ProTechnics
A CORE LABORATORIES COMPANY

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BY EMAIL From Charlie Perrin

Technical and Commercial Proposal
Interwell Tracer Services

Williams Cos.
Blanco Mesa Verde/Rosa Unit

Rio Arriba County, NM

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Well 15A Flowing gas wells 200 BWPD

1. Introduction

ProTechnics was requested by Williams Cos to recommend an interwell tracer program for the Blanco Mesa Verde/Rosa Unit The field is located in Rio Arriba County, NM

Map of the field is presented in Fig 1 The under study section of the field includes 1 injection (disposal), 94-WD The field includes many producers, as shown on the map However, the primary focus for sample analysis during this project is on the production wells 26B, 17A, and 15B

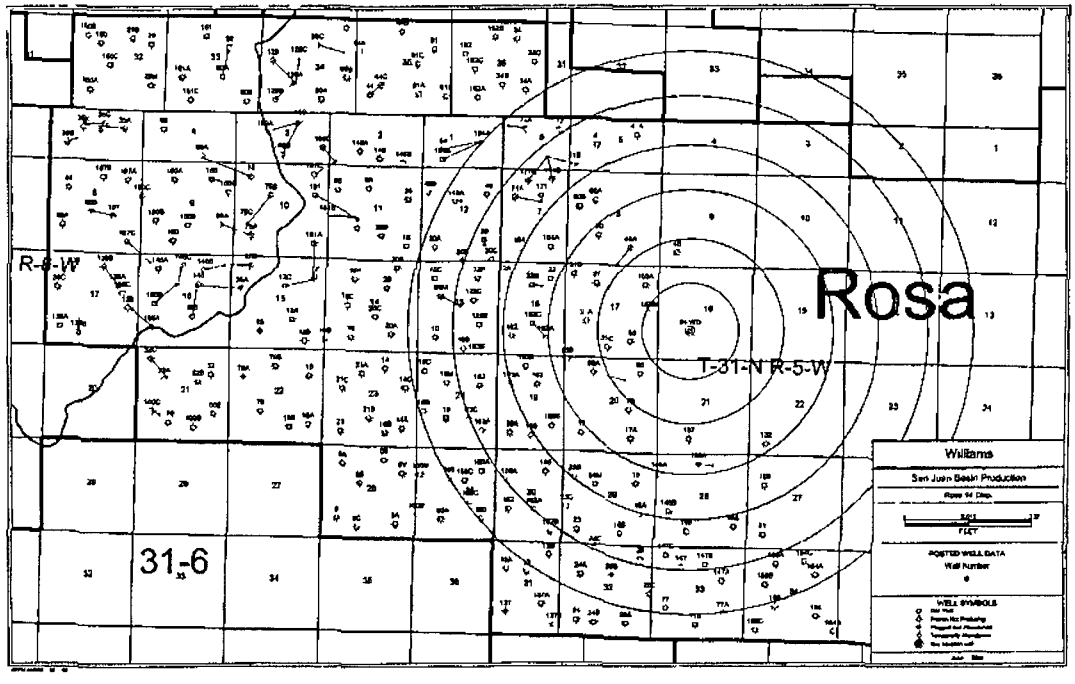


Fig 1- Map of the field

#94
30-039-23035
R-8685

2 Proposed Project

2.1 Objective

To evaluate interwell communication between the disposal and the production wells based on the detected tracers from the analyzed produced water samples

2.2. Quantity and Type of Chemical Tracers

There is a number of different Interwell Water Tracers (IWT) available These tracers have unique chemical characteristics that make them detectable individually ***ProTechnics is the only Service Company who is capable of detecting these tracers at very low concentrations of 50 parts per trillion.***

It is recommended to inject 30 litrers of IWT-1000 over a period of 6 hours into the disposal well

2.3. Sampling Schedule Analysis

According to Williams Cos , water production is increased in wells 26B, 17A, and 15B and therefore, sample analysis will be focused around these producers It is proposed to collect one 1000 cc water sample from each of these three producers as the pre-injection samples The pre-injection samples will be analyzed for the establishment of formation fluid baseline characteristics

As presented in Table 1 and since interwell communication is the only objective of this project (seepage from the disposal well to any of the production wells), it is recommended to collect one water sample every two weeks from the producers located within the first four rings of the disposal well over a period of 12 months

A series of samples will be selected from the sample collection list for analysis Production wells near the disposal well and near the wells with the increased water production history have been divided into two categories of primary and secondary for sample analysis purpose Samples collected from the wells in the primary category will be analyzed at a rate of one per well every 2 weeks Samples collected from the secondary category will be analyzed at a rate of one per well every month

Based on the results of sample analysis, samples collected from all other wells may be assigned for analysis

