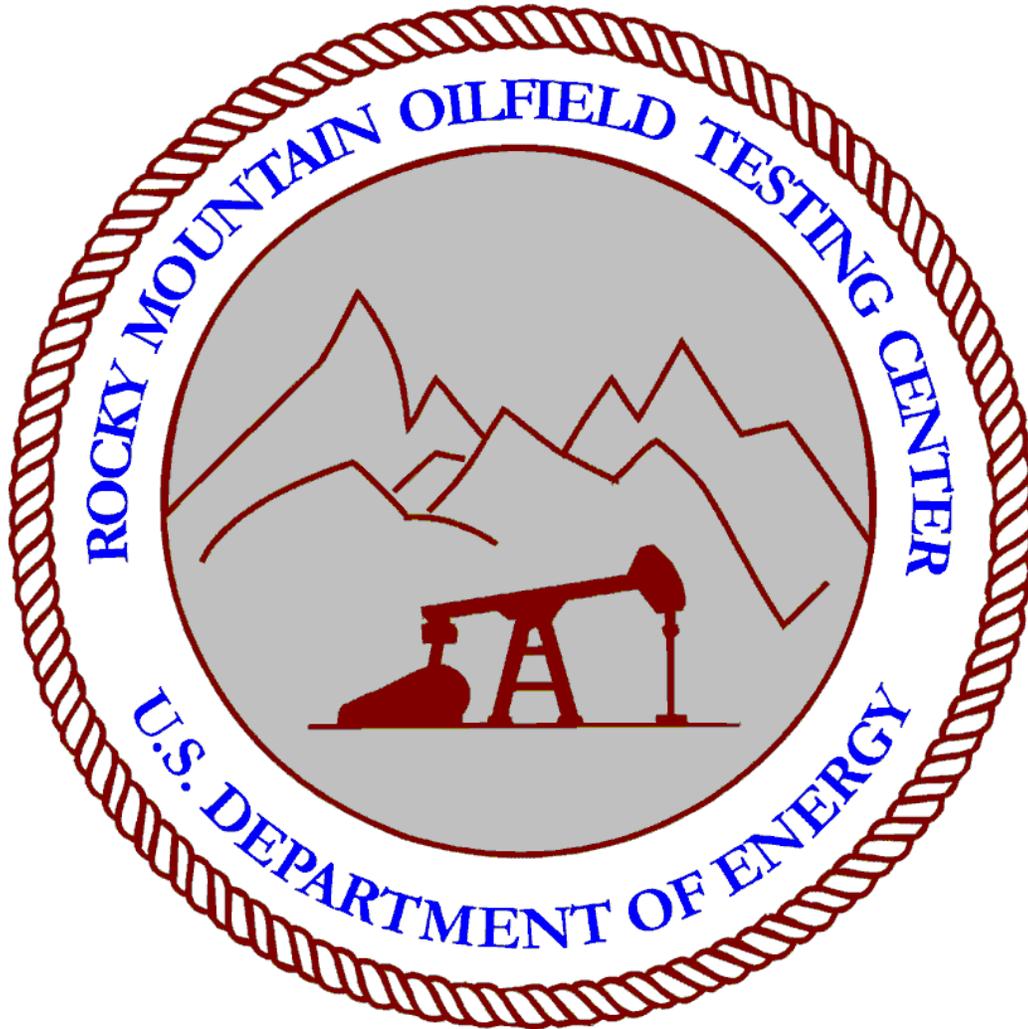


ROCKY MOUNTAIN OILFIELD TESTING CENTER

PROJECT TEST RESULTS

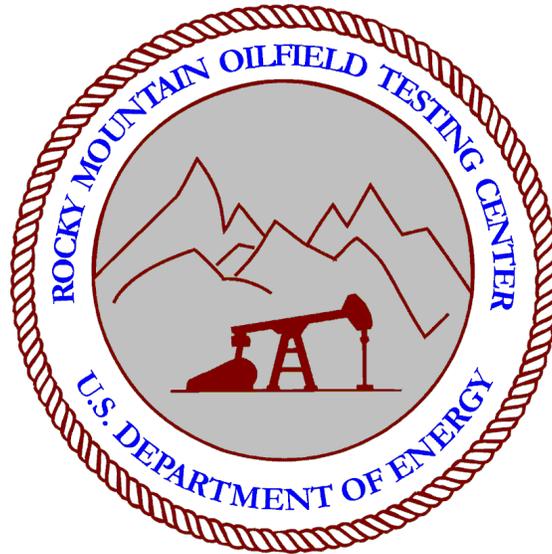


PETROLEUM MAGNETICS INTERNATIONAL

NOVEMBER 28, 1996

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ROCKY MOUNTAIN OILFIELD TESTING CENTER



