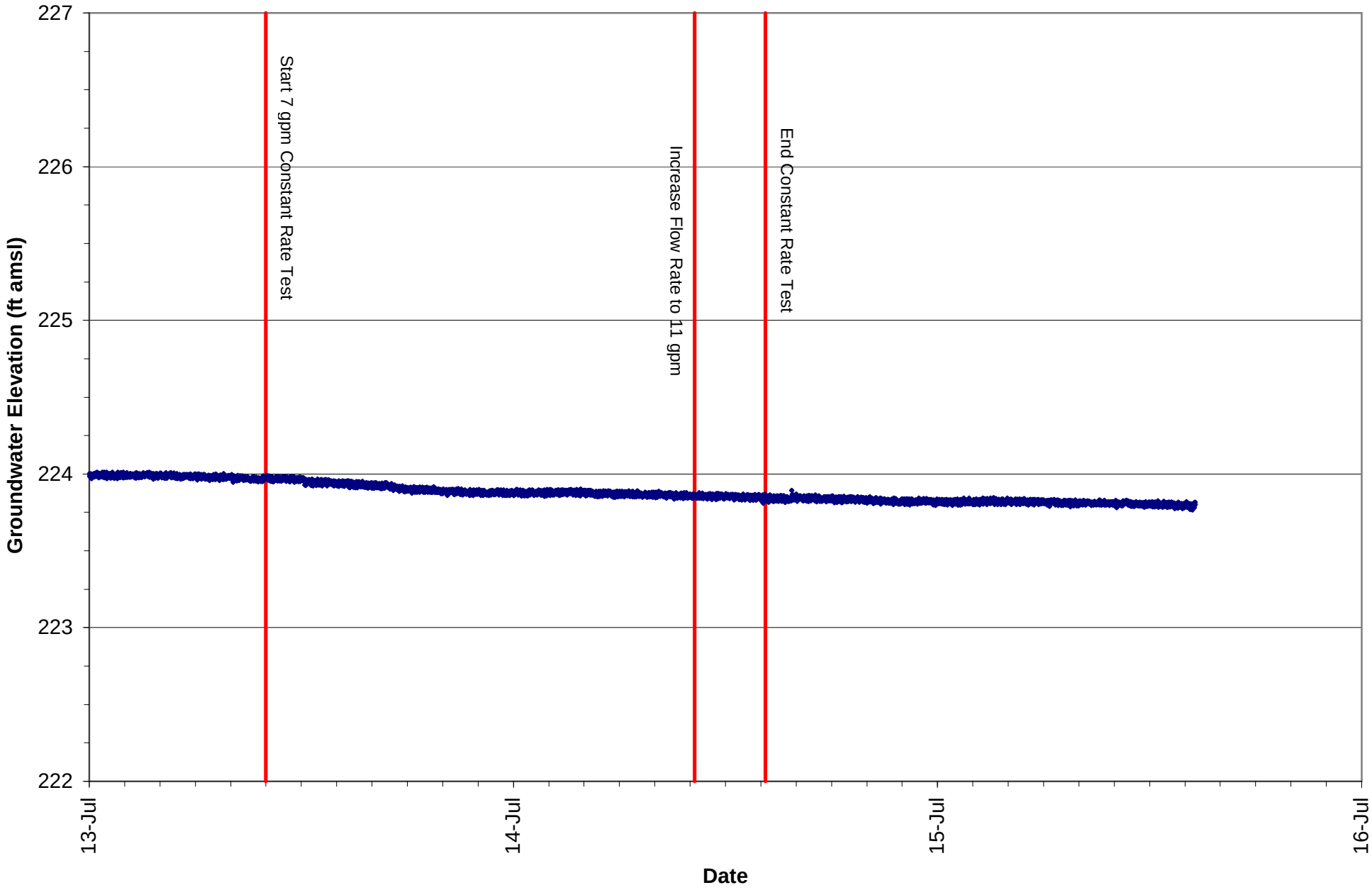

MW-067 Water Levels
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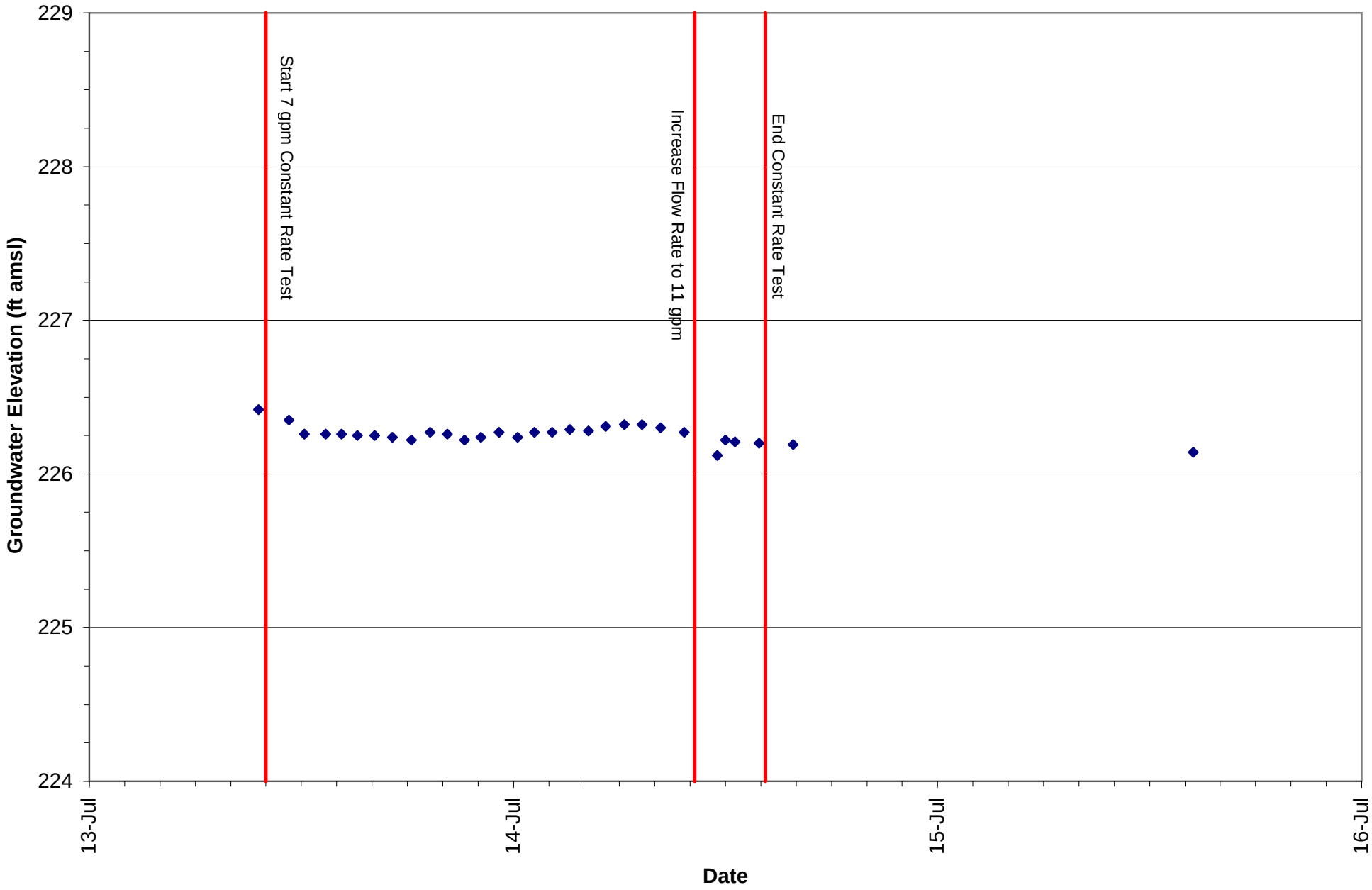
July 13-14, 2011



MW-170 Water Levels
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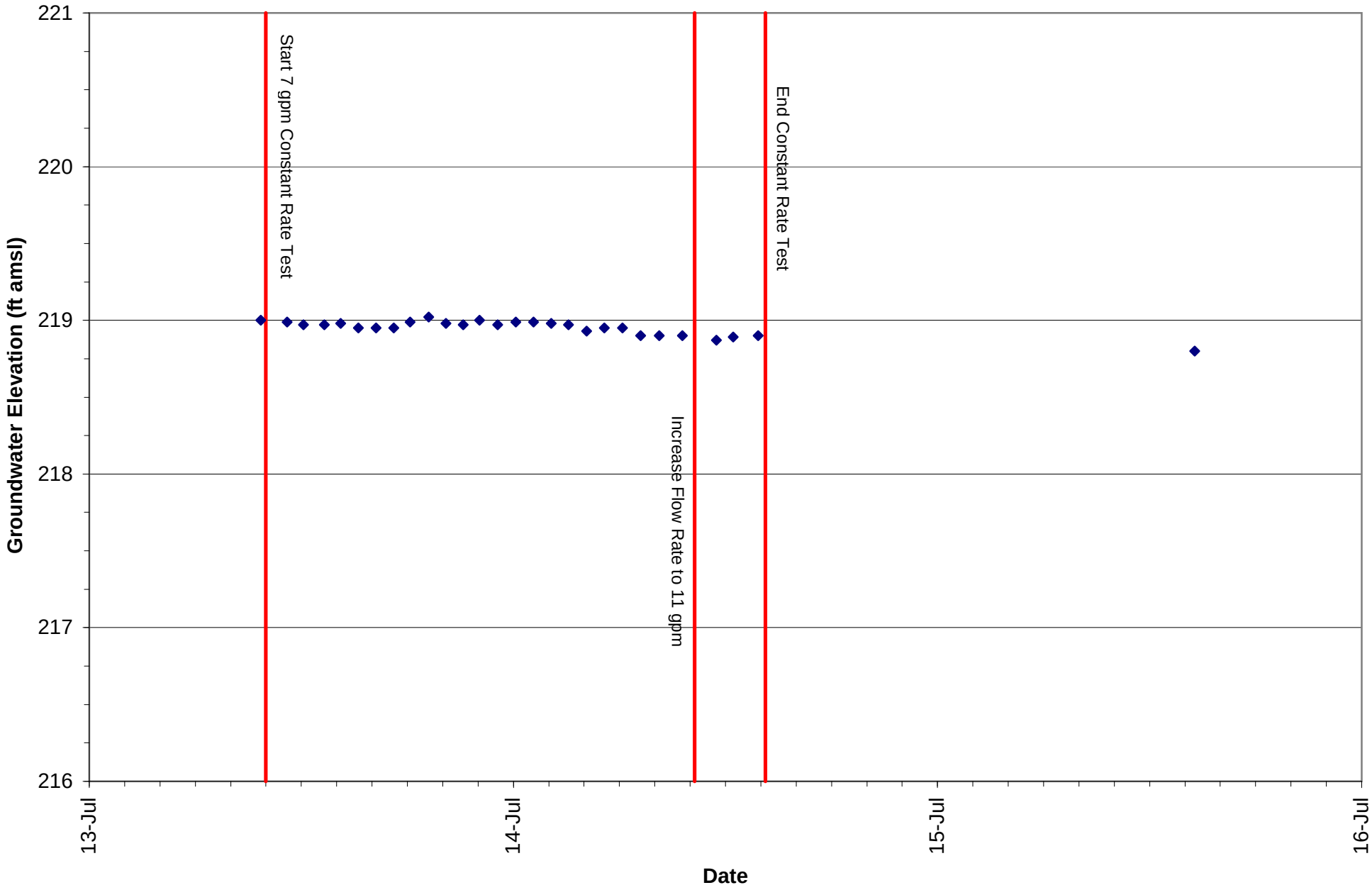
July 13-14, 2011



MW-614 Water Levels
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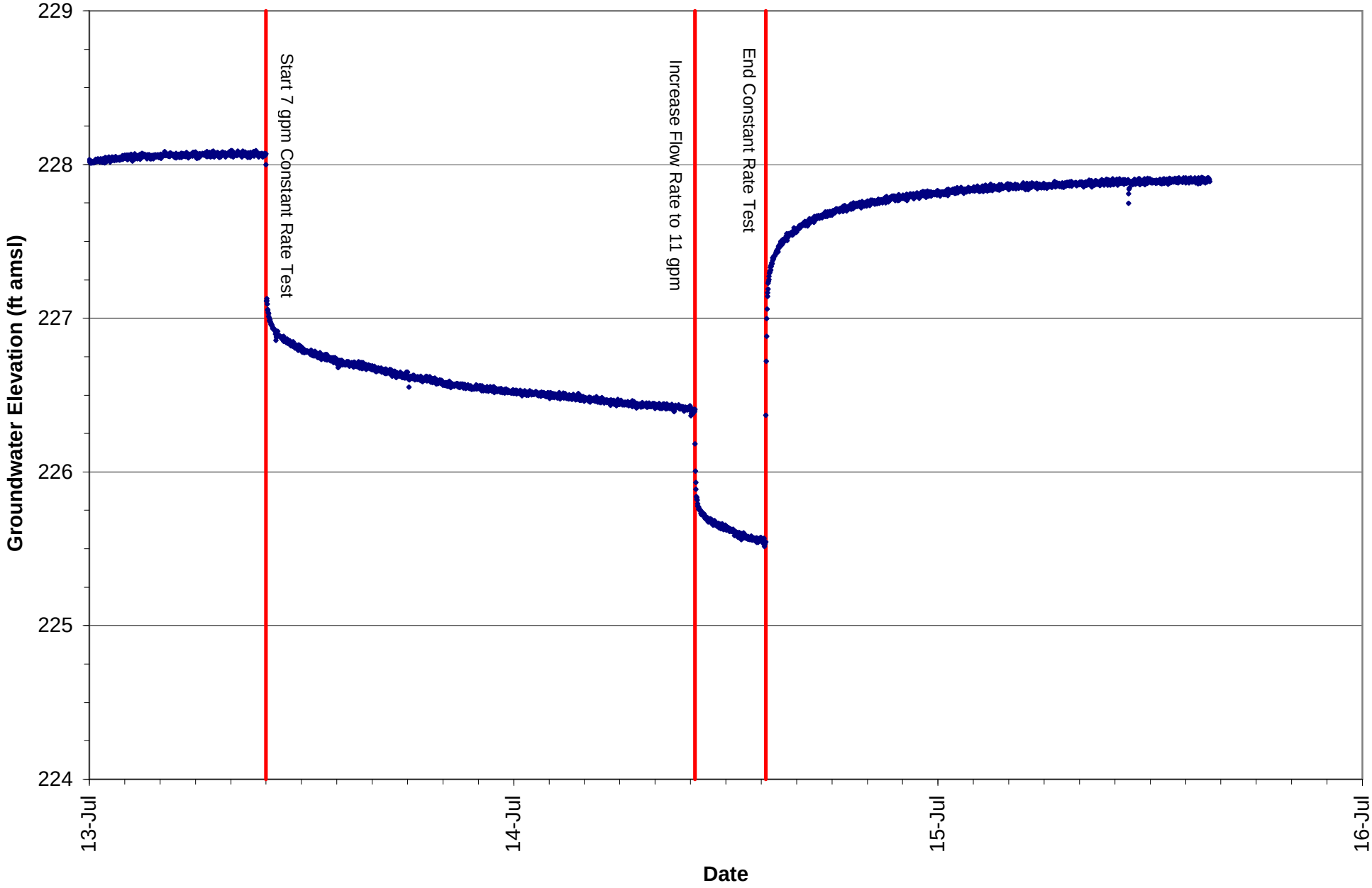
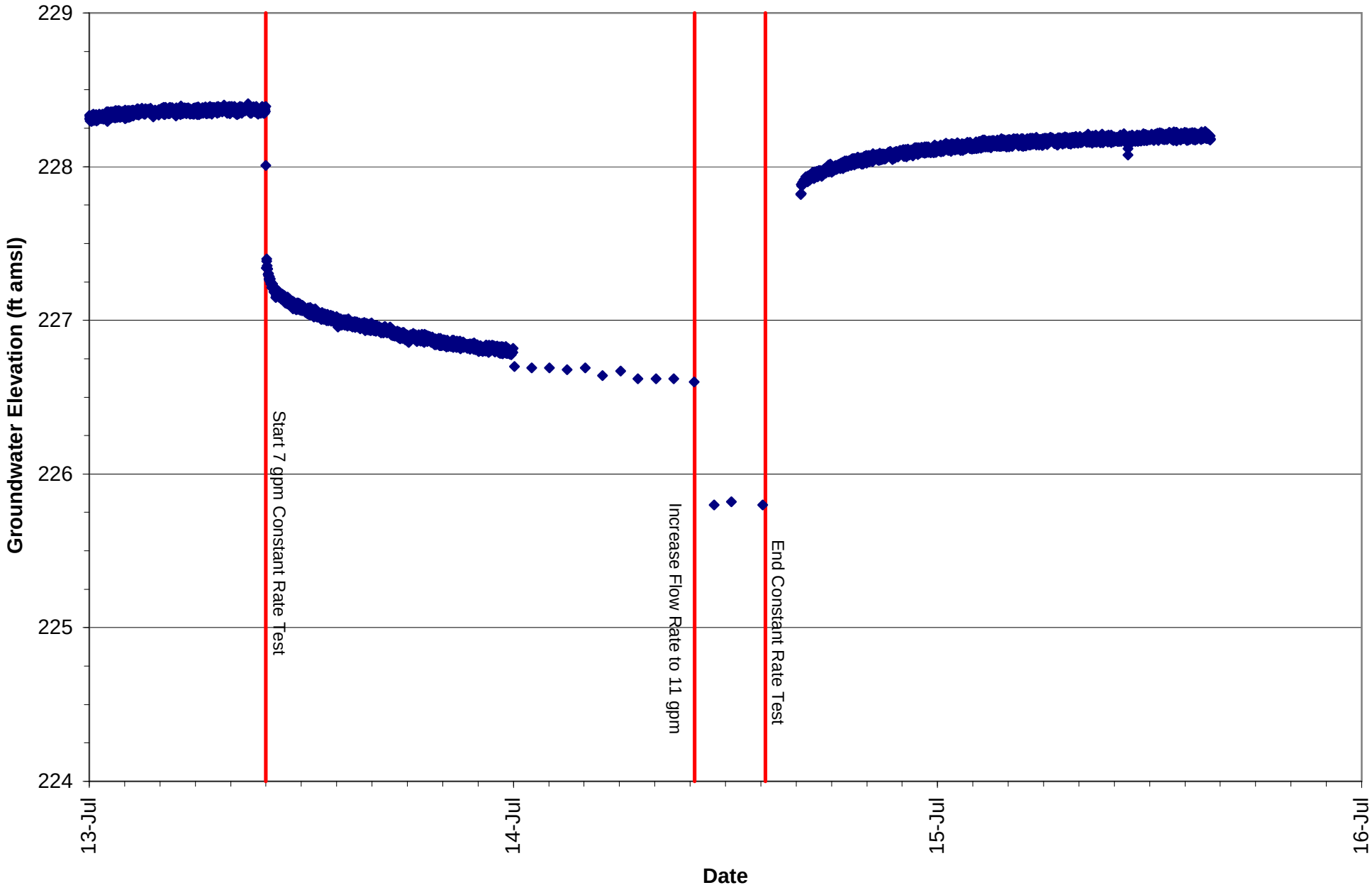
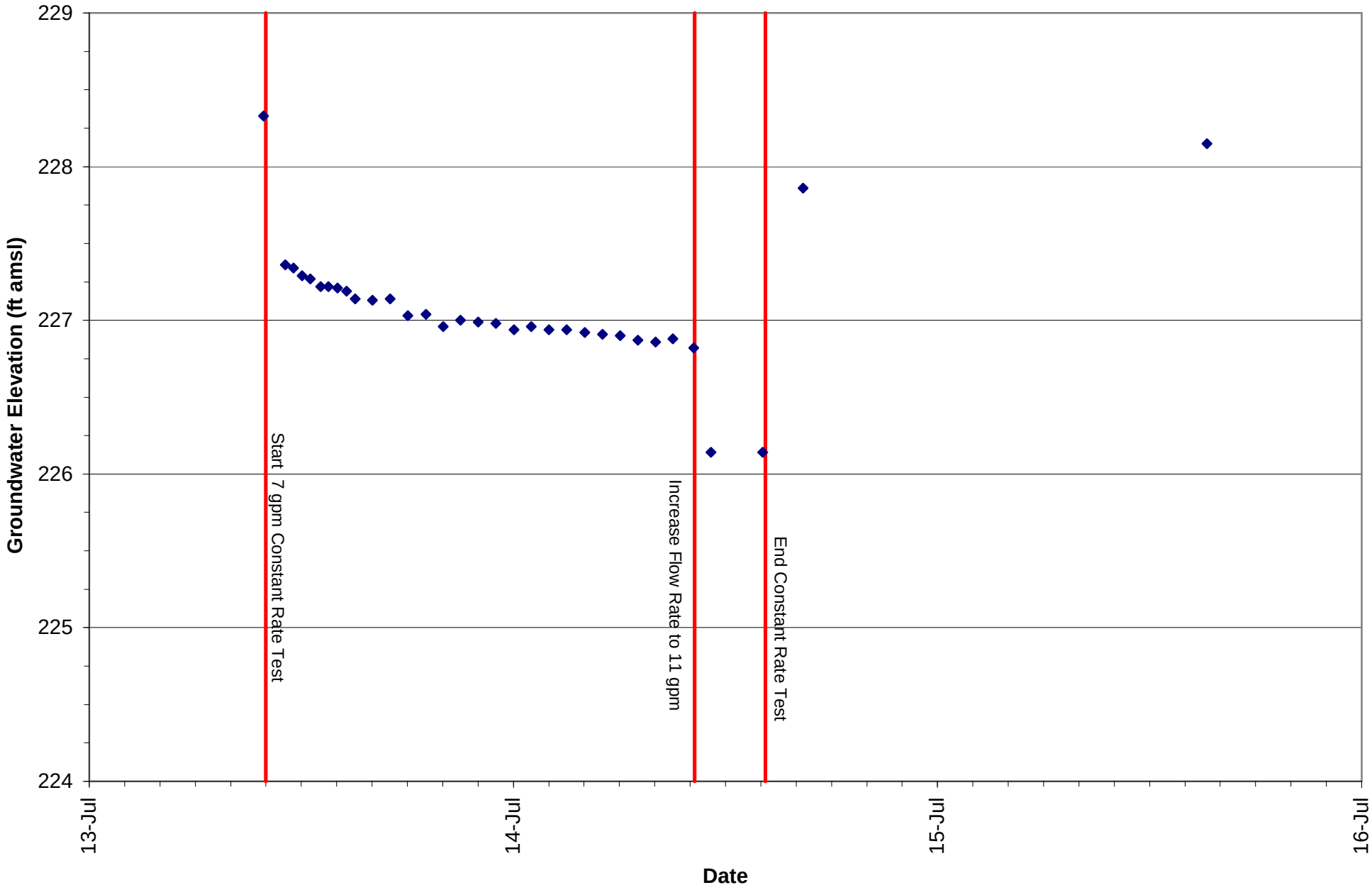
July 13-14, 2011



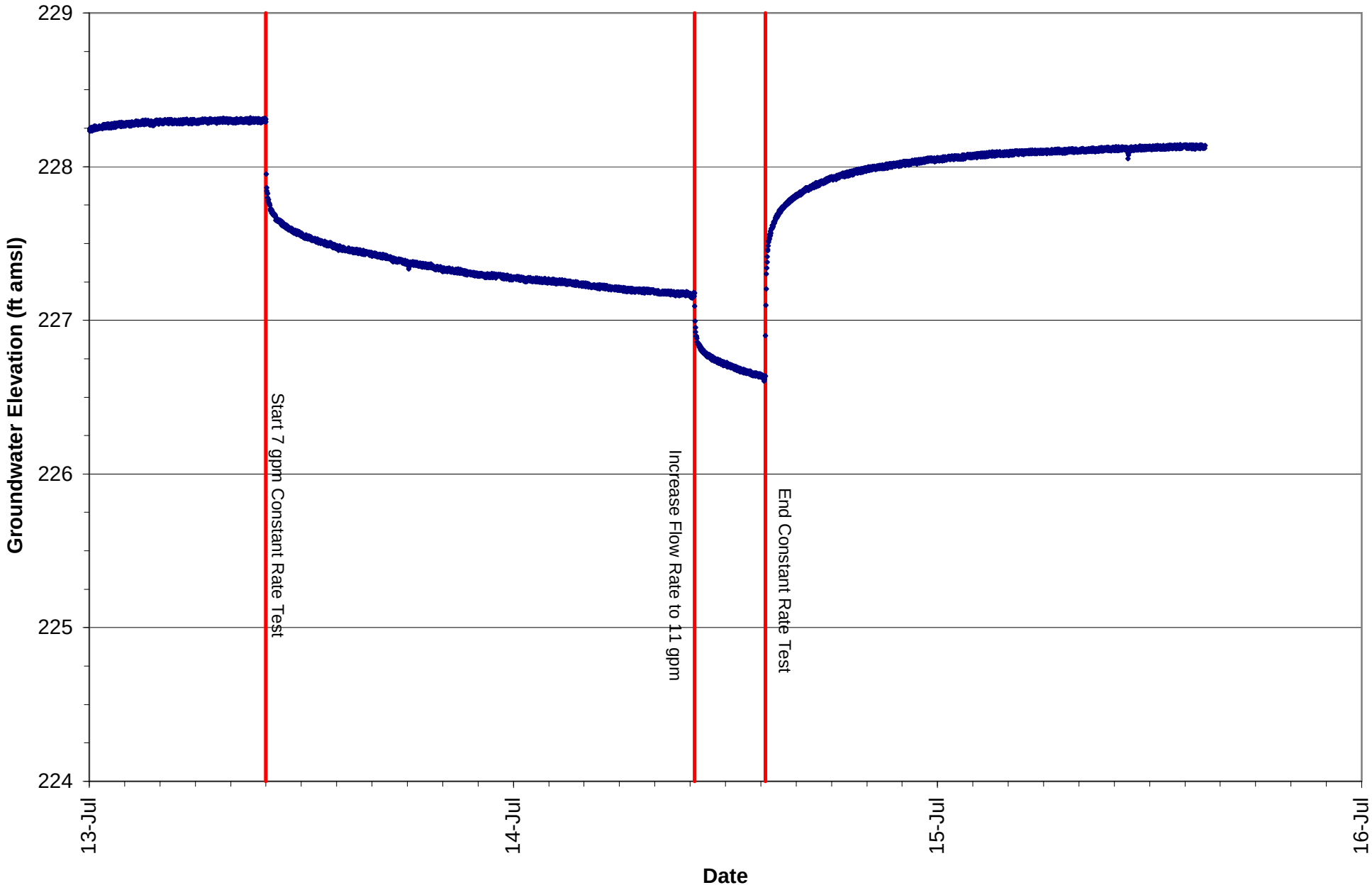
MW-615 Water Levels
GW-032B Constant Rate Test
July 13-14, 2011