Table 1- Sampling schedule

Category	Production Well	Collection one every 2 weeks	Weeks 1 to 52 Analysis One every month	Analysis One every 2 months
Primary	26B	26	12	
	17A	26	12	
	15B	26	12	
	85	26	12	
	17B	26	12	
	15	26	12	
	15A	26	12	
	26	26	12	
	153B	26	12	
	153A	26	12	
	153	26	12	
secondary	45	26		6
	31C	26		6
	46A	26		6
	85A	26		6
	187	26		6
	188A	26		6
	132	26		6
	146A	26		6
	17	26		6
	146B	26		6
	31A	26		
	80	26		
	31B	26		
	85B	26		
	80A	26		
	80B	26		
	154A	26		
	22	26		
	22B	26		
	182C	26		
	182A	26		
	182	26		
	183B	26		
	183	26		
	183A	26		
	159B	26		
	159	26		
	23B	26		
	64M	26		
	23	26		
	24C	26		
	147C	26		
	146	26		
	24A	26		
	26C	26		
	223C	26		
	TOTAL	728	132	60
	Pre-injection samples collected	3		
	Pre-injection samples analyzed	3		
	Total samples collected	731		
	Total samples analyzed	195		

2.4 Deliverables

Sample analysis results will be electronically available upon the completion of analysis of each sample batch 3 weeks from the time samples arrive to ProTechnics Lab in Houston

3. Project Cost

The cost of tracer injection for this project is $29,379 Table 2 presents the itemised cost

This cost includes,

a Engineering design and reporting during the project life
a Shipment and injection of the proposed water tracer
b Water sample kits and bottles to cover pre-injection samples and sample collections during the first 12 months of the project
c Equipment and personnel mobilization and demobilization during the proposed 2 days injection period (any additional daily stand by will be at $1500/day)

No costs have been included for sample collection as Williams Cos will be collecting samples ProTechnics will train sample collection

All produced water samples must be 400 cc (except for the pre-injection samples which are 1000 cc) If water samples arrive at the laboratory in emulsion form that requires separation of the water from oil phase then an additional charge of $100 per sample for water separation will be charged

Sample analysis will be at $300 per sample

After a period of 120 days from the date of this proposal, ProTechnics reserves the right to modify these prices based on changes in supplier and market conditions

Table 2- Itemized cost

Item Description	Cost, $
Engineering Services & Reporting During the Course of the Project	$ 8,147 78
Equipment Mobilization/Demobilization	$ 4,073 89
Personnel Mobilization/Demobilization	$ 12,221 67
Consumables	$ 4,953 85
TOTAL	$ 29,397 20

4 Interwell Tracer Injection Field Report Template

The template below must be filled and signed out by both ProTechnics' field engineer and clients' after the completion of the injection campaign