PROJECT TEST RESULTS  
PETROLEUM MAGNETIC INTERNATIONAL  
DOWNHOLE MAGNETS FOR SCALE CONTROL

Prepared for:

Industry Publication

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November 28, 1995

650100/9520:jb

**ABSTRACT**  
**November 28, 1995**

The Rocky Mountain Oilfield Testing Center (RMOTC) conducted a field test on the Petroleum Magnetics International (PMI) downhole magnet, at the Naval Petroleum Reserve No. 3 (NPR-3) located 35 miles north of Casper in Natrona County, Wyoming. PMI of Odessa, Texas, states that the magnets are designed to reduce scale and paraffin buildup on the rods, tubing and downhole pump of producing oil wells. The magnetic tools failed to reduce scale formation in the pump and on the rods and tubing of the two wells tested. The formation of scale inside the magnetic tool showed that the tool is ineffective in the prevention of scale formation. There were no production increases or extended run times observed on the test wells.

MRT:jb

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# ROCKY MOUNTAIN OILFIELD TESTING CENTER PROJECT TEST RESULTS

## PETROLEUM MAGNETICS INTERNATIONAL DOWNHOLE MAGNETS FOR SCALE CONTROL

November 28, 1995

### **INTRODUCTION:**

The Rocky Mountain Oilfield Testing Center (RMOTC) conducted a field test on the Petroleum Magnetics International (PMI) downhole magnet, at the Naval Petroleum Reserve No. 3 (NPR-3) located 35 miles north of Casper in Natrona County, Wyoming [T39N, R78W, Section 10 (see Map, page 2)].

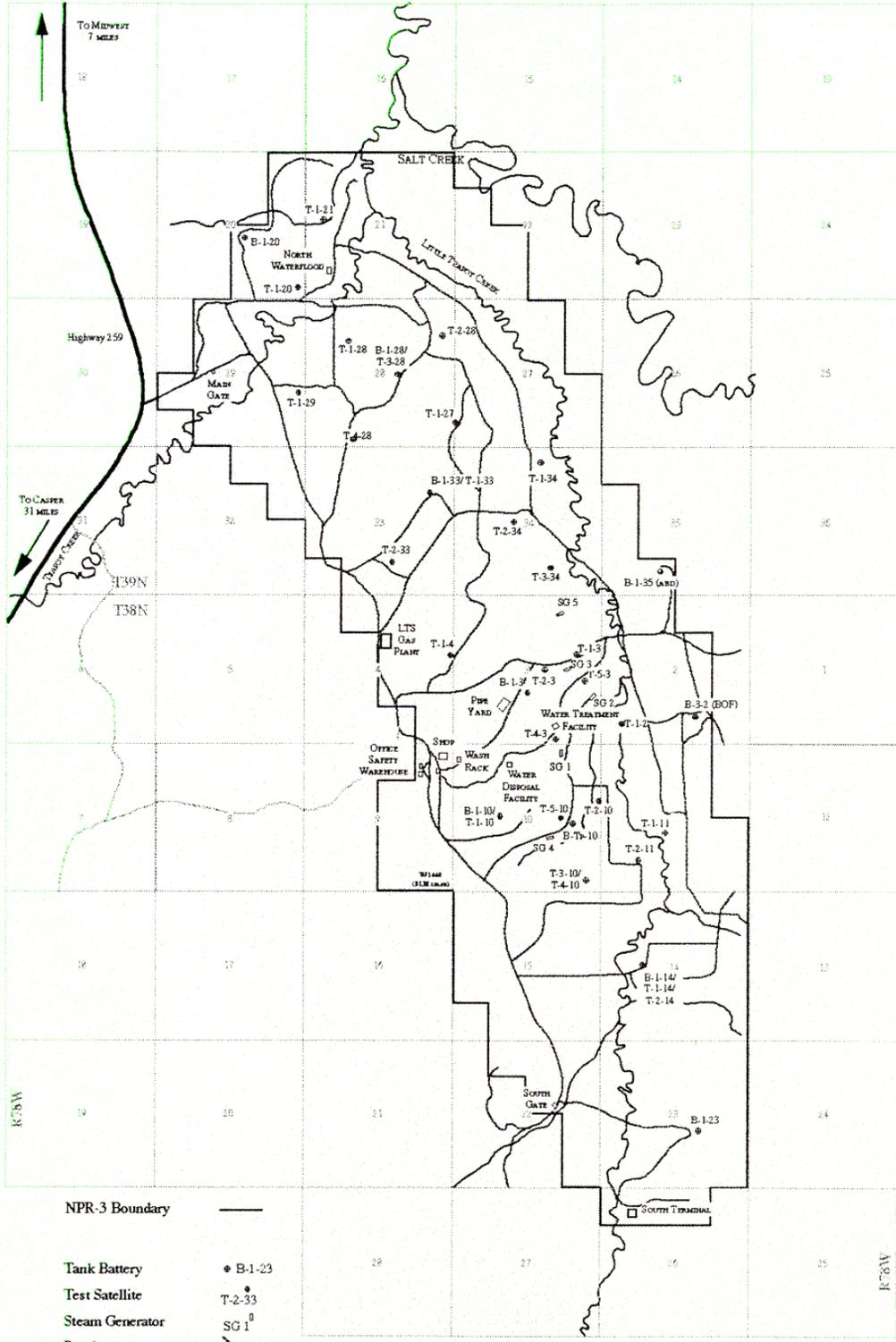
Petroleum Magnetics International of Odessa, Texas, manufactures the magnets, that are designed to reduce scale (and paraffin\*) buildup on the rods, tubing and downhole pump of producing oilwells. PMI states that the magnetic tools are designed to perform in any type of oil or water well, and use a ceramic magnet containing certain rare earths. No chemicals, electricity or other mechanical means are required for operation. In untreated fluids, carbonate molecules will bond together and form crystals. According to PMI, fluids passing through the magnets are treated and crystallization is reduced or stopped.