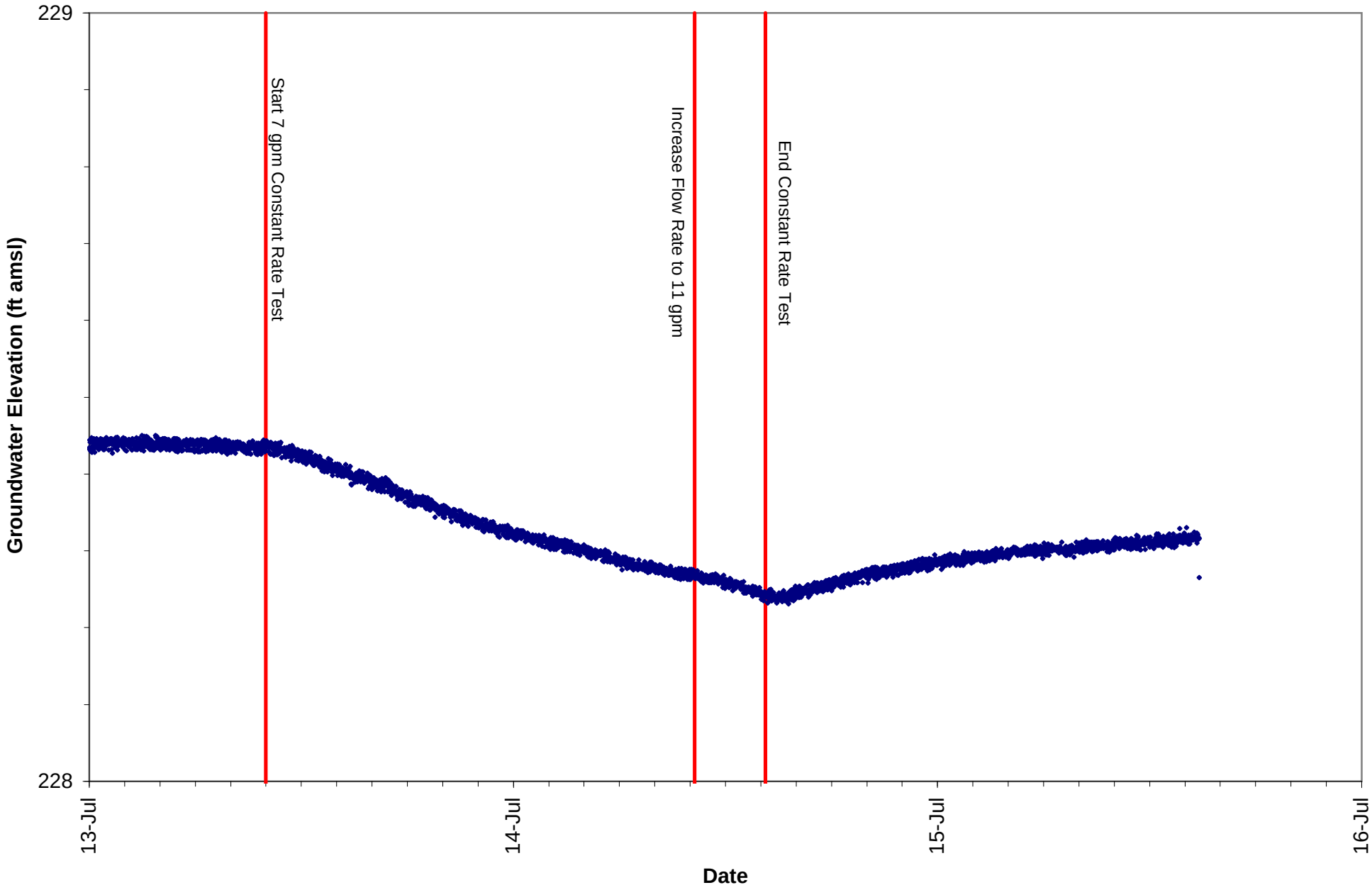
MW-616 Water Levels
GW-032B Constant Rate Test
July 13-14, 2011



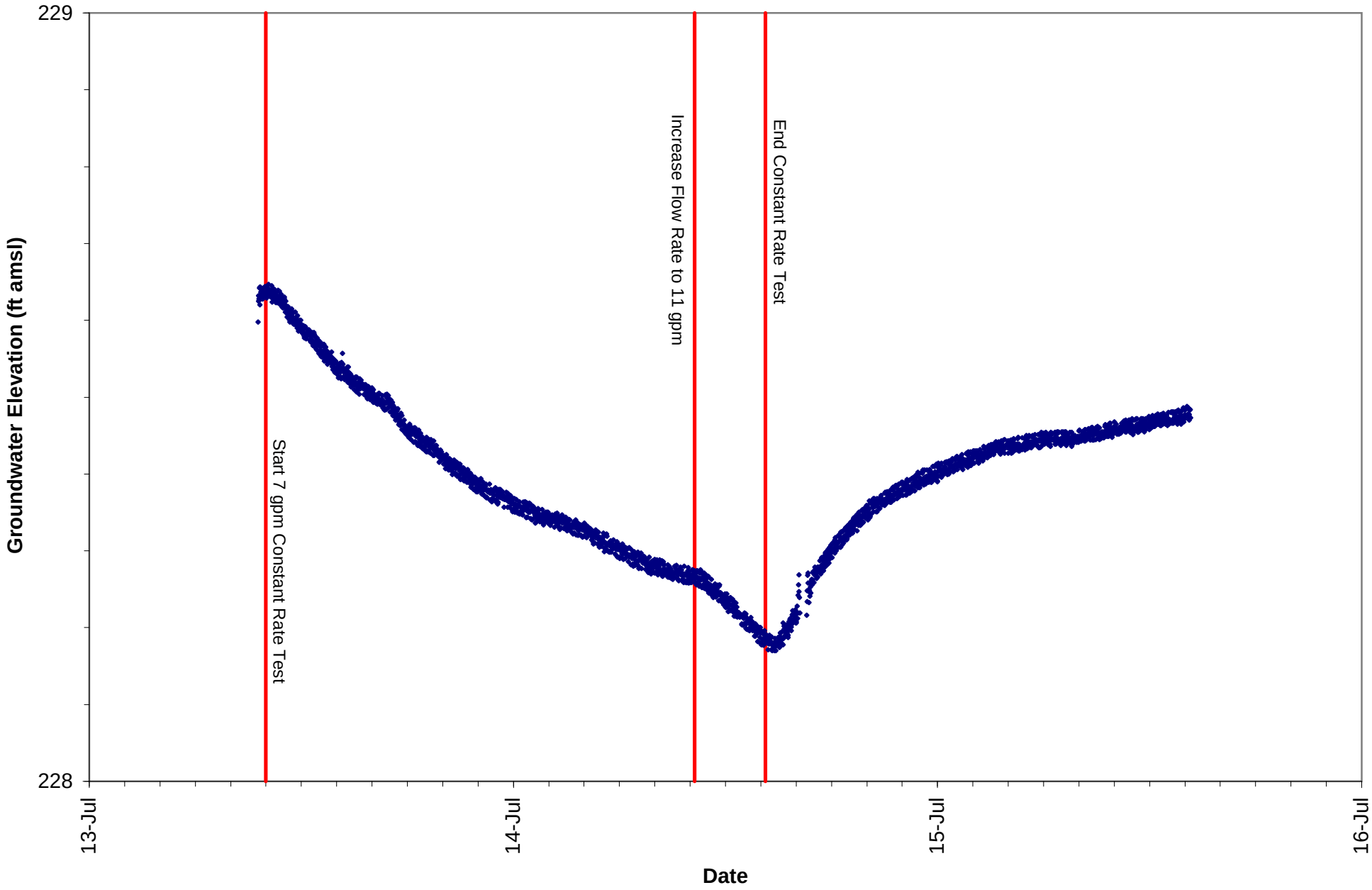
MW-757 Water Levels
GW-032B Constant Rate Test
July 13-14, 2011



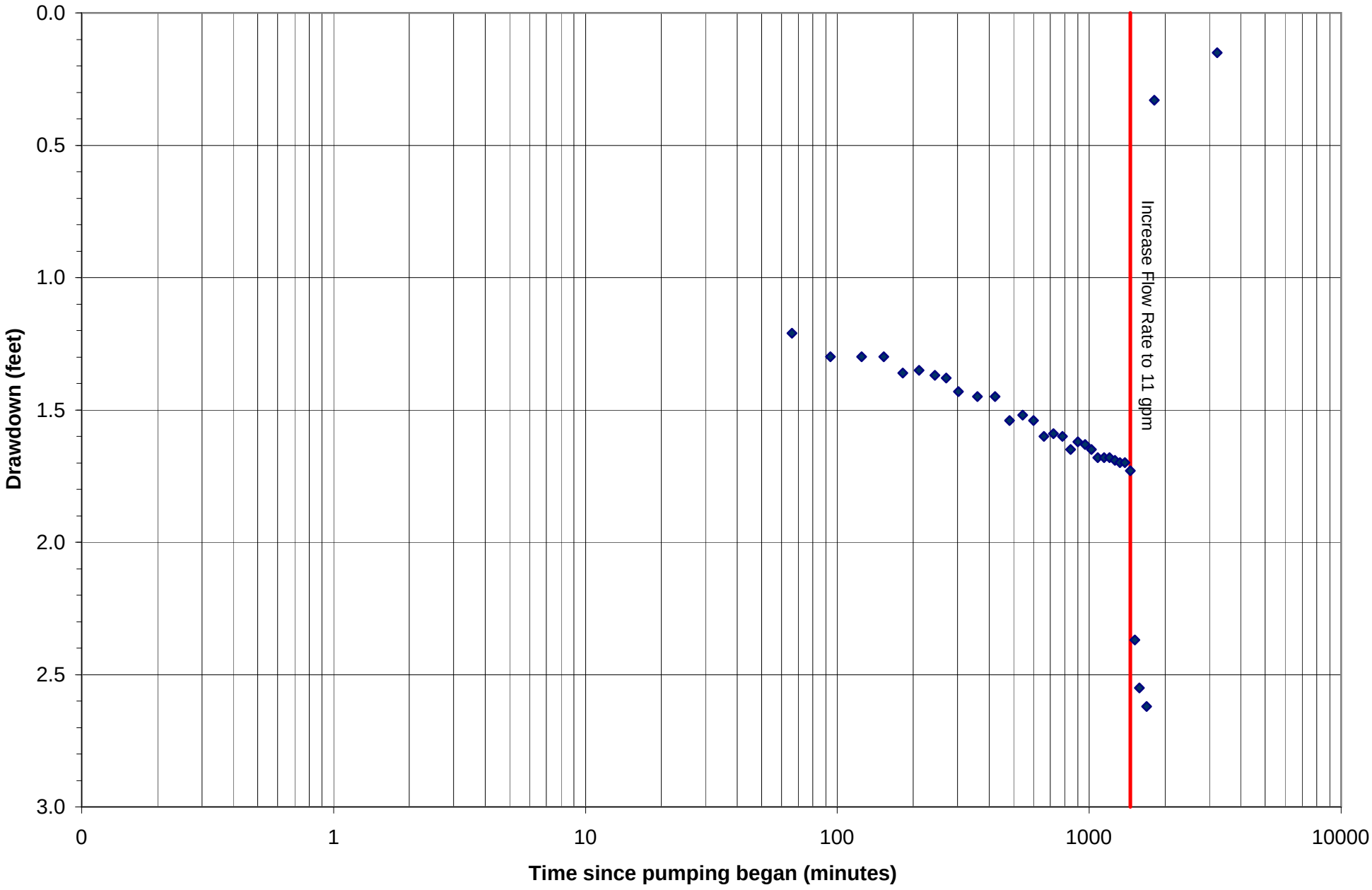
MW-782 Water Levels
GW-032B Constant Rate Test
July 13-14, 2011



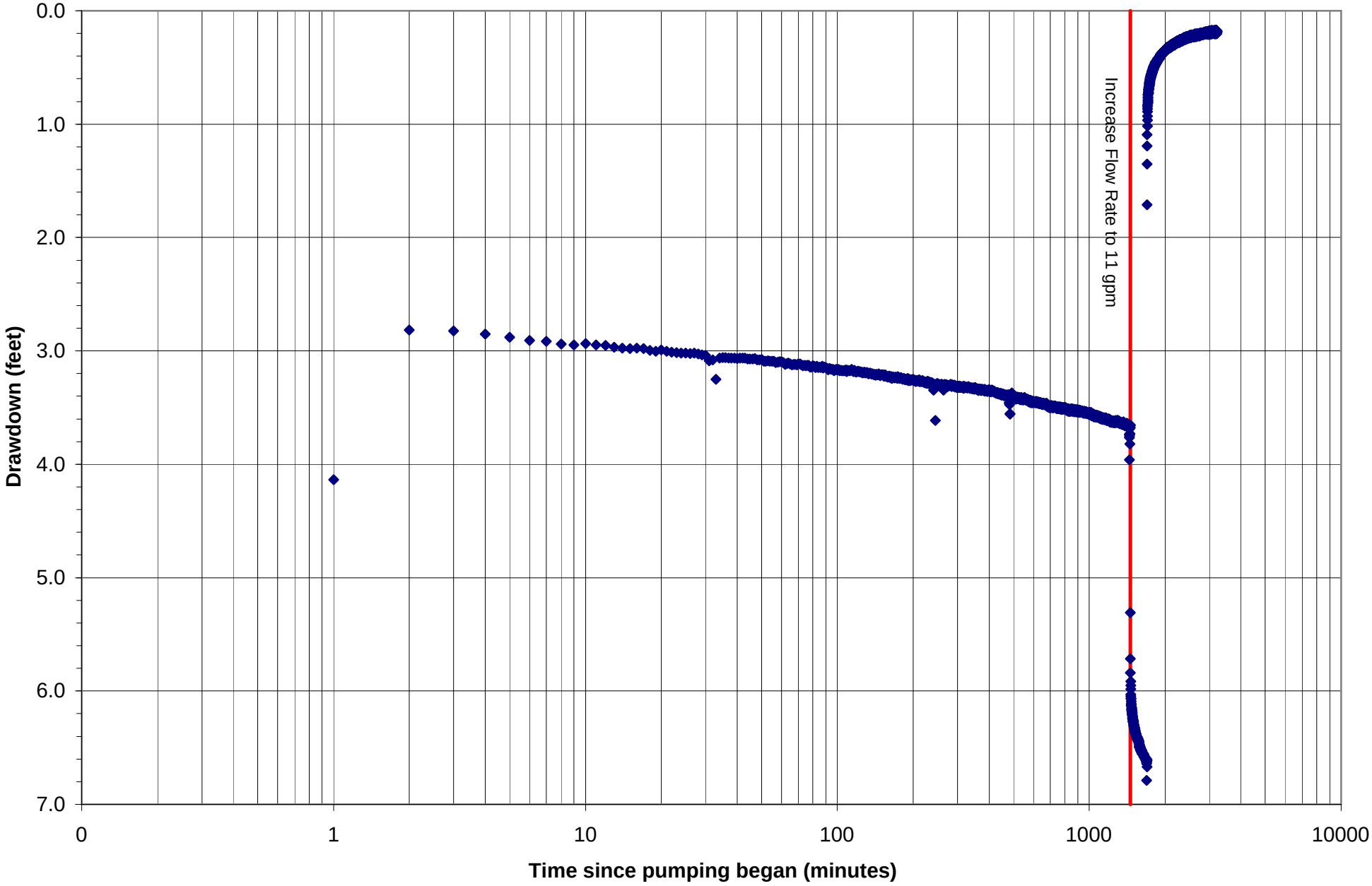
MW-839 Water Levels
GW-032B Constant Rate Test
July 13-14, 2011



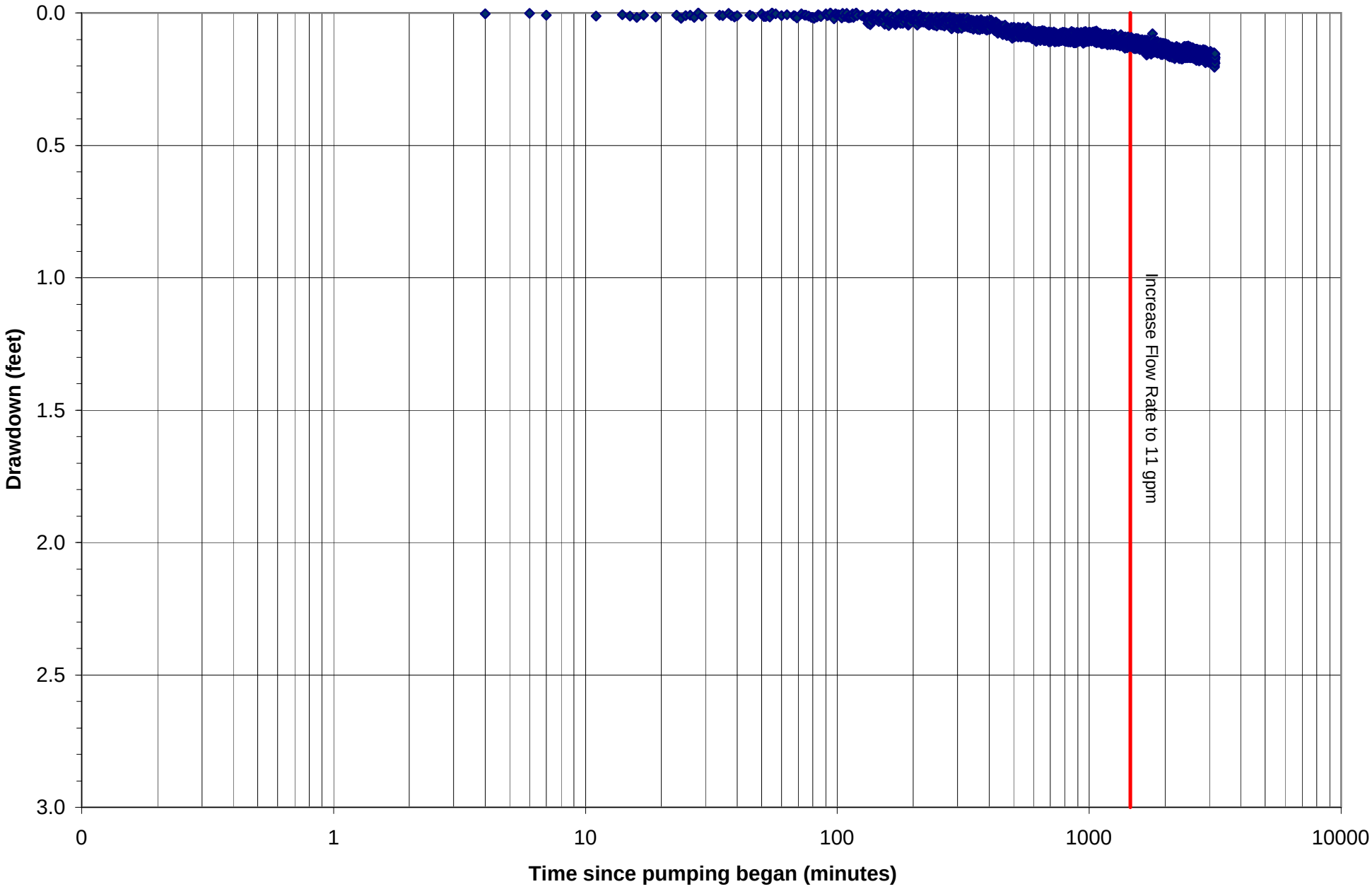
GW-032A Drawdown
GW-032B Constant Rate Test (7 gpm)
July 13-14, 2011



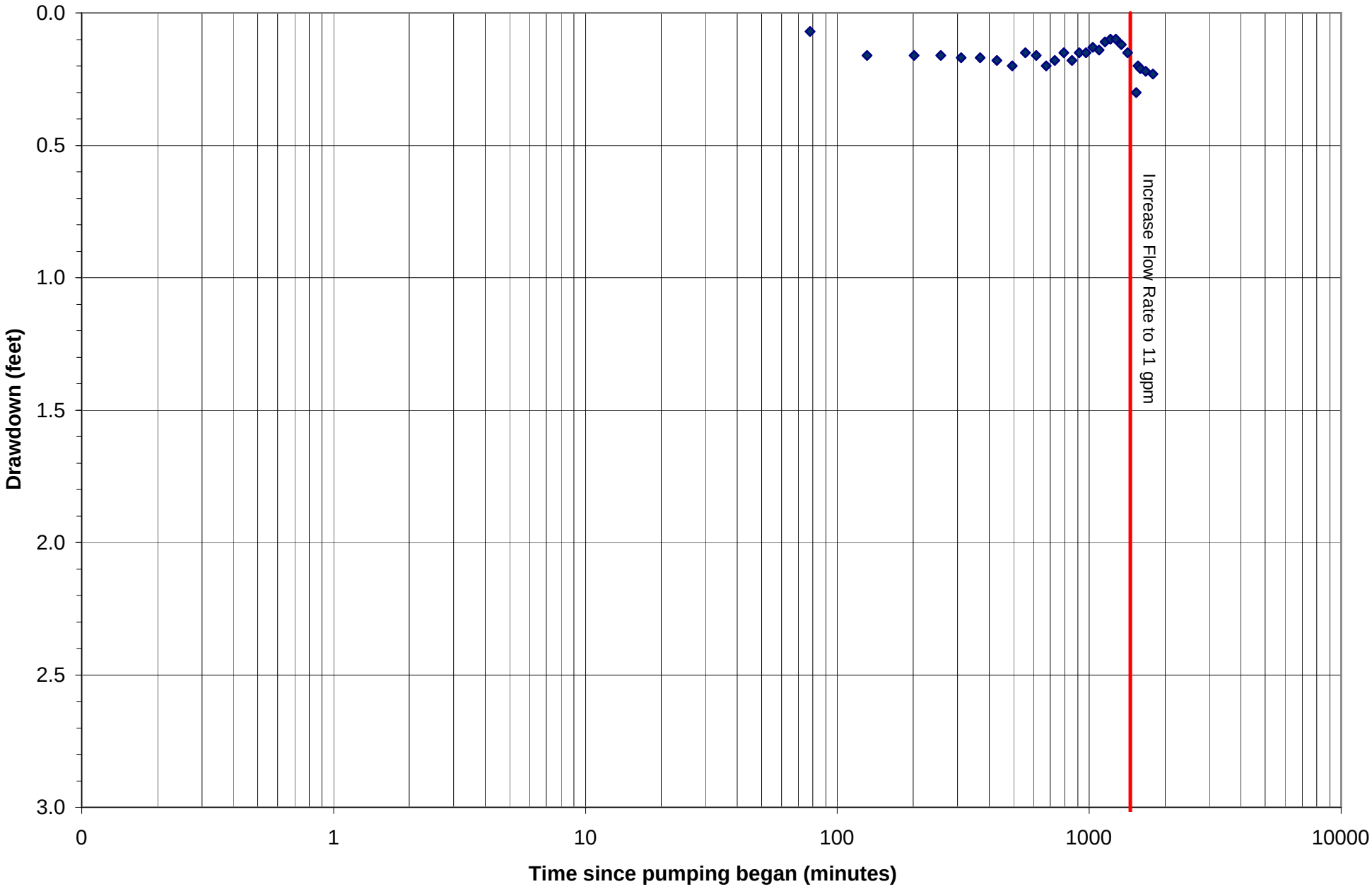
GW-032B Drawdown
GW-032B Constant Rate Test (7 gpm)
July 13-14, 2011



