M67001.AR.004569
MCB CAMP LEJEUNE
5090.3a

OHM Remediation
Services Corp.
A Subsidiary of OHM Corporation

April 1, 1996

Mr. William Russell - Code 18
Commander, Atlantic Division
Naval Facilities Engineering Command
1510 Gilbert Street, Bldg. N-26
Norfolk, Va. 23511-2699

Re: Relocation of Additional Extraction Wells
Groundwater Treatment Project - Lot 203
MCB Camp Lejeune - D.O. 0015
Contract N62470-93-D-3032

Dear Bill:

In Lance's absence, please find enclosed herewith a package of drawings which depict the revised locations for extraction wells and one proposed deep monitoring well for Site 82 at MCB Camp Lejeune, N.C. Baker Environmental has also provided a descriptive summary of how the results of the aquifer testing were used to determine the new well placements.

All well locations have been staked at Lejeune and found to be suitable for well installation. OHM is currently soliciting quotations from drilling firms to install the wells. The shallow wells will be installed using a hollow stem auger rig mounted upon an all terrain vehicle. The deep wells will be installed using a truck mounted mud rotary rig.

5335 Triangle Parkway, Suite 450 ■ Norcross, Georgia 30092 ■ 404-729-3900

Please review the enclosures and plan to participate in a conference call to discuss the well locations with all recipients of this communique on Thursday or Friday of this week. OHM proposes to commence drilling operations next week if at all possible.

Thanks in advance for your assistance.

Very truly yours,

OHM Remediation Services Corp.

James A. Dunn, Jr., P.E.
Senior Project Manager

Encl..

pc: Neal Paul - EMD/IR
Gena Townsend - EPA Region 4
Pattrick Waters - NCDEHNR Superfund
Rich Bonnelli/Dan Fisher - Baker
Tom McCrory - OHM
Jerry Haste - COTR
Kate Landman - Code 18

From: Dan Fisher
To: Bill Mullen/LANTDIV, Lance Laughmiller/LANTDIV
Subject: Well Location Justification

The following is a brief discussion regarding the chosen locations for the additional shallow and deep extraction wells at Site 82 (MCB Camp Lejeune). The locations of DRW-1 and SRW-1 are not relevant to this discussion as they have existed since early 1995.

The hydraulic conductivities (or permeabilities) of the surficial water-bearing zone and of the Castle Hayne aquifer were calculated from pumpng tests perfromed in February and March 1996. From the average of those values (both are about 1 to 5 ft/day) "capture zones" for each well at the estimated flow rate were generated using MODFLOW (a 3-D finite-difference groundwater flow model) and MODPATH (a program that generates flow lines from MODFLOW output).

The width of the capture zones around each extraction well determine the well spacing necessary to provide hydraulic capture. The two new deep wells (DRW-2 and DRW-3) were estimated to produce about 40 gpm each. This is greater than the current rate of DRW-1 (25 - 30 gpm) due to assumed improved design and installation techniques. The sand pack of DRW-1 was not completely installed due to sloughing into the bottom half of the 20 foot long screen. The screens in DRW-2 and DRW-3 will be 30 feet long and close supervision of their installation is highly recommended. A skilled mud rotary driller will be necessary.

The five new shallow wells were estimated at 5 gpm each (from the rate produced by SRW-1 during the pumping test).

The well spacing was determined by placing the wells downgradient of the bulk of contamination in the model, running the model and viewing the results using MODPATH. In several runs, it was apparent that the well spacing was either too wide (evidenced by "gaps" or leaks in the hydraulic barrier) or too close (resulting in unnecessary pumping). The final locations reflect the balance of closing the gaps while minimizing pumping.

The deep capture zones are much wider than those of the surficial. This is mainly due to the larger sustainable pumping rate in the Castle Hayne. This is the explanation as to why the deep wells are so much farther apart than the shallow wells. Also the configuration of the wells is different because of different flow patterns in the shallow (which generally follows topography) than in the Castle Hayne (generally west-northwest toward the regional groundwater discharge point -- the New River). The line of shallow wells perpendicular to flow lies east west (flow is north toward Wallace Creek) and the "line" deep wells trends NE to SW to catch the NW flow.

Well depths of the addtional wells were not changed radically from the existing wells: shallow wells about 30-35 feet bgs and deep wells 80 - 110 feet bgs. The depth of the shallow wells is based on the identified zones of contamination in the surficial water-bearing zone. Incidentally, a diameter of four inches is sufficient to produce 5 gpm in the shallow zone, rather than six inches as was installed in SRW-1.

The depth of the deep wells is in line with the prevailing notion of "not drawing contamination further downward," and while this is a desirable goal, it necessarily limits the available drawdown, and hence, the amount of water pumped by the system. The original estimates of deep well yield were based on the production of HP-651 (about 250 gpm), but the new extraction wells are screened shallower (80 to 110 feet bgs versus 125 to 300 bgs for HP-651) and are smaller in diameter (6 inch versus 10 inch) than the production well. The new estimates of pumping in the deep wells (40 gpm) are based largely on the real rate from DRW-1

and on estimates of increases due to a longer screen and functional sand pack.

The zone tapped by the former production well (125 to 155 feet bgs) will be monitored by DMW-1 to determine the level of contamination, if any, at that depth. It will also be used to evaluate the hydraulic effects of pumping the overlying depths.

