Compositional Analyses

for

Sandia National Laboratories

1X M9 Well
MWX-1 Well
Rulison Field
Garfield County, Colorado
File Number: ARFL-850028

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CORE LABORATORIES, INC.

Reply To:
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March 13, 1985

Sandia National Laboratories
P. O. Box 5800, Division 4753
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Attention: Mr. A. R. Sattler

Subject:

Compositional Analyses
1X M9 Well
MWX-1 Well
Rulison Field
Garfield County, Colorado
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Gentlemen:

On March 5, 1985 two liquid samples and one gas sample from the subject wells were submitted to our Aurora laboratory for compositional analysis.

The hydrocarbon composition of the gas sample was measured through decanes with an undecanes plus fraction by temperature programmed chromatography. The GPM, BTU (dry) and gas gravity were also determined, and with the composition, may be found on page one.

The hydrocarbon composition of the liquid samples were measured through decanes with an undecanes plus fraction be flash/chromatographic technique. The results of the liquid compositions may be found on pages two and three.

Thank you for the opportunity to perform this study for Sandia National Laboratories. If you have any questions concerning these test results, or if we can be of further assistance, please do not hesitate to contact us at (303)751-9334.

Very truly yours,

CORE LABORATORIES, Inc.

Craig L. Bromley

Craig L. Bromley
Reservoir Fluid Supervisor

CLB/MWO/sso
distribution

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File ARFL-850028

Company Sandia National Laboratories Formation Mesa Verde

Well 1X M9 (6172'-7735') County Garfield

Field Rulison State Colorado

HYDROCARBON ANALYSIS OF SEPARATOR GAS SAMPLE

Component	Mol Percent	GPM
Hydrogen Sulfide	0.00	
Carbon Dioxide	1.03	
Nitrogen	0.08	
Methane	89.62	
Ethane	6.56	1.789
Propane	1.71	0.480
iso-Butane	0.33	0.110
n-Butane	0.32	0.103
iso-Pentane	0.11	0.041
n-Pentane	0.08	0.030
Hexanes	0.08	0.032
Heptanes	0.05	0.021
Octanes	0.03	0.014
Nonanes	0.00	0.000
Decanes	0.00	0.000
Undecanes plus	0.00	0.000
	100.00	2.620

Calculated gas gravity (air = 1.000) = 0.630

Calculated gross heating value = 1125 BTU per cubic foot of dry gas at 15.025 psia and 60°F.

Collected at 165 psig and 76°F.

Cylinder No. 4M73

Sampled on 2/28/85

These analyses, opinions or interpretations are based on observations and material supplied by the client to whom, and for whose exclusive and confidential use, this report is made. The interpretations or opinions expressed represent the best judgement of Core Laboratories, Inc. (all errors and omissions excepted); but Core Laboratories, Inc. and its officers and employees, assume no responsibility and make no warranty or representations as to the productivity, proper operation, or profitableness of any oil, gas or other mineral well or sand in connection with which such report is used or relied upon.

Company Sandia National Laboratories Formation Mesa Verde

Well 1X M9 (6172'-7735') County Garfield

Field Rulison State Colorado

HYDROCARBON ANALYSIS OF FLUID SAMPLE

Component	Mol Percent	Weight Percent	Density, Gm/Cc @ 60°F.	°API @ 60°F.	Molecular Weight
Hydrogen Sulfide	0.00	0.00			
Carbon Dioxide	0.00	0.00			
Nitrogen	0.00	0.00			
Methane	0.00	0.00			
Ethane	0.04	0.01			
Propane	0.22	0.08			
iso-Butane	0.17	0.08			
n-Butane	0.21	0.10			
iso-Pentane	0.73	0.44			
n-Pentane	1.06	0.63			
Hexanes	5.03	3.53			
Heptanes	13.86	11.10			
Octanes	29.33	26.16			
Nonanes	19.80	19.97			
Decanes	11.97	13.37			
Undecanes plus	17.58	24.53	0.8058	43.9	167
	100.00	100.00			

