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THE MEMPHIS DEPOT
TENNESSEE

ADMINISTRATIVE RECORD COVER SHEET

AR File Number 767

ANNUAL OPERATION AND MAINTENANCE SUMMARY REPORT FOR YEAR 2003 GROUNDWATER INTERIM REMEDIAL ACTION

DUNN FIELD

MEMPHIS DEFENSE DEPOT, TENNESSEE

PREPARED FOR

MOBILE DISTRICT US ARMY CORPS OF ENGINEERS

BY

JACOBS FEDERAL PROGRAMS

OAK RIDGE, TN

January, 2004

USACE CONTRACT NO. DACA01-99-D-0040
JACOBS PROJECT NUMBER C5X51115

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1.0 INTRODUCTION

This report summarizes the information contained in the monthly operation and maintenance reports for the groundwater recovery system on Dunn Field at the Memphis Depot. These monthly reports have been submitted to the Memphis Depot and the regulating government agencies during the calendar year 2003.

1.1 Site Description and Background

DDMT covers 642 acres in Shelby County, Tennessee. The facility is approximately four miles southeast of the central business district and one mile northwest of Memphis International Airport. Operations began in 1942 with the mission to inventory and supply materials for the United States Army. In 1964, its mission was expanded to serve as one of the principal distribution centers for a complete range of military commodities. Past activities at DDMT included a wide range of storage, distribution, and maintenance practices. DDMT has been closed since 1997 and is maintained by the Memphis Depot Caretaker Division, under the control of the Defense Depot, Susquehanna, Pennsylvania/Defense Logistics Agency (DLA). DDMT is currently undergoing Base Realignment and Closure (BRAC) activities.

Dunn Field, also called OU-1, consists of 68 acres of land located north of the main installation. The northwestern quadrant of Dunn Field was used as a landfill area. The southwestern and southeastern quadrants were used as a storage area for mineral stockpiles. The northeastern portion was used as a pistol range and later as a pesticide storage area. Until 1970, Army supplies, including hazardous and non-hazardous materials were burned or buried primarily in the northwest portion of Dunn Field. These materials potentially included oil and grease, paint, paint thinner, methyl bromide, pesticides, herbicides, and food supplies. Disposal operations at Dunn Field have created a plume of contaminated groundwater, in the shallow fluvial aquifer, along the western and northern portion of Dunn Field. Groundwater monitoring performed during the 1989 and 1990 remedial investigation/feasibility study (RI/FS) identified concentrations of dissolved volatile organic compounds (VOCs) and heavy metals above regulatory limits. Identified VOCs included, but were not limited to tetrachloroethene, trichloroethene, dichloroethene, carbon tetrachloride, chloroform and 1,1,2,2-trichloroethane. The DDMT facility is classified as a Superfund Site under the Comprehensive Environmental Response, Compensation, and Liability Act of 1990 (CERCLA) Section 120 (Federal Facilities).

1.2 Groundwater Recovery System Description

As part of the Record of Decision (ROD) for interim remedial action at Dunn Field, seven groundwater extraction wells, one pre-cast concrete building, an underground conveyance system, a flow measurement and control system, and associated components were installed in 1997. Four additional recovery wells were installed and brought online in 2001. Equipment, process controls, operational requirements, recovery well sizes and depths, pumping rates, and construction drawings are defined in the Technical Specifications prepared by CH2M-Hill.

Jacobs Engineering operated and maintained this system throughout 2003. Effective January 1, 2004, MACTEC Engineering will assume these responsibilities.

2.0 OPERATION AND MAINTENANCE SUMMARY

2.1 Recovery Wells

Eight of the eleven recovery wells were 100% operational in 2003, excluding the time all units were shut down for the replacement of the drop pipe with flexible hose. Three of the wells experienced equipment failures leading to down time.

Two of the wells (RW-1 and RW-9) experienced pump failures. In both instances, the pump motor drive shaft wore out the pump spline, causing the motors to run continuously with no fluid being pumped.

One well (RW-4) has experienced a failure of the micro-controller unit, which will need to be repaired or replaced. This will occur early in 2004.

All rigid stainless steel drop pipe in each of the 11 recovery wells was replaced with a flexible hose system in April, 2003. This change was made to allow for easier down-hole equipment inspections. The pumps and motors can now be pulled using a portable winch that was supplied with this system modification. The wellhead housing will not have to be removed to change out the pump motor units.

RW-01

January-May – Pump and motor failed in this unit. Repair was made in April in conjunction with the conversion of all stainless steel drop pipe to flexible hose.

June-December – Unit was restarted and the pump was 100% operational the remainder of the year.

The flow meter malfunctioned and was replaced in December. During the time that the flow meter was offline, the flow rate was determined by using the average flow rate from the previous month.

RW-01A

The unit was 100% operational for the year, except for the time it was down to convert stainless steel drop pipe to flexible hose.

RW-01B

The unit was 100% operational for the year, except for the time it was down to convert stainless steel drop pipe to flexible hose.

RW-02

The unit was 100% operational for the year, except for the time it was down to convert stainless steel drop pipe to flexible hose.

RW-03:

The pump was 100% operational for the year, except for the time the unit was down to convert stainless steel drop pipe to flexible hose.

The flow meter element has failed in this unit in late December 2003 and will need to be replaced. During the time that the flow meter was offline, the flow rate was determined by using the average flow rate from the previous month. The repair will occur early in 2004.

RW-04

January-September - The unit was 100% operational, except for the time it was down to convert stainless steel drop pipe to flexible hose.

October-December – The unit began to experience multiple electrical problems, leading to the failure of the micro-controller unit. This will be repaired or replaced in early 2004.

RW-05

The pump was 100% operational for the year, except for the time the unit was down to convert stainless steel drop pipe to flexible hose.

The flow meter element was worn out and malfunctioned in November. It was replaced in December. During the time that the flow meter was offline, the flow rate was determined by using the average flow rate from the previous month.

RW-06

The unit was 100% operational for the year, except for the time it was down to convert stainless steel drop pipe to flexible hose.

RW-07

The unit was 100% operational for the year, except for the time it was down to convert stainless steel drop pipe to flexible hose.

RW-08

The unit was 100% operational for the year, except for the time it was down to convert stainless steel drop pipe to flexible hose.

RW-09

January-November - The pump was 100% operational, except for the time the unit was down to convert stainless steel drop pipe to flexible hose.

November-December – The pump and motor failed and was replaced in December. The unit was brought back online in late December.

The flow meter element has failed in this unit and will need to be replaced. During the time that the flow meter was offline, the flow rate was determined by using the average flow rate from the previous month. The repair will occur early in 2004.

2.2 Telemetry System

Data from each of the recovery well is collected in a central processor in the pump control building and is accessible via a remote modem connection. A new software program to download the data was obtained late in 2003 and will be put into service in 2004. The software program has been transferred to MACTEC Engineering.

3.0 SYSTEM PERFORMANCE

Monthly and cumulative extraction volumes for each well have been tabulated and are presented in Table 1. Graphical depictions of the recovery volumes have also been prepared and are presented as Figures 1 through 11.

The overall system performed very well in 2003, with only three wells experiencing significant downtime. Wells RW-1 and RW-9 experienced pump and motor failures. As in past failures, the pump spline and drive shaft wore out, causing the pump motor to run without pumping fluid.

Well RW-4 experienced a failure of the micro-controller unit (the first such failure to occur in the system).