Again, here are the Well Coordinates in the NC State Planar system:

SHALLOW WELLS:

SRW-1	E	2,503,435	N	348,298	(EXISTING)
SRW-2	E	2,503,440	N	348,640	
SRW-3	E	2,503,240	N	348,640	
SRW-4	E	2,503,030	N	348,660	
SRW-5	E	2,502,850	N	348,680	
SRW-6	E	2,502,670	N	348,760	

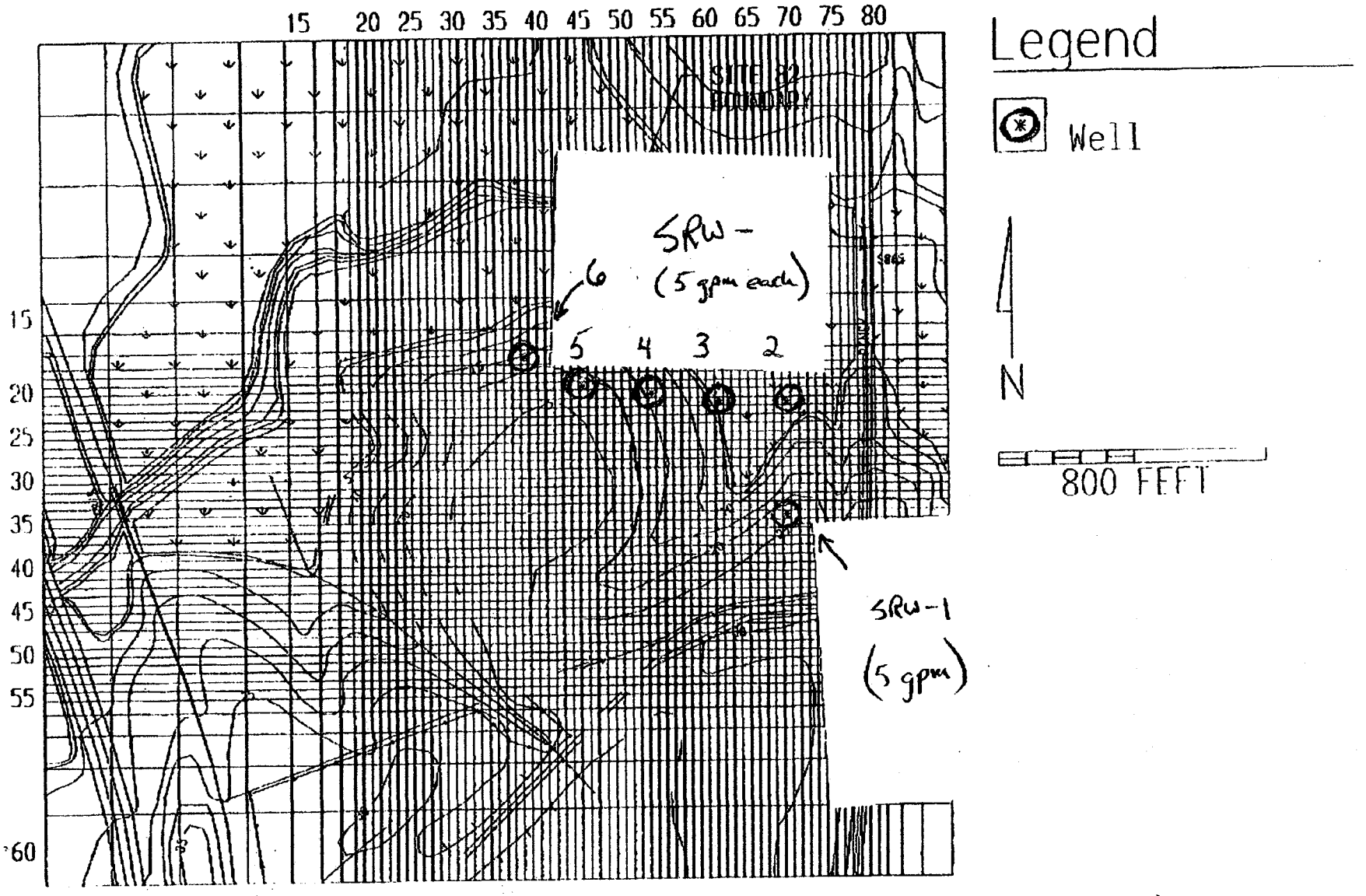
DEEP WELLS:

DRW-1	E	2,503,346	N	348,028	(EXISTING)
DRW-2	E	2,502,720	N	348,630	
DRW-3	E	2,502,320	N	348,280	
DMW-1	E	2,503,050	N	348,330	

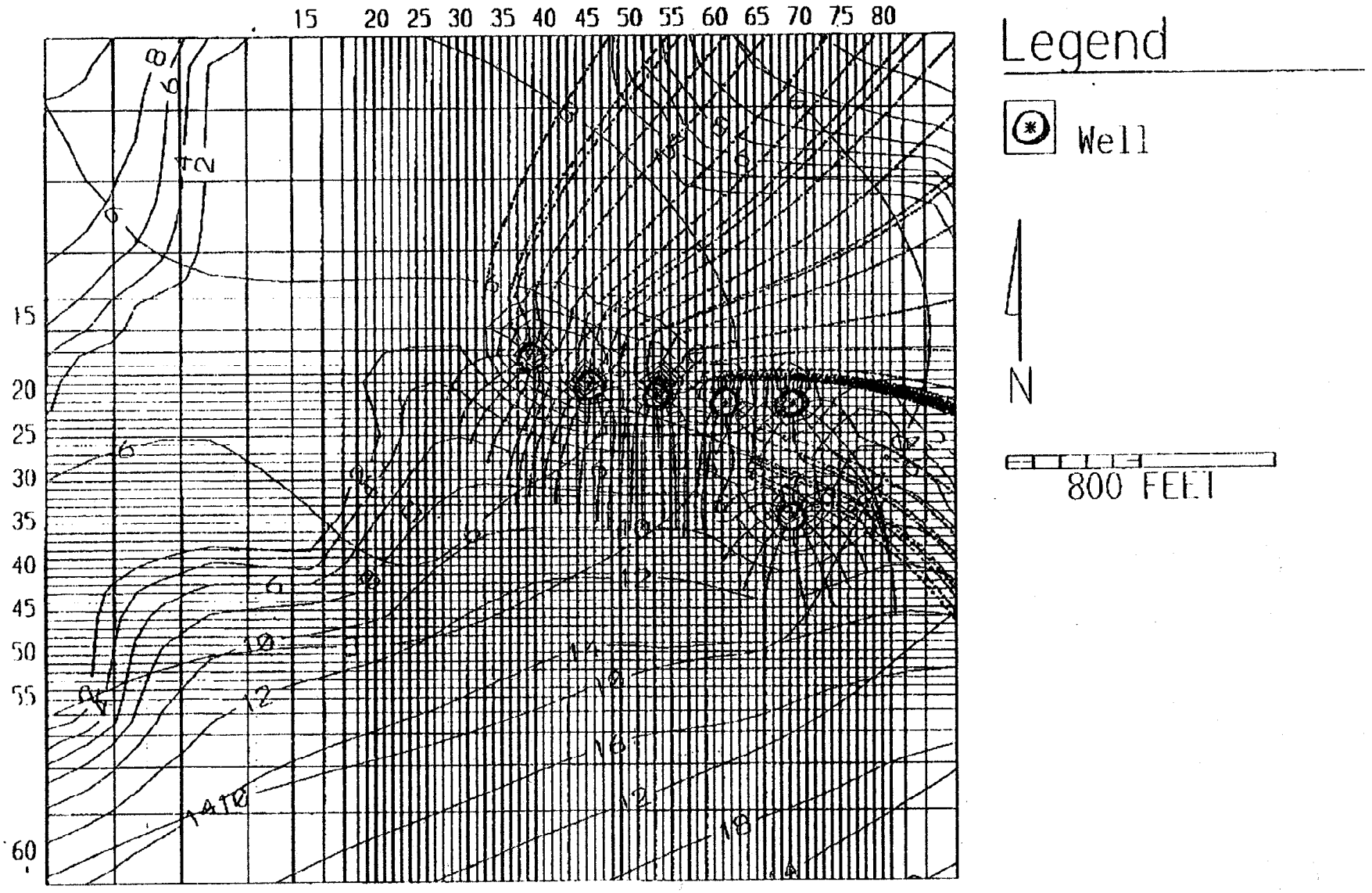
DSF (412) 269-6018 FAX (6057)