Properties of Heptanes Plus Fraction

Density, gm/cc @ 60°F.	0.7656
°API @ 60°F.	53.1
Molecular Weight	123

Sampled on 2/28/85

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File ARFL-850028

Company Sandia National Laboratories Formation Mesa Verde

Well MWX-1 County Garfield

Field Rulison State Colorado

HYDROCARBON ANALYSIS OF FLUID SAMPLE

Component	Mol Percent	Weight Percent	Density, Gm/Cc @ 60°F.	°API @ 60°F.	Molecular Weight
Hydrogen Sulfide	0.00	0.00			
Carbon Dioxide	0.00	0.00			
Nitrogen	0.00	0.00			
Methane	0.00	0.00			
Ethane	0.29	0.07			
Propane	1.00	0.36			
iso-Butane	0.78	0.37			
n-Butane	1.03	0.49			
iso-Pentane	2.07	1.21			
n-Pentane	1.63	0.96			
Hexanes	7.04	4.82			
Heptanes	14.47	11.32			
Octanes	25.03	21.84			
Nonanes	14.76	14.56			
Decanes	8.99	9.82			
Undecanes plus	22.91	34.18	0.8179	41.3	183
	100.00	100.00			

Properties of Heptanes Plus Fraction

Density, gm/cc @ 60°F.	0.7742
°API @ 60°F.	51.1
Molecular Weight	131

Sampled on 2/19/85

Sample No. 85-3

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A

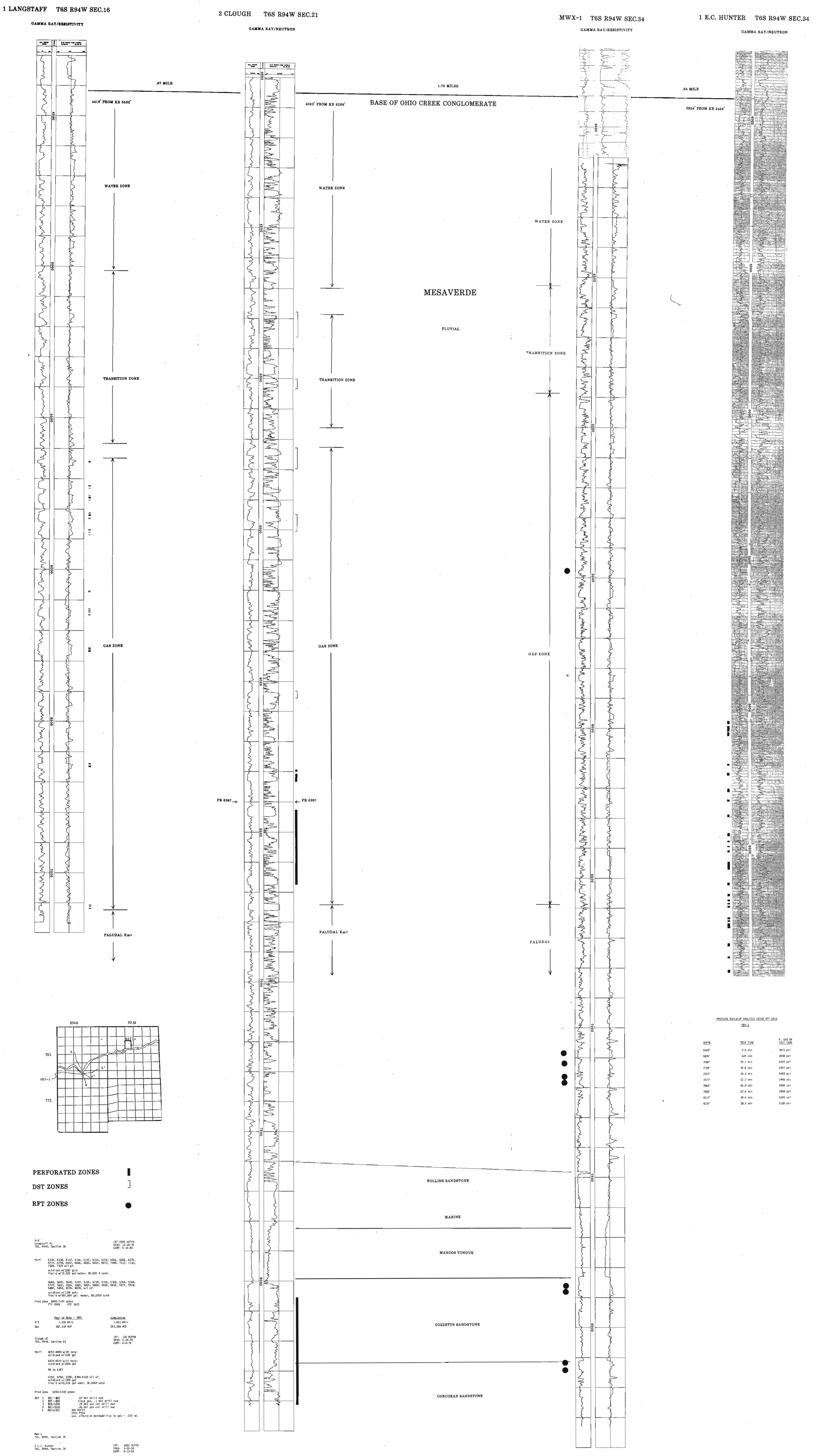
NORTH

PRODUCTION CROSS-SECTION A–A′

RULISON FIELD, GARFIELD COUNTY, COLORADO

A′

SOUTH



PRESSURE BUILD-UP ANALYSIS USING RFT DATA

RFT-3

DEPTH	TEST TIME	P. END OF TEST TIME
5440'	7.0 min	3672 psi
5635'	645 min	3930 psi
7084'	29.1 min	5239 psi
7128'	32.8 min	5267 psi
7257'	19.2 min	5456 psi
7277'	22.7 min	5486 psi
7864'	26.8 min	5589 psi
7885'	27.4 min	5596 psi
8117'	39.4 min	5721 psi
9135'	36.5 min	6135 psi

A-A'
Langstaff #1
T6S, R94W, Section 16

IP: 2050 MCFPD
SPUD: 12-29-79
COMP: 4-14-80