Other minor equipment failures were addressed and did not cause downtime. Well RW-1 required replacement of the flow meter, and wells RW-3, RW-5 and RW-9 experienced failure of the flow meter element.

Approximately 30.5 million gallons of water were removed from the ground in the calendar year 2003 (an increase of 2.2 million gallons over 2002), resulting in removal of approximately 38.4 pounds of TCE and 102.2 pounds of total volatile organic compounds.

Figure 12 graphically shows the groundwater quality, measured at the effluent metering station for TCE and Total VOC concentrations over the past four years. Both TCE and Total VOC indicated an increase in concentration for the first three quarters of 2003, followed by a slight decrease during the final quarter.

Overall, total VOC concentrations have generally ranged between 300 and 500 ug/L since 2000, while TCE concentrations have generally ranged from 80 to 180 ug/L. No clear upward or downward trend is apparent in the data since 2000.

TABLES

TABLE 1

YEAR 2003
SUMMARY OF GROUNDWATER EXTRACTION VOLUMES

	RW-1 Extraction Volume (Gal)	RW-1A Extraction Volume (Gal)	RW-1B Extraction Volume (Gal)	RW-2 Extraction Volume (Gal)	RW-3 Extraction Volume (Gal)	RW-4 Extraction Volume (Gal)	RW-5 Extraction Volume (Gal)	RW-6 Extraction Volume (Gal)	RW-7 Extraction Volume (Gal)	RW-8 Extraction Volume (Gal)	RW-9 Extraction Volume (Gal)	Monthly Totals
JAN	0	153,360	57,312	83,376	74,736	94,752	138,384	330,624	298,080	677,088	656,640	2,564,352
FEB	0	144,000	52,416	76,608	114,336	105,120	124,992	316,512	285,264	615,168	590,112	2,424,528
MAR	0	157,248	58,032	75,312	74,448	124,416	138,384	351,216	334,800	670,896	650,736	2,635,488
APR	0	80,748	47,322	62,532	48,888	99,546	102,858	370,404	272,280	482,796	493,050	2,060,424
MAY	5,100	233,424	73,440	87,264	73,152	186,480	155,664	399,744	291,168	612,432	626,832	2,744,700
JUN	43,200	177,120	69,120	86,400	52,272	195,408	159,840	413,568	301,824	592,560	558,000	2,649,312
JUL	44,640	183,024	71,424	89,280	46,800	232,992	138,384	443,664	328,896	616,032	580,752	2,775,888
AUG	44,640	182,448	71,424	89,280	61,200	235,872	138,384	434,448	336,960	616,032	584,784	2,795,472
SEP	43,200	172,800	66,240	89,280	23,040	216,000	133,920	449,280	299,520	599,040	571,680	2,664,000
OCT	44,640	174,240	69,984	93,744	34,560	131,184	148,752	456,480	298,080	621,792	595,440	2,668,896
NOV	43,200	168,480	64,800	90,720	33,120	164,580	168,480	393,120	285,120	604,800	320,256	2,336,676
DEC	44,640	169,398	66,672	93,744	86,832	0	160,848	472,896	395,568	622,800	32,760	2,146,158
Totals	313,260	1,996,290	768,186	1,017,540	723,384	1,786,350	1,708,890	4,831,956	3,727,560	7,331,436	6,261,042	30,465,894

Notes A general decrease in flow in all wells is noted in April This is caused by the shut down of the entire system for several days while the rigid stainless steel pipe was replaced with flexible hose

A general temporary increase in flow rates is also noted in May. This is due to the re-start of the recovery well system after the aquifer had been allowed to recover during the April shut down

The zero reading in RW-1 were due to the failure of the pump and motor in that unit Pump and motor were replaced in conjunction with the conversion of the stainless steel drop pipes to flexible hose

The set point at well RW-4 was lowered in May, allowing greater draw down in the well and resulting in an increase in flow The zero reading in December is due to the failure of the micro-controller resulting in shutdown of the well

The decrease in flow in RW-9 in November and December is due to downtime caused by pump and motor failure The pump and motor were replaced ir late December

The inconsistency of RW-3 flow rate may point to a need to replace the existing flow meter The recent failure of flow meters in other recovery wells may be an indication of this need for other wells also since all flow elements are of the same age

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FIGURES

Figure 1
Year 2003 Monthly and Cumulative Groundwater Extraction Volume for Recovery Well RW-1 in Gallons

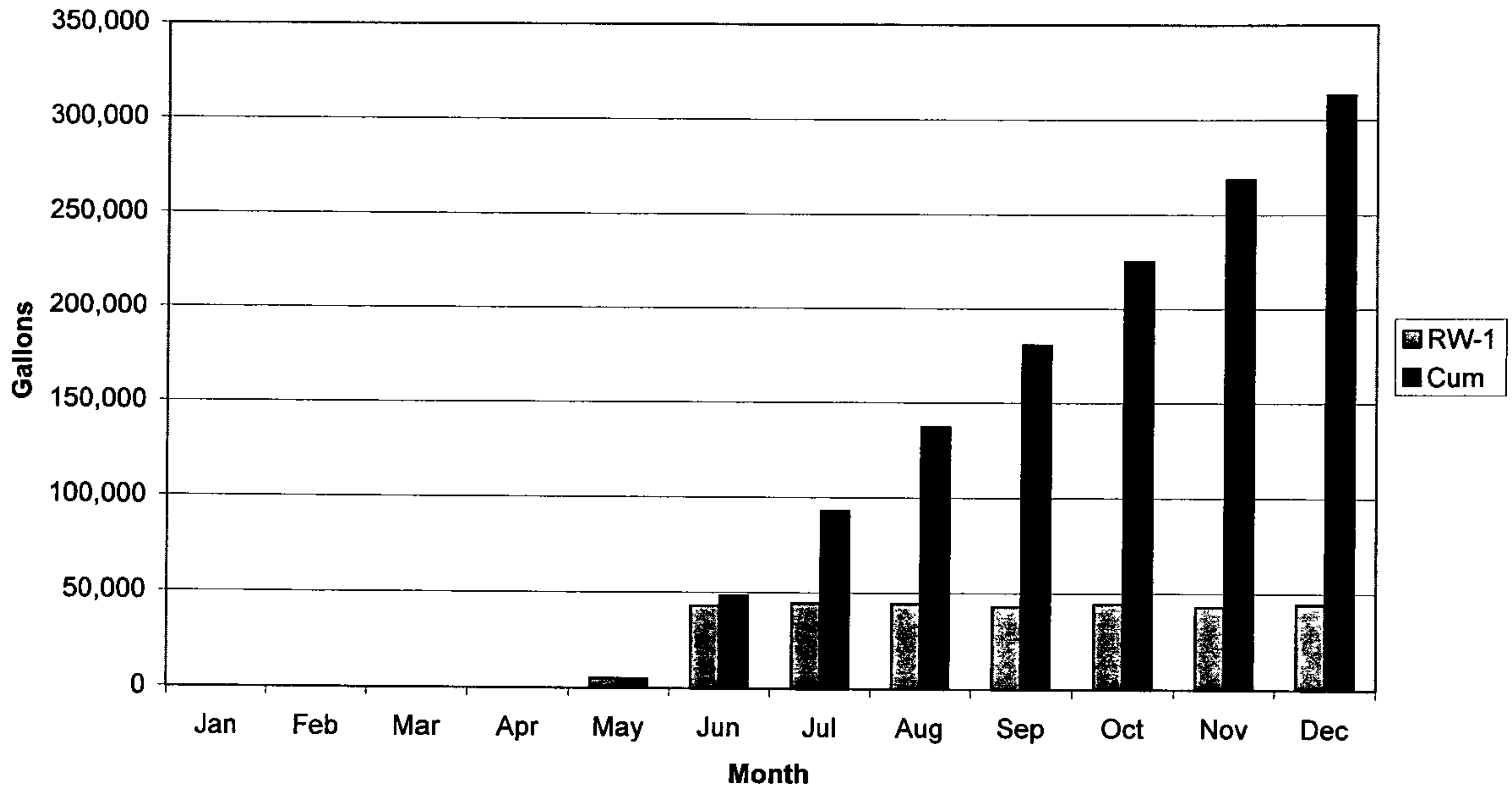

Figure 2
Year 2003 Monthly and Cumulative Groundwater Extraction Volume for Recovery Well RW-1A in Gallons