Interwell Tracer Injection Field Report

Core Lab
RESERVOIR OPTIMIZATION

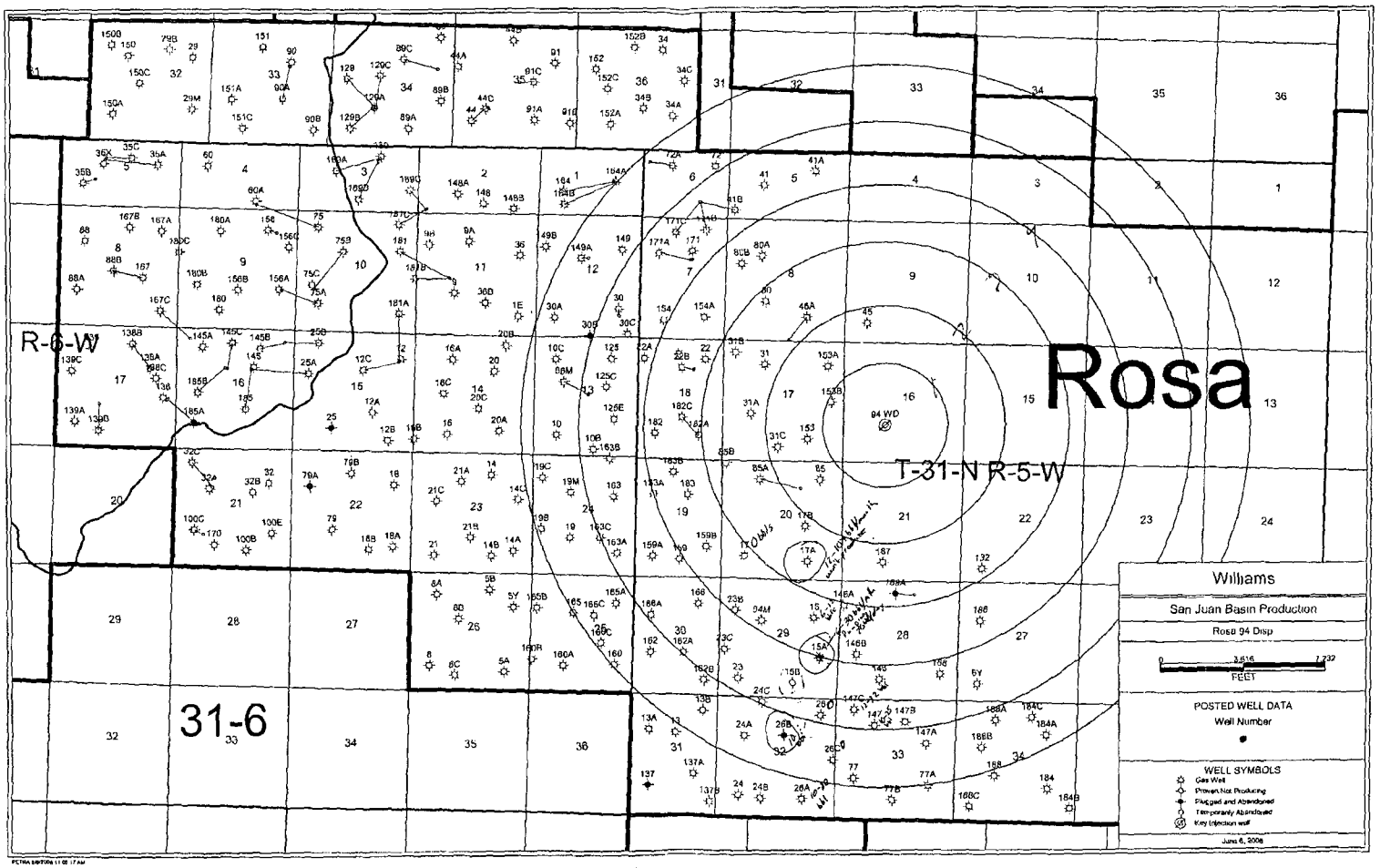
Injection Report Date
Company Name Williams Cos
Country USA
State/Province New Mexico
Field Name Blanco Mesa Verde/Rosa Unit
Project Name Blanco Mesa Verde/Rosa Unit
Interwell Type (select one) Waterflood Gasflood Geothermal
Steamflood WAG Others (explain) Disposal seepage evaluation

Pump Used

Tracers type	Tracer amount liters	Injection well ID	Date of Injection	Start time	End time	Well injection pressure psi or Kpa	Well injection rate bbl min	Tracer pump pressure psi or Kpa	Comments
IWT 1000	30	94-WD							

Describe any Problem

Name (Core Lab/ProTechnics' field technician) Signature Date
Name (Client's representative) Signature Date



Fed/BLM well

K 16 31N 5W

10725Z

	Production Well	Collection (1per 2wk)	Analysis (1per mo)	Analysis (1per 2mo)	Analysis (1 each)
PRIMARY	31	26	12		
	153	26	12		
	187	26	12		
	146A	26	12		
	153A	26	12		
	15B	26	12		
	17B	26	12		
	85A	26	12		
SECONDARY	80	26		6	
	154	26		6	
	31B	26		6	
	182A	26		6	
	183A	26		6	
	159B	26		6	
	23B	26		6	
	146	26		6	
	168	26		6	
	188B	26		6	
	31A	26			
	15	26			
	17	26			
	22	26			
	23	26			
	26	26			
	45	26			
	85	26			
	132	26			
	159	26			
	182	26			
	183	26			
	187	26			
	146B	26			
	147C	26			
	154A	26			
	15A	26			
	182C	26			
	183B	26			
	188A	26			
	223C	26			
	22B	26			
	24A	26			
	24C	26			
	26C	26			
	31C	26			
	46A	26			
	64M	26			
	80A	26			
	80B	26			
	85B	26			
Pre Injection Sample Wells					
	15B	1			1
	17B	1			1
	66M	1			1
	164A	1			1
	188	1			1
	31	1			1
	163A	1			1
	TOTAL	1281	96	60	7

Total Samples Collected = 1281
Total Samples Analyzed = 163

SpectraChem® Chemical Fracturing Tracers

MSDS Number: CFT-1000, Effective: January 12, 2004

MSDS No.: CFT-1000

Effective Date: January 12, 2004

1 PRODUCT IDENTIFICATION

1 1 Synonyms NONE
1 2 CAS No SEE BELOW
1 3 Molecular Weight SEE BELOW
1 4 Chemical Formula Proprietary
1 5 Product Codes IWT-1000
1 6 Product Function Water Phase Tracer
1 7 Supplier ProTechnics Division of Core Laboratories
6316 Windfern
Houston, Texas 77040
Emergency 1-800-866-8611
Transportation Emergency 1-800-535-5053 (inside US)
1-352-323-3500 collect (outside US)

