ILLINOIS EPA RCRA CORRECTIVE ACTION CERTIFICATION

This certification must accompany any document submitted to Illinois EPA in accordance with the corrective action requirements set forth in a facility's RCRA permit. The original and two copies of all documents submitted must be provided.

1.0 FACILITY IDENTIFICATION

Name: WRB Refining LLC - Wood River Refinery

County: Madison

Street Address: 900 South Central Ave.

Site No. (IEPA): 1191150002

City: Roxana, IL 62084

Site No. (USEPA): ILD 080 012 305

2.0 OWNER INFORMATION

Name: Not Applicable

Mailing Address:

3.0 OPERATOR INFORMATION

Equilon Enterprises LLC d/b/a Shell Oil Products US

17 Junction Drive, PMB #399

Glen Carbon, IL 62034

Contact Name:

Kevin Dyer

Contact Title:

Principal Program Manager

Phone No.:

618-288-7237

4.0 TYPE OF SUBMISSION (check applicable item and provide requested information, as applicable)

☐ RFI Phase I Workplan/Report
☐ RFI Phase II Workplan/Report
☐ CMP Report; Phase _____
☒ Other (describe):
30 Day Report
Date of Submittal March 4, 2011

IEPA Permit Log No. B-43-R
Date of Last IEPA Letter
on Project 11/15/10
Log No. of Last IEPA
Letter on Project B-43R-CA-2
Does this submittal include groundwater information: ☒ Yes ☐ No

5.0 DESCRIPTION OF SUBMITTAL: (briefly describe what is being submitted and its purpose)

30 Day Report in accordance with Part B Permit Section IV(J)(15)(c)

6.0 DOCUMENTS SUBMITTED (identify all documents in submittal, including cover letter; give dates of all documents)

RCRA Corrective Action Certification and letter report dated March 4, 2011.

7.0 CERTIFICATION STATEMENT - ***(This statement is part of the overall certification being provided by the owner/operator, professional and laboratory in Items 7.1, 7.2 and 7.3 below).*** The activities described in the subject submittals have been carried out in accordance with procedures approved by Illinois EPA. 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.

7.1 **OWNER/OPERATOR CERTIFICATION** (Must be completed for all submittals. Certification and signature requirements are set forth in 35 IAC 702.126.) All submittals pertaining to the corrective action requirements set forth in a RCRA Permit must be signed by the person designated below (or by a duly authorized representative of that person):

1. For a Corporation, by a principal executive officer of at least the level of vice-president.
2. For a Partnership or Sole Proprietorship, by a general partner or the proprietor, respectively.
3. For a Governmental Entity, by either a principal executive officer or a ranking elected official.

A person is a duly authorized representative only if:

1. the authorization is made in writing by a person described above; and
2. the written authorization is provided with this submittal (a copy of a previously submitted authorization can be used).

Owner Signature: _____ _____ (Date)

Title: _____

Operator Signature: [signature] 3/4/11 (Date)

Title: Principal Program Manager

7.2 **PROFESSIONAL CERTIFICATION** *(if necessary)* - Work carried out in this submittal or the regulations may also be subject to other laws governing professional services, such as the Illinois Professional Land Surveyor Act of 1989, the Professional Engineering Practice Act of 1989, the Professional Geologist Licensing Act, and the Structural Engineering Licensing Act of 1989. No one is relieved from compliance with these laws and the regulations adopted pursuant to these laws. All work that falls within the scope and definitions of these laws must be performed in compliance with them. The Illinois EPA may refer any discovered violation of these laws to the appropriate regulating authority.

Professional's Signature: [signature] 3/4/11 Date:

Professional's Name: Robert B Billman

Professional's Seal: PROFESSIONAL GEOLOGIST ROBERT B. BILLMAN 196-000646 ILLINOIS

Professional's Address: URS Corp.
1001 Highlands Plaza Drive
St Louis, Mo 63110

Professional's Phone No.: (314) 429-0100

7.3 **LABORATORY CERTIFICATION** *(if necessary)* - The sample collection, handling, preservation, preparation and analysis efforts for which this laboratory was responsible were carried out in accordance with procedures approved by Illinois EPA.

Name of Laboratory _____ _____
Signature of Laboratory Responsible Officer — Date

Mailing Address of Laboratory _____
Name and Title of Laboratory Responsible Officer

_____

_____

_____

URS

March 4, 2011

Mr. Stephen Nightingale, P.E.
Manager, Permit Section
Illinois Environmental Protection Agency
Bureau of Land
1021 North Grand Avenue East
Springfield, IL 62794

Subject: **30 Day Report – Groundwater Flow Control**
WRB Refining LLC Wood River Refinery
Roxana, Illinois
119115002 – Madison County
Equilon Enterprises LLC d/b/a Shell Oil Products US
Log No. B-43-R

Dear Mr. Nightingale:

On behalf of Shell Oil Products US (SOPUS), URS Corporation (URS) is submitting this report in fulfillment of Condition(IV)(J)(15)(c) of SOPUS' RCRA Part B Permit (Permit). This condition requires submittal of a report which describes the actions taken to regain control of groundwater flow.

INTRODUCTION AND BACKGROUND

Condition IV(A)(1) of the Permit requires "...control of horizontal and vertical groundwater flow in the uppermost aquifer such that the groundwater flow is towards the interior of the facility along the combined boundaries of North and Main Properties." This control is provided by 17 groundwater pumping wells on Main and North properties (**Figure 1**), as listed below:

- Six of the wells are located near the west fenceline of Main and North properties, and are referred to as the "west fenceline wells" for the purposes of this report.
- Ten wells are located between 7th and 11th Streets and are referred to as the "interior wells" for the purposes of this report.
- One well, Well W-68, is located much further east of the "interior wells," and is not specifically referred to in this report.

ConocoPhillips (COP) operates the groundwater pumping system at the facility. The primary purpose of these wells is to furnish water for process cooling needs. As a result of the pumping, a cone of depression is formed such that groundwater flow is inward along the combined boundaries of Main and North properties. Information on these wells is provided in **Table 1**.

Beginning in August 2010, weekly gauging data from well nests indicated that the groundwater gradient in the western part of the refinery was decreasing, but control was maintained (information included in the *Groundwater Monitoring Report – 2nd Half 2010* dated January 14, 2011). Groundwater data from the first quarter 2011 gauging event shows that groundwater was not fully controlled along portions of the western boundaries of Main and North properties.

1001 Highland Plaza Drive West, Suite 300
St. Louis, MO 63110
Phone: 314.429.0100
Fax: 314.429.0462

Figure 2 illustrates groundwater contours on January 13-14, 2011. In accordance with the permit, initial notification to the IEPA was made on February 4, 2011.

ACTIONS TAKEN TO REGAIN CONTROL

SOPUS initiated conversations with COP in January and February to discuss the causes for the change in groundwater conditions and actions needed to regain control. The following summarizes these conversations and resulting actions.

- The refinery cooling water demand varies throughout the year, from a low of approximately 2,600 gallons per minute (gpm) in the winter months to highs of approximately 4,000 gpm in the summer months. One condition of the previous RCRA Part B Permit required pumping a minimum of 3,000 gpm from Main and North properties. During times when the cooling water demand was below 3,000 gpm, the excess water was discharged to the process sewer. The renewed permit, which became effective October 28, 2010, does not have a minimum pumping rate. As a result of lower cooling demand, COP lowered the pumping rates below 3,000 gpm beginning in late November 2010. causing the change in groundwater conditions.
- Pumping rates for 2010 and 2011 to date are included in **Table 2**.
- As shown, pumping rates in December 2010 ranged from 2659 to 2933 with an average of 2779.
- As shown, pumping rates in January ranged from approximately 2,504 gpm to 3,330 gpm. Pumping rates from January 1st through 25th averaged 2,708 gpm.
- Upon discovering that groundwater control might have been lost, on January 25th, SOPUS requested that COP increase pumping, and the rate increased to an average of 3,284 gpm for the remainder of the month.
- Pumping rates in February ranged from approximately 3,184 gpm to 3,495 gpm and averaged 3,406 gpm.
    - Pumping rates on operating wells were initially increased in early February, where possible, to rates above refinery needs based on discussions with SOPUS.
    - Pumping rates were further increased as a result of the following actions by COP (**Table 2**):
        - Replaced a discharge header from well W-84 to 7th Street.
        - Replaced a pipe spool in a valve box and restarted well W-76.
- At SOPUS' request, COP is performing, or is scheduled to perform, actions to further increase overall pumping capacity, including wellhead and valve repairs, pump replacement, etc (**Table 1**).
- URS is gauging a subset of the facility wells on a weekly basis, beginning January 31, and developing contour maps. These are described below.