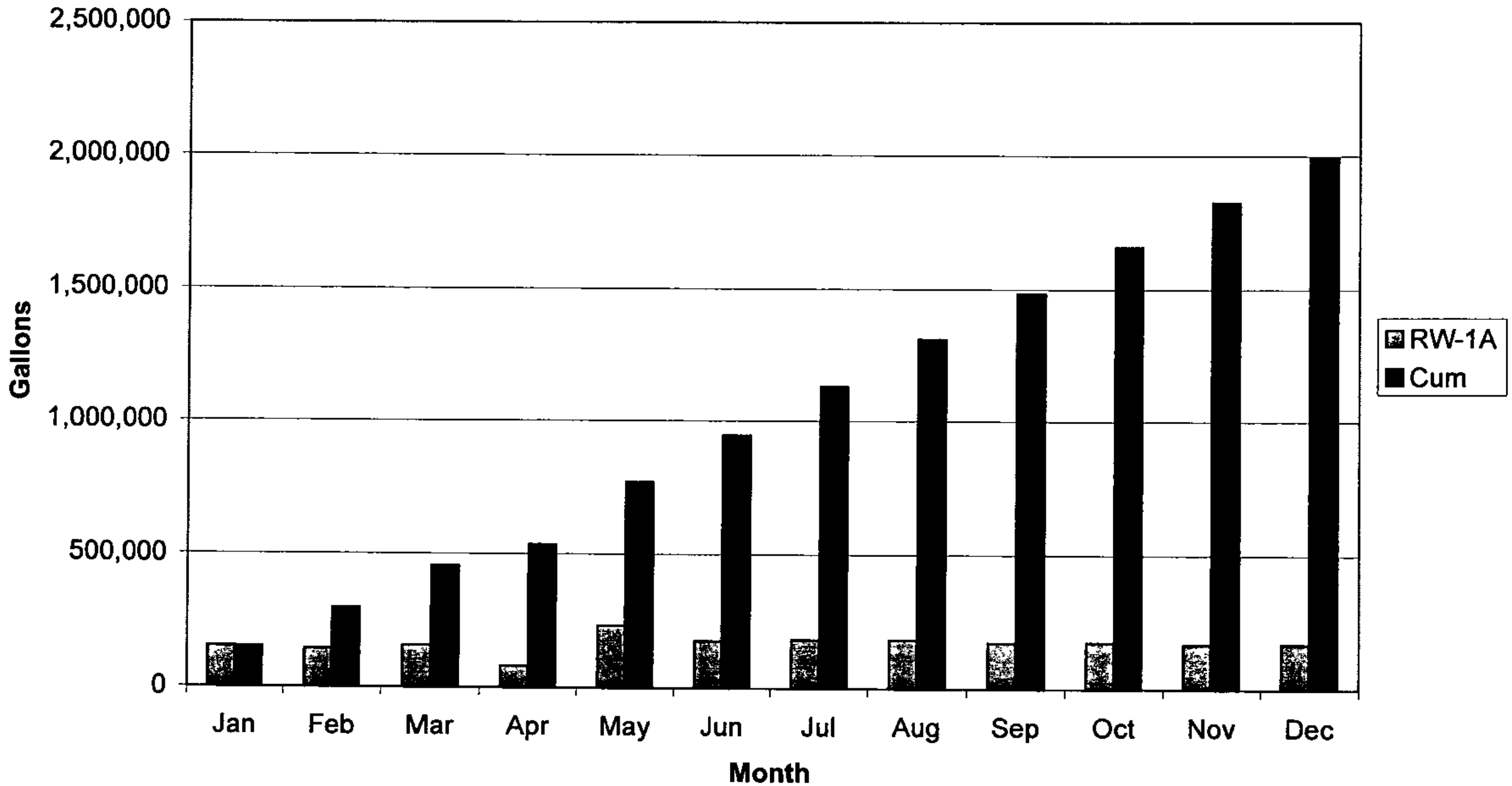

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Figure 3
Year 2003 Monthly and Cumulative Groundwater Extraction Volume for Recovery Well RW-1B in Gallons