Perf: 6134, 6138, 6143, 6146, 6150, 6154, 6159, 6162, 6264, 6270, 6274, 6278, 6642, 6646, 6650, 6654, 7086, 7112, 7126, 7285, 7329 w/1 jf.

acidized w/1200 gals
frac'd w/21,302 gal water, 30,000 # sand.

6642, 6646, 6648, 5122, 5128, 5130, 5142, 5150, 5264, 5268, 5722, 5822, 5826, 5902, 5924, 5928, 5932, 5934, 5936, 5940, 5952, 6176, 6178, w/1 jf.

acidized w/1100 gals
frac'd w/21,000 gal. water, 80,000# sand

Prod zone 5642-7329 gross
FTP 3500 FCP 3412

	Year to Date - 8851	Cumulative
Oil	1,139 bbls	1,811 bbls
Gas	182,126 MCF	293,386 MCF

Clough #2
T6S, R94W, Section 21

IP: 176 MCFPD
SPUD: 2-24-79
COMP: 6-6-79

Perf: 8252-8496 w/19 total
acidized w/1200 gal

6420-6614 w/17 total
acidized 2/2000 gal

PB to 6397

6292, 6294, 6298, 6304-6322 w/1 jf.
acidized w/1200 gal
frac'd w/41,938 gal emul, 38,200# sand

Prod Zone 6292-6322 gross

BOT 1	801-803	.02 bbl drill mud
2	805-1820	trace gas ; .1 bbl drill mud
3	1820-4002	.5 mcf gas ; .25 bbl drill mud
4	4002-5020	.05 bbl gas cut drill mud
5	4002-6355	484 MCFD
		1.5 bbl oil
		cum. effects=a permeability to gas = .022 md.

MWX-1
T6S, R94W, Section 34

E.C. Hunter
T6S, R94W, Section 34

IP: 1250 MCFPD
SPUD: 1-7-80
COMP: 3-15-80

Perf: 6062-6968, 6366-6586, 6287-6899, 6196-6201, 6216-61 78, 6370-6300, 6125-6133, 6135-6152, 6442-6462, 6408-6472, 880-81 189, 6921-6986, 6365-6396, 6420-6462, 6408-6472, 6365-6396, 6420-6462, 6408-6472, 6365-6396, 6420-6462, 6408-6472

B

PRODUCTION CROSS-SECTION B–B′

RULISON FIELD, GARFIELD COUNTY, COLORADO

WEST

B′

EAST

3-94 GOVT. T7S R94W SEC.3

GAMMA RAY/RESISTIVITY

.76MILE

4410' FROM KB 5932'