RESULTS OF ACTIONS TAKEN

The operational efforts and increased pumping is showing improved groundwater control, and this is expected to continue. **Figures 3** through 7 are groundwater contour maps that depict conditions between January 31st and February 28th, 2011. These maps illustrate the following:

- Groundwater pumping in the west fenceline production wells has maintained an inward gradient/control along most of this area, except for the extreme northern and southern portions.
- The cone of depression caused by pumping in the interior wells appears to be expanding. The lack of control along the far western portion of Main Property appears to be related to insufficient pumping in the interior production wells. The interior wells typically produce approximately 65 to 75% of the total groundwater from Main and North properties, and currently, only seven of the ten wells in this area are operating.

Figure 8 includes cross section maps along the west fenceline of North Property (section lines are depicted on **Figure 1**) and illustrate the following:

- Section A-A' shows that the gradient has changed from outward to inward over the indicated time period.
- Section B-B' shows that the gradient has been and continues to be inward over the indicated time period.
- Section C-C' shows that the gradient is still outward, but has improved over the indicated time period.

CONCLUSIONS/PATH FORWARD

COP will continue pumping operating wells at the highest rates feasible, and is prioritizing maintenance work described in this report. SOPUS does not anticipate further changes in the groundwater pattern along the west fenceline of North Property, as these wells are generally pumping at or near capacity. SOPUS does anticipate that the increased pumping in the interior wells, at the relatively higher rates, as well as the ongoing and planned repairs, will continue to strengthen and expand the cone of depression, eventually resulting in groundwater control. SOPUS is working with COP to replace one of the groundwater depression wells for additional capacity and backup. SOPUS will continue to monitor the progress of groundwater flow on a weekly basis control is regained.

In parallel with this work, SOPUS is responding to conditions 16 and 17 of the Agency's August 5, 2010 letter to SOPUS and COP. These conditions require information on the groundwater pumping and oil recovery systems and an evaluation of system performance and contingency plans. This evaluation will include a review of hydrogeologic conditions and system

performance information, and may include recommendations for well and/or pumping modifications.

If you have any questions concerning this information, please contact Kevin Dyer, SOPUS Principal Program Manager, at kevin.dyer@shell.com (618) 288-7237, or me at bob_billman@urscorp.com (314) 43-4108.

Sincerely,

Robert B. Billman
Senior Project Manager

Attachments

Table 1	Groundwater Production Well Summary
Table 2	Daily Groundwater Pumping
Figure 1	WRR Facility Map with Groundwater Production Wells and Monitoring Wells
Figure 2	Groundwater Contour Map January 13-14, 2011
Figure 3	Groundwater Contour Map January 31, 2011
Figure 4	Groundwater Contour Map February 7, 2011
Figure 5	Groundwater Contour Map February 14, 2011
Figure 6	Groundwater Contour Map February 21, 2011
Figure 7	Groundwater Contour Map February 28, 2011
Figure 8	Groundwater Cross Sections A-A', B-B' and C-C'

Cc: Kevin Dyer, SOPUS
Amy Boley, IEPA
Eric Petersen, COP

Table 1
Groundwater Production Well Summary

Well #	Date Installed	Well Screen Material	Well Diameter (in)	Total Depth (ft bgs)	Screened Interval (ft bgs)	Screen Length (ft)	Estimated Ground Surface Elevation** (ft MSL)	Estimated Screened Interval Elevation (ft MSL)	Status
"Interior Wells"									
W-39	August-1942	PC	30	137.00	67.00 - 137.00	70	444	377 - 307	Out of service (1)
W-42	8/5/1942	PC	20	138.00	68.00 - 138.00	70	445	377 - 307	Out of service (1)
W-69	3/25/1978	SS	20	140.00	90.00 - 140.00	50	445	355 - 305	Operating
W-70*	August-1978	SS	20	136.50	96.50 - 136.50	40	445	349 - 309	Operating
W-72	7/26/1982	SS	20	137.00	97.00 - 137.00	40	445	348 - 308	Out of service (2)
W-73	8/16/1982	SS	20	135.00	95.00 - 135.00	40	445	349 - 309	Out of service
W-75*	December-1987	SS	20	140.00	110.00 - 140.00	30	445	335 - 305	Operating
W-76*	December-1987	SS	20	140.00	110.00 - 140.00	30	443	333 - 303	Operating
W-82	12/10/2002	SS	20	120.00	100.00 - 120.00	20	445	345 - 325	Operating
W-84	June-2008	SS	20	137.00	106.00 - 136.00	30	445	339 - 309	Operating
W-85	March-2010	SS	24	101.90	76.9 - 101.9	25	444	367-342	Operating
"West Fenceline Wells"									
W-77	4/30/1990	SS	20	142.00	112.00 - 142.00	30	444	332 - 302	Operating
W-78	5/2/1990	SS	20	138.33	108.33 - 138.33	30	443	335 - 305	Out of service (3)
W-79	5/9/1990	SS	20	134.92	104.92 - 134.92	30	443	338 - 308	Operating
W-80	5/10/1990	SS	20	135.83	105.82 - 135.83	30	443	337 - 307	Operating
W-81	5/14/1990	SS	20	129.00	99.00 - 129.00	30	444	345 - 315	Operating
"East Property Wells"									
W-68*	12/1/1968	SS	20	130.00	90.00 - 130.00	40	441	351 - 311	Operating

NOTES:

SS = Stainless Steel
PC = Porous Concrete
NA = Not Available
(1) Wellhead and valve leaks scheduled for repair in March 2011.
(2) Repairs planned for week of March 7, 2011.
(3) New pump/motor scheduled for replacement week of February 28, 2011.

TABLE 2
DAILY WATER PRODUCTION SUMMARY

Date	GPM	Date	GPM	Date	GPM	Date	GPM	Date	GPM	Date	GPM
1/1/2010	3227	2/1/2010	3271	3/1/2010	3362	4/1/2010	3247	5/1/2010	3342	6/1/2010	3336
1/2/2010	3194	2/2/2010	3232	3/2/2010	3349	4/2/2010	3248	5/2/2010	3366	6/2/2010	3374
1/3/2010	3194	2/3/2010	3225	3/3/2010	3274	4/3/2010	3247	5/3/2010	3366	6/3/2010	3060
1/4/2010	3207	2/4/2010	3227	3/4/2010	3293	4/4/2010	3233	5/4/2010	3364	6/4/2010	3729
1/5/2010	3222	2/5/2010	3207	3/5/2010	3344	4/5/2010	3206	5/5/2010	3350	6/5/2010	3731
1/6/2010	3220	2/6/2010	3211	3/6/2010	3364	4/6/2010	3265	5/6/2010	3373	6/6/2010	3726
1/7/2010	3265	2/7/2010	3169	3/7/2010	3356	4/7/2010	3294	5/7/2010	3380	6/7/2010	3730
1/8/2010	3313	2/8/2010	3133	3/8/2010	3300	4/8/2010	3373	5/8/2010	3364	6/8/2010	3636
1/9/2010	3315	2/9/2010	3129	3/9/2010	2997*	4/9/2010	3367	5/9/2010	3315	6/9/2010	3291
1/10/2010	3302	2/10/2010	3117	3/10/2010	3177	4/10/2010	3405	5/10/2010	3315	6/10/2010	3644
1/11/2010	3352	2/11/2010	3151	3/11/2010	3180	4/11/2010	3404	5/11/2010	3317	6/11/2010	3488
1/12/2010	3373	2/12/2010	3221	3/12/2010	3173	4/12/2010	3383	5/12/2010	3336	6/12/2010	3451
1/13/2010	3412	2/13/2010	3239	3/13/2010	3147	4/13/2010	3390	5/13/2010	3338	6/13/2010	3494
1/14/2010	3409	2/14/2010	3242	3/14/2010	3088	4/14/2010	3443	5/14/2010	3310	6/14/2010	3648
1/15/2010	3407	2/15/2010	3218	3/15/2010	3133	4/15/2010	3460	5/15/2010	3316	6/15/2010	3648
1/16/2010	3401	2/16/2010	3209	3/16/2010	3108	4/16/2010	3423	5/16/2010	3331	6/16/2010	3592
1/17/2010	3396	2/17/2010	3196	3/17/2010	3159	4/17/2010	3423	5/17/2010	3310	6/17/2010	3665
1/18/2010	3404	2/18/2010	3241	3/18/2010	3161	4/18/2010	3423	5/18/2010	3300	6/18/2010	3792
1/19/2010	3386	2/19/2010	3254	3/19/2010	3201	4/19/2010	3410	5/19/2010	3301	6/19/2010	3955
1/20/2010	3335	2/20/2010	3255	3/20/2010	3208	4/20/2010	3373	5/20/2010	3309	6/20/2010	4011
1/21/2010	3306	2/21/2010	3261	3/21/2010	3174	4/21/2010	3414	5/21/2010	3315	6/21/2010	4027
1/22/2010	3299	2/22/2010	3289	3/22/2010	3266	4/22/2010	3449	5/22/2010	3332	6/22/2010	3964
1/23/2010	3303	2/23/2010	3331	3/23/2010	3297	4/23/2010	3465	5/23/2010	3336	6/23/2010	4019
1/24/2010	3301	2/24/2010	3328	3/24/2010	3309	4/24/2010	3444	5/24/2010	3338	6/24/2010	4040
1/25/2010	3292	2/25/2010	3336	3/25/2010	3312	4/25/2010	3313	5/25/2010	3332	6/25/2010	4048
1/26/2010	3286	2/26/2010	3355	3/26/2010	3252	4/26/2010	3307	5/26/2010	3327	6/26/2010	4050
1/27/2010	3287	2/27/2010	3372	3/27/2010	3255	4/27/2010	3288	5/27/2010	3324	6/27/2010	3978
1/28/2010	3285	2/28/2010	3361	3/28/2010	3261	4/28/2010	3291	5/28/2010	3308	6/28/2010	3859
1/29/2010	3288			3/29/2010	3253	4/29/2010	3327	5/29/2010	3278	6/29/2010	3877
1/30/2010	3285			3/30/2010	3246	4/30/2010	3335	5/30/2010	3243	6/30/2010	3889
1/31/2010	3285			3/31/2010	3245			5/31/2010	3389		