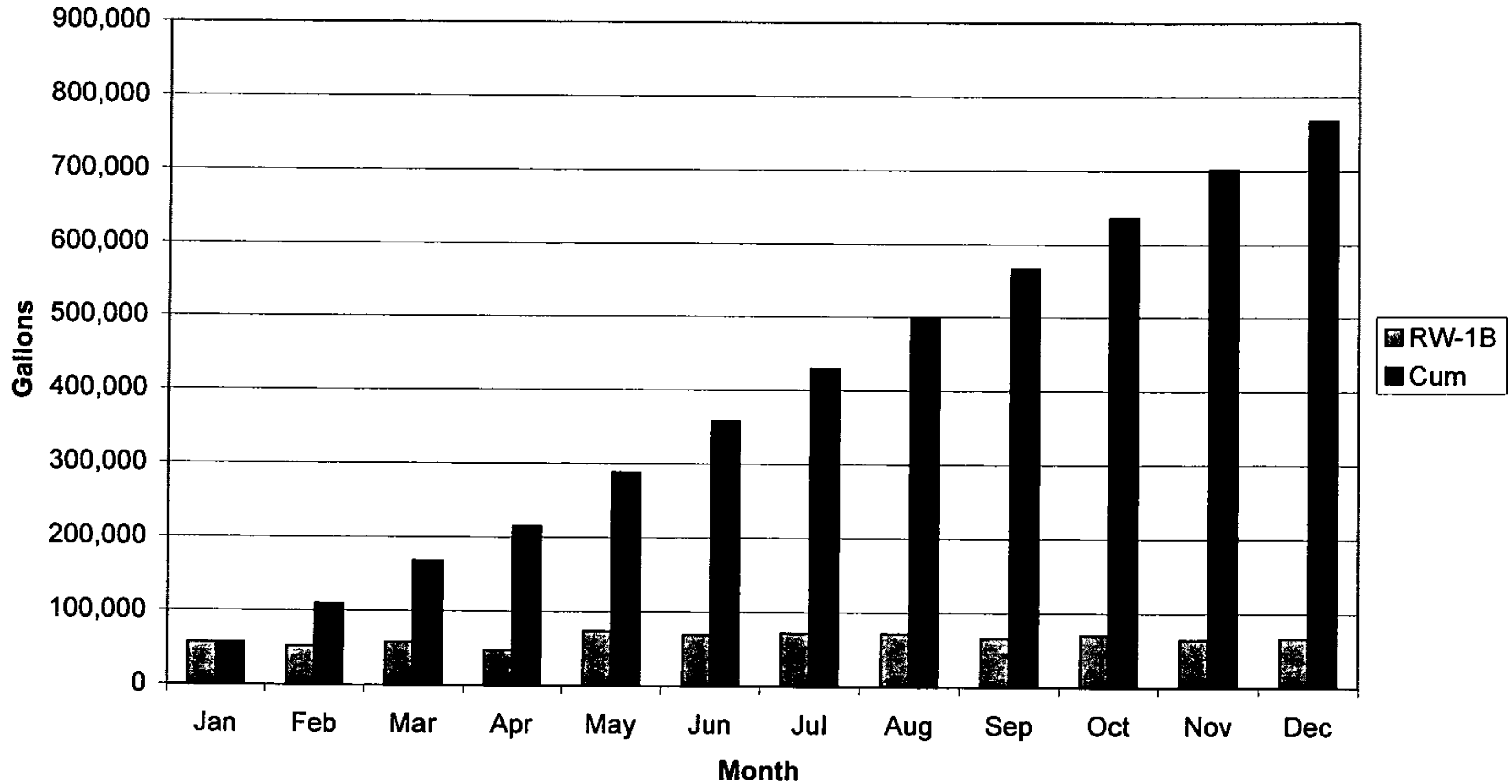

Figure 4
Year 2003 Monthly and Cumulative Groundwater Extraction Volume for Recovery Well RW-2 in Gallons

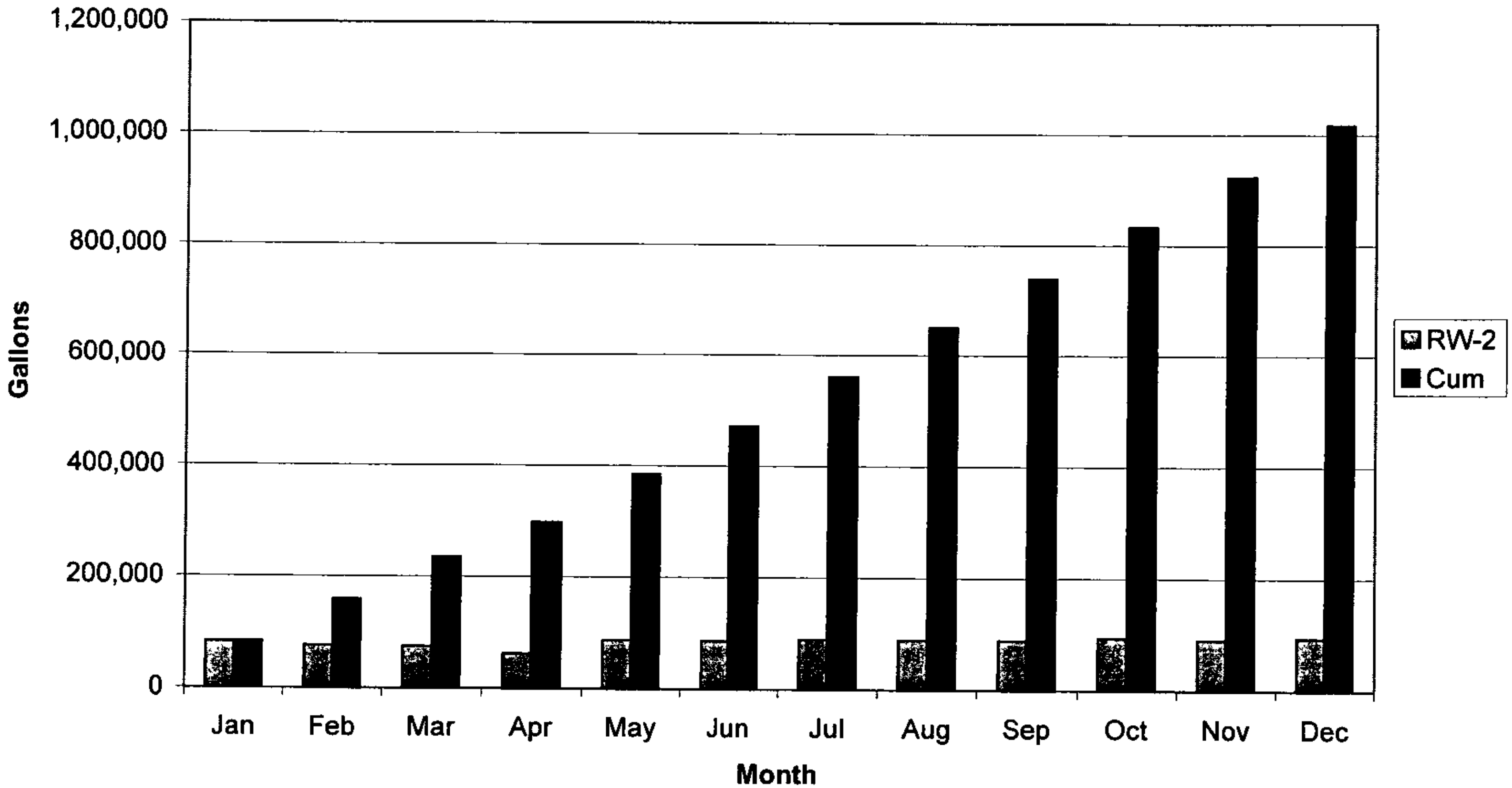

Figure 5
Year 2003 Monthly and Cumulative Groundwater Extraction Volume for Recovery Well RW-3 in Gallons