PS I am faxing this to Jim Dunn @ (770) 729-3905.

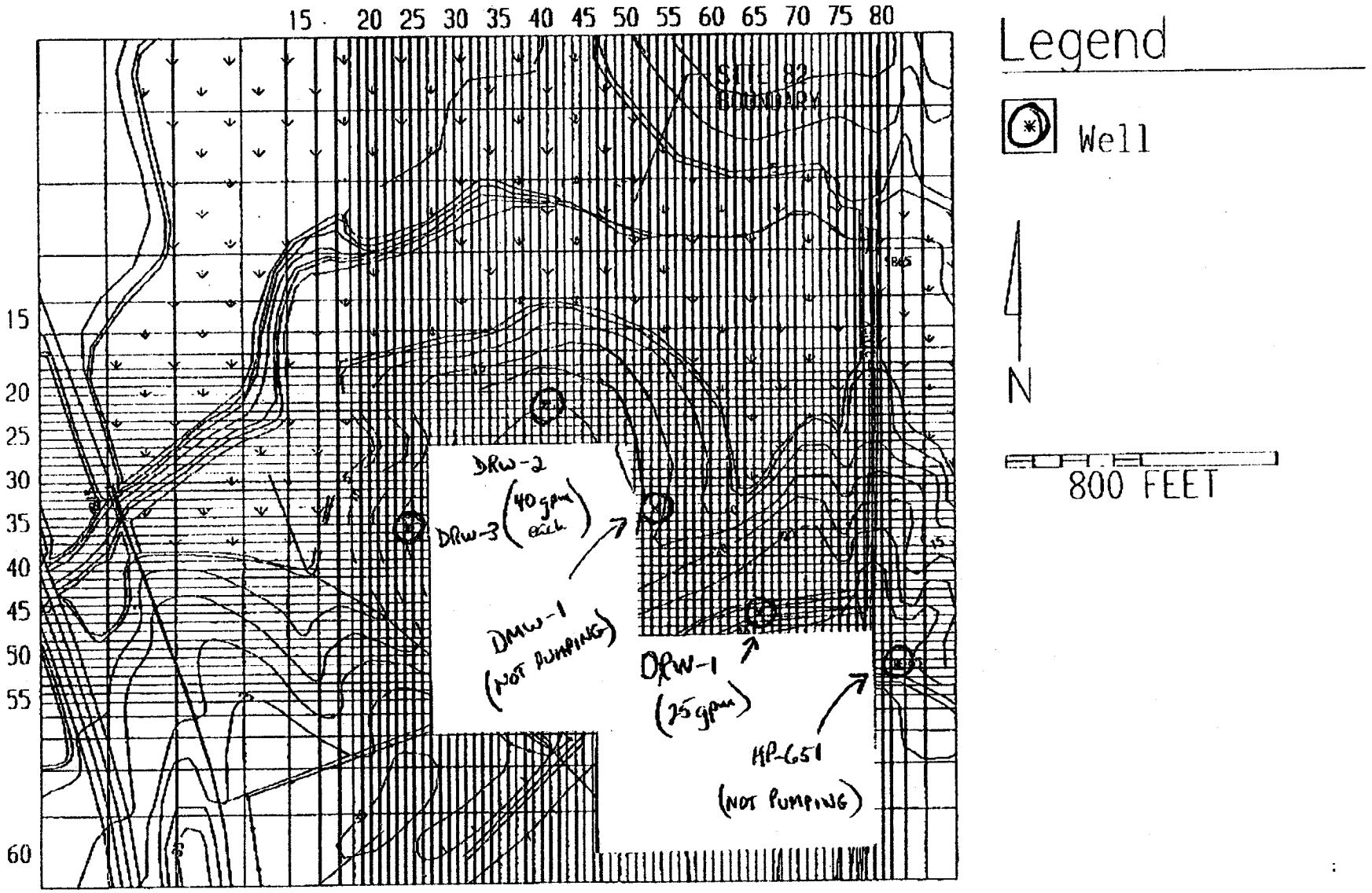
CC: RBONELLI, MBARTMAN



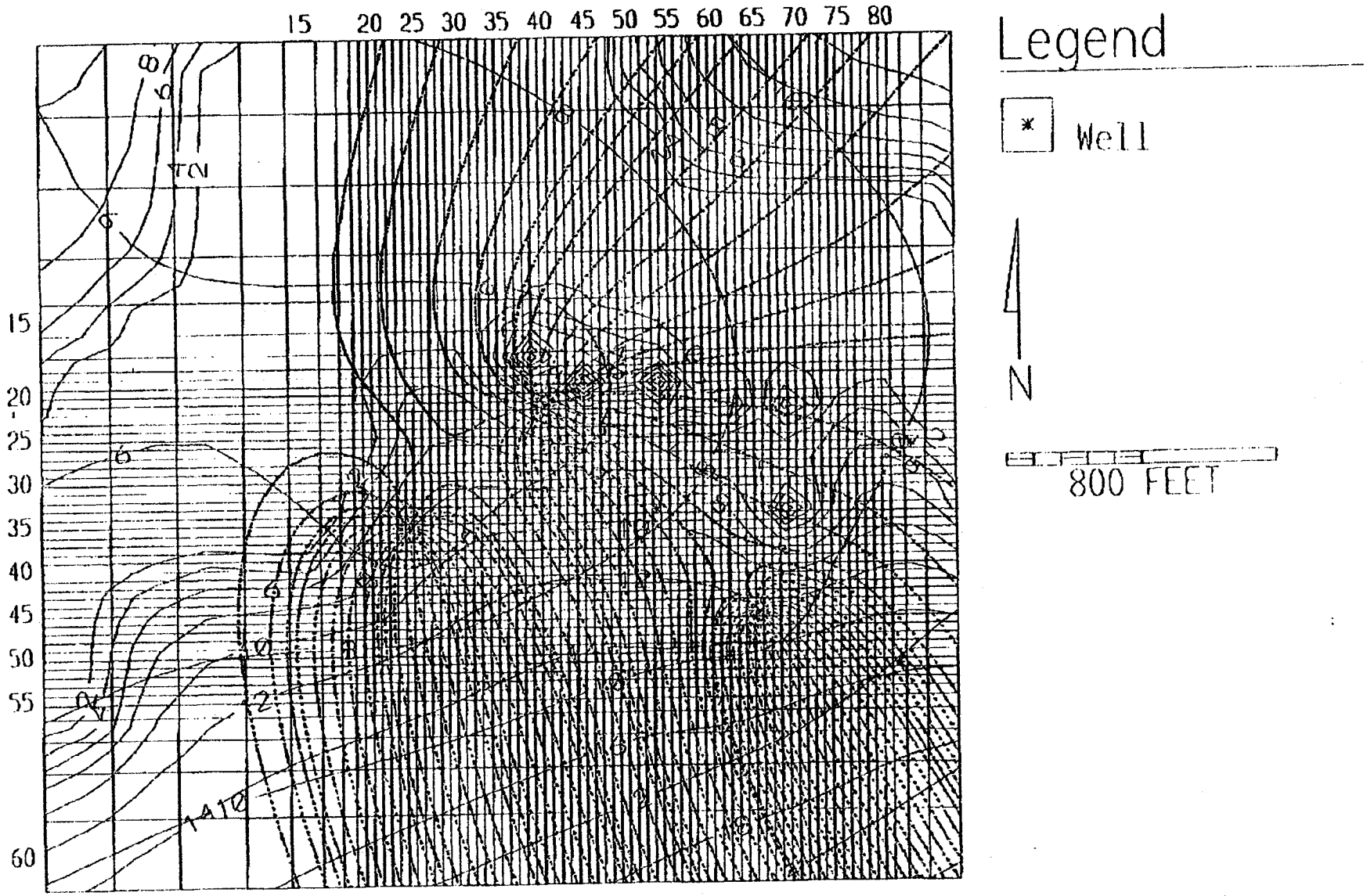
Shallow Well Locations -- Site 82 MCB Camp Lejeune (82-104)