AVERAGE: 3308 gpm AVERAGE: 3242 gpm AVERAGE: 3242 gpm AVERAGE: 3355 gpm AVERAGE: 3330 gpm AVERAGE: 3725 gpm

* Due to a 2.5 hour shutdown of the wells and biotreaters to replace a leaking gasket on the North Property Header.

TABLE 2
DAILY WATER PRODUCTION SUMMARY

Date	GPM	Date	GPM	Date	GPM	Date	GPM	Date	GPM	Date	GPM
7/1/2010	3883	8/1/2010	3903	9/1/2010	3304	10/1/2010	3250	11/1/2010	3375	12/1/2010	2831
7/2/2010	3880	8/2/2010	3901	9/2/2010	3289	10/2/2010	3314	11/2/2010	3371	12/2/2010	2808
7/3/2010	3876	8/3/2010	3998	9/3/2010	3322	10/3/2010	3311	11/3/2010	3431	12/3/2010	2831
7/4/2010	3877	8/4/2010	4021	9/4/2010	3285	10/4/2010	3271	11/4/2010	3303	12/4/2010	2833
7/5/2010	3843	8/5/2010	4014	9/5/2010	3291	10/5/2010	3313	11/5/2010	3156	12/5/2010	2840
7/6/2010	3832	8/6/2010	3907	9/6/2010	3322	10/6/2010	3316	11/6/2010	3070	12/6/2010	2874
7/7/2010	3829	8/7/2010	3859	9/7/2010	3341	10/7/2010	3289	11/7/2010	3068	12/7/2010	2933
7/8/2010	3822	8/8/2010	3893	9/8/2010	3356	10/8/2010	3298	11/8/2010	3128	12/8/2010	2749
7/9/2010	3825	8/9/2010	3868	9/9/2010	3376	10/9/2010	3310	11/9/2010	3139	12/9/2010	2851
7/10/2010	3767	8/10/2010	4012	9/10/2010	3350	10/10/2010	3281	11/10/2010	3109	12/10/2010	2900
7/11/2010	3762	8/11/2010	4035	9/11/2010	3357	10/11/2010	3277	11/11/2010	3106	12/11/2010	2820
7/12/2010	3691	8/12/2010	3910	9/12/2010	3341	10/12/2010	3271	11/12/2010	3058	12/12/2010	2843
7/13/2010	3537	8/13/2010	3920	9/13/2010	3397	10/13/2010	3198	11/13/2010	3010	12/13/2010	2859
7/14/2010	3575	8/14/2010	3753	9/14/2010	3490	10/14/2010	3211	11/14/2010	2999	12/14/2010	2861
7/15/2010	3608	8/15/2010	3779	9/15/2010	3399	10/15/2010	3323	11/15/2010	3091	12/15/2010	2914
7/16/2010	3737	8/16/2010	3888	9/16/2010	3318	10/16/2010	3408	11/16/2010	3125	12/16/2010	2844
7/17/2010	3868	8/17/2010	4017	9/17/2010	3231	10/17/2010	3369	11/17/2010	3096	12/17/2010	2779
7/18/2010	3827	8/18/2010	4012	9/18/2010	3229	10/18/2010	3312	11/18/2010	3108	12/18/2010	2730
7/19/2010	3790	8/19/2010	4028	9/19/2010	3238	10/19/2010	3283	11/19/2010	3111	12/19/2010	2730
7/20/2010	3825	8/20/2010	4011	9/20/2010	3244	10/20/2010	3340	11/20/2010	3116	12/20/2010	2659
7/21/2010	3859	8/21/2010	4016	9/21/2010	3349	10/21/2010	3306	11/21/2010	3115	12/21/2010	2690
7/22/2010	3911	8/22/2010	3958	9/22/2010	3357	10/22/2010	3280	11/22/2010	3092	12/22/2010	2687
7/23/2010	3948	8/23/2010	3946	9/23/2010	3426	10/23/2010	3331	11/23/2010	2487	12/23/2010	2693
7/24/2010	3930	8/24/2010	3977	9/24/2010	3174	10/24/2010	3342	11/24/2010	3069	12/24/2010	2698
7/25/2010	3885	8/25/2010	3942	9/25/2010	3249	10/25/2010	3370	11/25/2010	2951	12/25/2010	2696
7/26/2010	3942	8/26/2010	3901	9/26/2010	3249	10/26/2010	3388	11/26/2010	2950	12/26/2010	2694
7/27/2010	3974	8/27/2010	3936	9/27/2010	3250	10/27/2010	3362	11/27/2010	2962	12/27/2010	2678
7/28/2010	3956	8/28/2010	3610	9/28/2010	3272	10/28/2010	3186	11/28/2010	2930	12/28/2010	2686
7/29/2010	3956	8/29/2010	3435	9/29/2010	3132	10/29/2010	3196	11/29/2010	2857	12/29/2010	2694
7/30/2010	3967	8/30/2010	3327	9/30/2010	3157	10/30/2010	3355	11/30/2010	2844	12/30/2010	2707
7/31/2010	3945	8/31/2010	3327			10/31/2010	3350			12/31/2010	2739

AVERAGE: 3836 gpm **AVERAGE:** 3874 gpm **AVERAGE:** 3303 gpm **AVERAGE:** 3304 gpm **AVERAGE:** 3074 gpm **AVERAGE:** 2779 gpm

TABLE 2
DAILY WATER PRODUCTION SUMMARY

Date	GPM	Date	GPM
1/1/2011	2623	2/1/2011	3254
1/2/2011	2504	2/2/2011	3185
1/3/2011	2614	2/3/2011	3184
1/4/2011	2687	2/4/2011	3312
1/5/2011	2610	2/5/2011	3454
1/6/2011	3049	2/6/2011	3493
1/7/2011	2927	2/7/2011	3495
1/8/2011	2664	2/8/2011	3483
1/9/2011	2634	2/9/2011	3488
1/10/2011	2633	2/10/2011	3480
1/11/2011	2667	2/11/2011	3475
1/12/2011	2652	2/12/2011	3371
1/13/2011	2638	2/13/2011	3269
1/14/2011	2636	2/14/2011	3427
1/15/2011	2688	2/15/2011	3434
1/16/2011	2675	2/16/2011	3405
1/17/2011	2610	2/17/2011	3468
1/18/2011	2816	2/18/2011	3459
1/19/2011	2609	2/19/2011	3447
1/20/2011	2794	2/20/2011	3444
1/21/2011	2775	2/21/2011	3453
1/22/2011	2774	2/22/2011	3437
1/23/2011	2769	2/23/2011	3424
1/24/2011	2787	2/24/2011	3423
1/25/2011	2865	2/25/2011	3417
1/26/2011	3174	2/26/2011	3406
1/27/2011	3330	2/27/2011	3404
1/28/2011	3306	2/28/2011	3411
1/29/2011	3283		
1/30/2011	3326		
1/31/2011	3285		

AVERAGE: 2819 gpm AVERAGE: 3407 gpm gpm

N

Ø 1200

SCALE FEET

NORTH PROPERTY

BP PROPERTY

RIVERFRONT PROPERTY

POLISHING LAGOONS

MISSISSIPPI RIVER

RAND AVE.