### **TEST RESULTS:**

Two downhole magnets were tested at NPR-3, in Wells 62-1-SX-3 and 72-2-SX-3. Both wells produce from the Shannon formation at depths of 382-520 ft, are in an active steam drive area, and had experienced high failure rates due to scale formation in the pump, pump inlet, on the sucker rods and tubing. The wells were pulled frequently for pump changes or treated with an acid solution due to scale problems.

The magnets were installed and the wells were treated with a 5% hydrochloric acid (HCl) to clean the wellbore and tubulars of scale deposits. The wells were monitored by Pump-Off Controllers (POC's) daily for run time history, and tested through vertical treaters for oil and water production. No other type of treatment was conducted on the wells during the test period.

The intent was also to test the magnetic tool for paraffin treatment, but the tool received was too large (4.5") to provide sufficient clearance in the 5" casing.



NPR-3 Boundary

Tank Battery  
 Test Satellite  
 Steam Generator  
 Roads

• B-1-23  
 • T-2-33  
 ○ SG 1

SCALE 0 1000 2000 3000 4000 5000  
 1 Mile

**Naval Petroleum Reserve  
 No. 3 Roads and Facilities  
 Map**

**PRODUCTION HISTORY:**

**WELL 62-1-SX-3**

**WELL 72-2-SX-3**

<u>Month</u>	<u>Average Prod., BPD</u>		<u>Days on Production</u>	<u>Average Prod., BPD</u>		<u>Days on Production</u>
	<u>Oil</u>	<u>Water</u>		<u>Oil</u>	<u>Water</u>	
Jan	21	345	31	10	192	30
Feb	15	435	28	10	224	23
March	16	319	29	4	143	27
April	24	414	28	4	129	25
May	19	268	30	5	99	30
June	12	192	30	10	140	30

**PULLING AND TREATMENT HISTORY:**

<u>Date</u>	<u>Well 62-1-SX-3</u>	<u>Remarks</u>
11-21-94	.....	Pump changed - Moderate scale
12-27-94	.....	Pump hanging up - Treated 5% HCl
02-22-95	.....	Pump hanging up - Treated 10% HCl
03-21-95	.....	<b>Magniflo magnet installed</b>
03-22-95	.....	Treated 5% HCl
04-04-95	.....	<b>Removed Magniflo magnet - Pump inlet</b>
.....	.....	scaled off
04-13-95	.....	Treated 5% HCl
04-14-95	.....	Scale squeeze
06-21-95	.....	Treated with 5% HCl