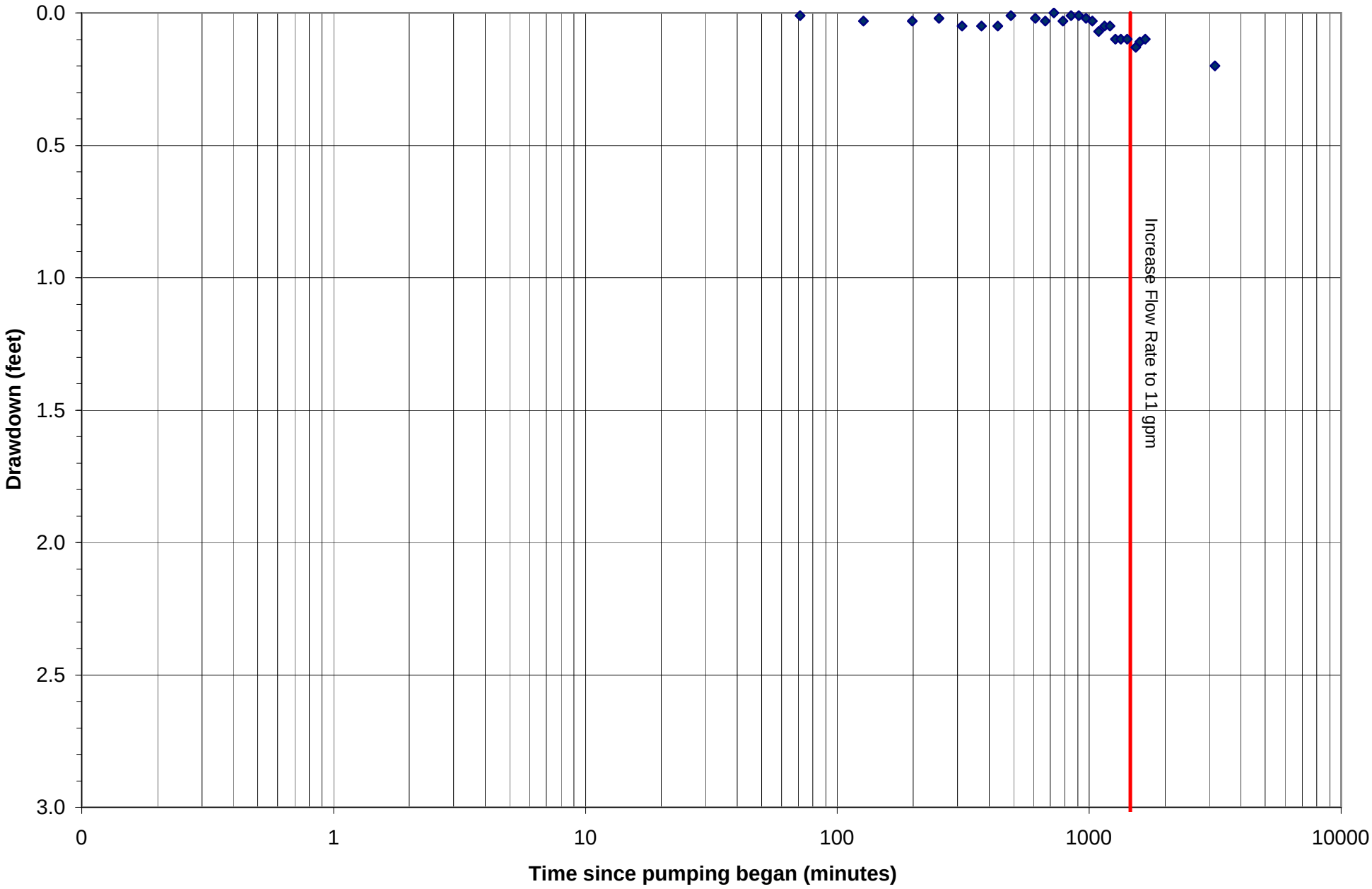
MW-066 Drawdown
GW-032B Constant Rate Test (7 gpm)
July 13-14, 2011



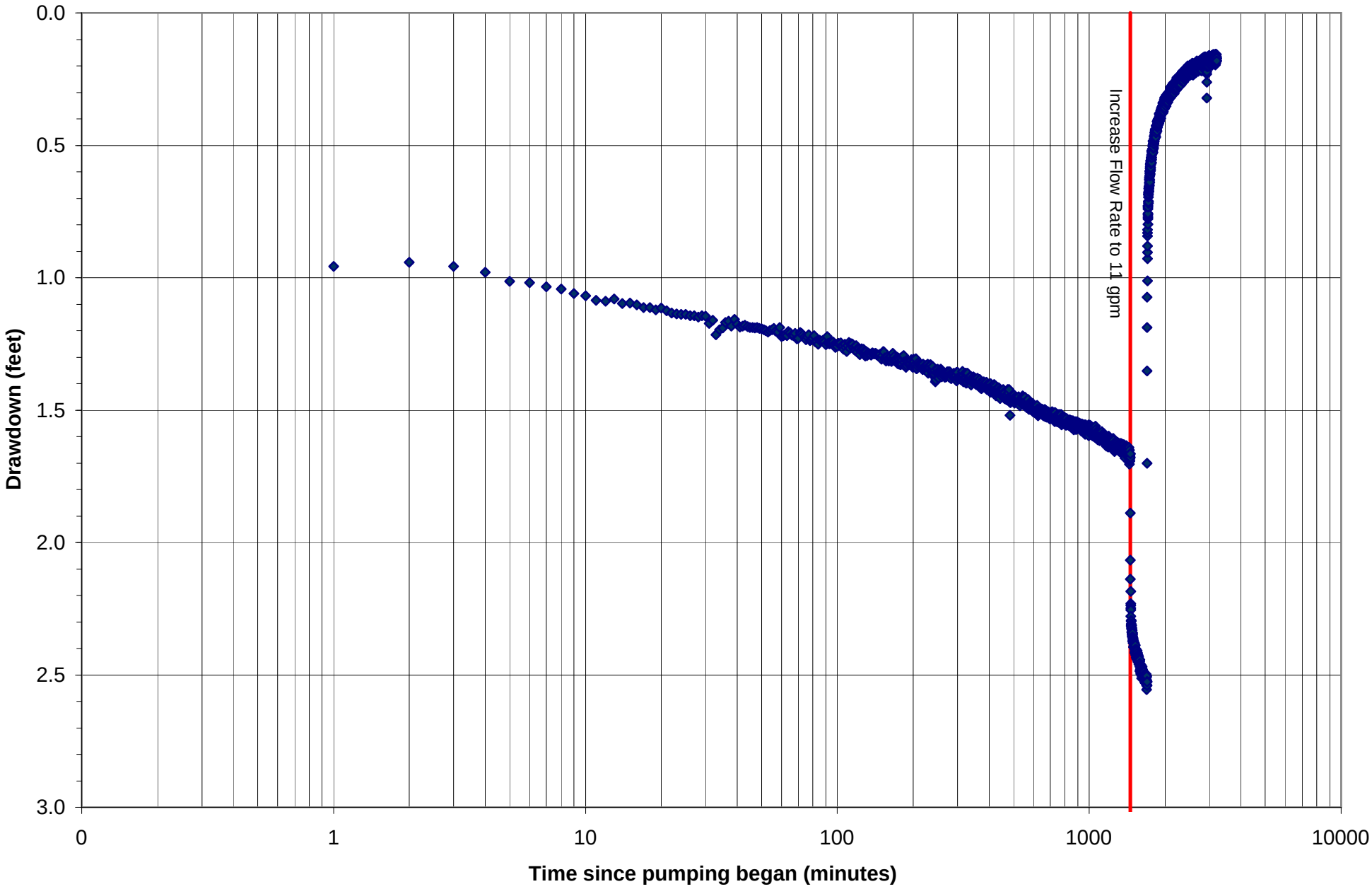
MW-067 Drawdown
GW-032B Constant Rate Test (7 gpm)
July 13-14, 2011



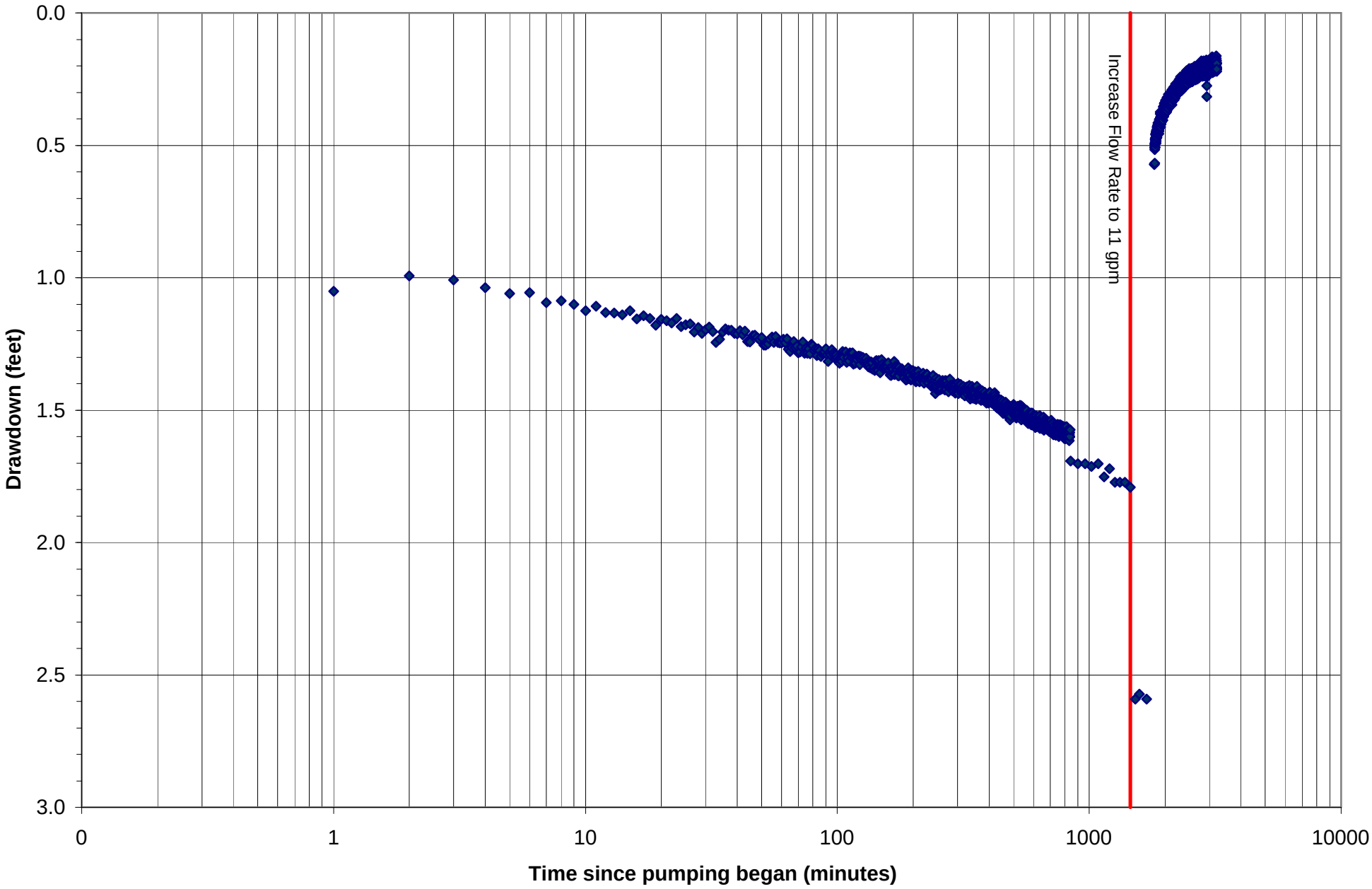
MW-170 Drawdown
GW-032B Constant Rate Test (7 gpm)
July 13-14, 2011



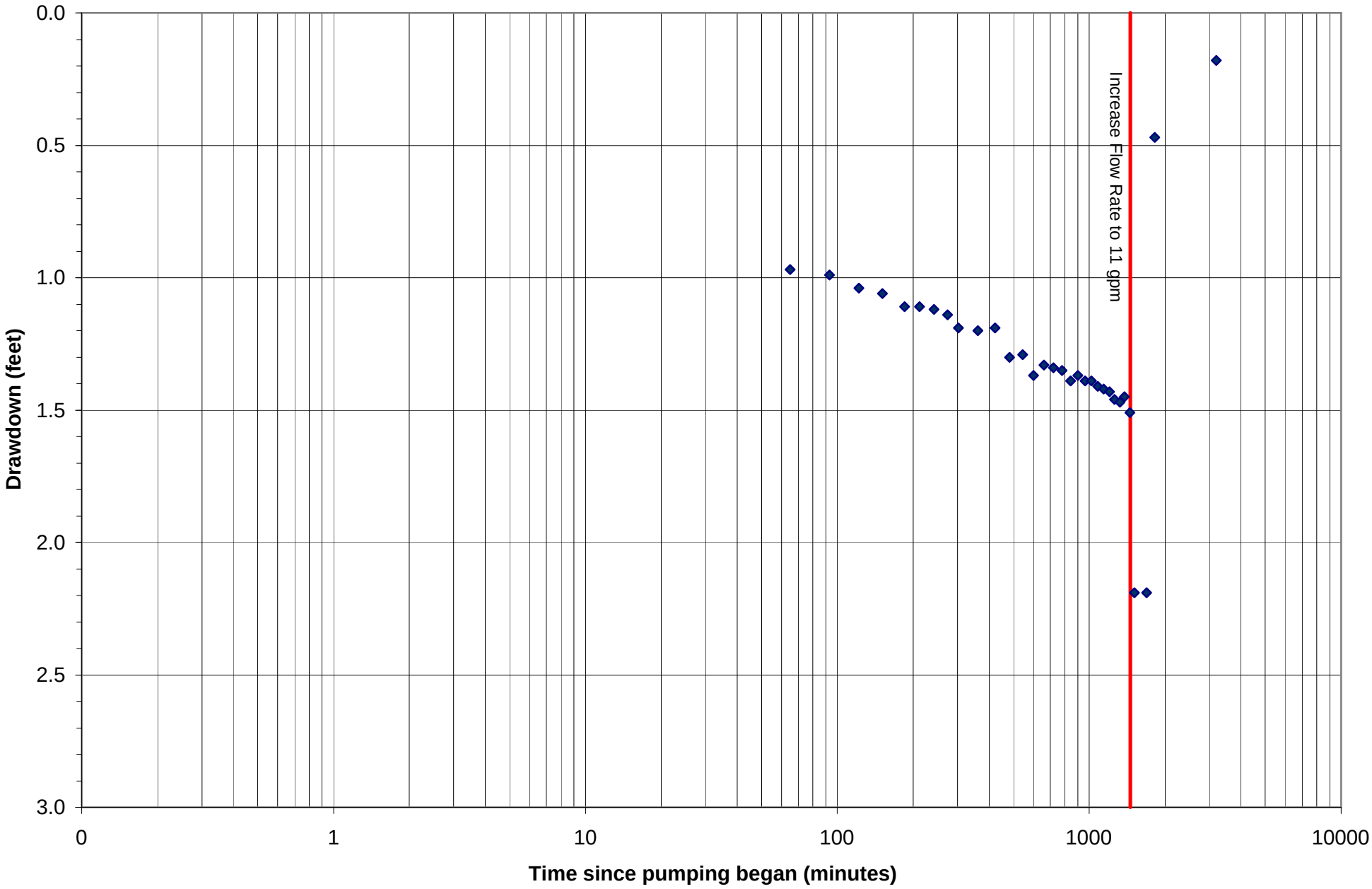
MW-614 Drawdown
GW-032B Constant Rate Test (7 gpm)
July 13-14, 2011



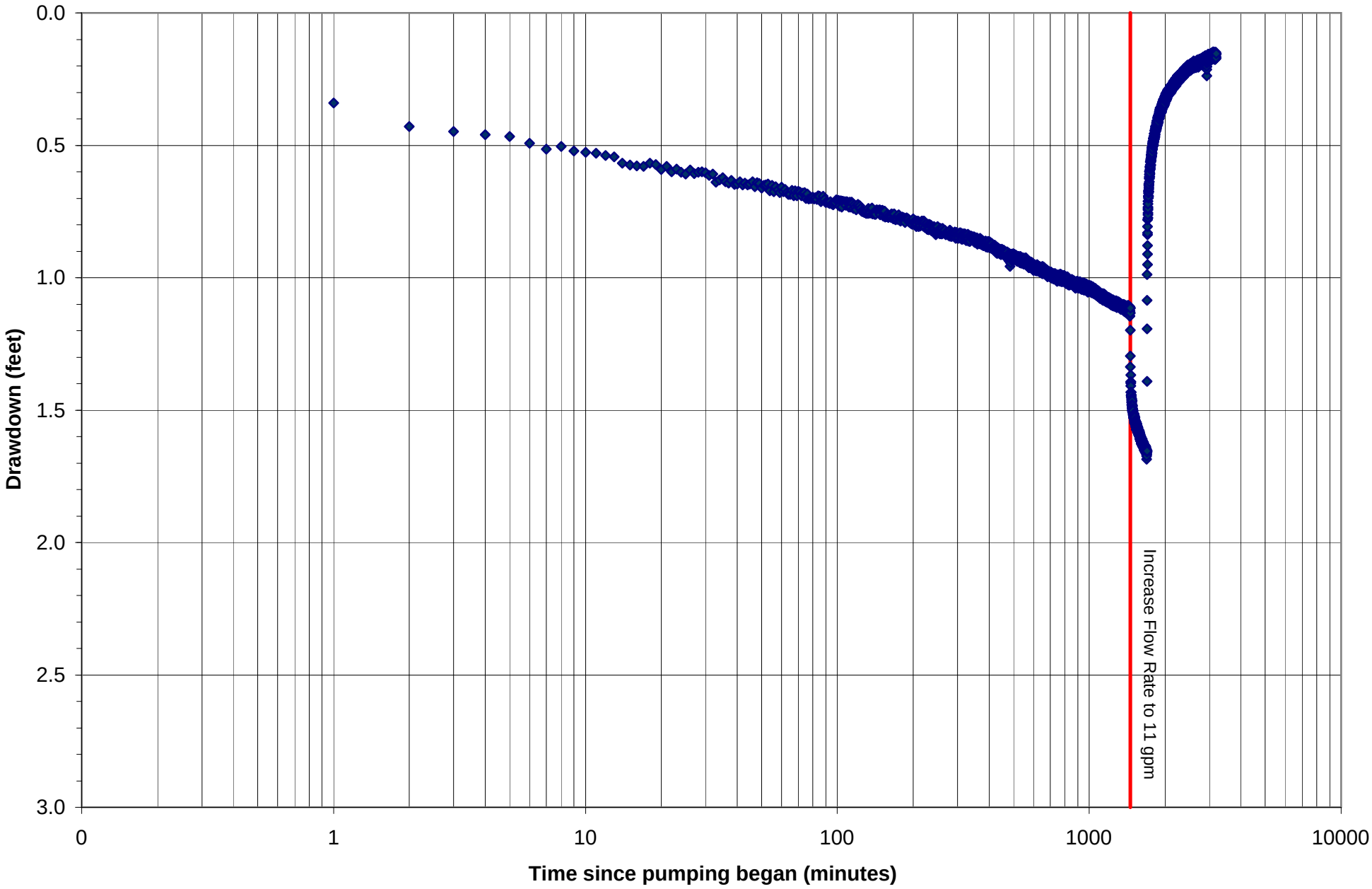
MW-615 Drawdown
GW-032B Constant Rate Test (7 gpm)
July 13-14, 2011

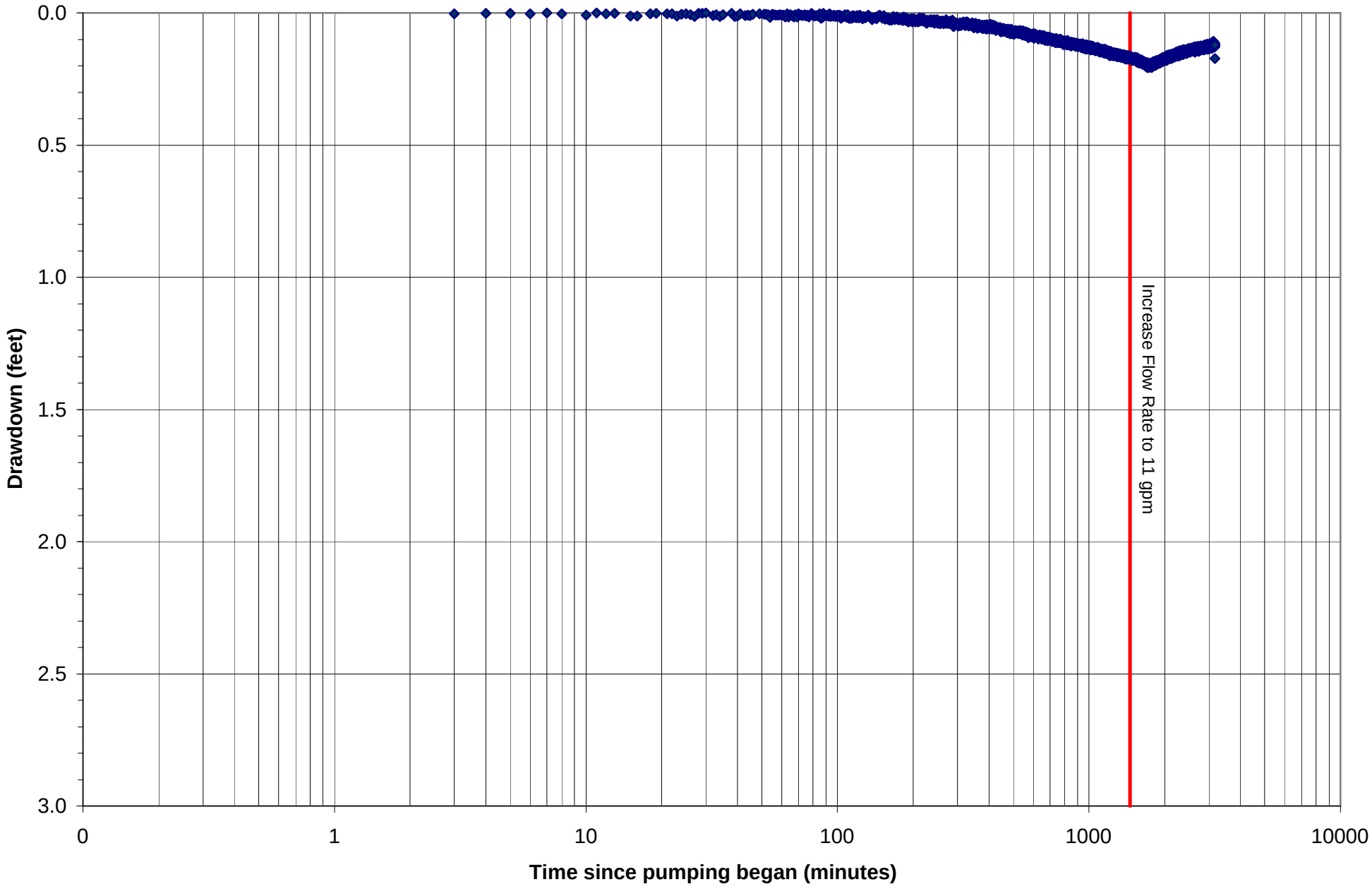


MW-616 Drawdown
GW-032B Constant Rate Test (7 gpm)
July 13-14, 2011

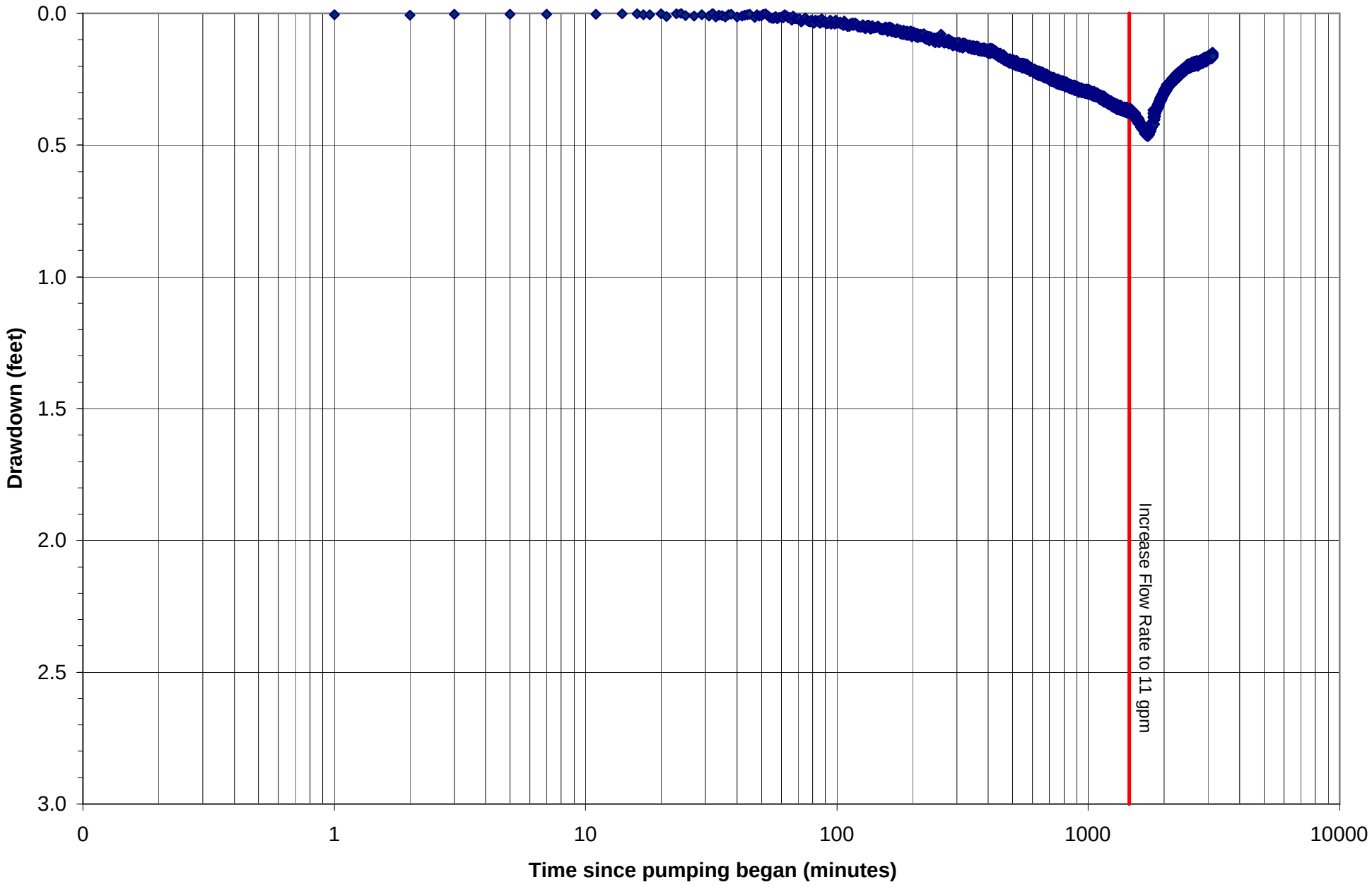


MW-757 Drawdown
GW-032B Constant Rate Test (7 gpm)
July 13-14, 2011




MW-782 Drawdown
GW-032B Constant Rate Test (7 gpm)
July 13-14, 2011
Drawdown (feet)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
1
10
100
1000
10000
Time since pumping began (minutes)
Increase Flow Rate to 11 gpm