Shallow Capture Zones SRW-1 thru 6 @ 5 GPM (82-104)



Deep Well Locations -- Site 82 MCB Camp Lejeune (82-104)



Deep Capture Zones DRW-1 @ 25 GPM; DRW-2 & 3 @ 40 GPM (82-104)

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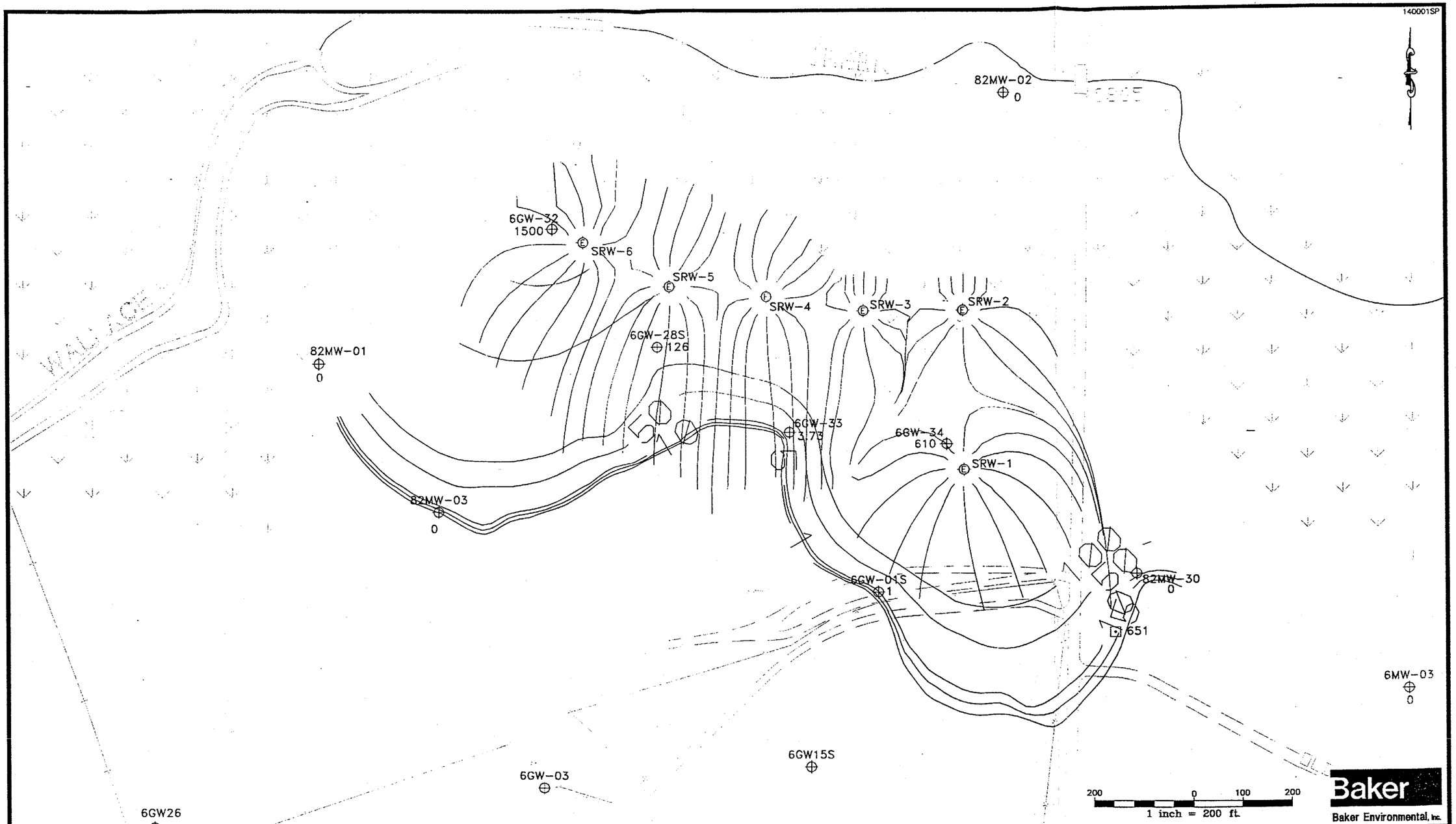