SHELL OIL COMPANY PROPERTY

WEST PROPERTY

VILLAGE OF ROXANA

VILLAGE OF HARTFORD

ROUTE 3

VALERO PROPERTY

MAIN PROPERTY

SOUTHWEST PROPERTY

TEXAS PIPELINE COMPANY

GRASSY LAKE

ROUTE 143

NORTH RUN-ON DITCH

KENDALL HILL

SOLID WASTE DISPOSAL BASIN

SMITH LAKE

KENDALL HILL PARK

(S. CENTRAL AVE.) HWY. 111

VILLAGE OF SOUTH ROXANA

LEGEND

- CROSS SECTIONS (FIGURE 8)
- REFINERY WATER PRODUCTION WELLS
- REFINERY OIL RECOVERY WELLS
- MONITORING WELL
- PIEZOMETER

SHELL OIL PRODUCTS US AT THE WRB REFINING LLC WOOD RIVER REFINERY ROXANA, ILLINOIS		PROJECT NO. 21562593
URS		
DRN. BY: cs February 2011 DSGN. BY: dp CHKD. BY: bb,ss	WRR Facility Map with Groundwater Production Wells and Monitoring Wells	FIGURE 1

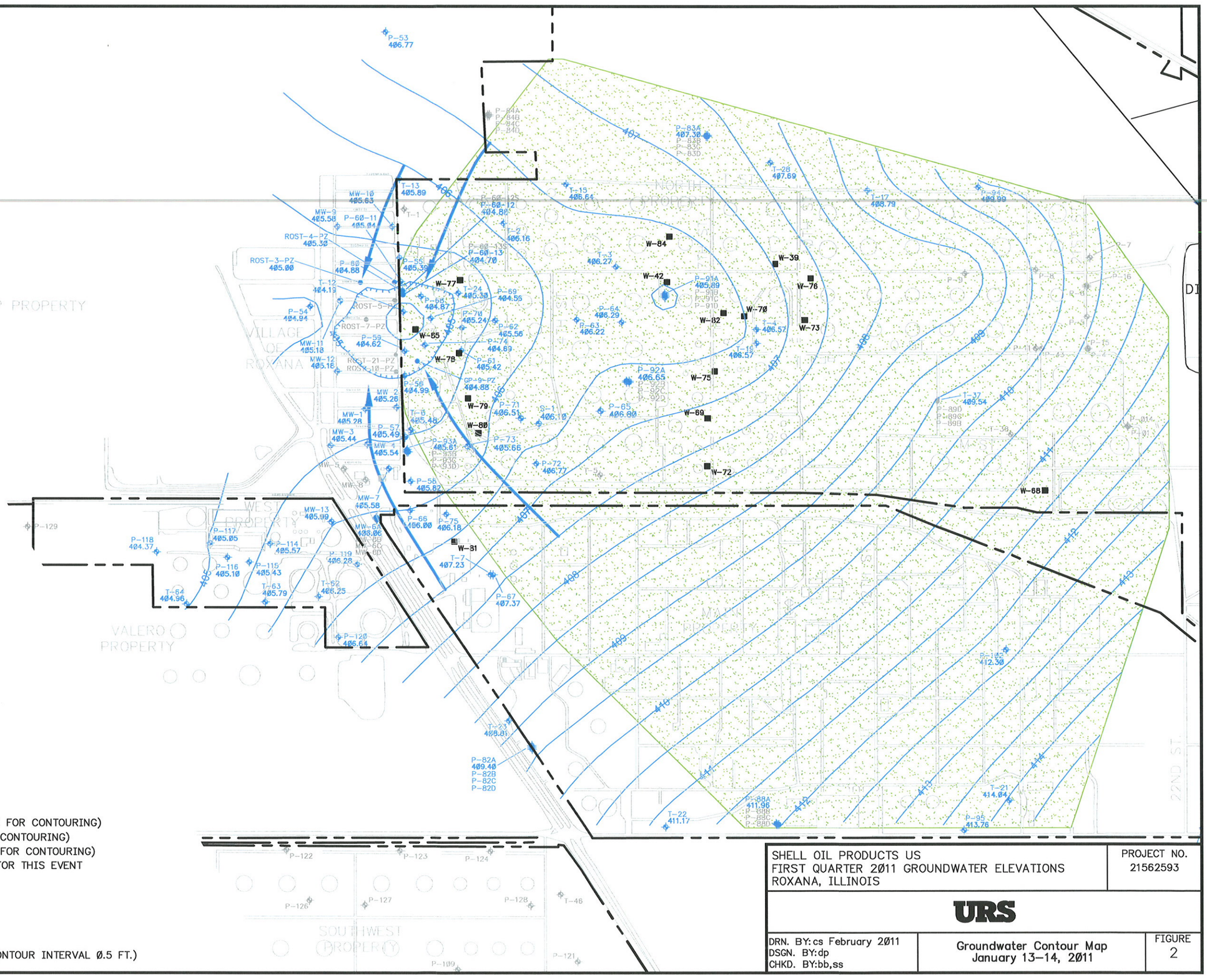
File: P:\ENVIRONMENTAL\SHELL OIL PRODUCT US\C-WRR-COP\WRB WEEKLY WELL GAUGING\FIGURES\ROXANA 1011 CONTOUR MAP (CONTOURS ON 1-31-11).DWG Last edited: FEB. 23, 11 @ 4:46 p.m. by: david dequire

NOTES:

1) WATER LEVELS WERE OBTAINED DURING THE FIRST QUARTER 2011 ON JANUARY 13–14, 2011, FOR A SUBSET OF THE FACILITY MONITORING WELLS.

2) CONTOUR LINES PRIMARILY GENERATED BY SURFER VERSION 8 MODELING OF GROUNDWATER ELEVATIONS. SOME INTERPRETATION WAS DONE UTILITZING PROFESSIONAL JUDGMENT AND CONTOUR LINES WERE MODIFIED BY HAND.

3) ELEVATIONS ARE RELATIVE TO 1988 USGS DATUM.