MW-839 Drawdown
GW-032B Constant Rate Test (7 gpm)
July 13-14, 2011



AQUIFER TEST DATA

Owner IBM East Fishkill Address main site County Putnam State NY

Date 7/12/11 Company performing test Groundwater Sciences corp Measured by CES | CSS | KBF

Well No. 032A Distance from pumping well 6' Type of test step test | 7GPM Constant Rate Test No. ____

Measuring equipment WLID

Time Data
Pump on: Date ____ Time ____ (t)
Pump off: Date ____ Time ____ (r)
Duration of aquifer test:
Pumping ____ Recovery ____

Water Level Data
Static water level ____
Measuring point ____
Elevation of measuring point ____

Discharge Data
How Q measured ____
Depth of pump/air line ____
Previous Pumping? Yes ____ No ____
Duration ____ End ____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water Level	Water level change s or s'		Discharge measurement	Rate		
7/12/11	1150					2.64								
7/12/11	1358					3.90								
7/12/11	1956					5.18								
7/12/11	2024					3.20								
7/13/11	0950					2.90								
7/13/11	1106					4.11								
7/13/11	1134					4.20								
7/13/11	1205					4.20								
7/13/11	1233					4.20								
7/13/11	1302					4.26								
7/13/11	1331					4.25								
7/13/11	1404					4.27								
7/13/11	1431					4.28								
7/13/11	1503					4.33								
7/13/11	1600					4.35								
7/13/11	1702					4.35								
7/13/11	1802					4.44								
7/13/11	1904					4.42								
7/13/11	2002					4.44								
7/13/11	2102					4.50								
7/13/11	2202					4.49								
7/13/11	2302					4.50								
7/14/11	0003					4.55								
7/14/11	0102					4.52								
7/14/11	0202					4.53								
7/14/11	0302					4.55								
7/14/11	0403					4.58								
7/14/11	0503					4.58								
7/14/11	603					4.58								

AQUIFER TEST DATA

Owner IBM East Fishkill Address Main Site County Dutchess State NY

Date 7/14/11 Company performing test GSC Measured by CES | CSS | KBF

Well No. 037A Distance from pumping well 6' Type of test constant Rate, 7 GPM Test No. _____

Measuring equipment WLID

Time Data
Pump on: Date _____ Time _____ (t)
Pump off: Date _____ Time _____ (r)
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous Pumping? Yes ____ No ____
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water Level	Water level change s or s'		Discharge measurement	Rate		
7/14/11	703					4.59								
7/14/11	803					4.60								
7/14/11	903					4.60								
7/14/11	1013					4.63								
7/14/11	1120					~~5.27~~ 5.25								
7/14/11	1219					~~6.5.45~~								
7/14/11	1406					5.52								
7/14/11	1616					3.23								
7/15/11	1534					3.05								

AQUIFER TEST DATA

Owner IBM East Fishkill Address Main Site County Dutchess State NY

Date 7/12/11 Company performing test Groundwater Sciences Corp Measured by CES | CJS | KBF

Well No. 032B Distance from pumping well — (pumped well) Type of test Step test | ~~constant~~ CES ~~Rate, Temp~~ Test No.

Measuring equipment WLIV)

Time Data
Pump on: Date ____ Time ____ (t)
Pump off: Date ____ Time ____ (r)
Duration of aquifer test:
Pumping ____ Recovery ____

Water Level Data
Static water level ____
Measuring point ____
Elevation of measuring point ____

Discharge Data
How Q measured ____
Depth of pump/air line ____
Previous Pumping? Yes ____ No ____
Duration ____ End ____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'			Water level measurement	Correction or Conversion	Water Level	Water level change s or s'		Discharge measurement	Rate		
7/12/11	1700					3.52					947.2	4.04		1st step = 4 gpm 56 psi
	1700	30				4.15					949.1	4.00		
	1701					4.27					951.0	4.00		
	1701	30				4.32					953.1	3.99		
	1702					4.36					955.3	3.98		
	1702	30				4.38					957.2	3.98		
	1703					4.38					959.1	3.99		
	1703	30				4.38					961.1	3.98		
	1704					4.38					963.3	3.99		
	1704	30				4.38					965.4	3.98		
	1705					4.39					967.4	3.98		
	1705	30				4.43					969.3	3.99		
	1706					4.45					971.3	3.99		
	1706	30				4.48					973.5	3.99		
	1707					4.48					975.5	3.99		
	1707	30				4.48					977.5	4.00		
	1708					4.48					979.4	3.99		
	1708	30				4.49					981.5	3.99		
	1709					4.49					983.6	3.99		
	1709	30				4.49					985.9	3.99		
	1710					4.48					987.8	3.99		
	1711					4.49					991.6	4.00		
	1712					4.50					996	3.99		
	1713					4.50					999.9	3.99		
	1714					4.51					1004.3	3.99		
	1715					4.52					1008.1	3.99		
	1716					4.52					1012.2	3.99		
	1717					4.52					1016.4	4.00		
	1718					4.52					1020.3	3.99		

AQUIFER TEST DATA

Owner FBM East Fishkill Address main site County Antelope State WY

Date 7/12/11 Company performing test GSC Measured by CES | CJS | KBF

Well No. 032B Distance from pumping well — (pumped well) Type of test step test | ~~constant~~ ~~rate, 7 GPM~~ ea3 Test No.

Measuring equipment WLID

Time Data
Pump on: Date ____ Time ____ (t)
Pump off: Date ____ Time ____ (r)
Duration of aquifer test:
Pumping ____ Recovery ____

Water Level Data
Static water level ____
Measuring point ____
Elevation of measuring point ____

Discharge Data
How Q measured ____
Depth of pump/air line ____
Previous Pumping? Yes ____ No ____
Duration ____ End ____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water Level	Water level change s or s'		Discharge measurement	Rate		
7/12/11	1719					4.52					1024.4	3.99		
	1720					4.52					1028.5	3.99		
	1725					4.52					1049.0	3.99		
	1730					4.53					1069.4	4.00		
	1735					4.53					1089.6	4.00		
	1740					4.54					1110.1	3.99		
	1745					4.54					1130.6	4.00		
	1750					4.55					1151.1	3.99		
	1755					4.55					1171.5	3.99		
	1800					4.56					1192.1			step 2 = 8gpm
	1800	30				~~4.50~~					1195.8	8.36		
	1801					5.30					1203.8	8.21		
	1801	30				5.50					1204.1	7.95		
	1802					5.52					1208.2	7.97		
	1802	30				5.57					1212.1	7.95		
	1803					5.61					1216.5	7.93		
	1803	30				5.62					1221.5	7.98		
	1804					5.62					1224.3	7.98		
	1804	30				5.63					1228.3	7.98		
	1805					5.62					1232.5	7.96		
	1805	30				5.62					1236.5	7.95		
	1806					5.67					1241.0	7.96		
	1806	30				5.70					1245.4	8.02		
	1807					5.70					1248.8	8.00		
	1807	30				5.61					1253.0	7.99		
	1808					5.65					1257.8	7.99		
	1808	30				5.78					1261.3	7.99		
	1809					5.67					1265.5	7.99		
	1809	30				5.65					1269.4	7.98		
	1810					5.65					1273.5	7.98		

AQUIFER TEST DATA

Owner IBM East Fishkill Address Main Site County Dutchess State NY

Date 7/12/11 Company performing test GSC Measured by CES/CJS/KBF

Well No. 032B Distance from pumping well — (Pumped well) Type of test Steptest ~~Constant Rate~~ Test No. ~~1 TEPM~~

Measuring equipment WLIN

Time Data
Pump on: Date ____ Time ____ (t)
Pump off: Date ____ Time ____ (r)
Duration of aquifer test:
Pumping ____ Recovery ____

Water Level Data
Static water level ____
Measuring point ____
Elevation of measuring point ____

Discharge Data
How Q measured ____
Depth of pump/air line ____
Previous Pumping? Yes ____ No ____
Duration ____ End ____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water Level	Water level change s or s'		Discharge measurement	Rate		
7/12/11	1811					5.66					1281.5	7.99		48 psi
	1812					5.66					1289.7	7.98		
	1813					5.67					1298.0	7.97		
	1814					5.67					1306.3	7.98		
	1815					5.68					1314.4	7.97		
	1816					5.67					1322.5	7.97		
	1817					5.67					1330.6	7.97		
	1818					5.67					1338.8	7.96		
	1819					5.68					1347.2	7.97		
	1820					5.68					1355.3	7.97		
	1825					5.70					1396.2	8.01		
	1830					5.72					1437.5	7.98		
	1835					5.72					1478.3	7.98		
	1840					5.72					1519.0	7.97		
	1845					5.75					1560.0	8.01		
	1850					5.75					1601.3	7.99		
	1855					5.75					1642.3	7.98		
	1900					5.77					1683.4	9.84		
	1900	30									1688.5	11.54		
	1901					6.99					1694.5	12.08		
	1901	30				7.02					1701.0	12.02		
	1902					7.08					1707.0	12.02		
	1902	30				7.05					1713.1	12.01		
	1903					7.10					1719.3	12.01		
	1903	30				7.14					1725.5	12.01		
	1904					7.25					1732.0	12.02		
	1904	30				7.28					1737.8	12.02		
	1905					7.29					1744.0	12.01		
	1905	30				7.31					1750.1	12.02		

AQUIFER TEST DATA

Owner IBM East Fishkill Address Main Site County Dutchess State NY

Date 7/12/11 Company performing test GSC Measured by CES | CJS | KBF

Well No. 032B Distance from pumping well — (Pumped Well) Type of test Step test | ~~Constant Rate~~ TGRM CES Test No. —

Measuring equipment WLID

Time Data
Pump on: Date — Time — (t)
Pump off: Date — Time — (r)
Duration of aquifer test:
Pumping — Recovery —

Water Level Data
Static water level —
Measuring point —
Elevation of measuring point —

Discharge Data
How Q measured —
Depth of pump/air line —
Previous Pumping? Yes — No —
Duration — End —

Comments on factors affecting test data

Date	Clock time	Time since pump started t'	Time since pump stopped t''	t/t'		Water level measurement	Correction or Conversion	Water Level	Water level change s or s'		Discharge measurement	Rate		Comments
7/12/11	~~1906~~ 1906					7.33					1756.5	12.01		1st valve - 5/psi
	1906 30					7.34					1762.5	12.00		
	1907					7.36					1768.6	12.02		Controller 48 Hz
	1907 30					7.37					1775.0	12.02		1st valve - 5/psi
	1908					7.38					1781.0	12.02		
	1908 30					7.38					1787.3	12.00		
	1909					7.38					1793.5	12.00		
	1909 30					7.39					1799.5	12.01		
	1910					7.40					1805.7	12.00		
	1911					7.41					1818.0	12.01		
	1912					7.43					1830.4	12.02		
	1913					7.44					1842.7	12.01		
	1914					7.44					1855.2	12.01		
	1915					7.45					1867.5	12.02		
	1916					7.46					1879.8	12.00		
	1917					7.46					1892.2	12.01		
	1918					7.48					1904.6	12.01		
	1919					7.49					1916.9	12.01		
	1920					7.49					1929.2	12.00		
	1925					7.53					1991.1	12.02		
	1930					7.55					2053.5	12.00		
	1935					7.56					2114.8	12.02		
	1940					7.59					2176.4	12.02		
	1945					7.59					2237.9	12.02		
	1950					7.62					2300.5	12.00		
	1955					7.63					2361.4	12.00		
	2000					7.66					2423.5	12.01		
	2000 30										2430.5	14.31		
2001	[illegible]										2438.0	14.96		

AQUIFER TEST DATA

Owner IBM East Fishkill Address Main Site County Dutchess State NY

Date 7/12/11 Company performing test GSC Measured by CES | CSS | KBF

Well No. 032B Distance from pumping well — (Pumped well) Type of test step test | ~~Constant Rate, 16gpm~~ CES Test No. —

Measuring equipment WLID

Time Data
Pump on: Date _____ Time _____ (t)
Pump off: Date _____ Time _____ (r)
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous Pumping? Yes ___ No ___
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water Level	Water level change s or s'		Discharge measurement	Rate		
7/12/11	2000	0									2446.3	15.78		
2002	2002	2									2459.5	16.26		
2002	2002	30									2462.7	16.20		
	2003					10.34					2471.0	16.04		
	2003	30				10.50					2479.3	16.02		
	2004					10.70					2487.5	16.00		
	2004	30				10.99					2496.0	15.96		
	2005					11.41					2504.0	15.92		
	2005	30				11.71					2511.9	15.88		
	2006					12.00					2520.0	15.87		
	2006	30				11.81					2528.4	15.92		
	2007					11.95					2536.5	15.90		
	2007	30				12.07					2544.6	15.85		
	2008					12.20					2553.0	15.89		
	2008	30				12.00					2560.8	15.46		
	2009					12.00					2568.5	14.72		
	2009	30				11.80					2598.2			
	2010													
	2011	30				3.75								
	2012					4.60								
	2012	30				4.55								
	2013					4.51								
	2013	30				4.40								
	2014					4.32								
	2014	30				4.28								
	2015					4.20								
	2015	30				4.09								
2016	~~2020~~					4.09								
2016	~~2025~~					4.09								

AQUIFER TEST DATA

Owner IBM East Fishkill Address main site County Dutchess State NY

Date 7/12/11 Company performing test GSC Measured by CES | CSS | KBF

Well No. 032B Distance from pumping well — (Pumped well) Type of test step test | ~~Constant~~ Test No. —

CES ~~Rate, TOFM~~

Measuring equipment WLID

Time Data	Water Level Data	Discharge Data	Comments on factors affecting test data
Pump on: Date ____ Time ____ (t) Pump off: Date ____ Time ____ (r) Duration of aquifer test: Pumping ____ Recovery ____	Static water level ____ Measuring point ____ Elevation of measuring point ____	How Q measured ____ Depth of pump/air line ____ Previous Pumping? Yes ____ No ____ Duration ____ End ____	

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water Level	Water level change s or s'		Discharge measurement	Rate		
7/12/11	~~2030~~	2017				4.10								Final totalizer
	~~2035~~	2017 30				4.05								2598.7
	~~2040~~	2018				4.02								
	~~2045~~	2018 30				4.00								
	~~2050~~	2019				3.97								
	~~2055~~	2019 30				3.97								
	~~2100~~	2020				3.95								
	2020 30					3.95								
	2021					3.94								

AQUIFER TEST DATA

Owner IBM East Fishkill Address main site County Dutchess State NY

Date 7/13/11 Company performing test GSL Measured by CES | CSS | KBF

Well No. 032B Distance from pumping well — (pumped well) Type of test Constant Rate 7 GPM Test No. _____

Measuring equipment WLID

Time Data
Pump on: Date _____ Time _____ (t)
Pump off: Date _____ Time _____ (r)
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous Pumping? Yes ____ No ____
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t'	Time since pump stopped t"	t/t'		Water level measurement	Correction or Conversion	Water Level	Water level change s or s'		Discharge measurement	Rate		Comments
7/13/11	0950					3.59					2598.7			start totalizer 2598.7
7/13/11	1000					3.56					2604.4	11.70		
	10:00:30										2610.5			
	10:01													
	10:01:30										2614.5	7.29		
	10:02					6.29					2618.0			
	10:02:30					6.27					2621.5	7.03		
	10:03					6.30					2625.3	7.05		
	10:03:30					6.30					2628.5	7.04		
	1004					6.35					2632.4	7.05		
	1004:30					6.35					2636.1	7.05		
	1005					6.50					2639.5	7.05		
	1005:30					6.50					2643.4	7.05		
	1006					6.50					2646.9	7.05		
	1006:30					6.50					2650.4	7.05		
	1007					6.51					2654.2	7.06		
	1007:30					6.52					2657.6	7.04		
	1008					6.52					2661.2	7.05		
	1008:30					6.52					2665.0	7.04		
	1009					6.52					2668.5	7.04		
	1009:30					6.52					2672.0	7.05		
	1010					6.50					2675.8	7.01		36 psi
	1011					6.45					2683.1	7.01		
	1012					6.46					2690.0	7.01		
	1013					6.45					2697.4	7.01		
	1014					6.45					2704.5	7.08		
	1015					6.45					2711.6	7.01		
	1016					6.45					2718.8	7.01		
	1017					6.46					2726.0	7.01		

AQUIFER TEST DATA

Owner IBM East Fishkill Address Main Site County Putnam State NY

Date 7/13/11 Company performing test GSC Measured by CES | CJS | KBF

Well No. 032B Distance from pumping well — Type of test Constant Rate 7 GPM Test No. _____
(Pumped well)

Measuring equipment WLID

Time Data
Pump on: Date _____ Time _____ (t)
Pump off: Date _____ Time _____ (r)
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous Pumping? Yes ___ No ___
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water Level	Water level change s or s'		Discharge measurement	Rate		Comments
7/13/11	1019					6.46					2733.3	7.02		
	1019					6.45					2740.2	7.01		
	1020					6.46					2747.5	7.01		
	1025					6.49					2784.0	7.01		
	1030					6.50					2819.5	7.01		turb = 10.3 ph = 6.44 con = 2491 uS Temp = 21.0 (CES)
	1035					6.52					2855.2	7.01		
	1040					6.53					2891.5	7.00		
	1045					6.53					2926.8	7.00		
	1050					6.53					2962.5	7.00		
	1055					6.55					2998.6	7.01		
	1100					6.55					3034.5	7.01		
	1130					6.60					3249.6	7.01		
	1200					6.72					3465.3	7.01		
	1230					6.74					3680.5	7.01		
	1300					6.78					3896.3	7.01		
	1330					6.78					4111.3	7.01		
	1400					6.80					4327.0	7.01		turb = 0.96, ph = 7.10, con = 255 temp = 21.0 @ 1200 (CES)
	1430					6.83					4542.0	7.01		
	1500					6.90					4757.4	7.01		
1600	~~1530~~					6.91					5187.9	7.00		
1700	~~1600~~					6.92					5617.9	7.00		
1800	~~1630~~					6.95					6047.3	6.99		Turb = 0.94 ph = 7.21 Temp = 20.2 con = 2563
1900	~~1700~~					6.95					6476.7	6.99		
2000	~~1730~~					7.00					6906.4	7.00		
2100	~~1800~~					7.15					7335.7	7.00		
2200	~~1830~~					7.10					7761.5	6.99		
2300	~~1900~~					7.00					8195.2	7.00		
2400	~~1930~~					7.12					8624.7	6.99		
0100	2000					7.14					9053.4	7.00		
0200						7.10					9482.5	6.99		

AQUIFER TEST DATA

Owner IBM East Fishkill Address Main Site County Dutchess State NY

Date 7/14/11 Company performing test GSC Measured by CES/CSS/KBF

Well No. 032B Distance from pumping well — Type of test Constant Rate 7 GPM Test No. _____
(Pumped Well)

Measuring equipment WLID

Time Data
Pump on: Date _____ Time _____ (t)
Pump off: Date _____ Time _____ (r)
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous Pumping? Yes ___ No ___
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t'	Time since pump stopped t"	t/t'		Water level measurement	Correction or Conversion	Water Level	Water level change s or s'		Discharge measurement	Rate		Comments
7/14/11	0300					7.18					9911.0	7.00		
	0400					7.11					10341.3	7.00		
	0500					7.14					10771.0	7.00		
	0600					7.10					11201.0	6.99		
	0700					7.11					11631.4	7.02		
	0800					7.10					12060.8	7.00		
	0900					7.18					12490.8	7.01		
	0933					7.18					—	7.00		
	1000					7.18					12921.6	7.00		turb = .94 ph = 7.57 con = 2785
	1011					7.25					~~13028.7~~ 9.			temp = 20.09
	1015					7.22					13028.7	9.41		Begin 11 gpm
	1016					9.00					13038.7	11.14		
	1017					9.49					13050.0	10.97		
	1018					9.53					13061.3	10.98		
	1019					9.64					13072.7	10.99		
	1020					9.68					13084.0	11.00		
	1021					9.68					13095.3	10.99		
	1022					9.68					13107.2	10.99		
	1023					9.68					13117.4	10.99		
	1024					9.68					13129.5	10.99		
	1025					9.68					13140.0	10.99		
	1030					9.68					13195.9	10.99		
	1035					9.68					13252.5	10.98		
	1040					9.68					13308.2	10.99		
	1045					9.70					13364.8	10.98		
	1050					9.74					13421.4	10.98		
	1055					9.75					13478.1	10.98		
	1100					9.76					13533.8	10.99		
	1105					9.77					13589.8	10.98		

AQUIFER TEST DATA

Owner IBM East Fishkill Address Main Site County Dutchess State NY

Date 7/14/11 Company performing test GSC Measured by CES (CSS) KBF

Well No. 032B Distance from pumping well — (Pumped well) Type of test Constant Rate 11gpm Test No. —

Measuring equipment NLID

Time Data
Pump on: Date ____ Time ____ (t)
Pump off: Date ____ Time ____ (r)
Duration of aquifer test:
Pumping ____ Recovery ____

Water Level Data
Static water level ____
Measuring point ____
Elevation of measuring point ____

Discharge Data
How Q measured ____
Depth of pump/air line ____
Previous Pumping? Yes ____ No ____
Duration ____ End ____

Date	Clock time	Time since pump started t′	Time since pump stopped t″	t/t′		Water level measurement	Correction or Conversion	Water Level	Water level change s or s′		Discharge measurement	Rate		Comments on factors affecting test data
7/14/11	1110					9.79					13646.0	10.94		
	1115					9.81					13702.2	10.98		11gpm
	1145					9.85					14039.5	10.99		
	1215					9.91					14373.4	10.98		
	1245					9.93					14716.5	11.00		
1322	~~1315~~					10.15					15143.2	11.00		~~1322 10.15~~
	1345					10.18					15390.3	10.99		
	1415					10.19					15728.2	10.99		ph=7.45 temp=20.6°C cond=2783
	1415	30				5.97					—	—		shutdown @ 1415 turb=0.93 after 4 hrs
	1416					5.21								
	1416	30				4.95								
	1417					4.84								47933.7 Last Blue meter (GPI) reading
	1417	30				4.82								
	1418					4.75								Final Brass Meter: 15728.4
	1418	30				4.60								
	1419					4.53								
	1419	30				4.48								
	1420					4.45								
	1420	30				4.43								
	1421					4.40								
	1421	30				4.39								
	1422					4.37								
	1422	30				4.34								
	1423					4.35								
	1423	30				4.35								
	1424					4.32								
	1424	30				4.31								
	1425					4.30								
	~~1430~~ 1625					3.99								
7/15/11	CES 1535					3.74								

AQUIFER TEST DATA

Owner IBM East Fishkill Address Main Site County Dutchess State NY

Date 7/12/11 Company performing test GSC Measured by CES | COS | KBF

Well No. OC6 Distance from pumping well 512' Type of test 5-step | 7GPM Constant Rate Test No. _____

Measuring equipment WLID

Time Data
Pump on: Date _____ Time _____ (t)
Pump off: Date _____ Time _____ (r)
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous Pumping? Yes ____ No ____
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t'	Time since pump stopped r'	t/t'		Water level measurement	Correction or Conversion	Water Level	Water level change s or s'		Discharge measurement	Rate		
7/12/11	0944					5.93								
7/13/11	0944					6.00								
7/13/11	1114					6.05								
7/13/11	1250					6.07								
7/13/11	1319					6.06								
7/13/11	1414					6.05								
7/13/11	1514					6.09								
7/13/11	1614					6.09								
7/13/11	1715					6.09								
7/13/11	1809					6.12								
7/13/11	1912					6.10								
7/13/11	2010					6.10								
7/13/11	2109					6.15								
7/13/11	2205					6.10								
7/13/11	2306					6.12								
7/14/11	0008					6.15								
7/14/11	0108					6.13								
7/14/11	0208					6.15								
7/14/11	0306					6.15								
7/14/11	0403					6.17								
7/14/11	0507					6.09								
7/14/11	609					6.14								
7/14/11	711					6.20								
7/14/11	814					6.17								
7/14/11	0933					6.14								
7/14/11	1128					6.19								
7/14/11	1225					6.18								
7/14/11	1358					6.18								
7/14/11	1545					6.18								
7/15/11	1439					6.20								

	Time	DTW
★ 7/8/11	1233	5.65
7/11/11	1317	5.72

AQUIFER TEST DATA

Owner IBM East Fishkill Address Main Site County Dutchess State NY

Date 7/12/11 Company performing test GSC Measured by CES | CJS | KBF

Well No. 067 Distance from pumping well 253' Type of test Step | 76 GPM Constant Rate Test No.