LEGEND

6GW-01S SHALLOW MONITORING WELL

651 WATER SUPPLY WELL

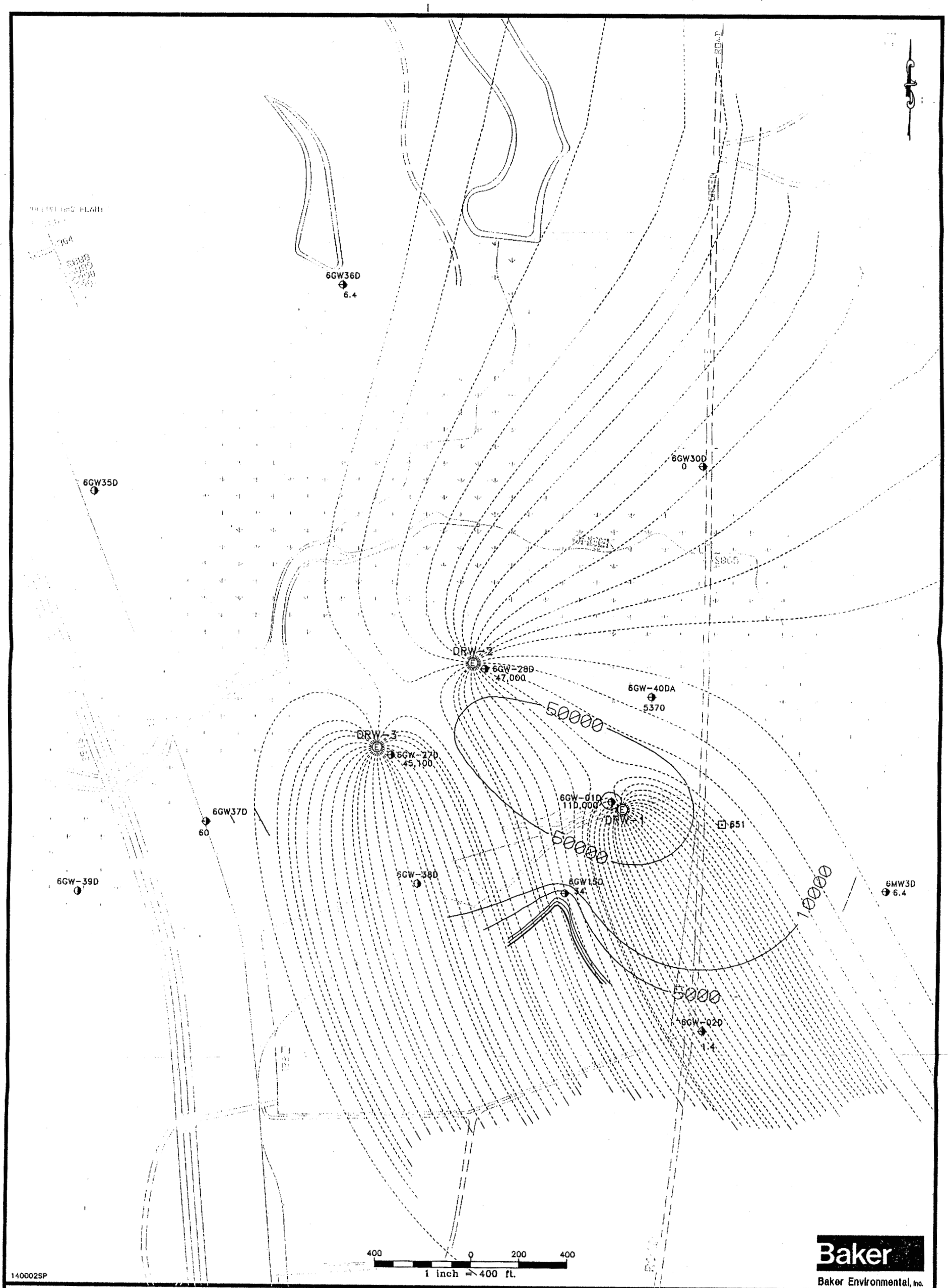
SRW-1 EXTRACTION WELL

1 TCE CONCENTRATION (ug/L)

SOURCE: LANTDIV, NOV. 1991

FIGURE 1
SHALLOW TCE CAPTURE ZONES
SITE 82

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA



LEGEND

6MW3D DEEP MONITORING WELL

651 WATER SUPPLY WELL

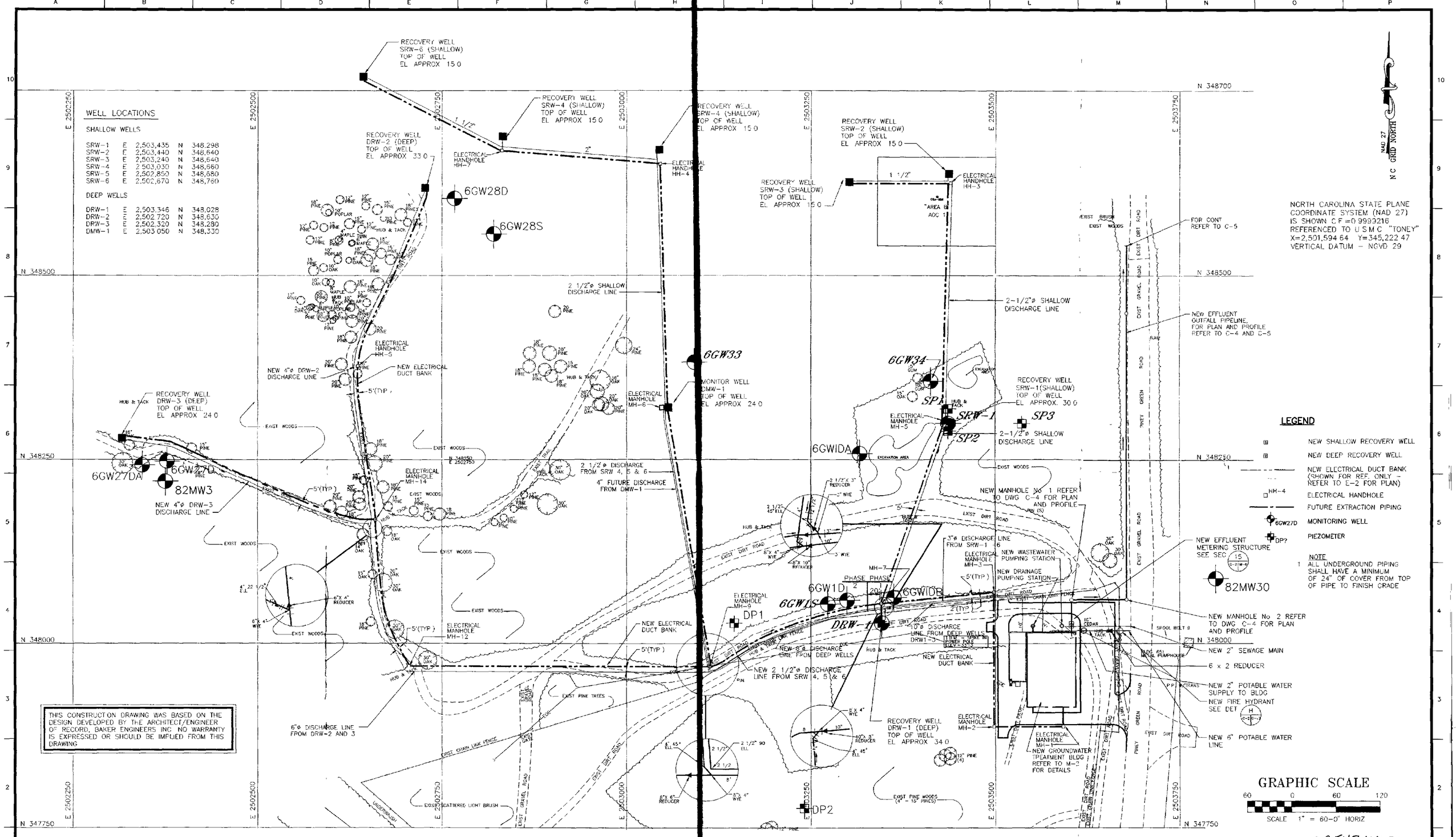
DRW-1 EXTRACTION WELL

6.4 TCE CONCENTRATION (ug/L)
- XX
- XX

SOURCE: LANTDIV, OCT. 1991

FIGURE 2
DEEP TCE CAPTURE ZONES
SITE 82

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA



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CADD FILE B:\OHM\LANTDIV\MISC\CD-14.DWG
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DESIGNED B MATTHEWS
CHECKED _____
CHECKED _____

REVISIONS

ZONE	REV	DESCRIPTION	BY	DATE	APP
	1	ISSUE FOR REVIEW & APPROVAL	OHM	9/29/94	
	2	REVISED PER LANTDIV COMMENTS AND ISSUED FOR CONSTRUCTION	OHM	1/30/95	
	3	REVISED PIPING AND ADDED FUTURE ADDITIONAL WELLS AND PIPING	B M	2/22/95	
	4	BAKER/LANTDIV REVIEW COMMENTS	B M.	3/27/95	
	5	REVISED SITE PIPING LOCATION AND DUCTBANK LOCATION	B.M	6/8/95	
	6	REVISED SITE PIPING LOCATION AND DUCTBANK LOCATION	JAD	3/27/96	