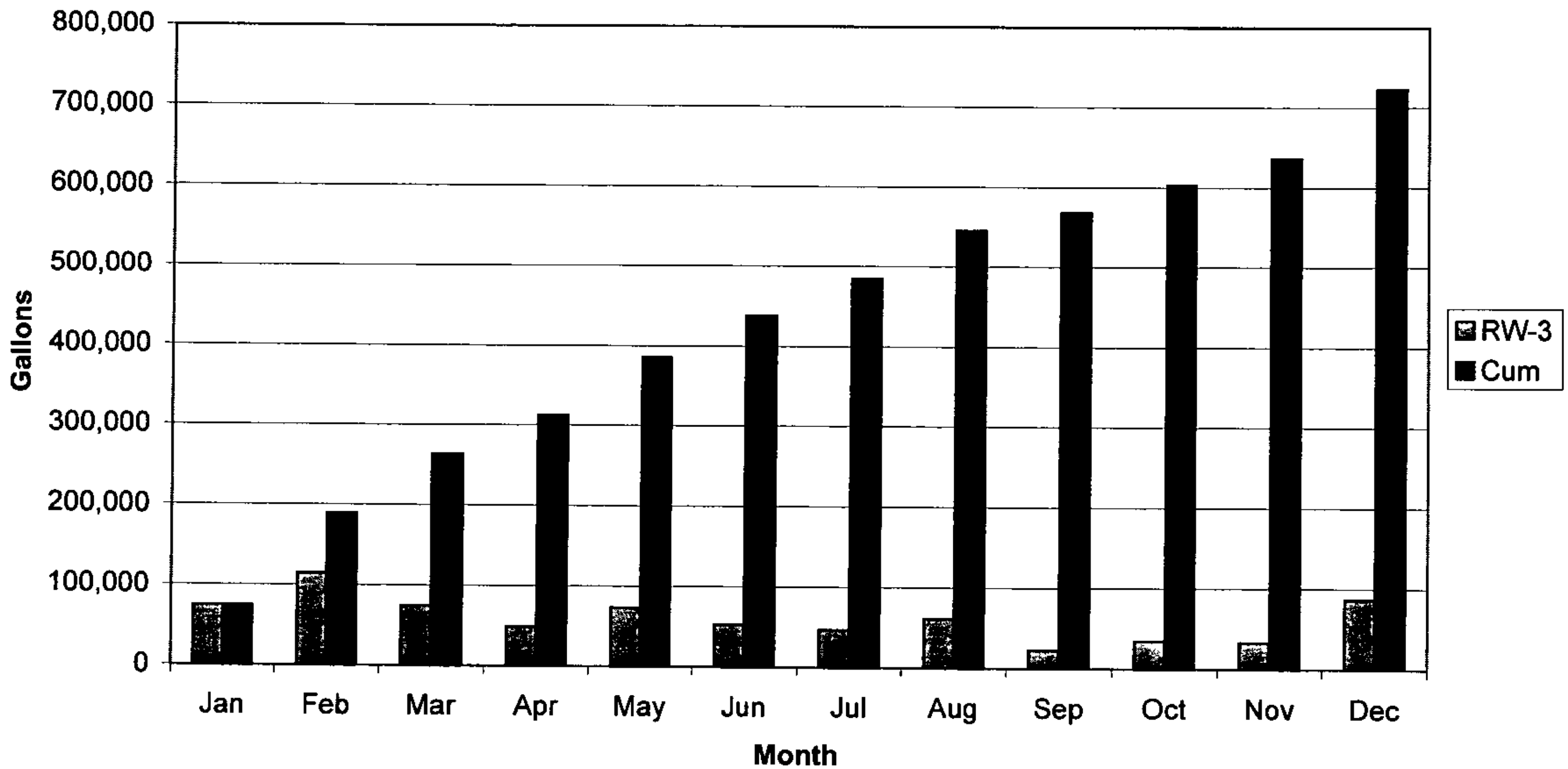

Figure 6
Year 2003 Monthly and Cumulative Groundwater Extraction Volume for Recovery Well RW-4 in Gallons

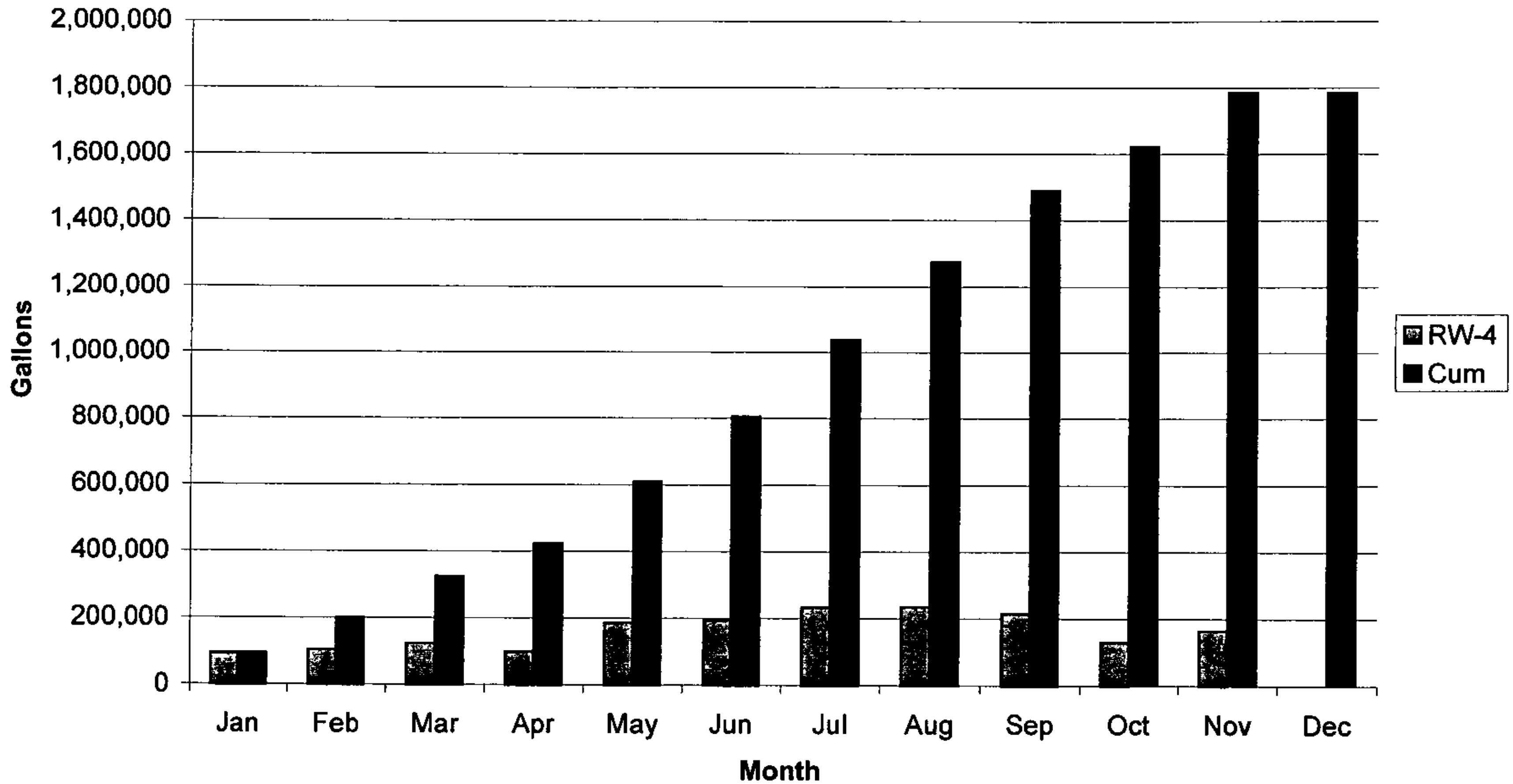

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Figure 7
Year 2003 Monthly and Cumulative Groundwater Extraction Volume for Recovery Well RW-5 in Gallons