SHELL OIL PRODUCTS US
FIRST QUARTER 2011 GROUNDWATER ELEVATIONS
ROXANA, ILLINOIS

PROJECT NO. 21562593

URS

DRN. BY: cs February 2011
DSGN. BY: dp
CHKD. BY: bb,ss

Groundwater Contour Map
January 13–14, 2011

FIGURE 2

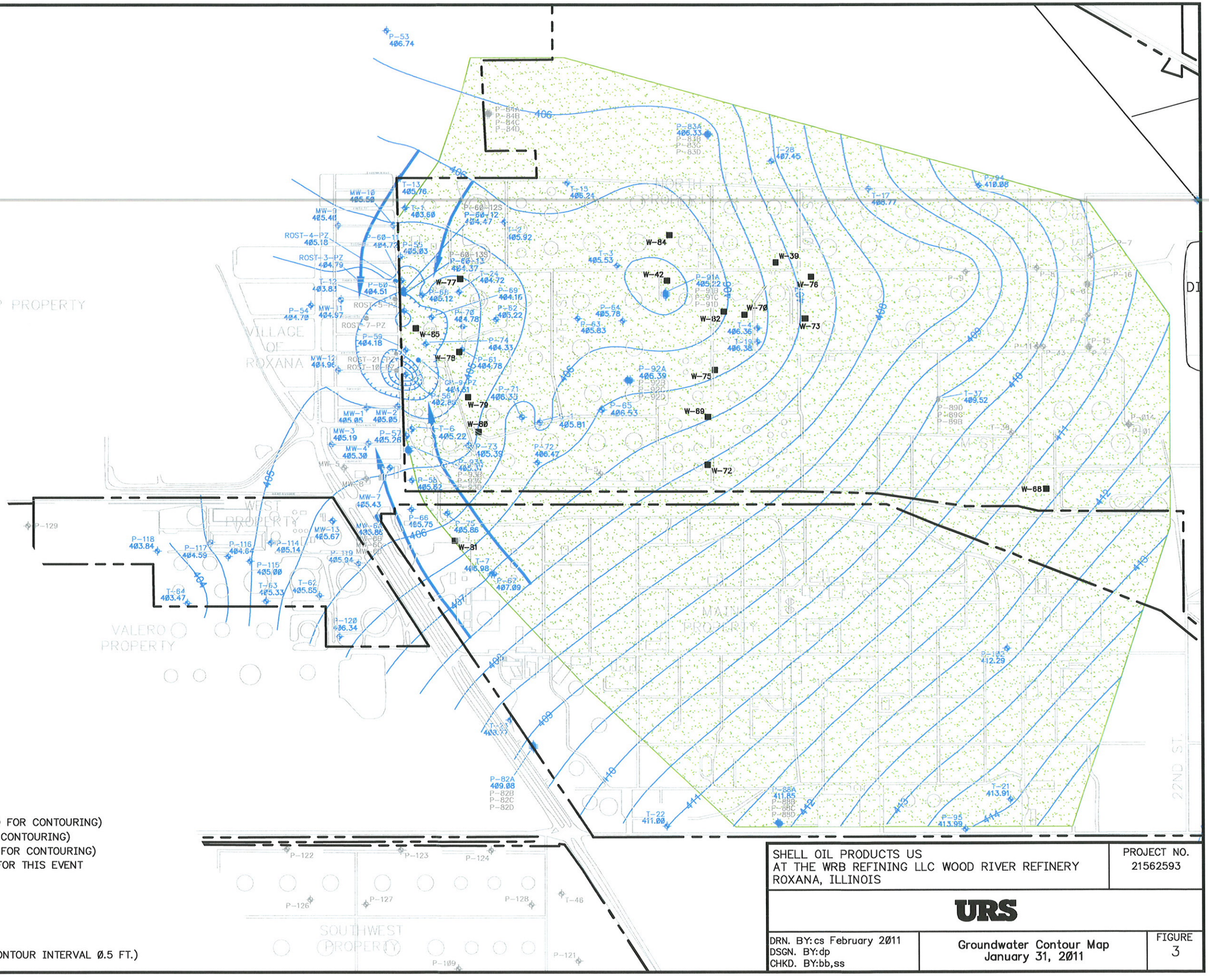
File: P:\ENVIRONMENTAL\SHELL OIL PRODUCT US\C-WRR-COP\WRB WEEKLY WELL GAUGING\FIGURES\ROXANA 1Q11 CONTOUR MAP (CONTOURS ON 1-31-11).DWG Last edited: FEB. 23, 11 @ 4:46 p.m. by: david.dequire

NOTES:

1) WATER LEVELS WERE OBTAINED DURING THE FIRST QUARTER 2011 ON JANUARY 31, 2011, FOR A SUBSET OF THE FACILITY MONITORING WELLS.

2) CONTOUR LINES PRIMARILY GENERATED BY SURFER VERSION 8 MODELING OF GROUNDWATER ELEVATIONS. SOME INTERPRETATION WAS DONE UTILITZING PROFESSIONAL JUDGMENT AND CONTOUR LINES WERE MODIFIED BY HAND.

3) ELEVATIONS ARE RELATIVE TO 1988 USGS DATUM.



N

Ø 800

SCALE FEET

LEGEND

- MONITORING WELL LOCATION GAUGED (USED FOR CONTOURING)
- PIEZOMETER LOCATION GAUGED (USED FOR CONTOURING)
- PIEZOMETER LOCATION GAUGED (NOT USED FOR CONTOURING)
- MONITORING WELL LOCATION NOT GAUGED FOR THIS EVENT
- WATER WELLS
- AREA OF GROUNDWATER CAPTURE
- GROUNDWATER GRADIENT
- 407 GROUNDWATER SURFACE CONTOUR NGVD (CONTOUR INTERVAL Ø.5 FT.)

SHELL OIL PRODUCTS US AT THE WRB REFINING LLC WOOD RIVER REFINERY ROXANA, ILLINOIS		PROJECT NO. 21562593
URS		
DRN. BY: cs February 2011 DSGN. BY: dp CHKD. BY: bb,ss	Groundwater Contour Map January 31, 2011	FIGURE 3

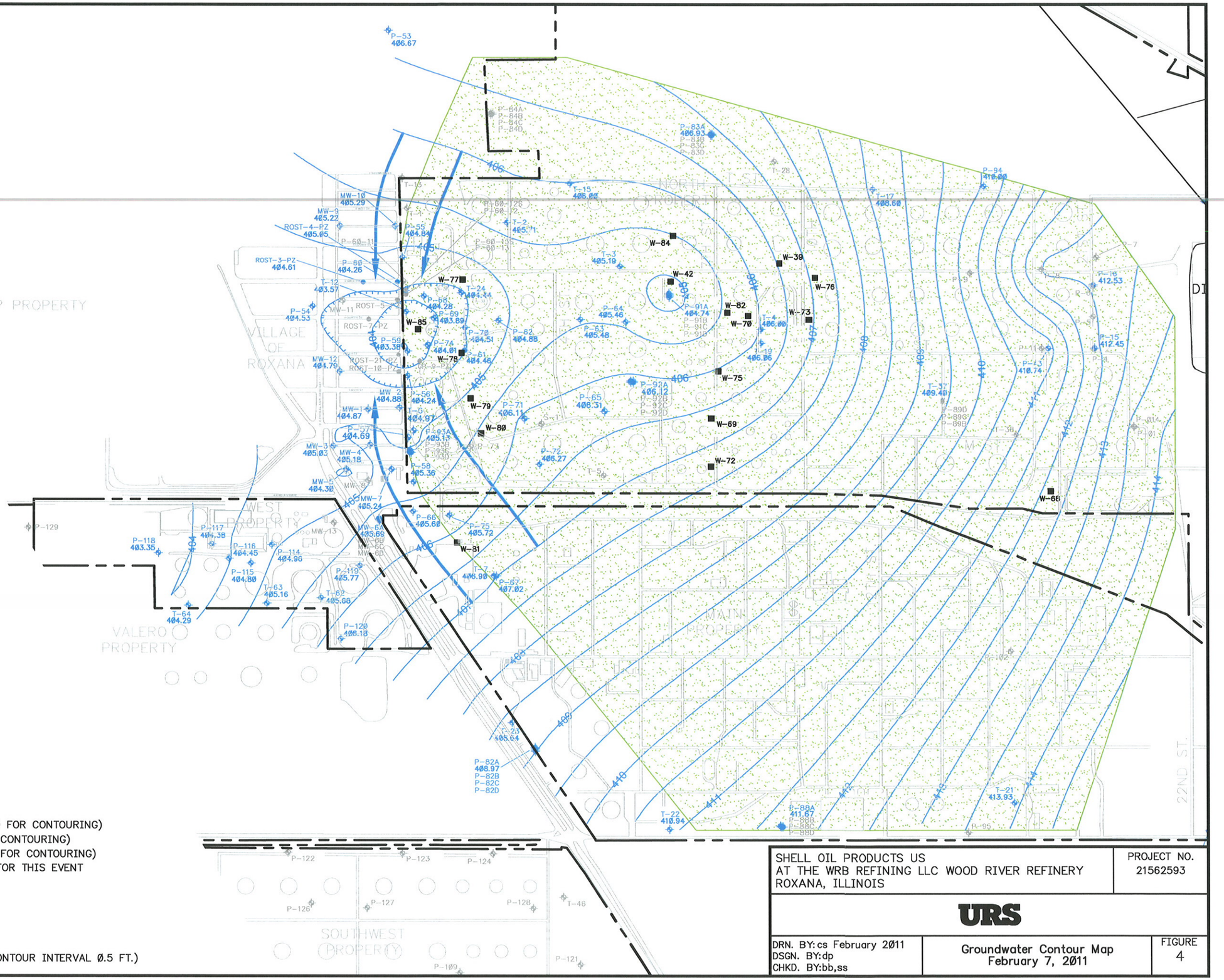
File: P:\ENVIRONMENTAL\SHELL OIL PRODUCT US\C-WRR-COP\WRB WEEKLY WELL GAUGING\FIGURES\ROXANA 1Q11 CONTOUR MAP (CONTOURS ON 1-31-11).DWG Last edited: FEB. 23, 11 @ 4:46 p.m. by: david.deguire

NOTES:

1) WATER LEVELS WERE OBTAINED DURING THE FIRST QUARTER 2011 ON FEBRUARY 7, 2011, FOR A SUBSET OF THE FACILITY MONITORING WELLS.

2) CONTOUR LINES PRIMARILY GENERATED BY SURFER VERSION 8 MODELING OF GROUNDWATER ELEVATIONS. SOME INTERPRETATION WAS DONE UTILITZING PROFESSIONAL JUDGMENT AND CONTOUR LINES WERE MODIFIED BY HAND.

3) ELEVATIONS ARE RELATIVE TO 1988 USGS DATUM.