Measuring equipment WLID

Time Data
Pump on: Date ____ Time ____ (t)
Pump off: Date ____ Time ____ (r)
Duration of aquifer test:
Pumping ____ Recovery ____

Water Level Data
Static water level ____
Measuring point ____
Elevation of measuring point ____

Discharge Data
How Q measured ____
Depth of pump/air line ____
Previous Pumping? Yes ____ No ____
Duration ____ End ____

Comments on factors affecting test data

Date	Clock time	Time since pump started t'	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water Level	Water level change s or s'		Discharge measurement	Rate		Comments on factors affecting test data
														★ 7/8/11 TIME dTW
7/12/11	0946					8.00								7/14/11 1407 7.99
7/13/11	0935					8.00								
7/13/11	1118					8.07								
7/13/11	1211					8.16								
7/13/11	1307					8.16								
7/13/11	1417					8.16								
7/13/11	1510					8.17								
7/13/11	1609					8.17								
7/13/11	1709					8.18								
7/13/11	1814					8.20								
7/13/11	1917					8.15								
7/13/11	2015					8.16								
7/13/11	2114					8.20								
7/13/11	2210					8.18								
7/13/11	2311					8.15								
7/14/11	0014					8.15								
7/14/11	0112					8.15								
7/14/11	0212					8.15								
7/14/11	0311					8.13								
7/14/11	0414					8.14								
7/14/11	0513					8.11								
7/14/11	0616					8.10								
7/14/11	716					8.10								
7/14/11	820					8.12								
7/14/11	0940					8.15								
7/14/11	1138					8.30								
7/14/11	1200					8.20								
7/14/11	1232					8.21								
7/14/11	1354					8.22								
7/14/11	1550					8.23								
7/15/11	1429					8.28								

AQUIFER TEST DATA

Owner IBM East Fishkill Address Main Site County Dutchess State NY

Date 7/12/11 Company performing test GSC Measured by CES | CJS | KBF

Well No. 170 Distance from pumping well 478' Type of test Step 1 76 gpm Constant rate Test No.

Measuring equipment WLID

Time Data
Pump on: Date ____ Time ____ (t)
Pump off: Date ____ Time ____ (r)
Duration of aquifer test:
Pumping ____ Recovery ____

Water Level Data
Static water level ____
Measuring point ____
Elevation of measuring point ____

Discharge Data
How Q measured ____
Depth of pump/air line ____
Previous Pumping? Yes ____ No ____
Duration ____ End ____

Comments on factors affecting test data

Date	Clock time	Time since pump started t'	Time since pump stopped t"	t/t'		Water level measurement	Correction or Conversion	Water Level	Water level change s or s'		Discharge measurement	Rate		★ 7/11/11 10.23
7/12/11	0942					10.30								
7/13/11	0942					10.55								
7/13/11	1111 CES					10.56								
7/13/11	1207					10.58								
7/13/11	1318					10.58								
7/13/11	1413					10.57								
7/13/11	1513					10.60								
7/13/11	1613					10.60								
7/13/11	1714					10.60								
7/13/11	1809					10.56								
7/13/11	19012					10.53								
7/13/11	2011					10.57								
7/13/11	2110					10.58								
7/13/11	2205					10.55								
7/13/11	2307					10.58								
7/14/11	0008					10.56								
7/14/11	0109					10.56								
7/14/11	0209					10.57								
7/14/11	0307					10.58								
7/14/11	0409					10.62								
7/14/11	0508					10.60								
7/14/11	610					10.60								
7/14/11	712					10.65								
7/14/11	815					10.65								
7/14/11	6934					10.65								
7/14/11	1129					10.68								
7/14/11	1226					10.66								
7/14/11	1351					10.65								
7/14/11	1842					10.65								
7/15/11	1433					10.75								

AQUIFER TEST DATA

Owner IBM East Fishkill Address Main Site County Dutchess State NY

Date 7/8/11 Company performing test Groundwater Sciences Measured by CES/CJS/KBF

Well No. 614 Distance from pumping well 19' Type of test Step Test / 7GPM Constant Rate Test Test No.

Measuring equipment WLID

Time Data
Pump on: Date ____ Time ____ (t)
Pump off: Date ____ Time ____ (r)
Duration of aquifer test:
Pumping ____ Recovery ____

Water Level Data
Static water level ____
Measuring point ____
Elevation of measuring point ____

Discharge Data
How Q measured ____
Depth of pump/air line ____
Previous Pumping? Yes ____ No ____
Duration ____ End ____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water Level	Water level change s or s'		Discharge measurement	Rate		
7/8/11	1300					3.00								
7/11/11	1341					2.17								
7/12/11	1054					2.19								
7/12/11	1157					2.19								
7/12/11	1225					2.67								
7/12/11	1256					2.67								
7/12/11	1357					3.35								
7/12/11	1431					3.39								
7/12/11	1659					2.29								
7/12/11	1758					2.98								
7/12/11	1856					3.71								
7/12/11	1955					4.50								
7/12/11	2009					4.98								
7/12/11	2023					2.68								
7/13/11	0948					2.32								
7/13/11	1108					3.50								
7/13/11	1135					3.55								
7/13/11	1207					3.55								
7/13/11	1235					3.57								
7/13/11	1303					3.65								
7/13/11	1331					3.60								
7/13/11	1405					3.70								
7/13/11	1432					3.73								
7/13/11	1505					3.75								
7/13/11	1605					3.75								
7/13/11	1705					3.78								
7/13/11	1804					3.75								
7/13/11	1905					3.71								
7/13/11	2003					3.78								
7/13/11	2103					3.85								
7/13/11	2203					3.86								

AQUIFER TEST DATA

Owner IBM East Fishkill Address Main Site County Dutchess State NY

Date 7/8/11 CES 7/13/11 Company performing test GSC Measured by CES/CSS/KBF

Well No. 614 Distance from pumping well 19' Type of test Constant Rate, 7GPM Test No. _____

Measuring equipment WLID

Time Data
Pump on: Date _____ Time _____ (t)
Pump off: Date _____ Time _____ (r)
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous Pumping? Yes ___ No ___
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water Level	Water level change s or s'		Discharge measurement	Rate		Comments
7/13/11	2303					3.89								7/8/11 DTW = 3.00 at 1300
7/14/11	0004					3.93								7/11/11 DTW = 2.17 at 1341
7/14/11	0103					3.93								7/12/11 DTW = 2.22 at 0953
7/14/11	0203					3.93								7/13/11 DTW = 2.32 at 0948
7/14/11	0303					3.93								
7/14/11	0404					3.94								
7/14/11	0504					3.97								
7/14/11	605					3.95								
7/14/11	704					3.97								
7/14/11	804					3.99								
7/14/11	905					4.00								
7/14/11	1014					4.00								
7/14/11	1121					4.83								
7/14/11	1149					4.82								
7/14/11	1330					4.80								
7/14/11	1246					4.81								
7/14/11	1408					4.87								
7/14/11	1427					3.20								
7/14/11	1610					2.80								
7/15/11	1533					2.50								

AQUIFER TEST DATA

Owner IBM East Fishkill Address Main Site County Dutchess State NY

Date 7/12/11 Company performing test GSC Measured by CES | CSS | KBE

Well No. 615 Distance from pumping well 9' Type of test Step | constant Rate, 7GPM Test No. ____

Measuring equipment WLID

Time Data
Pump on: Date ____ Time ____ (t)
Pump off: Date ____ Time ____ (r)
Duration of aquifer test:
Pumping ____ Recovery ____

Water Level Data
Static water level ____
Measuring point ____
Elevation of measuring point ____

Discharge Data
How Q measured ____
Depth of pump/air line ____
Previous Pumping? Yes ____ No ____
Duration ____ End ____

Date	Clock time	Time since pump started t	Time since pump stopped t'		Water level measurement	Correction or Conversion	Water Level	Water level change s or s'	Discharge measurement	Rate	Comments on factors affecting test data
7/12/11	0954				2.41						7/18/11 BTW = 3.25 at 1311
7/13/11	0949				2.56						7/11/11 BTW = 2.36 at 1344
7/13/11	1107				3.64						
7/13/11	1134				3.71						
7/13/11	1204				3.79						
~~7/13/11~~	~~1253~~				~~5.56~~						
7/13/11	1234				3.81						
7/13/11	1304				3.83						
7/13/11	1334				3.84						
7/13/11	1405				3.87						
7/13/11	1433				3.89						
7/13/11	1504				3.95						
7/13/11	1604				3.95						
7/13/11	1703				3.95						
7/13/11	1803				4.00						
7/13/11	1904				4.00						
7/13/11	2003				4.00						
7/13/11	2102				4.04						
7/13/11	2202				4.05						
7/13/11	2302				4.06						
7/14/11	0003				4.12						7/14/11 5.00 1230
7/14/11	0102				4.13						7/14/11 5.02 1407
7/14/11	0202				4.13						7/14/11 3.00 1614
7/14/11	0302				4.14						7/15/11 2.67 1532
7/14/11	0404				4.13						
7/14/11	0503				4.18						
7/14/11	0604				4.15						
7/14/11	0703				4.20						
7/14/11	0804				4.20						
7/14/11	0904				4.20						
7/14/11	.013				4.22						7/14/11 1121 5.02

AQUIFER TEST DATA

Owner IBM East Fishkill Address Main Site County Dutchess State NY

Date 7/12/11 Company performing test GSC Measured by CES | GSS | KBB

Well No. 616 Distance from pumping well 12' Type of test Step | 7GPM Constant Rate Test No. ____

Measuring equipment WLID

Time Data
Pump on: Date ____ Time ____ (t)
Pump off: Date ____ Time ____ (r)
Duration of aquifer test:
Pumping ____ Recovery ____

Water Level Data
Static water level ____
Measuring point ____
Elevation of measuring point ____

Discharge Data
How Q measured ____
Depth of pump/air line ____
Previous Pumping? Yes ____ No ____
Duration ____ End ____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water Level	Water level change s or s'		Discharge measurement	Rate		Comments
7/12/11	0955					2.72								7/8/11 ATW = 3.37 at 1343
7/13/11	0951					2.81								7/11/11 ATW = 2.71 at 1347
7/13/11	1105					3.78								
7/13/11	1133					3.80								
7/13/11	1202					3.85								
7/13/11	1231					3.87								
7/13/11	1305					3.92								
7/13/11	1337					3.92								
7/13/11	1402					3.93								
7/13/11	1434					3.95								
7/13/11	1503					4.00								
7/13/11	1602					4.01								
7/13/11	1707					4.00								
7/13/11	1802					4.11								
7/13/11	1903					4.10								
7/13/11	2001					4.18								
7/13/11	2101					4.14								
7/13/11	2201					4.15								
7/13/11	2301					4.16								
7/14/11	0002					4.20								
7/14/11	0101					4.18								
7/14/11	0201					4.20								7/14/11 1406 5.00
7/14/11	0301					4.20								~~4.8~~
7/14/11	0402					4.22								7/14/11 1623 3.28
7/14/11	0502					4.23								7/15/11 1515 2.99
7/14/11	602					4.24								
7/14/11	702					4.27								
7/14/11	802					4.28								
7/14/11	0902					4.26								
7/14/11	1012					4.32					7/14/11	1218	4.95	
7/14/11	1168					5.00								

AQUIFER TEST DATA

Owner IBM East Fishkill Address Main Site County Dutchess State NY

Date 7/8/11 Company performing test Groundwater Sciences Measured by CES/CSJ/KBF

Well No. 757 Distance from pumping well 27' Type of test Step Test / Constant Rate, 7GPM Test No. _____

Measuring equipment WLID

Time Data
Pump on: Date _____ Time _____ (t)
Pump off: Date _____ Time _____ (r)
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous Pumping? Yes ___ No ___
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t'	Time since pump stopped t	t/t'		Water level measurement	Correction or Conversion	Water Level	Water level change s or s'		Discharge measurement	Rate		
7/8/11	1454					6.52								
7/11/11	1350					5.97								
7/12/11	1052					5.97								
7/12/11	1222					6.27								
7/12/11	1255					6.31								
7/12/11	1356					6.66								
7/12/11	1430					6.69								
7/12/11	1658					6.12								
7/12/11	1759					6.46								
7/12/11	1855					6.84								
7/12/11	1957					7.34								
7/12/11	2010					7.61								
7/12/11	2022					6.46								
7/13/11	0952					6.14								
7/13/11	1038					6.73								
7/13/11	1103					6.78								
7/13/11	1132					6.80								
7/13/11	1202					6.83								
7/13/11	1232					6.86								
7/13/11	1300					6.91								
7/13/11	1331					6.91								
7/13/11	1401					6.91								
7/13/11	1400					6.92								
7/13/11	1502					6.98								
7/13/11	1601					6.99								
7/13/11	1701					7.00								
7/13/11	1901					7.10								
7/13/11	1903					7.10								
7/13/11	2001					7.10								
7/13/11	2100					7.15								
7/13/11	2201					7.15								

AQUIFER TEST DATA

Owner IBM East Fishkill Address Main Site County Dutchess State NY

Date 7/13/11 Company performing test GSC Measured by CES/CJS/KBF

Well No. 757 Distance from pumping well 27' Type of test Constant Rate, 7GPM Test No. ____

Measuring equipment WLID

Time Data
Pump on: Date ____ Time ____ (t)
Pump off: Date ____ Time ____ (r)
Duration of aquifer test:
Pumping ____ Recovery ____

Water Level Data
Static water level ____
Measuring point ____
Elevation of measuring point ____

Discharge Data
How Q measured ____
Depth of pump/air line ____
Previous Pumping? Yes ____ No ____
Duration ____ End ____

Comments on factors affecting test data

Date	Clock time	Time since pump started t'	Time since pump stopped r'	t/t'		Water level measurement	Correction or Conversion	Water Level	Water level change s or s'		Discharge measurement	Rate		
7/13/11	2301					7.15								
7/14/11	0001					7.16								
7/14/11	0101					7.17								
7/14/11	0201					7.19								
7/14/11	0301					7.20								
7/14/11	0401					7.20								
7/14/11	0501					7.22								
7/14/11	601					7.24								
7/14/11	701					7.25								
7/14/11	801					7.26								
7/14/11	901					7.25								
7/14/11	1012					7.27								
7/14/11	1117					7.81								
7/14/11	1147					7.83								
7/14/11	1217					7.80								
7/14/11	1247					7.80								
7/14/11	1405					7.81								
7/14/11	1427					6.93								
7/14/11	1649					6.58								
7/15/11	1506					6.29								

AQUIFER TEST DATA

Owner IBM East Fishkill Address Main Site County Dutchess State NY

Date 7/8/11 Company performing test GSC Measured by CES | CSS | KBF

Well No. 782 Distance from pumping well 206' Type of test Step | 76 GPM Constant Rate Test No. _____

Measuring equipment WLID

Time Data
Pump on: Date _____ Time _____ (t)
Pump off: Date _____ Time _____ (r)
Duration of aquifer test:
Pumping _____ Recovery _____

Water Level Data
Static water level _____
Measuring point _____
Elevation of measuring point _____

Discharge Data
How Q measured _____
Depth of pump/air line _____
Previous Pumping? Yes ____ No ____
Duration _____ End _____

Comments on factors affecting test data

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Water level measurement	Correction or Conversion	Water Level	Water level change s or s'		Discharge measurement	Rate		
7/8/11	1401					13.45								
7/11/11	1306					14.32								
7/12/11	0933					13.44								
7/13/11	0930					13.50								
7/13/11	1106					13.52								
7/13/11	1202					13.52								
7/13/11	1313					13.53								
7/13/11	1409					13.53								
7/13/11	1506					13.55								
7/13/11	1607					13.55								
7/13/11	1707					13.57								
7/13/11	1804					13.66								
7/13/11	1905					13.60								
7/13/11	2005					13.60								
7/13/11	2104					13.60								
7/14/11	0624					13.66								
7/14/11	0706					13.68								
7/14/11	809					13.68								
7/14/11	0938					13.69								
7/14/11	1124					13.78								
7/14/11	1209					13.70								
7/14/11	1322					13.69								
7/14/11	1347					13.67								
7/14/11	1457	CES				NR								
7/14/11	1535					13.68								
7/15/11	1453					13.63								

AQUIFER TEST DATA

Owner IBM East Fishkill Address Main Site County Dutchess State NY

Date 7/8/11 Company performing test GSC Measured by CES/GSS/KBF

Well No. 839 Distance from pumping well 182' Type of test Step 1 7GPM Constant Rate Test No. ____

Measuring equipment WLID

Time Data
Pump on: Date ____ Time ____ (t)
Pump off: Date ____ Time ____ (r)
Duration of aquifer test:
Pumping ____ Recovery ____

Water Level Data
Static water level ____
Measuring point ____
Elevation of measuring point ____

Discharge Data
How Q measured ____
Depth of pump/air line ____
Previous Pumping? Yes ____ No ____
Duration ____ End ____

Comments on factors affecting test data

Date	Clock time	Time since pump started t'	Time since pump stopped t	t/t'	Water level measurement	Correction or Conversion	Water Level	Water level change s or s'	Discharge measurement	Rate	Comments
7/8/11	1442				6.48						
7/9/11	1357				6.40						
7/12/11	1425				6.40						
7/13/11	0937				6.47						
7/13/11	1120				6.50						
7/13/11	1214				6.605						
7/13/11	1325				6.60						
7/13/11	1440				6.58						
7/13/11	1511				6.59						
7/13/11	1610				6.59						
7/13/11	1710				6.59						
7/13/11	1816				6.75						
7/13/11	1919				6.79						
7/13/11	2018				6.80						
7/13/11	2119				6.73						
7/14/11	2214				6.75						
7/13/11	2313				6.83						
7/14/11	0096				6.75						
7/14/11	0118				6.188						
7/14/11	0206				6.88						
7/14/11	0313				6.81						
7/14/11	0416				6.80						
7/14/11	0515				6.85						7/14/11 1605 6.93
7/14/11	618				6.94						7/15/11 1420 6.63
7/14/11	718				6.92						
7/14/11	823				6.93						
7/14/11	894				6.96						
7/14/11	1134				7.02						
7/14/11	1203				7.03						
7/14/11	1233				7.02						
	1251				7.03						

MANUAL and TRANSDUCER GROUNDWATER ELEVATION DATA

(Excel file provided electronically on enclosed CD)

Columbia Analytical Services™ 1565 Jefferson Rd, Building 300, Suite 360 | Rochester, NY 14623 | 585-288-5380 | 585-288-8475 fax |

August 02, 2011 Service Request No: R1104005

Mr. Keith Vinal
IBM Corporation
2070 Route 52
BLG 300 Z4A1
Hopewell Junction, NY 12533

Laboratory Results for: IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 490802

Dear Mr. Vinal:

Enclosed are the results of the sample(s) submitted to our laboratory on July 19, 2011. For your reference, these analyses have been assigned our service request number **R1104005**.

All analyses were performed according to our laboratory's quality assurance program. The test results meet requirements of the NELAP standards except as noted in the case narrative report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report. The measurement uncertainty of the results included in this report is within that expected when using the prescribed method(s) for analysis of these samples, and represented by Laboratory Control Sample control limits. Any events, such as QC failures, which may add to the uncertainty are explained in the report narrative.

Please contact me if you have any questions. My extension is 7470. You may also contact me via email at CBeechler@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Carlton Beechler
Project Manager

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	IBM Corporation	**Service Request No.:**	R1104005
Project:	IBM EF Non-Routine – 7/13-14/11	**Date Received:**	7/19/11
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Laboratory Control Sample (LCS).

Sample Receipt

Six water samples were received for analysis at Columbia Analytical Services on 7/19/11. The samples were received in good condition and consistent with the accompanying chain of custody form. All sampling activities performed by CAS personnel have been in accordance with "CAS Field Procedures and Measurements Manual" or by client specifications. The samples were stored in a refrigerator between 1°C and 6°C upon receipt at the laboratory.

Volatile Organic Compounds by Method 8620C

The Initial Calibration (ICAL), Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) criteria were met for all samples with the following exceptions: The CCV standards exceeded 20% difference criteria for Dichlorodifluoromethane on 7/21/11(early run) and Acetone, Tetrahydrofuran and Total Xylenes 7/21/11 (late run). All detected concentrations for these compounds in samples associated with these CCVs should be considered estimated.

All surrogate standard recoveries were within acceptable limits.

Batch QC is included in the report. Laboratory Control Samples (LCS) were within QC acceptance limits.

Hits between the MDL and MRL are flagged with a "J" as estimated.

All Method Blanks were free of contamination with the exception of low level hits of 1,2,3-Trichlorobenzene on 7/21/11 (both runs). No data is affected.

The samples were properly preserved and analyzed within the appropriate holding times for the method.

No other analytical or quality control problems were encountered during analysis.

Approved by_____ **Date** 8/3/11

Client: IBM Corporation
Project: IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856

Service Request: R1104005

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
R1104005-001	TRIP BLANK	7/13/11	09:53
R1104005-002	GW-032B PumpTest	7/13/11	10:30
R1104005-003	GW-032B PumpTest	7/13/11	12:00
R1104005-004	GW-032B PumpTest	7/13/11	18:00
R1104005-005	GW-032B PumpTest	7/14/11	10:00
R1104005-006	GW-032B PumpTest	7/14/11	14:00

Columbia Analytical Services INC

REPORT QUALIFIERS

U	Analyte was analyzed for but not detected. The sample quantitation limit has been corrected for dilution and for percent moisture, unless otherwise noted in the case narrative.
J	Estimated value due to either being a Tentatively Identified Compound (TIC) or that the concentration is between the MRL and the MDL. Concentrations are not verified within the linear range of the calibration. For DoD: concentration >40% difference between two GC columns (pesticides/Arclors).
B	Analyte was also detected in the associated method blank at a concentration that may have contributed to the sample result.
E	Inorganics- Concentration is estimated due to the serial dilution was outside control limits.
E	Organics- Concentration has exceeded the calibration range for that specific analysis.
D	Concentration is a result of a dilution, typically a secondary analysis of the sample due to exceeding the calibration range or that a surrogate has been diluted out of the sample and cannot be assessed.
*	Indicates that a quality control parameter has exceeded laboratory limits. Under the "Notes" column of the Form I, this qualifier denotes analysis was performed out of Holding Time.
H	Analysis was performed out of hold time for tests that have an "immediate" hold time criteria.
#	Spike was diluted out.
+	Correlation coefficient for MSA is <0.995.
N	Inorganics- Matrix spike recovery was outside laboratory limits.
N	Organics- Presumptive evidence of a compound (reported as a TIC) based on the MS library search.
S	Concentration has been determined using Method of Standard Additions (MSA).
W	Post-Digestion Spike recovery is outside control limits and the sample absorbance is <50% of the spike absorbance.
P	Concentration >40% (25% for CLP) difference between the two GC columns.
C	Confirmed by GC/MS
Q	DoD reports: indicates a pesticide/Aroclor is not confirmed (≥100% Difference between two GC columns).
X	See Case Narrative for discussion.