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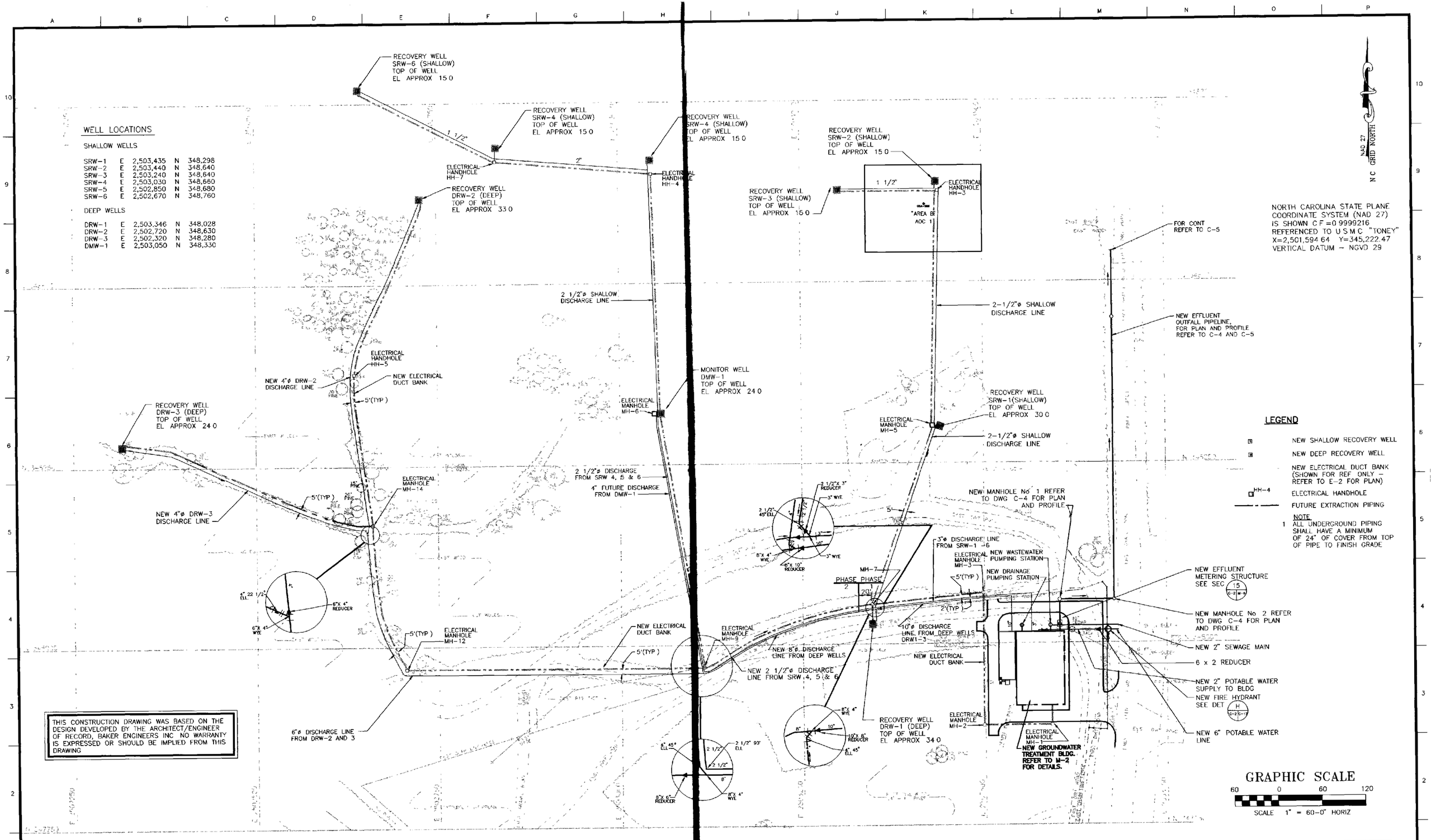
ATLANTIC DIVISION
NAVAL STATION — NORFOLK, VIRGINA
LANTDIV RAC CONTRACT N62470-93-D-3032 — DELIVERY ORDER NO. 0015
OPERABLE UNIT NO. 2 — MARINE CORPS BASE, CAMP LEJEUNE, N.C

CIVIL