N

Ø 8ØØ

SCALE FEET

LEGEND

- MONITORING WELL LOCATION GAUGED (USED FOR CONTOURING)
- PIEZOMETER LOCATION GAUGED (USED FOR CONTOURING)
- PIEZOMETER LOCATION GAUGED (NOT USED FOR CONTOURING)
- MONITORING WELL LOCATION NOT GAUGED FOR THIS EVENT
- WATER WELLS
- AREA OF GROUNDWATER CAPTURE
- GROUNDWATER GRADIENT
- 407 GROUNDWATER SURFACE CONTOUR NGVD (CONTOUR INTERVAL Ø.5 FT.)

SHELL OIL PRODUCTS US AT THE WRB REFINING LLC WOOD RIVER REFINERY ROXANA, ILLINOIS	PROJECT NO. 21562593
URS	
DRN. BY: cs February 2011 DSGN. BY: dp CHKD. BY: bb,ss	Groundwater Contour Map February 7, 2011
	FIGURE 4

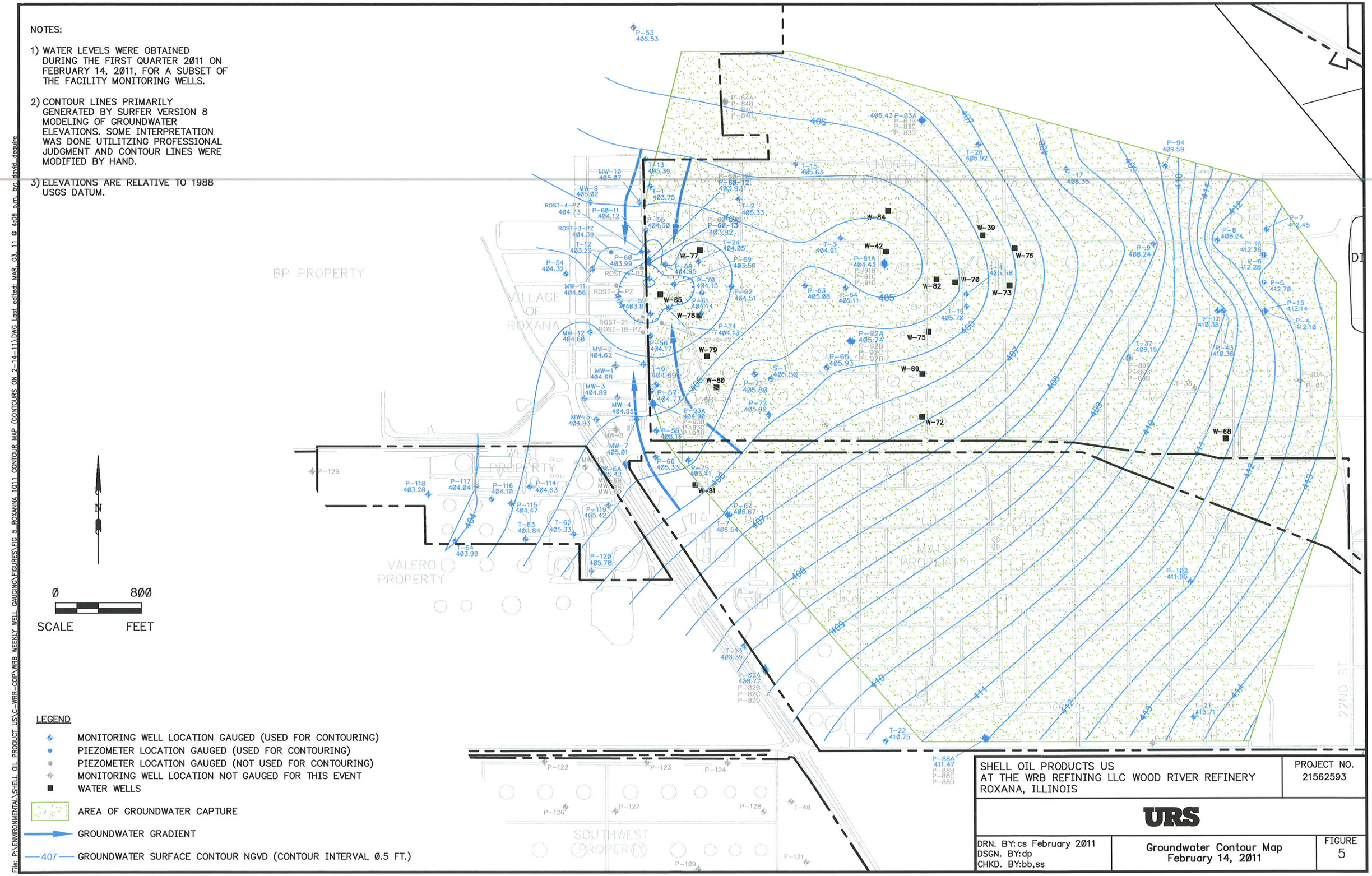
File: P:\ENVIRONMENTAL\SHELL OIL PRODUCT US\C-WRR-OOP\WRB WEEKLY WELL GAUGING\FIGURES\ROXANA 1Q11 CONTOUR MAP (CONTOURS ON 2-7-11).DWG Last edited: FEB. 23, 11 @ 4:31 p.m. by: david.deguire

NOTES:

1) WATER LEVELS WERE OBTAINED DURING THE FIRST QUARTER 2011 ON FEBRUARY 14, 2011, FOR A SUBSET OF THE FACILITY MONITORING WELLS.

2) CONTOUR LINES PRIMARILY GENERATED BY SURFER VERSION 8 MODELING OF GROUNDWATER ELEVATIONS. SOME INTERPRETATION WAS DONE UTILITZING PROFESSIONAL JUDGMENT AND CONTOUR LINES WERE MODIFIED BY HAND.

3) ELEVATIONS ARE RELATIVE TO 1988 USGS DATUM.



LEGEND

- MONITORING WELL LOCATION GAUGED (USED FOR CONTOURING)
- PIEZOMETER LOCATION GAUGED (USED FOR CONTOURING)
- PIEZOMETER LOCATION GAUGED (NOT USED FOR CONTOURING)
- MONITORING WELL LOCATION NOT GAUGED FOR THIS EVENT
- WATER WELLS
- AREA OF GROUNDWATER CAPTURE
- GROUNDWATER GRADIENT
- 407 GROUNDWATER SURFACE CONTOUR NGVD (CONTOUR INTERVAL Ø.5 FT.)