ACCREDITED IN ACCORDANCE WITH nelac

CAS/Rochester Lab ID # for State Certifications[1]

NELAP Accredited	Nebraska Accredited
Connecticut ID # PH0556	Nevada ID # NY-00032
Delaware Accredited	New Jersey ID # NY004
DoD ELAP #65817	New York ID # 10145
Florida ID # E87674	New Hampshire ID # 294100 A/B
Illinois ID #200047	Pennsylvania ID# 68-786
Maine ID #NY0032	Rhode Island ID # 158

[1] Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable, except as noted in the laboratory case narrative provided. For a specific list of accredited analytes, refer to the certifications section at www.caslab.com.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	R1104005
Project:	IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	7/13/11 0953
Sample Matrix:	Water	**Date Received:**	7/19/11
		Date Analyzed:	7/21/11 22:41
Sample Name:	TRIP BLANK	**Units:**	µg/L
Lab Code:	R1104005-001	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analytical Method:	8260C	**Analysis Lot:**	254317
Data File Name:	J:\ACQUDATA\msvoa12\Data\072111\U9330.D\	**Instrument Name:**	R-MS-12
		Dilution Factor:	1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
630-20-6	1,1,1,2-Tetrachloroethane	1.0	U	1.0	0.20	
71-55-6	1,1,1-Trichloroethane (TCA)	1.0	U	1.0	0.23	
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	1.0	0.20	
79-00-5	1,1,2-Trichloroethane	1.0	U	1.0	0.23	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	1.0	U	1.0	0.31	
75-34-3	1,1-Dichloroethane (1,1-DCA)	1.0	U	1.0	0.20	
75-35-4	1,1-Dichloroethene (1,1-DCE)	1.0	U	1.0	0.29	
87-61-6	1,2,3-Trichlorobenzene	1.0	U	1.0	0.20	
120-82-1	1,2,4-Trichlorobenzene	1.0	U	1.0	0.26	
95-50-1	1,2-Dichlorobenzene	1.0	U	1.0	0.20	
107-06-2	1,2-Dichloroethane	1.0	U	1.0	0.20	
78-87-5	1,2-Dichloropropane	1.0	U	1.0	0.28	
541-73-1	1,3-Dichlorobenzene	1.0	U	1.0	0.20	
106-46-7	1,4-Dichlorobenzene	1.0	U	1.0	0.20	
67-64-1	Acetone	5.0	U	5.0	0.98	
71-43-2	Benzene	1.0	U	1.0	0.21	
108-86-1	Bromobenzene	1.0	U	1.0	0.20	
74-97-5	Bromochloromethane	5.0	U	5.0	0.28	
75-27-4	Bromodichloromethane	1.0	U	1.0	0.20	
75-25-2	Bromoform	1.0	U	1.0	0.27	
74-83-9	Bromomethane	1.0	U	1.0	0.31	
56-23-5	Carbon Tetrachloride	1.0	U	1.0	0.27	
108-90-7	Chlorobenzene	1.0	U	1.0	0.20	
75-00-3	Chloroethane	1.0	U	1.0	0.31	
67-66-3	Chloroform	1.0	U	1.0	0.22	
74-87-3	Chloromethane	1.0	U	1.0	0.24	
124-48-1	Dibromochloromethane	1.0	U	1.0	0.20	
74-95-3	Dibromomethane	1.0	U	1.0	0.25	
75-71-8	Dichlorodifluoromethane (CFC 12)	1.0	U	1.0	0.56	
75-09-2	Methylene Chloride	1.0	U	1.0	0.22	
100-41-4	Ethylbenzene	1.0	U	1.0	0.20	
1634-04-4	Methyl tert-Butyl Ether	1.0	U	1.0	0.20	
127-18-4	Tetrachloroethene (PCE)	1.0	U	1.0	0.20	
109-99-9	Tetrahydrofuran (THF)	5.0	U	5.0	0.66	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	R1104005
Project:	IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	7/13/11 0953
Sample Matrix:	Water	**Date Received:**	7/19/11
		Date Analyzed:	7/21/11 22:41
Sample Name:	TRIP BLANK	**Units:**	µg/L
Lab Code:	R1104005-001	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analytical Method:	8260C	**Analysis Lot:**	254317
Data File Name:	J:\ACQUDATA\msvoa12\Data\072111\U9330.D\	**Instrument Name:**	R-MS-12
		Dilution Factor:	1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
108-88-3	Toluene	1.0	U	1.0	0.20	
79-01-6	Trichloroethene (TCE)	**0.69**	J	1.0	0.23	
75-69-4	Trichlorofluoromethane (CFC 11)	1.0	U	1.0	0.20	
75-01-4	Vinyl Chloride	1.0	U	1.0	0.23	
1330-20-7	Xylenes, Total	2.0	U	2.0	0.40	
156-59-2	cis-1,2-Dichloroethene	**0.34**	J	1.0	0.20	
10061-01-5	cis-1,3-Dichloropropene	1.0	U	1.0	0.20	
179601-23-1	m,p-Xylenes	2.0	U	2.0	0.20	
95-47-6	o-Xylene	1.0	U	1.0	0.20	
156-60-5	trans-1,2-Dichloroethene	1.0	U	1.0	0.20	
10061-02-6	trans-1,3-Dichloropropene	1.0	U	1.0	0.20	
354-23-4	1,2-Dichloro-1,1,2-trifluoroethane (CFC 123a)	1.0	U	1.0	0.35	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	107	85-122	7/21/11 22:41	
Dibromofluoromethane	105	89-116	7/21/11 22:41	
Toluene-d8	108	87-121	7/21/11 22:41	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	R1104005
Project:	IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	7/13/11 1030
Sample Matrix:	Water	**Date Received:**	7/19/11
		Date Analyzed:	7/21/11 23:14
Sample Name:	GW-032B PumpTest	**Units:**	µg/L
Lab Code:	R1104005-002	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analytical Method:	8260C	**Analysis Lot:**	254317
Data File Name:	J:\ACQUDATA\msvoa12\Data\072111\U9331.D\	**Instrument Name:**	R-MS-12
		Dilution Factor:	1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
630-20-6	1,1,1,2-Tetrachloroethane	1.0	U	1.0	0.20	
71-55-6	1,1,1-Trichloroethane (TCA)	1.0	U	1.0	0.23	
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	1.0	0.20	
79-00-5	1,1,2-Trichloroethane	1.0	U	1.0	0.23	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	1.0	U	1.0	0.31	
75-34-3	1,1-Dichloroethane (1,1-DCA)	1.0	U	1.0	0.20	
75-35-4	1,1-Dichloroethene (1,1-DCE)	1.0	U	1.0	0.29	
87-61-6	1,2,3-Trichlorobenzene	1.0	U	1.0	0.20	
120-82-1	1,2,4-Trichlorobenzene	1.0	U	1.0	0.26	
95-50-1	1,2-Dichlorobenzene	1.0	U	1.0	0.20	
107-06-2	1,2-Dichloroethane	1.0	U	1.0	0.20	
78-87-5	1,2-Dichloropropane	1.0	U	1.0	0.28	
541-73-1	1,3-Dichlorobenzene	1.0	U	1.0	0.20	
106-46-7	1,4-Dichlorobenzene	1.0	U	1.0	0.20	
67-64-1	Acetone	5.0	U	5.0	0.98	
71-43-2	Benzene	1.0	U	1.0	0.21	
108-86-1	Bromobenzene	1.0	U	1.0	0.20	
74-97-5	Bromochloromethane	5.0	U	5.0	0.28	
75-27-4	Bromodichloromethane	1.0	U	1.0	0.20	
75-25-2	Bromoform	1.0	U	1.0	0.27	
74-83-9	Bromomethane	1.0	U	1.0	0.31	
56-23-5	Carbon Tetrachloride	1.0	U	1.0	0.27	
108-90-7	Chlorobenzene	1.0	U	1.0	0.20	
75-00-3	Chloroethane	1.0	U	1.0	0.31	
67-66-3	Chloroform	1.0	U	1.0	0.22	
74-87-3	Chloromethane	1.0	U	1.0	0.24	
124-48-1	Dibromochloromethane	1.0	U	1.0	0.20	
74-95-3	Dibromomethane	1.0	U	1.0	0.25	
75-71-8	Dichlorodifluoromethane (CFC 12)	1.0	U	1.0	0.56	
75-09-2	Methylene Chloride	1.0	U	1.0	0.22	
100-41-4	Ethylbenzene	1.0	U	1.0	0.20	
1634-04-4	Methyl tert-Butyl Ether	1.0	U	1.0	0.20	
127-18-4	Tetrachloroethene (PCE)	**0.97**	J	1.0	0.20	
109-99-9	Tetrahydrofuran (THF)	5.0	U	5.0	0.66	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	R1104005
Project:	IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	7/13/11 1030
Sample Matrix:	Water	**Date Received:**	7/19/11
		Date Analyzed:	7/21/11 23:14
Sample Name:	GW-032B PumpTest	**Units:**	µg/L
Lab Code:	R1104005-002	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analytical Method:	8260C	**Analysis Lot:**	254317
Data File Name:	J:\ACQUDATA\msvoa12\Data\072111\U9331.D\	**Instrument Name:**	R-MS-12
		Dilution Factor:	1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
108-88-3	Toluene	**0.64**	J	1.0	0.20	
79-01-6	Trichloroethene (TCE)	**2.7**		1.0	0.23	
75-69-4	Trichlorofluoromethane (CFC 11)	1.0	U	1.0	0.20	
75-01-4	Vinyl Chloride	1.0	U	1.0	0.23	
1330-20-7	Xylenes, Total	2.0	U	2.0	0.40	
156-59-2	cis-1,2-Dichloroethene	**0.67**	J	1.0	0.20	
10061-01-5	cis-1,3-Dichloropropene	1.0	U	1.0	0.20	
179601-23-1	m,p-Xylenes	2.0	U	2.0	0.20	
95-47-6	o-Xylene	1.0	U	1.0	0.20	
156-60-5	trans-1,2-Dichloroethene	1.0	U	1.0	0.20	
10061-02-6	trans-1,3-Dichloropropene	1.0	U	1.0	0.20	
354-23-4	1,2-Dichloro-1,1,2-trifluoroethane (CFC 123a)	1.0	U	1.0	0.35	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	108	85-122	7/21/11 23:14	
Dibromofluoromethane	106	89-116	7/21/11 23:14	
Toluene-d8	110	87-121	7/21/11 23:14	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	R1104005
Project:	IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	7/13/11 1200
Sample Matrix:	Water	**Date Received:**	7/19/11
		Date Analyzed:	7/21/11 23:48
Sample Name:	GW-032B PumpTest	**Units:**	µg/L
Lab Code:	R1104005-003	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analytical Method:	8260C	**Analysis Lot:**	254317
Data File Name:	J:\ACQUDATA\msvoa12\Data\072111\U9332.D\	**Instrument Name:**	R-MS-12
		Dilution Factor:	1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
630-20-6	1,1,1,2-Tetrachloroethane	1.0	U	1.0	0.20	
71-55-6	1,1,1-Trichloroethane (TCA)	1.0	U	1.0	0.23	
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	1.0	0.20	
79-00-5	1,1,2-Trichloroethane	1.0	U	1.0	0.23	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	1.0	U	1.0	0.31	
75-34-3	1,1-Dichloroethane (1,1-DCA)	1.0	U	1.0	0.20	
75-35-4	1,1-Dichloroethene (1,1-DCE)	1.0	U	1.0	0.29	
87-61-6	1,2,3-Trichlorobenzene	1.0	U	1.0	0.20	
120-82-1	1,2,4-Trichlorobenzene	1.0	U	1.0	0.26	
95-50-1	1,2-Dichlorobenzene	1.0	U	1.0	0.20	
107-06-2	1,2-Dichloroethane	1.0	U	1.0	0.20	
78-87-5	1,2-Dichloropropane	1.0	U	1.0	0.28	
541-73-1	1,3-Dichlorobenzene	1.0	U	1.0	0.20	
106-46-7	1,4-Dichlorobenzene	1.0	U	1.0	0.20	
67-64-1	Acetone	5.0	U	5.0	0.98	
71-43-2	Benzene	1.0	U	1.0	0.21	
108-86-1	Bromobenzene	1.0	U	1.0	0.20	
74-97-5	Bromochloromethane	5.0	U	5.0	0.28	
75-27-4	Bromodichloromethane	1.0	U	1.0	0.20	
75-25-2	Bromoform	1.0	U	1.0	0.27	
74-83-9	Bromomethane	1.0	U	1.0	0.31	
56-23-5	Carbon Tetrachloride	1.0	U	1.0	0.27	
108-90-7	Chlorobenzene	1.0	U	1.0	0.20	
75-00-3	Chloroethane	1.0	U	1.0	0.31	
67-66-3	Chloroform	1.0	U	1.0	0.22	
74-87-3	Chloromethane	1.0	U	1.0	0.24	
124-48-1	Dibromochloromethane	1.0	U	1.0	0.20	
74-95-3	Dibromomethane	1.0	U	1.0	0.25	
75-71-8	Dichlorodifluoromethane (CFC 12)	1.0	U	1.0	0.56	
75-09-2	Methylene Chloride	1.0	U	1.0	0.22	
100-41-4	Ethylbenzene	1.0	U	1.0	0.20	
1634-04-4	Methyl tert-Butyl Ether	1.0	U	1.0	0.20	
127-18-4	Tetrachloroethene (PCE)	**1.1**		1.0	0.20	
109-99-9	Tetrahydrofuran (THF)	5.0	U	5.0	0.66	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	R1104005
Project:	IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	7/13/11 1200
Sample Matrix:	Water	**Date Received:**	7/19/11
		Date Analyzed:	7/21/11 23:48
Sample Name:	GW-032B PumpTest	**Units:**	µg/L
Lab Code:	R1104005-003	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analytical Method:	8260C	**Analysis Lot:**	254317
Data File Name:	J:\ACQUDATA\msvoa12\Data\072111\U9332.D\	**Instrument Name:**	R-MS-12
		Dilution Factor:	1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
108-88-3	Toluene	**0.27**	J	1.0	0.20	
79-01-6	Trichloroethene (TCE)	**2.7**		1.0	0.23	
75-69-4	Trichlorofluoromethane (CFC 11)	1.0	U	1.0	0.20	
75-01-4	Vinyl Chloride	1.0	U	1.0	0.23	
1330-20-7	Xylenes, Total	2.0	U	2.0	0.40	
156-59-2	cis-1,2-Dichloroethene	**0.60**	J	1.0	0.20	
10061-01-5	cis-1,3-Dichloropropene	1.0	U	1.0	0.20	
179601-23-1	m,p-Xylenes	2.0	U	2.0	0.20	
95-47-6	o-Xylene	1.0	U	1.0	0.20	
156-60-5	trans-1,2-Dichloroethene	1.0	U	1.0	0.20	
10061-02-6	trans-1,3-Dichloropropene	1.0	U	1.0	0.20	
354-23-4	1,2-Dichloro-1,1,2-trifluoroethane (CFC 123a)	1.0	U	1.0	0.35	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	108	85-122	7/21/11 23:48	
Dibromofluoromethane	103	89-116	7/21/11 23:48	
Toluene-d8	110	87-121	7/21/11 23:48	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	R1104005
Project:	IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	7/13/11 1800
Sample Matrix:	Water	**Date Received:**	7/19/11
		Date Analyzed:	7/22/11 00:20
Sample Name:	GW-032B PumpTest	**Units:**	µg/L
Lab Code:	R1104005-004	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analytical Method:	8260C	**Analysis Lot:**	254317
Data File Name:	J:\ACQUDATA\msvoa12\Data\072111\U9333.D\	**Instrument Name:**	R-MS-12
		Dilution Factor:	1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
630-20-6	1,1,1,2-Tetrachloroethane	1.0	U	1.0	0.20	
71-55-6	1,1,1-Trichloroethane (TCA)	1.0	U	1.0	0.23	
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	1.0	0.20	
79-00-5	1,1,2-Trichloroethane	1.0	U	1.0	0.23	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	1.0	U	1.0	0.31	
75-34-3	1,1-Dichloroethane (1,1-DCA)	1.0	U	1.0	0.20	
75-35-4	1,1-Dichloroethene (1,1-DCE)	1.0	U	1.0	0.29	
87-61-6	1,2,3-Trichlorobenzene	1.0	U	1.0	0.20	
120-82-1	1,2,4-Trichlorobenzene	1.0	U	1.0	0.26	
95-50-1	1,2-Dichlorobenzene	1.0	U	1.0	0.20	
107-06-2	1,2-Dichloroethane	1.0	U	1.0	0.20	
78-87-5	1,2-Dichloropropane	1.0	U	1.0	0.28	
541-73-1	1,3-Dichlorobenzene	1.0	U	1.0	0.20	
106-46-7	1,4-Dichlorobenzene	1.0	U	1.0	0.20	
67-64-1	Acetone	5.0	U	5.0	0.98	
71-43-2	Benzene	1.0	U	1.0	0.21	
108-86-1	Bromobenzene	1.0	U	1.0	0.20	
74-97-5	Bromochloromethane	5.0	U	5.0	0.28	
75-27-4	Bromodichloromethane	1.0	U	1.0	0.20	
75-25-2	Bromoform	1.0	U	1.0	0.27	
74-83-9	Bromomethane	1.0	U	1.0	0.31	
56-23-5	Carbon Tetrachloride	1.0	U	1.0	0.27	
108-90-7	Chlorobenzene	1.0	U	1.0	0.20	
75-00-3	Chloroethane	1.0	U	1.0	0.31	
67-66-3	Chloroform	1.0	U	1.0	0.22	
74-87-3	Chloromethane	1.0	U	1.0	0.24	
124-48-1	Dibromochloromethane	1.0	U	1.0	0.20	
74-95-3	Dibromomethane	1.0	U	1.0	0.25	
75-71-8	Dichlorodifluoromethane (CFC 12)	1.0	U	1.0	0.56	
75-09-2	Methylene Chloride	1.0	U	1.0	0.22	
100-41-4	Ethylbenzene	1.0	U	1.0	0.20	
1634-04-4	Methyl tert-Butyl Ether	1.0	U	1.0	0.20	
127-18-4	Tetrachloroethene (PCE)	**1.0**		1.0	0.20	
109-99-9	Tetrahydrofuran (THF)	5.0	U	5.0	0.66	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	R1104005
Project:	IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	7/13/11 1800
Sample Matrix:	Water	**Date Received:**	7/19/11
		Date Analyzed:	7/22/11 00:20
Sample Name:	GW-032B PumpTest	**Units:**	µg/L
Lab Code:	R1104005-004	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analytical Method:	8260C	**Analysis Lot:**	254317
Data File Name:	J:\ACQUDATA\msvoa12\Data\072111\U9333.D\	**Instrument Name:**	R-MS-12
		Dilution Factor:	1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
108-88-3	Toluene	**0.21**	J	1.0	0.20	
79-01-6	Trichloroethene (TCE)	**2.8**		1.0	0.23	
75-69-4	Trichlorofluoromethane (CFC 11)	1.0	U	1.0	0.20	
75-01-4	Vinyl Chloride	1.0	U	1.0	0.23	
1330-20-7	Xylenes, Total	2.0	U	2.0	0.40	
156-59-2	cis-1,2-Dichloroethene	**0.54**	J	1.0	0.20	
10061-01-5	cis-1,3-Dichloropropene	1.0	U	1.0	0.20	
179601-23-1	m,p-Xylenes	2.0	U	2.0	0.20	
95-47-6	o-Xylene	1.0	U	1.0	0.20	
156-60-5	trans-1,2-Dichloroethene	1.0	U	1.0	0.20	
10061-02-6	trans-1,3-Dichloropropene	1.0	U	1.0	0.20	
354-23-4	1,2-Dichloro-1,1,2-trifluoroethane (CFC 123a)	1.0	U	1.0	0.35	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	108	85-122	7/22/11 00:20	
Dibromofluoromethane	105	89-116	7/22/11 00:20	
Toluene-d8	112	87-121	7/22/11 00:20	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	R1104005
Project:	IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	7/14/11 1000
Sample Matrix:	Water	**Date Received:**	7/19/11
		Date Analyzed:	7/22/11 07:37
Sample Name:	GW-032B PumpTest	**Units:**	µg/L
Lab Code:	R1104005-005	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analytical Method:	8260C	**Analysis Lot:**	254314
Data File Name:	J:\ACQUDATA\MSVOA12\DATA\072111\U9347.D\	**Instrument Name:**	R-MS-12
		Dilution Factor:	1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
630-20-6	1,1,1,2-Tetrachloroethane	1.0	U	1.0	0.20	
71-55-6	1,1,1-Trichloroethane (TCA)	1.0	U	1.0	0.23	
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	1.0	0.20	
79-00-5	1,1,2-Trichloroethane	1.0	U	1.0	0.23	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	1.0	U	1.0	0.31	
75-34-3	1,1-Dichloroethane (1,1-DCA)	1.0	U	1.0	0.20	
75-35-4	1,1-Dichloroethene (1,1-DCE)	1.0	U	1.0	0.29	
87-61-6	1,2,3-Trichlorobenzene	1.0	U	1.0	0.20	
120-82-1	1,2,4-Trichlorobenzene	1.0	U	1.0	0.26	
95-50-1	1,2-Dichlorobenzene	1.0	U	1.0	0.20	
107-06-2	1,2-Dichloroethane	1.0	U	1.0	0.20	
78-87-5	1,2-Dichloropropane	1.0	U	1.0	0.28	
541-73-1	1,3-Dichlorobenzene	1.0	U	1.0	0.20	
106-46-7	1,4-Dichlorobenzene	1.0	U	1.0	0.20	
67-64-1	Acetone	5.0	U	5.0	0.98	
71-43-2	Benzene	1.0	U	1.0	0.21	
108-86-1	Bromobenzene	1.0	U	1.0	0.20	
74-97-5	Bromochloromethane	5.0	U	5.0	0.28	
75-27-4	Bromodichloromethane	1.0	U	1.0	0.20	
75-25-2	Bromoform	1.0	U	1.0	0.27	
74-83-9	Bromomethane	1.0	U	1.0	0.31	
56-23-5	Carbon Tetrachloride	1.0	U	1.0	0.27	
108-90-7	Chlorobenzene	1.0	U	1.0	0.20	
75-00-3	Chloroethane	1.0	U	1.0	0.31	
67-66-3	Chloroform	1.0	U	1.0	0.22	
74-87-3	Chloromethane	1.0	U	1.0	0.24	
124-48-1	Dibromochloromethane	1.0	U	1.0	0.20	
74-95-3	Dibromomethane	1.0	U	1.0	0.25	
75-71-8	Dichlorodifluoromethane (CFC 12)	1.0	U	1.0	0.56	
75-09-2	Methylene Chloride	1.0	U	1.0	0.22	
100-41-4	Ethylbenzene	1.0	U	1.0	0.20	
1634-04-4	Methyl tert-Butyl Ether	1.0	U	1.0	0.20	
127-18-4	Tetrachloroethene (PCE)	**0.84**	J	1.0	0.20	
109-99-9	Tetrahydrofuran (THF)	5.0	U	5.0	0.66	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	R1104005
Project:	IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	7/14/11 1000
Sample Matrix:	Water	**Date Received:**	7/19/11
		Date Analyzed:	7/22/11 07:37
Sample Name:	GW-032B PumpTest	**Units:**	µg/L
Lab Code:	R1104005-005	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analytical Method:	8260C	**Analysis Lot:**	254314
Data File Name:	J:\ACQUDATA\MSVOA12\DATA\072111\U9347.D\	**Instrument Name:**	R-MS-12
		Dilution Factor:	1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
108-88-3	Toluene	1.0	U	1.0	0.20	
79-01-6	Trichloroethene (TCE)	**2.8**		1.0	0.23	
75-69-4	Trichlorofluoromethane (CFC 11)	1.0	U	1.0	0.20	
75-01-4	Vinyl Chloride	1.0	U	1.0	0.23	
1330-20-7	Xylenes, Total	2.0	U	2.0	0.40	
156-59-2	cis-1,2-Dichloroethene	**0.60**	J	1.0	0.20	
10061-01-5	cis-1,3-Dichloropropene	1.0	U	1.0	0.20	
179601-23-1	m,p-Xylenes	2.0	U	2.0	0.20	
95-47-6	o-Xylene	1.0	U	1.0	0.20	
156-60-5	trans-1,2-Dichloroethene	1.0	U	1.0	0.20	
10061-02-6	trans-1,3-Dichloropropene	1.0	U	1.0	0.20	
354-23-4	1,2-Dichloro-1,1,2-trifluoroethane (CFC 123a)	1.0	U	1.0	0.35	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	109	85-122	7/22/11 07:37	
Dibromofluoromethane	106	89-116	7/22/11 07:37	
Toluene-d8	112	87-121	7/22/11 07:37	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	R1104005
Project:	IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	7/14/11 1400
Sample Matrix:	Water	**Date Received:**	7/19/11
		Date Analyzed:	7/22/11 08:08
Sample Name:	GW-032B PumpTest	**Units:**	µg/L
Lab Code:	R1104005-006	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analytical Method:	8260C	**Analysis Lot:**	254314
Data File Name:	J:\ACQUDATA\MSVOA12\DATA\072111\U9348.D\	**Instrument Name:**	R-MS-12
		Dilution Factor:	1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
630-20-6	1,1,1,2-Tetrachloroethane	1.0	U	1.0	0.20	
71-55-6	1,1,1-Trichloroethane (TCA)	1.0	U	1.0	0.23	
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	1.0	0.20	
79-00-5	1,1,2-Trichloroethane	1.0	U	1.0	0.23	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	1.0	U	1.0	0.31	
75-34-3	1,1-Dichloroethane (1,1-DCA)	1.0	U	1.0	0.20	
75-35-4	1,1-Dichloroethene (1,1-DCE)	1.0	U	1.0	0.29	
87-61-6	1,2,3-Trichlorobenzene	1.0	U	1.0	0.20	
120-82-1	1,2,4-Trichlorobenzene	1.0	U	1.0	0.26	
95-50-1	1,2-Dichlorobenzene	1.0	U	1.0	0.20	
107-06-2	1,2-Dichloroethane	1.0	U	1.0	0.20	
78-87-5	1,2-Dichloropropane	1.0	U	1.0	0.28	
541-73-1	1,3-Dichlorobenzene	1.0	U	1.0	0.20	
106-46-7	1,4-Dichlorobenzene	1.0	U	1.0	0.20	
67-64-1	Acetone	5.0	U	5.0	0.98	
71-43-2	Benzene	1.0	U	1.0	0.21	
108-86-1	Bromobenzene	1.0	U	1.0	0.20	
74-97-5	Bromochloromethane	5.0	U	5.0	0.28	
75-27-4	Bromodichloromethane	1.0	U	1.0	0.20	
75-25-2	Bromoform	1.0	U	1.0	0.27	
74-83-9	Bromomethane	1.0	U	1.0	0.31	
56-23-5	Carbon Tetrachloride	1.0	U	1.0	0.27	
108-90-7	Chlorobenzene	1.0	U	1.0	0.20	
75-00-3	Chloroethane	1.0	U	1.0	0.31	
67-66-3	Chloroform	1.0	U	1.0	0.22	
74-87-3	Chloromethane	1.0	U	1.0	0.24	
124-48-1	Dibromochloromethane	1.0	U	1.0	0.20	
74-95-3	Dibromomethane	1.0	U	1.0	0.25	
75-71-8	Dichlorodifluoromethane (CFC 12)	1.0	U	1.0	0.56	
75-09-2	Methylene Chloride	1.0	U	1.0	0.22	
100-41-4	Ethylbenzene	1.0	U	1.0	0.20	
1634-04-4	Methyl tert-Butyl Ether	1.0	U	1.0	0.20	
127-18-4	Tetrachloroethene (PCE)	**0.98**	J	1.0	0.20	
109-99-9	Tetrahydrofuran (THF)	5.0	U	5.0	0.66	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	R1104005
Project:	IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	7/14/11 1400
Sample Matrix:	Water	**Date Received:**	7/19/11
		Date Analyzed:	7/22/11 08:08
Sample Name:	GW-032B PumpTest	**Units:**	µg/L
Lab Code:	R1104005-006	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analytical Method:	8260C	**Analysis Lot:**	254314
Data File Name:	J:\ACQUDATA\MSVOA12\DATA\072111\U9348.D\	**Instrument Name:**	R-MS-12
		Dilution Factor:	1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
108-88-3	Toluene	1.0	U	1.0	0.20	
79-01-6	Trichloroethene (TCE)	**2.9**		1.0	0.23	
75-69-4	Trichlorofluoromethane (CFC 11)	1.0	U	1.0	0.20	
75-01-4	Vinyl Chloride	1.0	U	1.0	0.23	
1330-20-7	Xylenes, Total	2.0	U	2.0	0.40	
156-59-2	cis-1,2-Dichloroethene	**0.58**	J	1.0	0.20	
10061-01-5	cis-1,3-Dichloropropene	1.0	U	1.0	0.20	
179601-23-1	m,p-Xylenes	2.0	U	2.0	0.20	
95-47-6	o-Xylene	1.0	U	1.0	0.20	
156-60-5	trans-1,2-Dichloroethene	1.0	U	1.0	0.20	
10061-02-6	trans-1,3-Dichloropropene	1.0	U	1.0	0.20	
354-23-4	1,2-Dichloro-1,1,2-trifluoroethane (CFC 123a)	1.0	U	1.0	0.35	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	109	85-122	7/22/11 08:08	
Dibromofluoromethane	106	89-116	7/22/11 08:08	
Toluene-d8	110	87-121	7/22/11 08:08	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	RI104005
Project:	IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Analyzed:	7/21/11 17:10
Sample Name:	Method Blank	**Units:**	µg/L
Lab Code:	RQ1106988-04	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analytical Method:	8260C	**Analysis Lot:**	254317
Data File Name:	J:\ACQUDATA\msvoa12\Data\072111\U9322.D\	**Instrument Name:**	R-MS-12
		Dilution Factor:	1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
630-20-6	1,1,1,2-Tetrachloroethane	1.0	U	1.0	0.20	
71-55-6	1,1,1-Trichloroethane (TCA)	1.0	U	1.0	0.23	
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	1.0	0.20	
79-00-5	1,1,2-Trichloroethane	1.0	U	1.0	0.23	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	1.0	U	1.0	0.31	
75-34-3	1,1-Dichloroethane (1,1-DCA)	1.0	U	1.0	0.20	
75-35-4	1,1-Dichloroethene (1,1-DCE)	1.0	U	1.0	0.29	
87-61-6	1,2,3-Trichlorobenzene	**0.26**	J	1.0	0.20	
120-82-1	1,2,4-Trichlorobenzene	1.0	U	1.0	0.26	
95-50-1	1,2-Dichlorobenzene	1.0	U	1.0	0.20	
107-06-2	1,2-Dichloroethane	1.0	U	1.0	0.20	
78-87-5	1,2-Dichloropropane	1.0	U	1.0	0.28	
541-73-1	1,3-Dichlorobenzene	1.0	U	1.0	0.20	
106-46-7	1,4-Dichlorobenzene	1.0	U	1.0	0.20	
67-64-1	Acetone	5.0	U	5.0	0.98	
71-43-2	Benzene	1.0	U	1.0	0.21	
108-86-1	Bromobenzene	1.0	U	1.0	0.20	
74-97-5	Bromochloromethane	5.0	U	5.0	0.28	
75-27-4	Bromodichloromethane	1.0	U	1.0	0.20	
75-25-2	Bromoform	1.0	U	1.0	0.27	
74-83-9	Bromomethane	1.0	U	1.0	0.31	
56-23-5	Carbon Tetrachloride	1.0	U	1.0	0.27	
108-90-7	Chlorobenzene	1.0	U	1.0	0.20	
75-00-3	Chloroethane	1.0	U	1.0	0.31	
67-66-3	Chloroform	1.0	U	1.0	0.22	
74-87-3	Chloromethane	1.0	U	1.0	0.24	
124-48-1	Dibromochloromethane	1.0	U	1.0	0.20	
74-95-3	Dibromomethane	1.0	U	1.0	0.25	
75-71-8	Dichlorodifluoromethane (CFC 12)	1.0	U	1.0	0.56	
75-09-2	Methylene Chloride	1.0	U	1.0	0.22	
100-41-4	Ethylbenzene	1.0	U	1.0	0.20	
1634-04-4	Methyl tert-Butyl Ether	1.0	U	1.0	0.20	
127-18-4	Tetrachloroethene (PCE)	1.0	U	1.0	0.20	
109-99-9	Tetrahydrofuran (THF)	5.0	U	5.0	0.66	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	R1104005
Project:	IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Analyzed:	7/21/11 17:10
Sample Name:	Method Blank	**Units:**	µg/L
Lab Code:	RQ1106988-04	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analytical Method:	8260C	**Analysis Lot:**	254317
Data File Name:	J:\ACQUDATA\msvoa12\Data\072111\U9322.D\	**Instrument Name:**	R-MS-12
		Dilution Factor:	1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
108-88-3	Toluene	1.0	U	1.0	0.20	
79-01-6	Trichloroethene (TCE)	1.0	U	1.0	0.23	
75-69-4	Trichlorofluoromethane (CFC 11)	1.0	U	1.0	0.20	
75-01-4	Vinyl Chloride	1.0	U	1.0	0.23	
1330-20-7	Xylenes, Total	2.0	U	2.0	0.40	
156-59-2	cis-1,2-Dichloroethene	1.0	U	1.0	0.20	
10061-01-5	cis-1,3-Dichloropropene	1.0	U	1.0	0.20	
179601-23-1	m,p-Xylenes	2.0	U	2.0	0.20	
95-47-6	o-Xylene	1.0	U	1.0	0.20	
156-60-5	trans-1,2-Dichloroethene	1.0	U	1.0	0.20	
10061-02-6	trans-1,3-Dichloropropene	1.0	U	1.0	0.20	
354-23-4	1,2-Dichloro-1,1,2-trifluoroethane (CFC 123a)	1.0	U	1.0	0.35	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	107	85-122	7/21/11 17:10	
Dibromofluoromethane	105	89-116	7/21/11 17:10	
Toluene-d8	111	87-121	7/21/11 17:10	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	R1104005
Project:	IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Analyzed:	7/22/11 07:06
Sample Name:	Method Blank	**Units:**	µg/L
Lab Code:	RQ1107023-04	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analytical Method:	8260C	**Analysis Lot:**	254314
Data File Name:	J:\ACQUDATA\msvoa12\Data\072111\U9346.D\	**Instrument Name:**	R-MS-12
		Dilution Factor:	1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
630-20-6	1,1,1,2-Tetrachloroethane	1.0	U	1.0	0.20	
71-55-6	1,1,1-Trichloroethane (TCA)	1.0	U	1.0	0.23	
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U	1.0	0.20	
79-00-5	1,1,2-Trichloroethane	1.0	U	1.0	0.23	
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	1.0	U	1.0	0.31	
75-34-3	1,1-Dichloroethane (1,1-DCA)	1.0	U	1.0	0.20	
75-35-4	1,1-Dichloroethene (1,1-DCE)	1.0	U	1.0	0.29	
87-61-6	1,2,3-Trichlorobenzene	**0.21**	**J**	1.0	0.20	
120-82-1	1,2,4-Trichlorobenzene	1.0	U	1.0	0.26	
95-50-1	1,2-Dichlorobenzene	1.0	U	1.0	0.20	
107-06-2	1,2-Dichloroethane	1.0	U	1.0	0.20	
78-87-5	1,2-Dichloropropane	1.0	U	1.0	0.28	
541-73-1	1,3-Dichlorobenzene	1.0	U	1.0	0.20	
106-46-7	1,4-Dichlorobenzene	1.0	U	1.0	0.20	
67-64-1	Acetone	5.0	U	5.0	0.98	
71-43-2	Benzene	1.0	U	1.0	0.21	
108-86-1	Bromobenzene	1.0	U	1.0	0.20	
74-97-5	Bromochloromethane	5.0	U	5.0	0.28	
75-27-4	Bromodichloromethane	1.0	U	1.0	0.20	
75-25-2	Bromoform	1.0	U	1.0	0.27	
74-83-9	Bromomethane	1.0	U	1.0	0.31	
56-23-5	Carbon Tetrachloride	1.0	U	1.0	0.27	
108-90-7	Chlorobenzene	1.0	U	1.0	0.20	
75-00-3	Chloroethane	1.0	U	1.0	0.31	
67-66-3	Chloroform	1.0	U	1.0	0.22	
74-87-3	Chloromethane	1.0	U	1.0	0.24	
124-48-1	Dibromochloromethane	1.0	U	1.0	0.20	
74-95-3	Dibromomethane	1.0	U	1.0	0.25	
75-71-8	Dichlorodifluoromethane (CFC 12)	1.0	U	1.0	0.56	
75-09-2	Methylene Chloride	1.0	U	1.0	0.22	
100-41-4	Ethylbenzene	1.0	U	1.0	0.20	
1634-04-4	Methyl tert-Butyl Ether	1.0	U	1.0	0.20	
127-18-4	Tetrachloroethene (PCE)	1.0	U	1.0	0.20	
109-99-9	Tetrahydrofuran (THF)	5.0	U	5.0	0.66	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	R1104005
Project:	IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Analyzed:	7/22/11 07:06
Sample Name:	Method Blank	**Units:**	µg/L
Lab Code:	RQ1107023-04	**Basis:**	NA