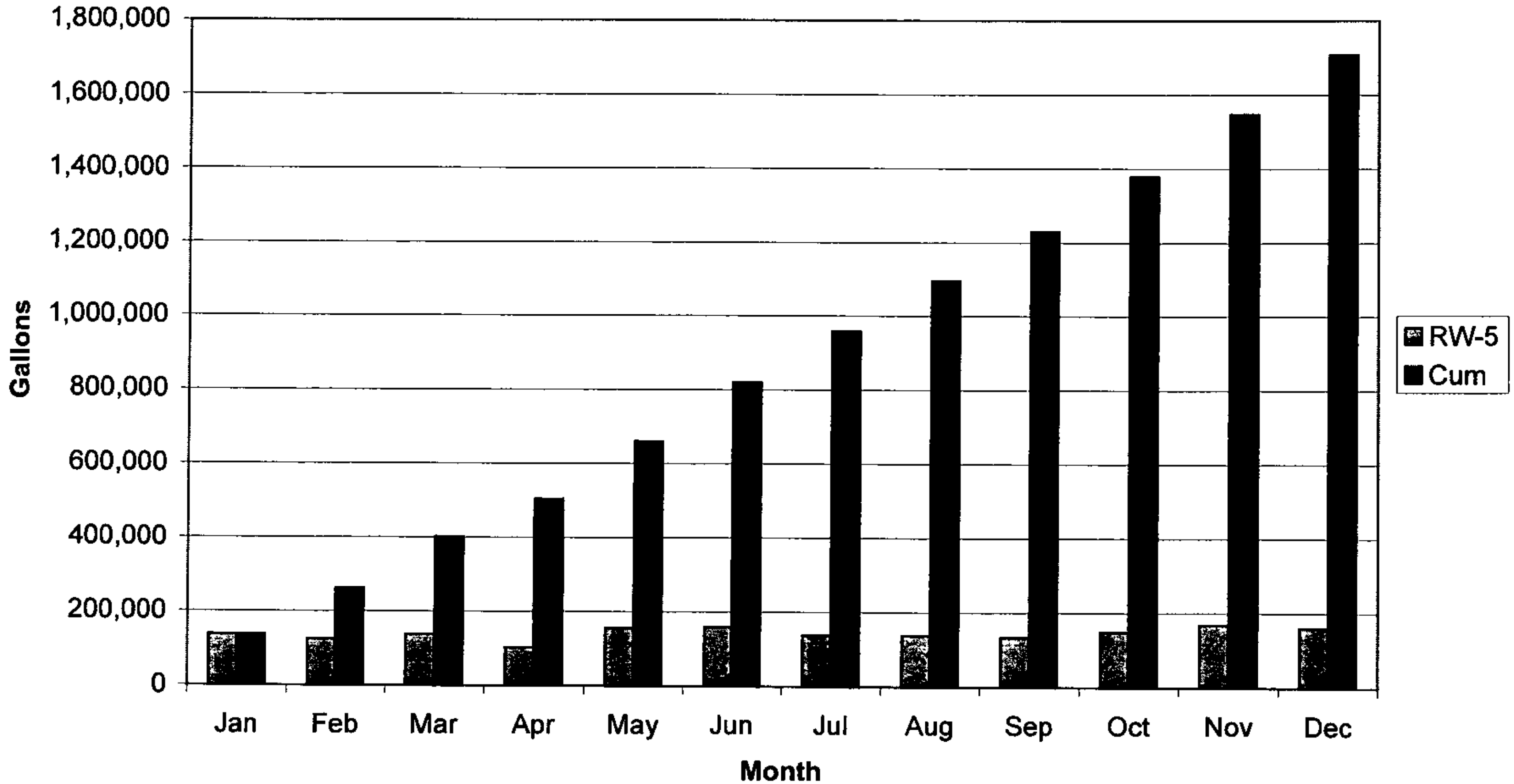

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Figure 8
Year 2003 Monthly and Cumulative Groundwater Extraction Volume for Recovery Well RW-6 in Gallons

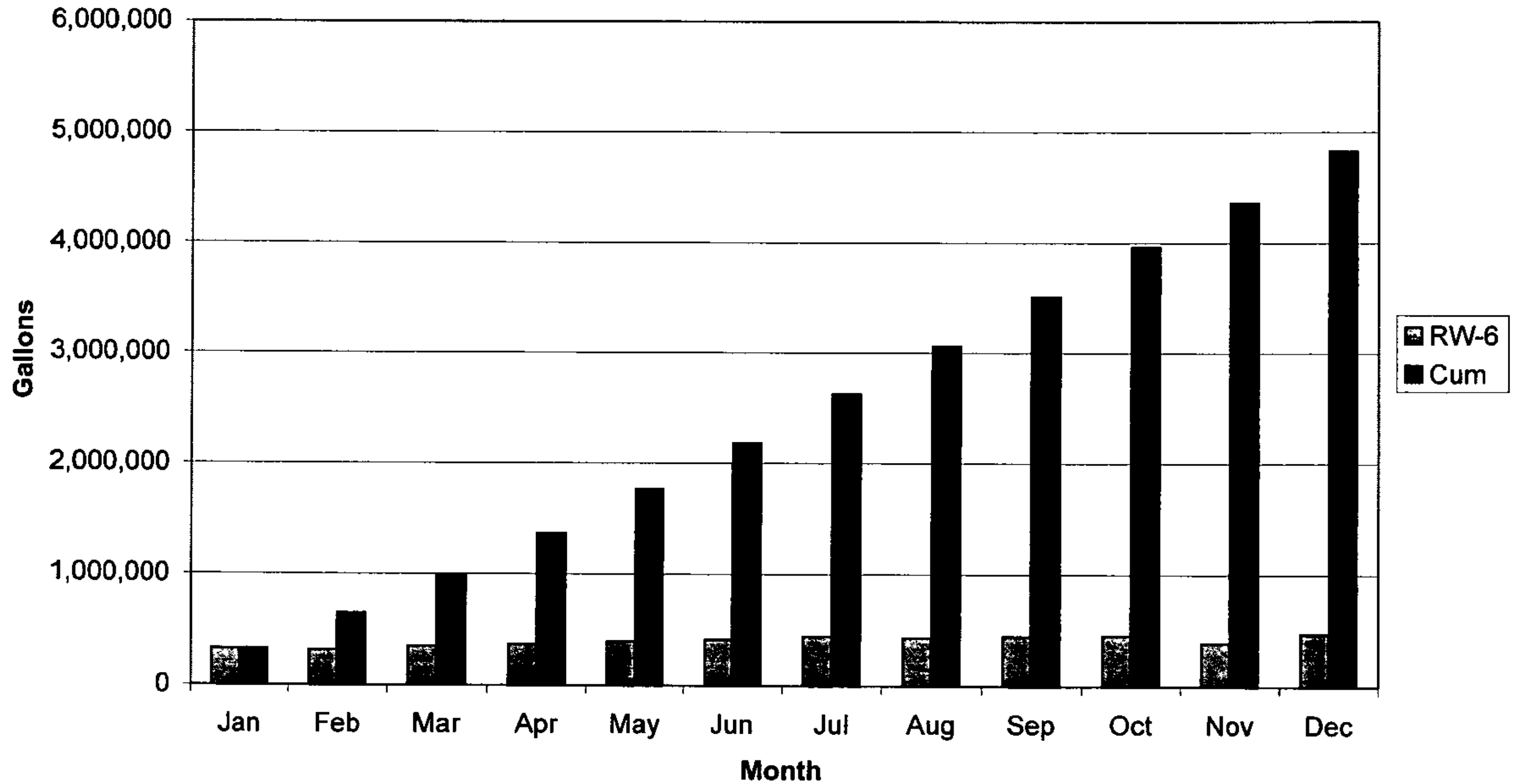

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Figure 9
Year 2003 Monthly and Cumulative Groundwater Extraction Volume for Recovery Well RW-7 in Gallons