EXISTING MONITORING WELLS

DRAWING NUMBER CD-14
SHEET NUMBER: of
DATE 3/27/95



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SITE PIPING PLAN

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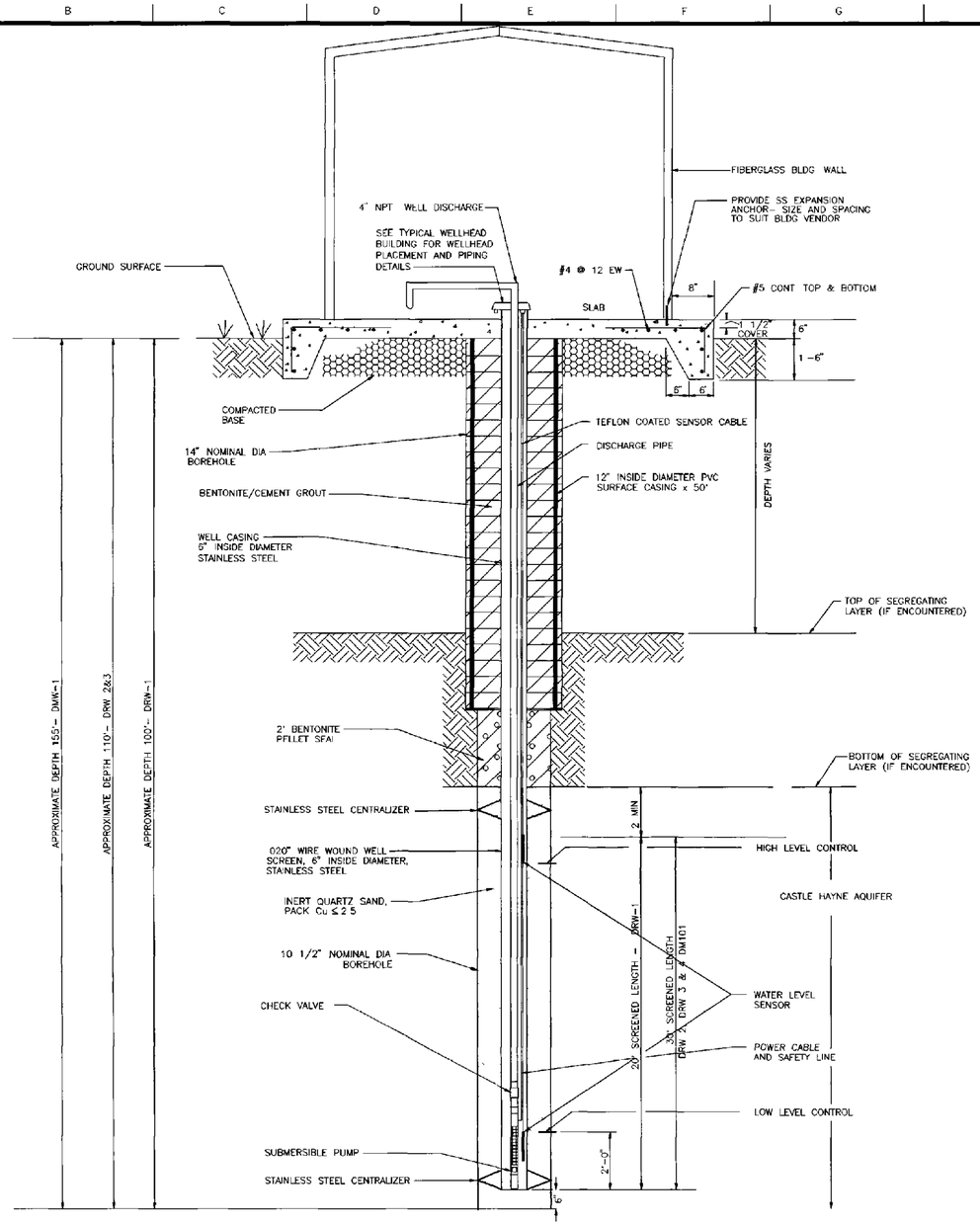
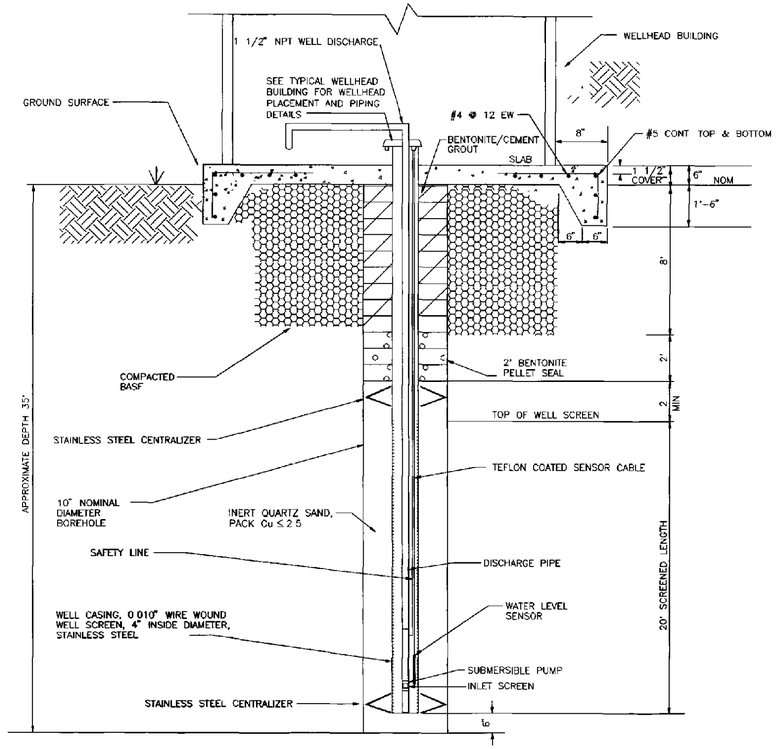