Volatile Organic Compounds by GC/MS

Analytical Method:	8260C	**Analysis Lot:**	254314
Data File Name:	J:\ACQUDATA\msvoa12\Data\072111\U9346.D\	**Instrument Name:**	R-MS-12
		Dilution Factor:	1

CAS No.	Analyte Name	Result	Q	MRL	MDL	Note
108-88-3	Toluene	1.0	U	1.0	0.20	
79-01-6	Trichloroethene (TCE)	1.0	U	1.0	0.23	
75-69-4	Trichlorofluoromethane (CFC 11)	1.0	U	1.0	0.20	
75-01-4	Vinyl Chloride	1.0	U	1.0	0.23	
1330-20-7	Xylenes, Total	2.0	U	2.0	0.40	
156-59-2	cis-1,2-Dichloroethene	1.0	U	1.0	0.20	
10061-01-5	cis-1,3-Dichloropropene	1.0	U	1.0	0.20	
179601-23-1	m,p-Xylenes	2.0	U	2.0	0.20	
95-47-6	o-Xylene	1.0	U	1.0	0.20	
156-60-5	trans-1,2-Dichloroethene	1.0	U	1.0	0.20	
10061-02-6	trans-1,3-Dichloropropene	1.0	U	1.0	0.20	
354-23-4	1,2-Dichloro-1,1,2-trifluoroethane (CFC 123a)	1.0	U	1.0	0.35	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Q
4-Bromofluorobenzene	112	85-122	7/22/11 07:06	
Dibromofluoromethane	103	89-116	7/22/11 07:06	
Toluene-d8	112	87-121	7/22/11 07:06	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IBM Corporation
Project: IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856
Sample Matrix: Water

Service Request: R1104005
Date Analyzed: 7/21/11

Lab Control Sample Summary
Volatile Organic Compounds by GC/MS

Analytical Method: 8260C

Units: µg/L
Basis: NA

Analysis Lot: 254317

Analyte Name	Lab Control Sample RQ1106988-03 Result	Spike Amount	% Rec	% Rec Limits
1,1,1,2-Tetrachloroethane	19.6	20.0	98	77 - 122
1,1,1-Trichloroethane (TCA)	18.3	20.0	92	72 - 128
1,1,2,2-Tetrachloroethane	20.1	20.0	100	72 - 131
1,1,2-Trichloroethane	19.0	20.0	95	80 - 122
1,1,2-Trichloro-1,2,2-trifluoroethane	18.8	20.0	94	68 - 136
1,1-Dichloroethane (1,1-DCA)	20.1	20.0	100	76 - 124
1,1-Dichloroethene (1,1-DCE)	19.3	20.0	96	72 - 129
1,2,3-Trichlorobenzene	23.4	20.0	117	68 - 135
1,2,4-Trichlorobenzene	21.9	20.0	110	70 - 133
1,2-Dichlorobenzene	19.7	20.0	99	79 - 124
1,2-Dichloroethane	19.5	20.0	97	73 - 127
1,2-Dichloropropane	19.9	20.0	100	80 - 123
1,3-Dichlorobenzene	20.5	20.0	103	78 - 124
1,4-Dichlorobenzene	20.4	20.0	102	78 - 123
Acetone	17.4	20.0	87	54 - 139
Benzene	19.8	20.0	99	78 - 121
Bromobenzene	19.9	20.0	99	79 - 120
Bromochloromethane	19.4	20.0	97	80 - 124
Bromodichloromethane	19.3	20.0	96	80 - 125
Bromoform	21.2	20.0	106	68 - 130
Bromomethane	19.7	20.0	99	57 - 144
Carbon Tetrachloride	18.4	20.0	92	68 - 133
Chlorobenzene	19.8	20.0	99	80 - 121
Chloroethane	20.0	20.0	100	71 - 130
Chloroform	20.3	20.0	102	78 - 125
Chloromethane	19.8	20.0	99	61 - 138
Dibromochloromethane	19.2	20.0	96	78 - 133
Dibromomethane	19.6	20.0	98	79 - 120
Dichlorodifluoromethane (CFC 12)	22.0	20.0	110	45 - 159
Methylene Chloride	19.2	20.0	96	75 - 125
Ethylbenzene	21.3	20.0	106	78 - 123
Methyl tert-Butyl Ether	19.4	20.0	97	75 - 126

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IBM Corporation
Project: IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856
Sample Matrix: Water

Service Request: R1104005
Date Analyzed: 7/21/11

Lab Control Sample Summary
Volatile Organic Compounds by GC/MS

Analytical Method: 8260C

Units: µg/L
Basis: NA

Analysis Lot: 254317

Lab Control Sample
RQ1106988-03

Analyte Name	Result	Spike Amount	% Rec	% Rec Limits
Tetrachloroethene (PCE)	20.0	20.0	100	72 - 131
Tetrahydrofuran (THF)	16.9	20.0	84	64 - 129
Toluene	20.5	20.0	102	78 - 122
Trichloroethene (TCE)	19.5	20.0	98	74 - 127
Trichlorofluoromethane (CFC 11)	20.4	20.0	102	69 - 141
Vinyl Chloride	21.3	20.0	106	72 - 138
Xylenes, Total	61.6	60.0	103	78 - 119
cis-1,2-Dichloroethene	20.3	20.0	101	78 - 122
cis-1,3-Dichloropropene	19.8	20.0	99	77 - 125
m,p-Xylenes	40.8	40.0	102	79 - 126
o-Xylene	20.8	20.0	104	77 - 118
trans-1,2-Dichloroethene	19.3	20.0	97	75 - 121
trans-1,3-Dichloropropene	19.5	20.0	98	69 - 127
1,2-Dichloro-1,1,2-trifluoroethane (CFC 123a)	17.9	20.0	90	64 - 131

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IBM Corporation
Project: IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856
Sample Matrix: Water

Service Request: R1104005
Date Analyzed: 7/22/11

Lab Control Sample Summary
Volatile Organic Compounds by GC/MS

Analytical Method: 8260C

Units: µg/L
Basis: NA

Analysis Lot: 254314

Lab Control Sample
RQ1107023-03

Analyte Name	Result	Spike Amount	% Rec	% Rec Limits
1,1,1,2-Tetrachloroethane	21.6	20.0	108	77 - 122
1,1,1-Trichloroethane (TCA)	21.4	20.0	107	72 - 128
1,1,2,2-Tetrachloroethane	19.4	20.0	97	72 - 131
1,1,2-Trichloroethane	20.1	20.0	100	80 - 122
1,1,2-Trichloro-1,2,2-trifluoroethane	21.4	20.0	107	68 - 136
1,1-Dichloroethane (1,1-DCA)	21.8	20.0	109	76 - 124
1,1-Dichloroethene (1,1-DCE)	21.9	20.0	109	72 - 129
1,2,3-Trichlorobenzene	24.6	20.0	123	68 - 135
1,2,4-Trichlorobenzene	23.9	20.0	119	70 - 133
1,2-Dichlorobenzene	21.1	20.0	106	79 - 124
1,2-Dichloroethane	19.9	20.0	99	73 - 127
1,2-Dichloropropane	21.3	20.0	106	80 - 123
1,3-Dichlorobenzene	21.8	20.0	109	78 - 124
1,4-Dichlorobenzene	21.8	20.0	109	78 - 123
Acetone	16.5	20.0	82	54 - 139
Benzene	22.0	20.0	110	78 - 121
Bromobenzene	21.3	20.0	107	79 - 120
Bromochloromethane	20.9	20.0	105	80 - 124
Bromodichloromethane	20.7	20.0	103	80 - 125
Bromoform	20.5	20.0	103	68 - 130
Bromomethane	21.0	20.0	105	57 - 144
Carbon Tetrachloride	19.8	20.0	99	68 - 133
Chlorobenzene	22.4	20.0	112	80 - 121
Chloroethane	22.5	20.0	113	71 - 130
Chloroform	22.4	20.0	112	78 - 125
Chloromethane	21.7	20.0	108	61 - 138
Dibromochloromethane	19.5	20.0	98	78 - 133
Dibromomethane	19.9	20.0	99	79 - 120
Dichlorodifluoromethane (CFC 12)	24.7	20.0	124	45 - 159
Methylene Chloride	20.6	20.0	103	75 - 125
Ethylbenzene	23.3	20.0	116	78 - 123
Methyl tert-Butyl Ether	19.8	20.0	99	75 - 126

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IBM Corporation
Project: IBM EF Non-Routine - 7/13-14/11/BASE AGREEMENT # 4908029856
Sample Matrix: Water

Service Request: R1104005
Date Analyzed: 7/22/11

Lab Control Sample Summary
Volatile Organic Compounds by GC/MS

Analytical Method: 8260C

Units: µg/L
Basis: NA

Analysis Lot: 254314

Analyte Name	Lab Control Sample RQ1107023-03 Result	Spike Amount	% Rec	% Rec Limits
Tetrachloroethene (PCE)	21.9	20.0	109	72 - 131
Tetrahydrofuran (THF)	16.6	20.0	83	64 - 129
Toluene	23.0	20.0	115	78 - 122
Trichloroethene (TCE)	22.1	20.0	110	74 - 127
Trichlorofluoromethane (CFC 11)	22.8	20.0	114	69 - 141
Vinyl Chloride	23.8	20.0	119	72 - 138
Xylenes, Total	68.9	60.0	115	78 - 119
cis-1,2-Dichloroethene	22.7	20.0	113	78 - 122
cis-1,3-Dichloropropene	18.5	20.0	93	77 - 125
m,p-Xylenes	45.8	40.0	114	79 - 126
o-Xylene	23.2	20.0	116	77 - 118
trans-1,2-Dichloroethene	20.9	20.0	105	75 - 121
trans-1,3-Dichloropropene	18.3	20.0	91	69 - 127
1,2-Dichloro-1,1,2-trifluoroethane (CFC 123a)	20.0	20.0	100	64 - 131

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Columbia Analytical Services™ CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

1 Mustard Street, Suite 250, Rochester, NY 14609 | 585.288.5380 | 800.695.7222 | 585.288.8475 (fax) PAGE _____ OF _____

Project Name: IBM EAST FISHKILL	Project Number: NON-ROUTINE
Project Manager: M.MADISON	Report CC: Ed Stoner, Jackie Braungart
Company/Address: 2070 ROUTE 52, HOPEWELL JCT., NY 12533	
Phone #: 845.894.8544	E-mail:
Sampler's Signature: Ed Stoner	Sampler's Printed Name: Ed Stoner

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	PRESERVATIVE	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608	PCB's ☐ 8082 ☐ 608	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	REMARKS/ ALTERNATE DESCRIPTION
TRIP BLANK		7-13-11	9:53	GW	3/44	ML HCL						8260		
GW-032B PumpTest		7/13/11	1030		3/44	ML HCL						8260		
GW-032B PumpTest		7/13/11	1200		3/44	ML HCL						8260		
GW-032B PumpTest		7/13/11	1800		3/44	ML HCL						8260		
GW-032B PumpTest		7/14/11	1000		3/44	ML HCL						8260		
GW-032B PumpTest		7/14/11	1400		3/44	ML HCL						8260		
~~GW-032B PumpTest~~	CES				3/44	ML HCL						8260		
~~GW-032B PumpTest~~	CES				3/44	ML HCL						8260		

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

SPECIAL INSTRUCTIONS/COMMENTS
Metals

P.O. # 5003762208

See QAPP ☐

TURNAROUND REQUIREMENTS
X RUSH (SURCHARGES APPLY)
____1 day ____2 day ____3 day
____4 day ____5 day
____Standard 14 DAY

REQUESTED REPORT DATE
7/31/2011

REPORT REQUIREMENTS
____ I. Results Only
✓ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data

Edata ____ Yes ____ No

INVOICE INFORMATION
PO #:
BILL TO:

R1104005
IBM Corporation
IBM EF Non-Routine - 7/13-14/11

STATE WHERE SAMPLES WERE COLLECTED:

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	
Signature: Ed Stoner CES	Signature: B. Mazzetti	Signature:	Signature: Amy Hentschke	Signature:	Signature:
Printed Name: Ed Stoner	Printed Name: B. MAZZETTI	Printed Name:	Printed Name: Amy Hentschke	Printed Name:	Printed Name:
Firm: GSC	Firm: CAS	Firm:	Firm: CAS	Firm:	Firm:
Date/Time: 7/14/11 1430	Date/Time: 7-14-11 14:30	Date/Time:	Date/Time: 7/19/11 1315	Date/Time:	Date/Time:

Distribution: White - Lab Copy; Yellow - Return To Originator

SCOC Rev. 10/2010

Cooler Receipt And Preservation Check Form

Project/Client IBM Folder Number R110405

Cooler received on 7/19/11 by: AHH COURIER: (CAS) UPS FEDEX VELOCITY CLIENT

1.	Were custody seals on outside of cooler?		YES	(NO)		
2.	Were custody papers properly filled out (ink, signed, etc.)?		(YES)	NO		
3.	Did all bottles arrive in good condition (unbroken)?		(YES)	NO		
4.	Did VOA vials, Alkalinity, or Sulfide have significant* air bubbles?	YES	(NO)	N/A		
5.	Were Ice or Ice packs present?	(YES)	NO			
6.	Where did the bottles originate?	CAS/ROC, (CLIENT)				
7.	Temperature of cooler(s) upon receipt:	4.6°	6.3°			
	Is the temperature within 0° - 6° C?:	(Yes)	(Yes)	Yes	Yes	Yes
	If No, Explain Below	No	No	No	No	No

Date/Time Temperatures Taken: 7/19/11 1322

Thermometer ID: IR GUN#3 / (IR GUN#4) Reading From: Temp Blank / (Sample Bottle)

If out of Temperature, note packing/ice condition, Client Approval to Run Samples: _____

PC Secondary Review: C 7/19/11

Cooler Breakdown: Date: 7/20/11 Time: 0755 by: BD

1.	Were all bottle labels complete (*i.e.* analysis, preservation, etc.)?	(YES)	NO
2.	Did all bottle labels and tags agree with custody papers?	YES	(NO) *
3.	Were correct containers used for the tests indicated?	(YES)	NO
4.	Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated		(N/A)

Explain any discrepancies: _____

pH	Reagent	YES	NO	Lot Received	Exp
≥12	NaOH				
≤2	HNO_3				
≤2	H_2SO_4				
Residual Chlorine (-)	For TCN and Phenol			If present, contact PM to add ascorbic acid	
	$Na_2S_2O_3$	-	-		
	Zn Aceta	-	-		
	HCl	*	*	client	

Sample ID	Vol. Added	Lot Added	Final pH

*Not to be tested before analysis – pH tested and recorded by VOAs or GenChem on a separate worksheet

Yes = All samples OK

No = Samples were preserved at lab as listed

PM OK to Adjust: _____

Bottle lot numbers: client

Other Comments:

* loc. -006 bottle says it was sampled @ 1415, C.O.C. says 1400. C.O.C. followed.