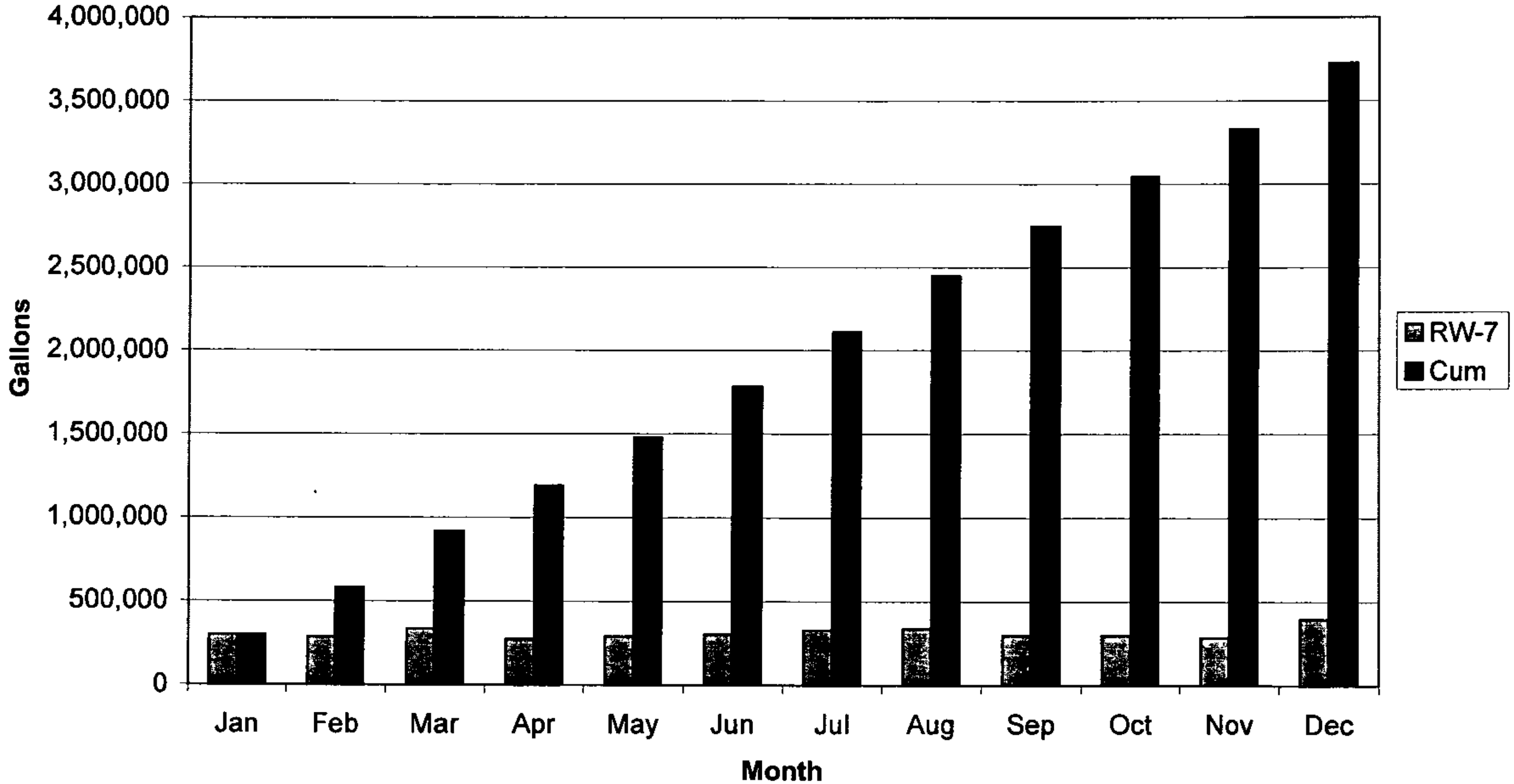

Figure 10
Monthly and Cumulative Groundwater Extraction Volume for Recovery Well RW-8 in Gallons

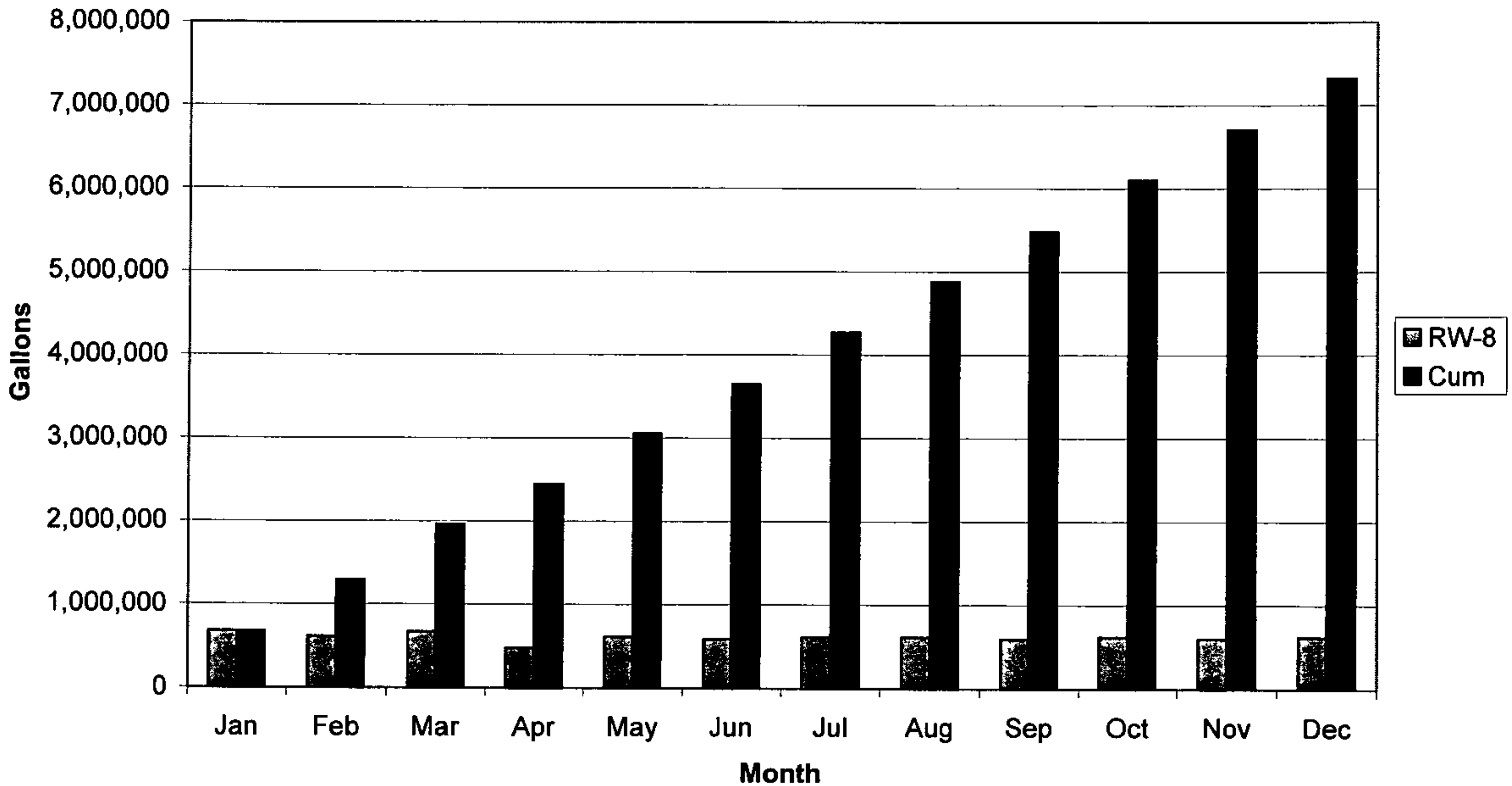

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Figure 11
Monthly and Cumulative Groundwater Extraction Volume for Recovery Well RW-9 in Gallons