**Well 72-1-SX-3**

12-08-94	.....	Pump change - Moderate scale
01-25-95	.....	Pump hanging up - Treated 5% HCl
02-02-95	.....	Pump change - Pump intake scaled off
02-16-95	.....	Treated with 10% HCl
03-14-95	.....	<b>Magniflo magnet installed</b>
03-17-95	.....	Treated 5% HCl
04-10-95	.....	<b>Removed Magniflo magnet - Pump inlet</b>
.....	.....	<b>scaled off</b>
04-13-95	.....	Treated 5% HCl
04-14-95	.....	Scale squeeze
05-11-95	.....	Pump change - No scale

## **OBSERVATIONS:**

The run time on Well 62-1 -SX-3 was 13 days, and on Well 72-1 -SX-3 27 days before the pumps failed and the magnets were removed. On each well, pump problems were observed in the pumping cycle as suggested by the POC's, but due to rig availability the wells were not pulled until the dates shown. When the pumps were disassembled for repair, heavy scale deposits were found on the inside of the magnets, on the ball and seat of the pumps, and on the sucker rods above the pumps.

## **CONCLUSION:**

The PMI magnetic tools failed to reduce scale formation on the pump and rods of the wells tested. The formation of scale inside the magnetic tool shows that the tool is ineffective in the prevention of scale formation. There were no production increases or extended run times observed on the test wells. While the PMI magnetic tools proved ineffective under our field conditions, RMOTC cannot make a blanket claim about how they may perform in other oilfields.

## **ACKNOWLEDGEMENTS:**

This research was funded by the Petroleum Magnetics International (PMI) and the Rocky Mountain Oilfield Testing Center (RMOTC). Work was directed by Michael R. Tyler, RMOTC Field Engineer, and supported by Jeanette Buelt, RMOTC Engineering Technician; Matt Hoffman, Sr. Well Technician; Pete Toups, Workover Rig Supervisor; Bill Gillam, Pumper A; and Brian Meidinger, Pumper A. RMOTC is operated by Fluor Daniel (NPOSR), Inc., the Management and Operating Contractor for the Department of Energy Naval Petroleum and Oil Shale Reserves in Colorado, Utah, and Wyoming (NPOSR-CUW).

RMOTCs goal is to partner with the oil industry to improve productivity through field testing of new petroleum technology, evaluate new equipment and techniques, disseminate information to the petroleum industry, and conduct training for universities, Native Americans, and private industry. For more information contact the Rocky Mountain Oilfield Testing Center, 907 North Poplar, Suite 100, Casper, Wyoming 82601 or telephone (307) 261-5000, Extension 5060.