SHELL OIL PRODUCTS US
AT THE WRB REFINING LLC WOOD RIVER REFINERY
ROXANA, ILLINOIS

PROJECT NO. 21562593

URS

DRN. BY: cs February 2011
DSGN. BY: dp
CHKD. BY: bb,ss

Groundwater Contour Map
February 14, 2011

FIGURE 5

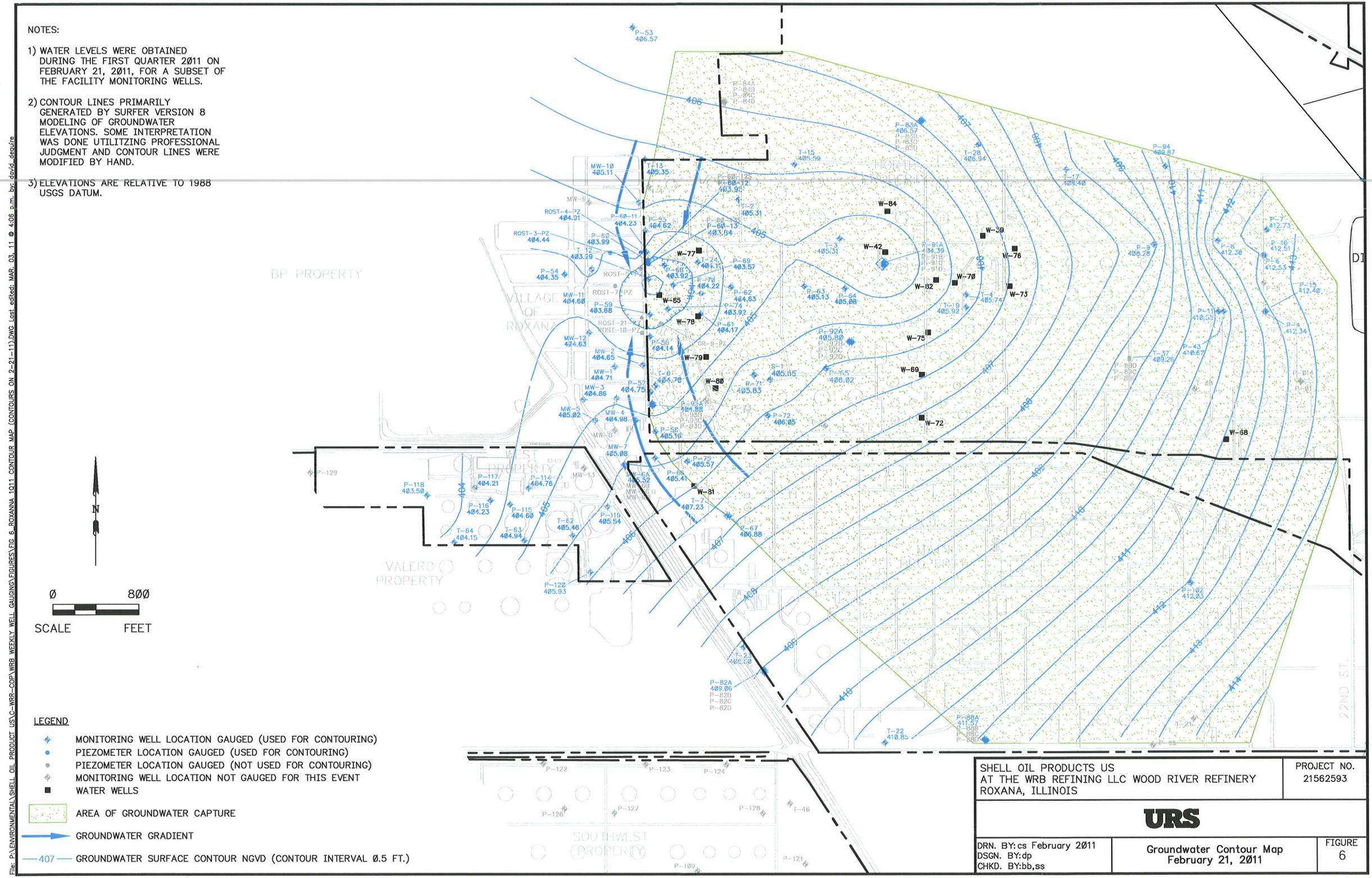
File: P:\ENVIRONMENTAL\SHELL OIL PRODUCT US\C-WRR-COP\WRB WEEKLY WELL GAUGING\FIGURES\FIG 5_ROXANNA 1011 CONTOUR MAP (CONTOURS ON 2-14-11).DWG Last edited: MAR. 03, 11 @ 4:06 p.m. by: david_dequire

NOTES:

1) WATER LEVELS WERE OBTAINED DURING THE FIRST QUARTER 2011 ON FEBRUARY 21, 2011, FOR A SUBSET OF THE FACILITY MONITORING WELLS.

2) CONTOUR LINES PRIMARILY GENERATED BY SURFER VERSION 8 MODELING OF GROUNDWATER ELEVATIONS. SOME INTERPRETATION WAS DONE UTILITZING PROFESSIONAL JUDGMENT AND CONTOUR LINES WERE MODIFIED BY HAND.

3) ELEVATIONS ARE RELATIVE TO 1988 USGS DATUM.



SHELL OIL PRODUCTS US
AT THE WRB REFINING LLC WOOD RIVER REFINERY
ROXANA, ILLINOIS

PROJECT NO. 21562593

URS

DRN. BY: cs February 2011
DSGN. BY: dp
CHKD. BY: bb, ss

Groundwater Contour Map
February 21, 2011

FIGURE 6

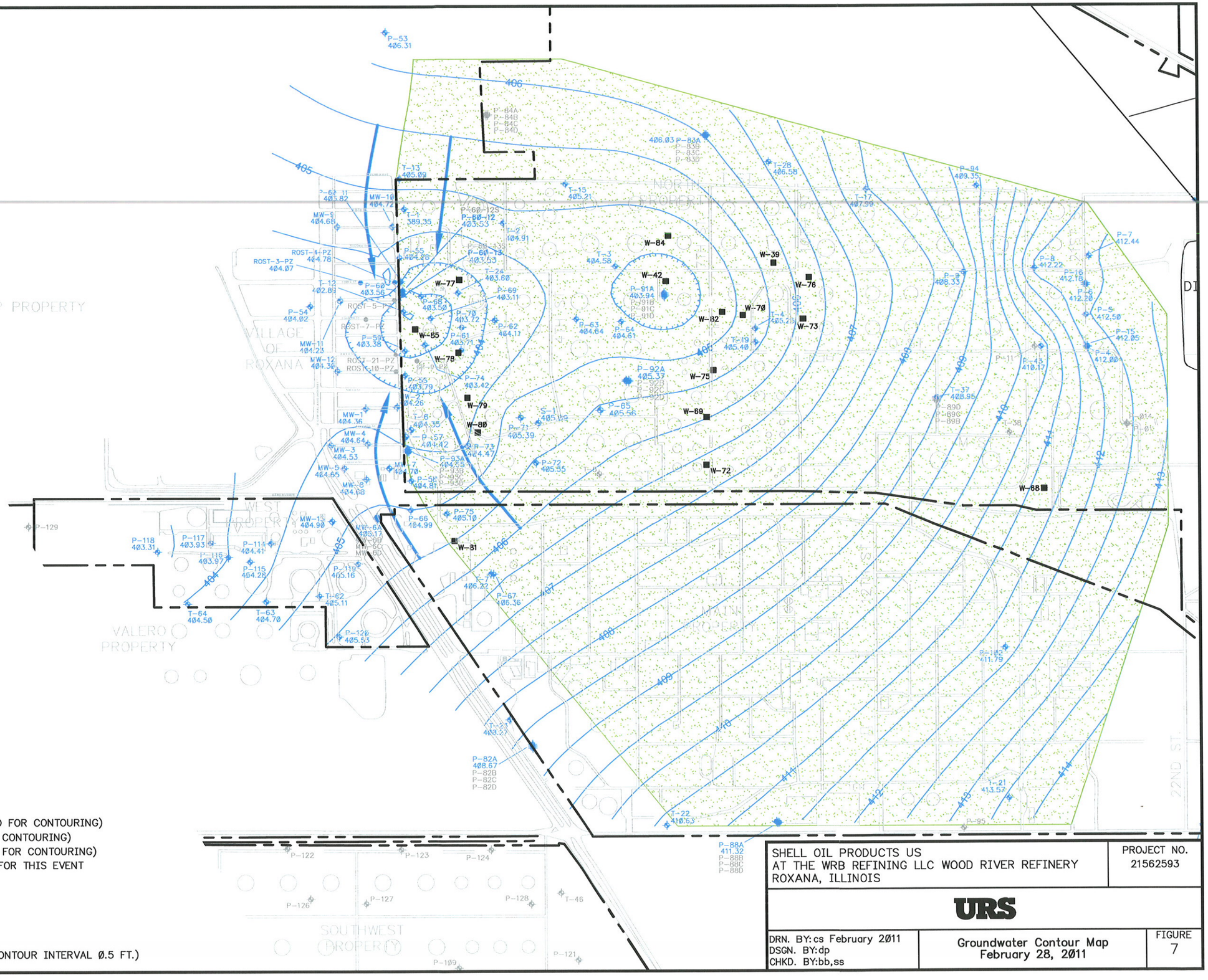
File: P:\ENVIRONMENTAL\SHELL OIL PRODUCT US\C-WRR-COP\WRB WEEKLY WELL GAUGING\FIGURES\FIG 6_ROXANNA 1Q11 CONTOUR MAP (CONTOURS ON 2-21-11).DWG Last edited: MAR. 03, 11 @ 4:06 p.m. by: david_dequire

NOTES:

1) WATER LEVELS WERE OBTAINED DURING THE FIRST QUARTER 2011 ON FEBRUARY 28, 2011, FOR A SUBSET OF THE FACILITY MONITORING WELLS.

2) CONTOUR LINES PRIMARILY GENERATED BY SURFER VERSION 8 MODELING OF GROUNDWATER ELEVATIONS. SOME INTERPRETATION WAS DONE UTILITZING PROFESSIONAL JUDGMENT AND CONTOUR LINES WERE MODIFIED BY HAND.

3) ELEVATIONS ARE RELATIVE TO 1988 USGS DATUM.