TYPICAL SECTION – DRW 1,2, AND 3 AND DMW-1

NTS
(SEE SHEET C-2 FOR WELL LOCATIONS)

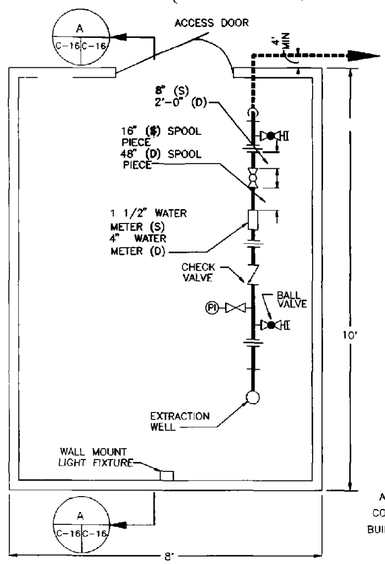


TYPICAL SECTION – SRW 1 THROUGH SRW 6

NTS
(SEE SHEET C-2 FOR WELL LOCATIONS)

NOTES

MATERIALS AND PRODUCTS SHALL CONFORM TO SPECIFICATIONS SECTION 02900

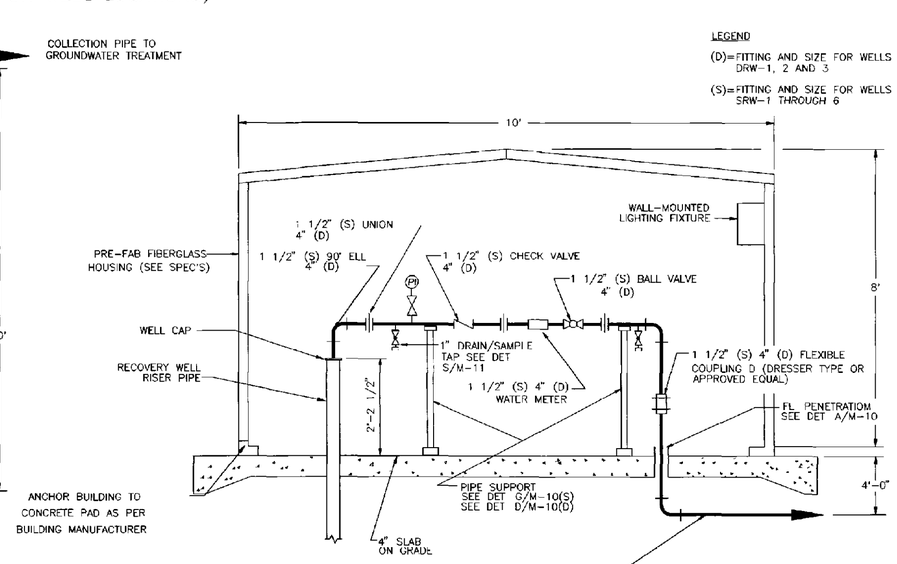


PLAN

NTS

TYPICAL WELLHEAD BUILDING

NTS



ANCHOR BUILDING TO CONCRETE PAD AS PER BUILDING MANUFACTURER

TYP. SECTION A C-16 C-16

NTS

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	2	BAKER/LANTDIV REVIEW COMMENTS	BM	3/27/95	
	3	ADDED WELLS & CLARIFIED	JAD	3/26/96	

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RECOVERY WELL DETAILS

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