2 COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	CAS No	Percent	Hazardous
Sodium Hydroxide	1310-73-2	2	Yes
Water	7732-18-5	86	No
Tetrabutylammonium hydrogen sulfate	32503-27-8	1	No
Proprietary Ingredient supplied as 10% w/w Aqueous solution	445-29-4	10	No

3. HAZARDS IDENTIFICATION

3 1 Hazard Symbols

X

IRRITANT

3 2 Target Organs
Irritating to respiratory system, eyes, and skin
In case of contact with eyes, rinse immediately with plenty of water and wear suitable protective clothing and wear suitable gloves

3 3 First Aid Measures

a) Inhalation
Remove From Source of Exposure
Remove To Fresh Air And Rest
Get Prompt Medical Attention
Show This Safety Data Sheet To Medical Personnel

b) Eyes	Flush with water for at least 15 minutes If Irritation Persists Then Consult A Doctor
c) Skin	Flush with water for at least 15 minutes Wash With Soap/Cleanser And Rinse With Plenty Of Water
d) Ingestion	Do Not Induce Vomiting Wash Out Mouth With Water Obtain Medical Attention If Adverse Symptoms Persist

4 FIRE FIGHTING MEASURES

4 1 Suitable Extinguishers	Carbon Dioxide (CO2) – Black Foam – Cream Dry Chemical
4 2 Unsuitable Extinguishers	Not Applicable
4 3 Hazardous Decomposition	Carbon Monoxide, Carbon Dioxide, irritating and toxic fumes and gases, hydrogen fluoride
4 4 Special Procedures	Mask Or Breathing Apparatus May Be Required

5. HANDLING AND STORAGE

5 1 Handling	Avoid Skin Contact
5 2 Storage	Store in a cool dry place

6 ACCIDENTAL RELEASE MEASURES

6 1 Exposure Controls	Not Applicable
6 2 Personal Protection	Wear gloves and eye/face protection and avoid breathing dust
6 3 Disposal Considerations	Collect together and place into sealed, labelled containers Remove to a chemical incinerator or approved disposal site

7 PHYSICAL AND CHEMICAL PROPERTIES

7 1 Appearance White to tan solid
7 2 Odor Odorless
7 3 Solubility No information found
7 4 pH N A
7 5 % Volatiles by volume @ 21°C (70°F) No information found
7 6 Boiling Point No information found
7 7 Melting Point 123-125°C
7 8 Vapor Pressure (mm Hg) No information found
7 9 Evaporation Rate (BuAc = 1) No information found

8 STABILITY AND REACTIVITY

8 1 Stability Stable under ordinary conditions of use and storage

8 2 Hazardous Decomposition Products Thermal decomposition may produce carbon monoxide, carbon dioxide and hydrogen fluoride

8 3 Hazardous Polymerization Not known to occur

8 4 Incompatibilities

8 4 1 Strong acids

8 4 2 Strong bases

8 4 3 Strong oxidizing agents

8 4 4 Strong reducing agents

8 5 Conditions to Avoid Heat, moisture, incompatibles

9 TOXICOLOGICAL INFORMATION

Caution! The toxicological properties of this material have not been fully investigated May cause eye and skin irritation May cause respiratory and digestive tract irritation

10 ECOLOGICAL INFORMATION

10 1 Environmental Fate No information found

10 2 Environmental Toxicity No information found

10 3 Disposal Considerations Collect together and place into sealed, labeled containers
Remove to a chemical incinerator or approved disposal site

11 TRANSPORT INFORMATION

Sodium Hydroxide (Limited Quantity), UN 1824

12 REGULATORY INFORMATION

12 1 Chemical Inventory Status - Part 1

Ingredient	TSCA	EC	Japan	Australia
Proprietary Ingredients CFT-1000	No	No	No	No

12 2 Chemical Inventory Status - Part 2

Ingredient	Korea	DSL	NDSL	Phil
Proprietary Ingredients CFT-1000	No	No	No	No

12 3 Federal, State & International Regulations - Part 1

Ingredient	RQ	TPQ	SARA 302 List	SARA 313 Chemical Catg.
Proprietary Ingredients CFT-1000	No	No	No	No

12 4 Federal, State & International Regulations - Part 2

Ingredient	CERCLA	RCRA 261.33	TSCA 8(d)
Proprietary Ingredients CFT-1000	No	No	No

12 5 Chemical Weapons Convention

Chemical Weapons Convention:	No
TSCA 12(b)	No
CDTA	No
SARA 311/312	
Acute	No
Chronic	No
Fire	No
Pressure	No
Reactivity	No

13 WHMIS.

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR

14 OTHER INFORMATION

14 2 NFPA Ratings

Health 2 Flammability 0 Reactivity 1

14 3 Label Hazard Symbols

X

IRRITANT

15 REVISION INFORMATION

MSDS Section(s) changed since last revision of this document includes 1, 2, 3, 4, 5, 6, 9, 10 and14

16 DISCLAIMER

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