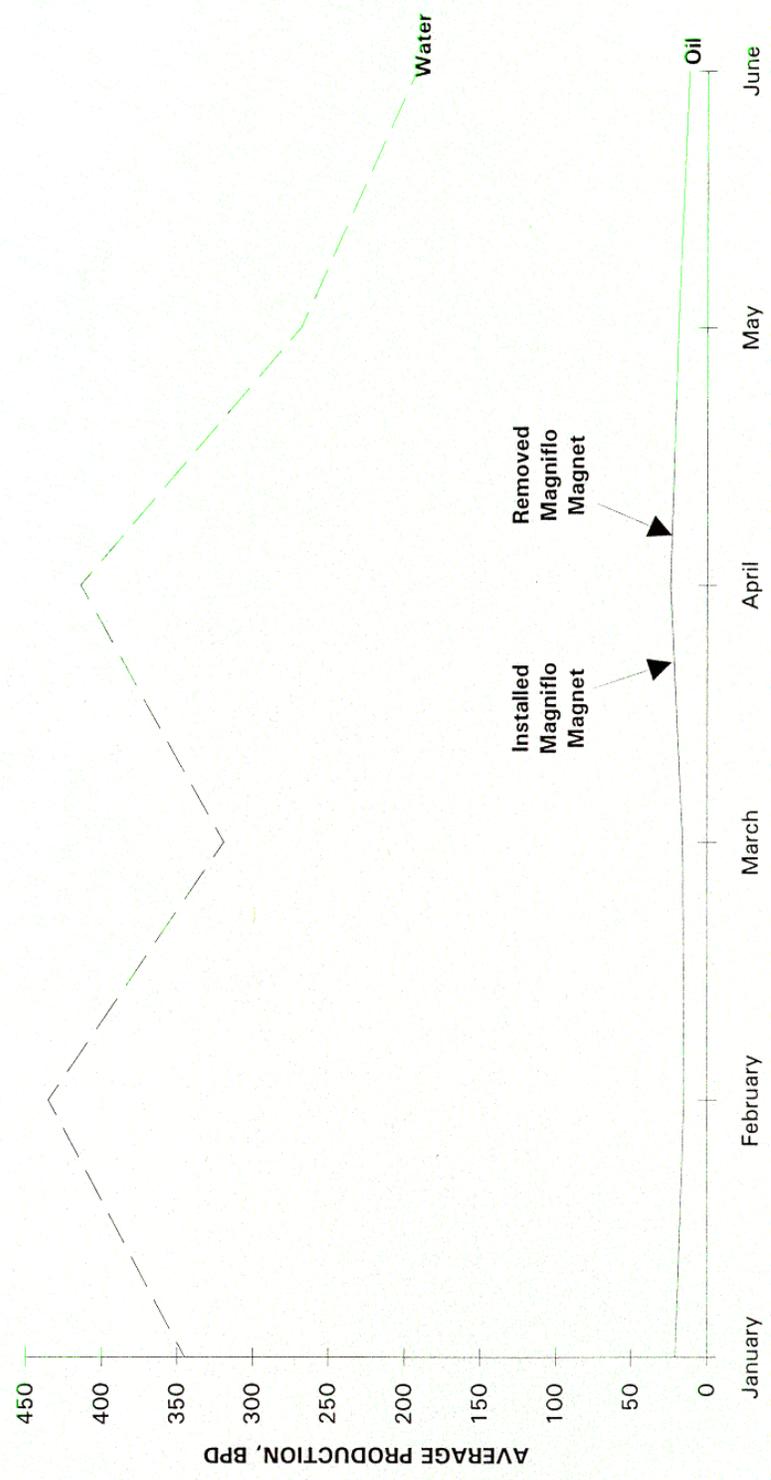
## PRODUCTION HISTORY WELL 62-1-SX-3

<u>Month</u>	<u>Average Production, BPD</u>		<u>Days on Production</u>
	<u>Oil</u>	<u>Water</u>	
Jan	21	345	31
Feb	15	435	28
March	16	319	29
April	24	414	28
May	19	268	30
June	12	192	30

## PULLING AND TREATMENT HISTORY WELL 62-1-SX-3

<u>Date</u>	<u>Remarks</u>
11-21-94	..... Pump changed - Moderate scale
12-27-94	..... Pump hanging up - Treated 5% HCl
02-22-95	..... Pump hanging up - Treated 10% HCl
03-21-95	..... <i>Magniflo magnet installed</i>
03-22-95	..... Treated 5% HCl
04-04-95	..... <i>Removed Magniflo magnet - Pump inlet scaled off</i>
04-13-95	..... Treated 5% HCl
04-14-95	..... Scale squeeze
06-21-95	..... Treated with 5% HCl

# MAGNIFLO PRODUCTION HISTORY WELL 62-1-SX-3



## PRODUCTION HISTORY WELL 72-2-SX-3

<u>Month</u>	<u>Average Production, BPD</u>		<u>Days on Production</u>
	<u>Oil</u>	<u>Water</u>	
Jan	10	192	30
Feb	10	224	23
March	4	143	27
April	4	129	25
May	5	99	30
June	10	140	30

## PULLING AND TREATMENT HISTORY WELL 72-2-SX-3

<u>Date</u>	<u>Remarks</u>
12-08-94	Pump change - Moderate scale
01-25-95	Pump hanging up - Treated 5% HCl
02-02-95	Pump change - Pump intake scaled off
02-16-95	Treated with 10% HCl
03-14-95	<b>Magniflo magnet installed</b>
03-17-95	Treated 5% HCl
04-10-95	<b>Removed Magniflo magnet - Pump inlet scaled off</b>
04-13-95	Treated 5% HCl
04-14-95	Scale squeeze
05-11-95	Pump change - No scale

# MAGNIFLO PRODUCTION HISTORY WELL 72-2-SX-3