C Secondary Review: C 7/21/11

*significant air bubbles: VOA > 5-6 mm, WC > 1

00026

Columbia Analytical Services™ 1565 Jefferson Rd, Building 300, Suite 360 | Rochester, NY 14623 | 585-288-5380 | 585-288-8475 fax |

August 08, 2011 Service Request No: R1104007

Mr. Keith Vinal
IBM Corporation
2070 Route 52
BLG 300 Z4A1
Hopewell Junction, NY 12533

Laboratory Results for: IBM EF Non-Routine - 7/14/11/BASE AGREEMENT # 490802985

Dear Mr. Vinal:

Enclosed are the results of the sample(s) submitted to our laboratory on July 19, 2011. For your reference, these analyses have been assigned our service request number **R1104007**.

All analyses were performed according to our laboratory's quality assurance program. The test results meet requirements of the NELAP standards except as noted in the case narrative report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report. The measurement uncertainty of the results included in this report is within that expected when using the prescribed method(s) for analysis of these samples, and represented by Laboratory Control Sample control limits. Any events, such as QC failures, which may add to the uncertainty are explained in the report narrative.

Please contact me if you have any questions. My extension is 7470. You may also contact me via email at CBeechler@caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Carlton Beechler
Project Manager

CASE NARRATIVE

This report contains analytical results for the following samples:
Service Request Number: R1104007

Lab ID	Client ID
R1104007-001	GW-032B Pump Test
R1104007-002	GW-032B Pump Test DISSOLVED

All samples were received in good condition unless otherwise noted on the cooler receipt and preservation check form located at the end of this report.

All samples were preserved in accordance with approved analytical methods.

All samples have been analyzed by the approved methods cited on the analytical results pages.

All holding times and associated QC were within limits.

No analytical or QC problems were encountered.

All sampling activities performed by CAS personnel have been in accordance with "CAS Field Procedures and Measurements Manual" or by client specifications.

Samples have been subcontracted to the following laboratory(ies). The subcontractor's analytical report is attached:

EnviroTest Laboratories, Inc
Newburgh, NY

Columbia Analytical Services™

REPORT QUALIFIERS

U	Analyte was analyzed for but not detected. The sample quantitation limit has been corrected for dilution and for percent moisture, unless otherwise noted in the case narrative.
J	Estimated value due to either being a Tentatively Identified Compound (TIC) or that the concentration is between the MRL and the MDL. Concentrations are not verified within the linear range of the calibration. For DoD: concentration >40% difference between two GC columns (pesticides/Arclors).
B	Analyte was also detected in the associated method blank at a concentration that may have contributed to the sample result.
E	Inorganics- Concentration is estimated due to the serial dilution was outside control limits.
E	Organics- Concentration has exceeded the calibration range for that specific analysis.
D	Concentration is a result of a dilution, typically a secondary analysis of the sample due to exceeding the calibration range or that a surrogate has been diluted out of the sample and cannot be assessed.
*	Indicates that a quality control parameter has exceeded laboratory limits. Under the "Notes" column of the Form I, this qualifier denotes analysis was performed out of Holding Time.
H	Analysis was performed out of hold time for tests that have an "immediate" hold time criteria.
#	Spike was diluted out.
+	Correlation coefficient for MSA is <0.995.
N	Inorganics- Matrix spike recovery was outside laboratory limits.
N	Organics- Presumptive evidence of a compound (reported as a TIC) based on the MS library search.
S	Concentration has been determined using Method of Standard Additions (MSA).
W	Post-Digestion Spike recovery is outside control limits and the sample absorbance is <50% of the spike absorbance.
P	Concentration >40% (25% for CLP) difference between the two GC columns.
C	Confirmed by GC/MS
Q	DoD reports: indicates a pesticide/Aroclor is not confirmed (≥100% Difference between two GC columns).
X	See Case Narrative for discussion.

ACCREDITED IN ACCORDANCE WITH nelac

CAS/Rochester Lab ID # for State Certifications[1]

NELAP Accredited
Connecticut ID # PH0556
Delaware Accredited
DoD ELAP #65817
Florida ID # E87674
Illinois ID #200047
Maine ID #NY0032
Nebraska Accredited
Nevada ID # NY-00032
New Jersey ID # NY004
New York ID # 10145
New Hampshire ID # 294100 A/B
Pennsylvania ID# 68-786
Rhode Island ID # 158

[1] Analyses were performed according to our laboratory's NELAP-approved quality assurance program and any applicable state requirements. The test results meet requirements of the current NELAP standards or state requirements, where applicable, except as noted in the laboratory case narrative provided. For a specific list of accredited analytes, refer to the certifications section at www.caslab.com.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	R1104007
Project:	IBM EF Non-Routine - 7/14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	7/14/11 1000
Sample Matrix:	Water	**Date Received:**	7/19/11
Sample Name:	GW-032B Pump Test		
Lab Code:	R1104007-001	**Basis:**	NA

General Chemistry Parameters

Analyte Name	Method	Result	Q	Units	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Note
Alkalinity as CaCO3, Total	SM 2320 B	**308**		mg/L	2.0	0.6	1	NA	7/26/11 09:30	
Ammonia as Nitrogen	350.1	**0.056**		mg/L	0.050	0.004	1	NA	7/27/11 12:58	
Carbon, Total Organic (TOC)	SM20 5310 C	**5.2**		mg/L	1.0	0.4	1	NA	8/2/11 22:59	
Chloride	300.0	**909**		mg/L	40	38	200	NA	7/29/11 02:42	
Fluoride	300.0	**0.15**		mg/L	0.10	0.02	1	NA	7/21/11 05:19	
Hardness, Total as CaCO3	SM 2340 C	**543**		mg/L	29	10	1	NA	7/22/11 09:30	
Sulfate	300.0	**36.8**		mg/L	2.0	1.2	10	NA	7/28/11 12:21	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	R1104007
Project:	IBM EF Non-Routine - 7/14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	7/14/11 1000
Sample Matrix:	Water	**Date Received:**	7/19/11
Sample Name:	GW-032B Pump Test		
Lab Code:	R1104007-001	**Basis:**	NA

Inorganic Parameters

Analyte Name	Method	Result	Q	Units	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Note
Calcium, Total	200.7	**166**		mg/L	1.0	0.2	1	7/21/11	7/28/11 23:36	
Iron, Total	200.7	**0.05**	J	mg/L	0.10	0.02	1	7/21/11	7/28/11 23:36	
Magnesium, Total	200.7	**37.0**		mg/L	1.0	0.009	1	7/21/11	7/28/11 23:36	
Manganese, Total	200.7	**0.048**		mg/L	0.010	0.0006	1	7/21/11	8/4/11 10:48	
Potassium, Total	200.7	**4.0**		mg/L	2.0	0.2	1	7/21/11	8/4/11 10:48	
Sodium, Total	200.7	**458**		mg/L	5.0	0.6	5	7/21/11	8/4/11 10:42	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	R1104007
Project:	IBM EF Non-Routine - 7/14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	7/14/11 1000
Sample Matrix:	Water	**Date Received:**	7/19/11
Sample Name:	GW-032B Pump Test DISSOLVED		
Lab Code:	R1104007-002	**Basis:**	NA

Inorganic Parameters

Analyte Name	Method	Result	Q	Units	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Note
Iron, Dissolved	200.7	**0.06**	J	mg/L	0.10	0.02	1	7/21/11	7/28/11 23:42	
Manganese, Dissolved	200.7	**0.046**		mg/L	0.010	0.0006	1	7/21/11	8/4/11 10:54	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	R1104007
Project:	IBM EF Non-Routine - 7/14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank		
Lab Code:	R1104007-MB	**Basis:**	NA

General Chemistry Parameters

Analyte Name	Method	Result	Q	Units	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Note
Alkalinity as CaCO3, Total	SM 2320 B	**1.0**	J	mg/L	2.0	0.6	1	NA	7/26/11 09:30	
Ammonia as Nitrogen	350.1	0.050	U	mg/L	0.050	0.004	1	NA	7/27/11 12:38	
Carbon, Total Organic (TOC)	SM20 5310 C	1.0	U	mg/L	1.0	0.4	1	NA	8/2/11 15:34	
Chloride	300.0	0.20	U	mg/L	0.20	0.19	1	NA	7/29/11 01:59	
Fluoride	300.0	0.10	U	mg/L	0.10	0.02	1	NA	7/21/11 00:35	
Hardness, Total as CaCO3	SM 2340 C	2.0	U	mg/L	2.0	0.7	1	NA	7/22/11 09:30	
Sulfate	300.0	0.20	U	mg/L	0.20	0.12	1	NA	7/28/11 08:12	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IBM Corporation	**Service Request:**	R1104007
Project:	IBM EF Non-Routine - 7/14/11/BASE AGREEMENT # 4908029856	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank		
Lab Code:	R1104007-MB	**Basis:**	NA

Inorganic Parameters

Analyte Name	Method	Result	Q	Units	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Note
Calcium, Total	200.7	1.0	U	mg/L	1.0	0.2	1	7/21/11	7/28/11 21:21	
Iron, Dissolved	200.7	0.10	U	mg/L	0.10	0.02	1	7/21/11	7/28/11 21:21	
Iron, Total	200.7	0.10	U	mg/L	0.10	0.02	1	7/21/11	7/28/11 21:21	
Magnesium, Total	200.7	1.0	U	mg/L	1.0	0.009	1	7/21/11	7/28/11 21:21	
Manganese, Dissolved	200.7	0.010	U	mg/L	0.010	0.0006	1	7/21/11	8/4/11 09:11	
Manganese, Total	200.7	0.010	U	mg/L	0.010	0.0006	1	7/21/11	8/4/11 09:11	
Potassium, Total	200.7	2.0	U	mg/L	2.0	0.2	1	7/21/11	8/4/11 09:11	
Sodium, Total	200.7	1.0	U	mg/L	1.0	0.2	1	7/21/11	8/4/11 09:11	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IBM Corporation
Project: IBM EF Non-Routine - 7/14/11/BASE AGREEMENT # 4908029856
Sample Matrix: Water

Service Request: R1104007
Date Analyzed: 7/21/11 - 8/ 2/11

Lab Control Sample Summary
General Chemistry Parameters

Units: mg/L
Basis: NA

Analyte Name	Method	Lab Control Sample R1104007-LCS Result	Spike Amount	% Rec	% Rec Limits
Ammonia as Nitrogen	350.1	0.518	0.500	104	90 - 110
Carbon, Total Organic (TOC)	SM20 5310 C	10.2	10.0	102	86 - 117
Chloride	300.0	2.09	2.00	105	90 - 110
Fluoride	300.0	1.07	1.00	107	90 - 110
Sulfate	300.0	2.09	2.00	104	90 - 110
Alkalinity as CaCO3, Total	SM 2320 B	20.1	20.0	101	72 - 115
Hardness, Total as CaCO3	SM 2340 C	18.9	20.0	95	92 - 110

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IBM Corporation
Project: IBM EF Non-Routine - 7/14/11/BASE AGREEMENT # 4908029856
Sample Matrix: Water

Service Request: R1104007
Date Analyzed: 7/28/11 - 8/ 4/11

Lab Control Sample Summary
Inorganic Parameters

Units: mg/L
Basis: NA

Analyte Name	Method	Lab Control Sample R1104007-LCS Result	Spike Amount	% Rec	% Rec Limits
Calcium, Total	200.7	1.97	2.0	98	85 - 115
Iron, Dissolved	200.7	1.03	1.00	103	85 - 115
Iron, Total	200.7	1.03	1.00	103	85 - 115
Magnesium, Total	200.7	2.04	2.0	102	85 - 115
Manganese, Dissolved	200.7	0.502	0.500	100	85 - 115
Manganese, Total	200.7	0.502	0.500	100	85 - 115
Potassium, Total	200.7	19.0	20.0	95	85 - 115
Sodium, Total	200.7	19.6	20.0	98	85 - 115

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Columbia Analytical Services™ CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

1 Mustard Street, Suite 250, Rochester, NY 14609 | 585.288.5380 | 800.695.7222 | 585.288.8475 (fax) PAGE _____ OF _____

Project Name: IBM EAST FISHKILL	Project Number: NON-ROUTINE
Project Manager: M.MADISON	Report CC: Ed Stoner, Jackie Braungart
Company/Address: 2070 ROUTE 52, HOPEWELL JCT.,NY 12533	
Phone #: 845.894.8544	E-mail:
Sampler's Signature: Ed Stoner	Sampler's Printed Name: Ed Stoner

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	PRESERVATIVE	GC/MS VOA's ☐ 8260 ☐ 624 ☐ CLP	GC/MS SVOA's ☐ 8270 ☐ 625	GC VOA's ☐ 8021 ☐ 601/602	PESTICIDES ☐ 8081 ☐ 608	PCB's ☐ 8082 ☐ 608	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	REMARKS/ ALTERNATE DESCRIPTION
GW-032B PumpTest		7/14/11	1000	GW	1	500 ML UNP								Sulfate,FL,CL
		7/14/11	1000	GW	1	250 UNP								Tot ALK
		7/14/11	1000	GW	1	250 H2SO4								NH3/N
		7/14/11	1000	GW	1	1000 UNP								TSS/TDS (ETL)
		7/14/11	1000	GW	1	250 UNP								NO2/N, NO3/N (ETL)
		7/14/11	1000	GW	3	44ml H2SO4								TOC
		7/14/11	1000	GW	1	250ml HNO3								Total Ca, K, Na, Mg, Mn, Fe
		7/14/11	1000	GW	1	250ml HNO3								Total Hardness
		7/14/11	1000	GW	1	250 ml HNO3								Dissolved Iron, Manganese

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

SPECIAL INSTRUCTIONS/COMMENTS
Metals

P.O. # 5003782208

See QAPP ☐

TURNAROUND REQUIREMENTS
_____ RUSH (SURCHARGES APPLY)
____1 day ____2 day ____3 day
____4 day ____5 day
_____Standard

REQUESTED REPORT DATE
7/31/2011

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with F

Edata ____ Yes ____ N

INVOICE INFORMATION
PO #:
BILL TO:

R1104007
IBM Corporation
IBM EF Non-Routine - 7/14/11

STATE WHERE SAMPLES WERE COLLECTED:

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	
Signature: Ed Stoner	Signature:	Signature:	Signature:	Signature:	Signature:
Printed Name: Ed Stoner	Printed Name: M.MADISON	Printed Name:	Printed Name: Amy Hentschke	Printed Name:	Printed Name:
Firm: GSC	Firm: CAS	Firm:	Firm: CAS	Firm:	Firm:
Date/Time: 7/14/2011 1035	Date/Time: 7/14/11 1835	Date/Time:	Date/Time: 7/19/11 1315	Date/Time:	Date/Time:

Distribution: White - Lab Copy; Yellow - Return To Originator

SCOC Rev. 10/2010

Cooler Receipt And Preservation Check Form

Project/Client IBM Folder Number R1104005

Cooler received on 7/19/11 by: AHH COURIER: (CAS) UPS FEDEX VELOCITY CLIENT

1.	Were custody seals on outside of cooler?		YES	(NO)		
2.	Were custody papers properly filled out (ink, signed, etc.)?		(YES)	NO		
3.	Did all bottles arrive in good condition (unbroken)?		(YES)	NO		
4.	Did VOA vials, Alkalinity, or Sulfide have significant* air bubbles?		YES	(NO)	N/A	
5.	Were Ice or Ice packs present?		(YES)	NO		
6.	Where did the bottles originate?		CAS/ROC, (CLIENT)			
7.	Temperature of cooler(s) upon receipt:	4.6°	6.3°			
	Is the temperature within 0° - 6° C?:	(Yes)	(Yes)	Yes	Yes	Yes
	If No, Explain Below	No	No	No	No	No

Date/Time Temperatures Taken: 7/19/11 1322

Thermometer ID: IR GUN#3 / (IR GUN#4) Reading From: Temp Blank / (Sample Bottle)

If out of Temperature, note packing/ice condition, Client Approval to Run Samples: _____

PC Secondary Review: _____ 7/19/11

Cooler Breakdown: Date: 7/20/11 Time: 0817 by: BD

1.	Were all bottle labels complete (*i.e.* analysis, preservation, etc.)?	(YES)	NO
2.	Did all bottle labels and tags agree with custody papers?	(YES)	NO
3.	Were correct containers used for the tests indicated?	(YES)	NO

4. Air Samples: Cassettes / Tubes Intact Canisters Pressurized Tedlar® Bags Inflated (N/A)

Explain any discrepancies: _____

pH	Reagent	YES	NO	Lot Received	Exp
≥12	NaOH				
≤2	HNO_3	✓		client	
≤2	H_2SO_4	✓		client	
Residual Chlorine (-)	For TCN and Phenol			If present, contact PM to add ascorbic acid	
	$Na_2S_2O_3$	-	-		
	Zn Aceta	-	-		
	HCl	*	*		

Sample ID	Vol. Added	Lot Added	Final pH

*Not to be tested before analysis – pH tested and recorded by VOAs or GenChem on a separate worksheet

Yes = All samples OK

No = Samples were preserved at lab as listed

PM OK to Adjust: _____

Bottle lot numbers: client, 050211-2R, 080910-2FF

Other Comments: _____

C 7/21/11

C Secondary Review: _____

*significant air bubbles: VOA > 5-6 mm ; WC >1 in. dia.

ANALYTICAL REPORT

Job Number: 420-45673-1

SDG Number: Pump Test (07/14/11)

Job Description: CAS

For:
CAS
Mark Madison
BLD325
2070 Route 52
Hopewell Junction, NY 12533

Attention: Carl Beechler

Meredith Ruthven

Meredith W Ruthven
Customer Service Manager
mruthven@envirotestlaboratories.com
07/28/2011

cc: Jackie Braungart
Mr. Mark Madison
Mr. Keith Vinal

EnviroTest Laboratories, Inc. Certifications and Approvals: NELAP Accredited, NYSDOH 10142, NJDEP NY015, CTDOPH PH-0554, EPA NY00049.

METHOD SUMMARY

Client: CAS

Job Number: 420-45673-1
Sdg Number: Pump Test (07/14/11)

Description	Lab Location	Method	Preparation Method
Matrix Water			
Anions by Ion Chromatography	EnvTest	MCAWW 300.0	
Total Dissolved Solids (Dried at 180 °C)	EnvTest	SM18 SM 2540C	
Total Suspended Solids Dried at 103-105°C	EnvTest	SM18 SM 2540D	
Nitrite by Colormetric	EnvTest	SM20 SM 4500B	

Lab References:

EnvTest = EnviroTest

Method References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM18 = "Standard Methods For The Examination Of Water And Wastewater", 18th Edition, 1992.

SM20 = "Standard Methods For The Examination Of Water And Wastewater", 20th Edition."

METHOD / ANALYST SUMMARY

Client: CAS

Job Number: 420-45673-1
Sdg Number: Pump Test (07/14/11)

Method	Analyst	Analyst ID
MCAWW 300.0	Savage, Lisa M	LMS
SM18 SM 2540C	Givler, Justin	JG
SM18 SM 2540D	Givler, Justin	JG
SM20 SM 4500B	Savage, Lisa M	LMS

SAMPLE SUMMARY

Client: CAS

Job Number: 420-45673-1
Sdg Number: Pump Test (07/14/11)

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
420-45673-1	GW-032B Pumptest	Water	07/14/2011 1000	07/14/2011 1545

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Client Sample ID: GW-032B Pumptest
Lab Sample ID: 420-45673-1

Date Sampled: 07/14/2011 1000
Date Received: 07/14/2011 1545
Client Matrix: Water

Analyte	Result/Qualifier		Unit	RL	RL	Dilution
Method: 300.0			Date Analyzed:	07/14/2011 1734		
Nitrate as N	2.8		mg/L	0.010	0.010	1.0
Method: SM 2540C			Date Analyzed:	07/18/2011 0931		
Total Dissolved Solids	2100		mg/L	5.0	5.0	1.0
Method: SM 2540D			Date Analyzed:	07/19/2011 1110		
Total Suspended Solids	1.0	U	mg/L	1.0	1.0	1.0
Method: SM 4500B			Date Analyzed:	07/15/2011 1510		
Nitrite as N	0.010	U	mg/L	0.010	0.010	1.0

DATA REPORTING QUALIFIERS

Client: CAS

Job Number: 420-45673-1
Sdg Number: Pump Test (07/14/11)

Lab Section	Qualifier	Description
General Chemistry		
	U	The analyte was analyzed for but not detected at or above the stated limit.

EnviroTest Laboratories Inc.

CHAIN OF CUSTODY

315 Fullerton Avenue
Newburgh, NY 12550
TEL (845) 562-0890
FAX (845) 562-0841

CUSTOMER NAME: Columbia Analytical Services
ADDRESS: 2070 Route 52
CITY, STATE: Hopewell Jct., NY 12533
NAME OF CONTACT: Mark Madison PHONE NO. 845.894.8614
PROJECT LOCATION: East Fishkill
PROJECT NUMBER / PO NO.: 401524

REPORT TYPE
STANDARD ☒ ISRA ☐
NJ REG ☐
NYASP A ☐ B ☐ CLP ☐
OTHER ____

TURNAROUND
☒ NORMAL ____
☐ QUICK ____
☐ VERBAL ____

REPORT # (Lab Use Only)
15673

SAMPLE TEMP. 4.4 C
SAMPLE REC'D ON ICE ☐ Y ☐ N
ph CHECK ☐ Y ☐ N
CHLORINE (RESIDUAL) ☐ Y ☐ N
REVIEWED BY: ____

NY PUBLIC WATER SUPPLIES
SOURCE ID ___ ___ ___
ELAP TYPE ___ ___ ___
FEDERAL ID ___ ___ ___ ___ ___ ___ ___ ___ ___

NOTE: SAMPLE TEMPERATURE UPON RECEIPT MUST BE 4° ± 2°C.

Matrix
DW = DRINKING WATER S = SOIL O = OIL
WW = WASTE WATER SL = SLUDGE GW = GROUND WATER

ETL #	SAMPLING DATE	TIME (AM/PM)	COMP	GRAB	MATRIX	CLIENT I.D.	Total Number of Containers	40ml Glass HCL	Liter Amber HCL	250ml Amber Sulfuric	Liter Amber Organic Washed	250ml Plastic Nitric Acid	250ml Plastic Sodium Hydroxide	Liter Plastic	Liter Plastic Sulfuric Acid	250ml Plastic	125ml Plastic Sterile	8 oz. Soil	2 oz. Qorpak	250ml Plastic NaOH / ZN ACC	ANALYSIS REQUESTED
	7/14/11	1035	GW	X	GW-032B	PUMPTEST	1			250 UNP											NO2/N, NO3/N
							1			1000ML UNP											TSS/TDS

SAMPLES SUBMITTED FOR ANALYSIS WILL BE SUBJECT TO THE ETL TERMS AND CONDITIONS OF SALE UNLESS ALTERNATE TERMS ARE AGREED IN WRITING.

RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
	ETS	7/14/11	1035		ETL	7/14/11	1.10
SAMPLED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
	ETL	7/14/11	3:45		ETS	7/14/11	15 45

COMMENTS ____

NYSDOH 10142 NJDEP NY015 CTDOPH PH-0554 EPA NY00049

LOGIN SAMPLE RECEIPT CHECK LIST

Client: CAS

Job Number: 420-45673-1
Sdg Number: Pump Test (07/14/11)

Login Number: 45673

Question	T/F/NA	Comment
Radioactivity either was not measured or, if measured, is at or below background	NA	
The cooler's custody seal, if present, is intact.	NA	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	NA	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	