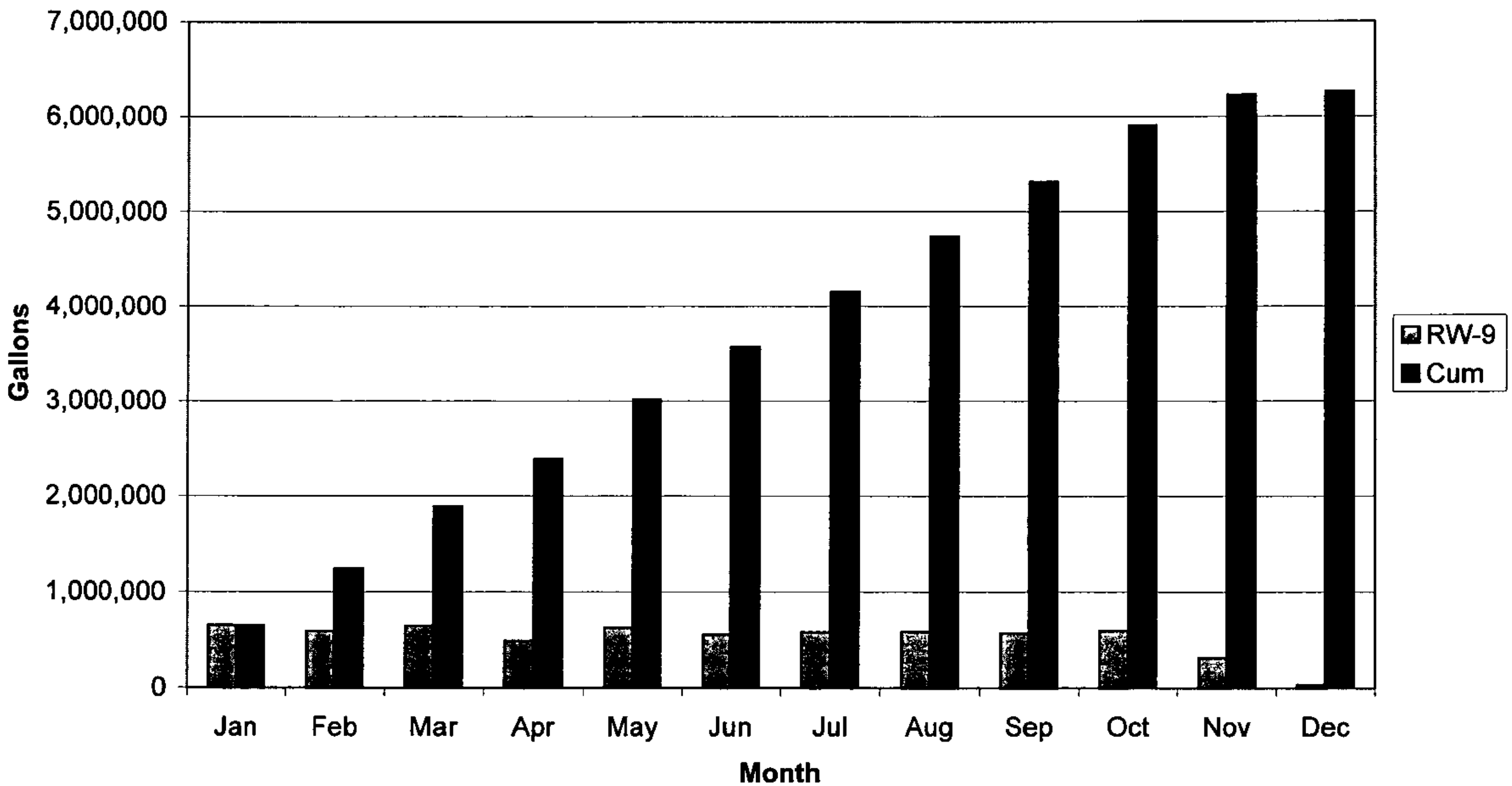
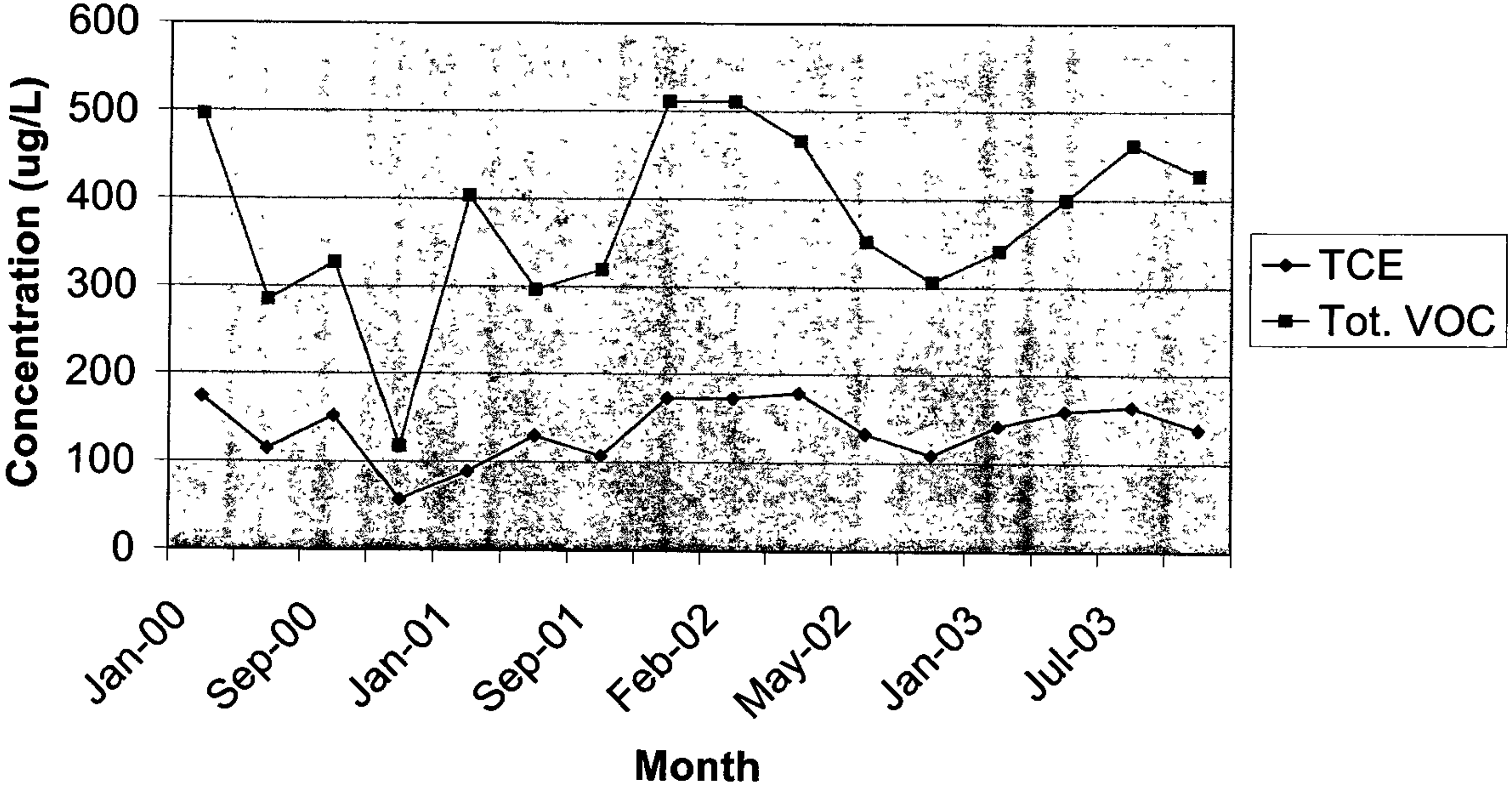


Figure 12
TCE and Total VOC Concentrations in Effluent



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