1 BERNKLAU T6S R94W SEC.34

SPONTANEOUS POTENTIAL/RESISTIVITY

2986' FROM KB 8457'

MWX-1 T6S R94W SEC.34

GAMMA RAY/RESISTIVITY

.30MILE

1.06MILES

1 JUHAN-FEDERAL T6S R94W SEC.35

SPONTANEOUS POTENTIAL/RESISTIVITY

.73MILE

BASE OF OHIO CREEK CONGLOMERATE

3935' FROM KB 8487'

1 JUHAN T6S R94W SEC.26

SPONTANEOUS POTENTIAL/RESISTIVITY

WATER ZONE

TRANSITION ZONE

MESAVERDE

FLUVIAL

GAS ZONE

PALUDAL

ROLLINS SANDSTONE

MARINE

MANCOS TONGUE

COZZETTE SANDSTONE

CORCORAN SANDSTONE

PERFORATED ZONES

DST ZONES

RFT ZONES

B-B′

3-94 Gov't
T7, R94W, Section 3 swNW

SPD: 6/85 MCFPD
SPUD: 11-21-81
COMP: 3-17-82

	Year to Date - 1983	Cumulative
Gas	12,234 MCF	264,453 MCF
Water	135 bbls	

Perf: 5130-5434, 5456-5-163C, 6199-6205, 6332-6383
acid'ed
sand water frac.

1 Bernklau
T6S, R94W, Section 34

GR: 5457'
SPUD: 2-27-81
Suspended 4-81

Perf: 4205-4216 w/6 gf
sand water frac.

MWX-1
T6S, R94W, Section 34

Juhan-Federal #1
T6S, R94W, Section 35

IPF: 2502 MCFGPD
SPUD: 9-30-82
COMP: 8-24-83

Perf: 5151-5484, 6150-6196, 6532-6596, 6762-6796, 6830-6854, 6138-6189, 6201-6302, 6364-6424

Prod zones
6364-6424, 6030-6086, 6762-6854, 6530-6596, 6150-6189, 5364-5484,

6030-6086 - acidized w/600 gal mud acid
SIP 2500 # 'P' 3000-5000 # @ 20M
frac'd thru 3½" casing w/40,000 gal water &
sand w/ 40,000 #
ABP 4200 '' 5200 # @ 20 BPM
well head blew off
est. 250 MCF blowing wfd

Corcoran: 8,340' - 8,424 -- acidized w/2000 gal mud acid
SIP 4500# 'Complete' 20 4500# SIP 2800#
frac'd w/38000 gal water and 36,000# sand
ABP 5300#, max TP4500# @ 5.2 BPM thru 2 7/8" tubing

Juhan #1
T6S, R94W, Section 26

IPF: 2937 MCFGPD

Perf: 5600-5624, 5986-6008, 6277-6301, 6353-6383, 6417-6440 (unable to break formation)
Sand oil frac

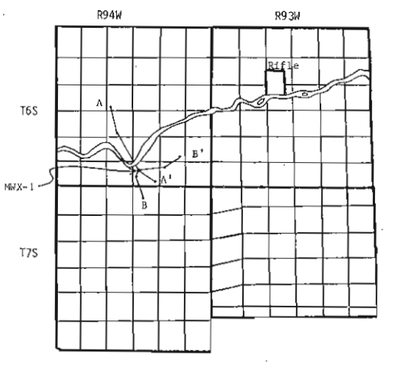
	Year to Date - 1983	Cumulative
Gas	45,251 MCF	543,426
Water	589 bbls	

PREVIOUS BUILD-UP ANALYSIS (RING RFT DATA

MWX-1

DEPTH	TEST TIME	P END OF TEST TIME
5482'	2.9 min	3471 psi
5835'	545 min	2899 psi
7064'	26.1 min	5129 psi
7126'	22.6 min	5257 psi
7403'	18.2 min	5455 psi
7577'	22.7 min	5546 psi
7884'	24.8 min	5888 psi
7885'	27.0 min	5848 psi
8117'	20.6 min	6181 psi
8132'	26.9 min	6181 psi

JUNE 1982



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