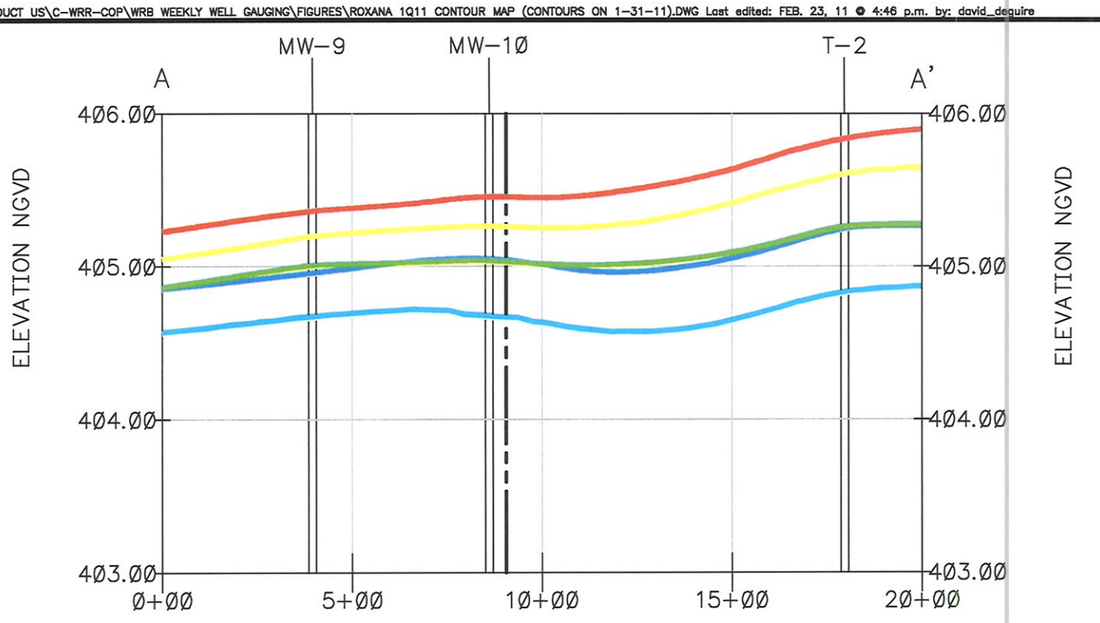


LEGEND

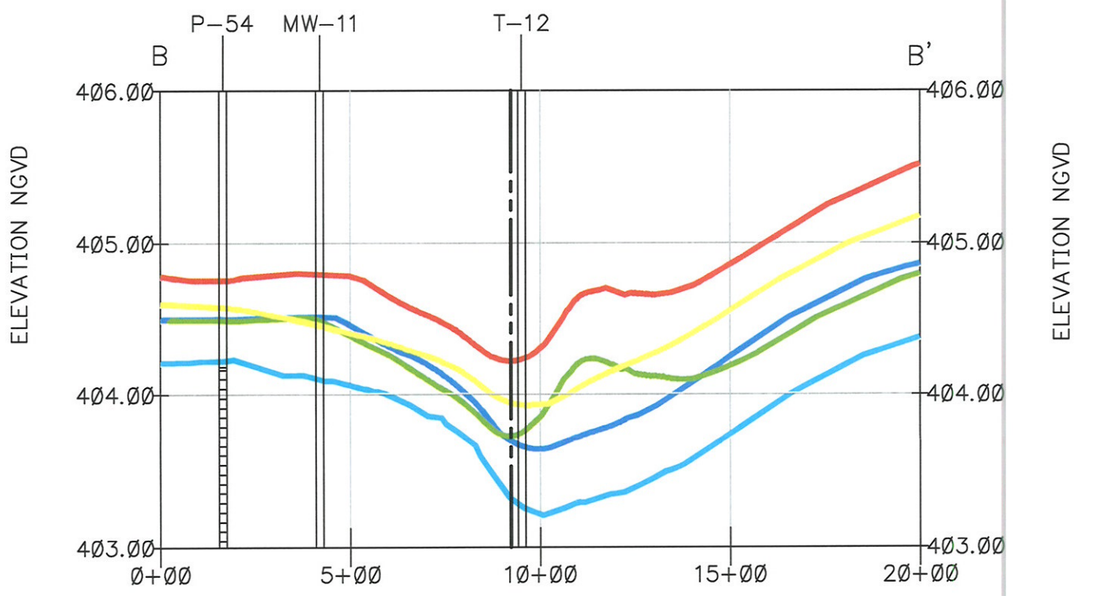
- MONITORING WELL LOCATION GAUGED (USED FOR CONTOURING)
- PIEZOMETER LOCATION GAUGED (USED FOR CONTOURING)
- PIEZOMETER LOCATION GAUGED (NOT USED FOR CONTOURING)
- MONITORING WELL LOCATION NOT GAUGED FOR THIS EVENT
- WATER WELLS
- AREA OF GROUNDWATER CAPTURE
- GROUNDWATER GRADIENT
- 407 GROUNDWATER SURFACE CONTOUR NGVD (CONTOUR INTERVAL Ø.5 FT.)

SHELL OIL PRODUCTS US AT THE WRB REFINING LLC WOOD RIVER REFINERY ROXANA, ILLINOIS		PROJECT NO. 21562593
URS		
DRN. BY: cs February 2011 DSGN. BY: dp CHKD. BY: bb,ss	Groundwater Contour Map February 28, 2011	FIGURE 7

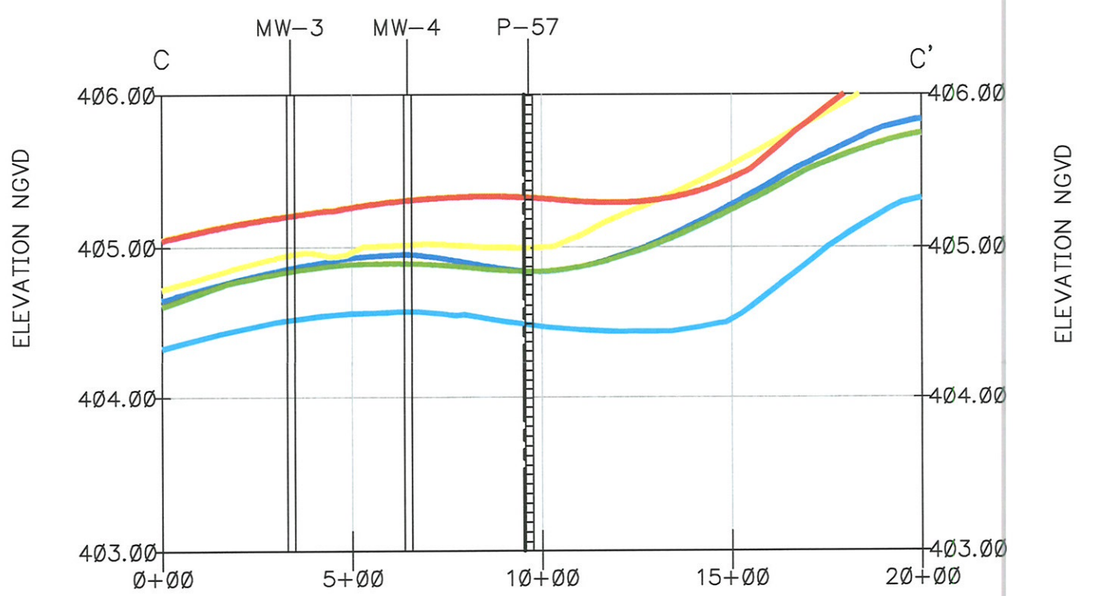
File: P:\ENVIRONMENTAL\SHELL OIL PRODUCT US\C-WRR-COP\WRB WEEKLY WELL GAUGING\FIGURES\FIG 7-ROXANNA 1Q11 CONTOUR MAP (CONTOURS ON 2-28-11).DWG Last edited: MAR. 03, 11 @ 4:05 p.m. by: david.deguire



SECTION A-A'
HORIZONTAL SCALE 1"=400'
VERTICAL SCALE 1"=1'



SECTION B-B'
HORIZONTAL SCALE 1"=400'
VERTICAL SCALE 1"=1'



SECTION C-C'
HORIZONTAL SCALE 1"=400'
VERTICAL SCALE 1"=1'

LEGEND

- MONITORING WELL/ SCREEN INTERVAL
- PROPERTY LINE
- GROUNDWATER PROFILE 1-31-11
- GROUNDWATER PROFILE 2-7-11
- GROUNDWATER PROFILE 2-14-11
- GROUNDWATER PROFILE 2-21-11
- GROUNDWATER PROFILE 2-28-11

SHELL OIL PRODUCTS US AT THE WRB REFINING LLC WOOD RIVER REFINERY ROXANA, ILLINOIS	PROJECT NO. 21562593
URS	
DRN. BY: cs February 2011 DSGN. BY: dp CHKD. BY: bb,ss	Groundwater Cross Sections — FIGURE 8