

G. W. Henderson
Denver

4-29-5-42W

140
CNS

83011ART0061

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

SOURCE ROCK EVALUATION

Mississippian and Pennsylvanian Cores, Seven Wells,
Hugoton Embayment, Western Kansas

Geochemistry Services Group

R. J. Harwood

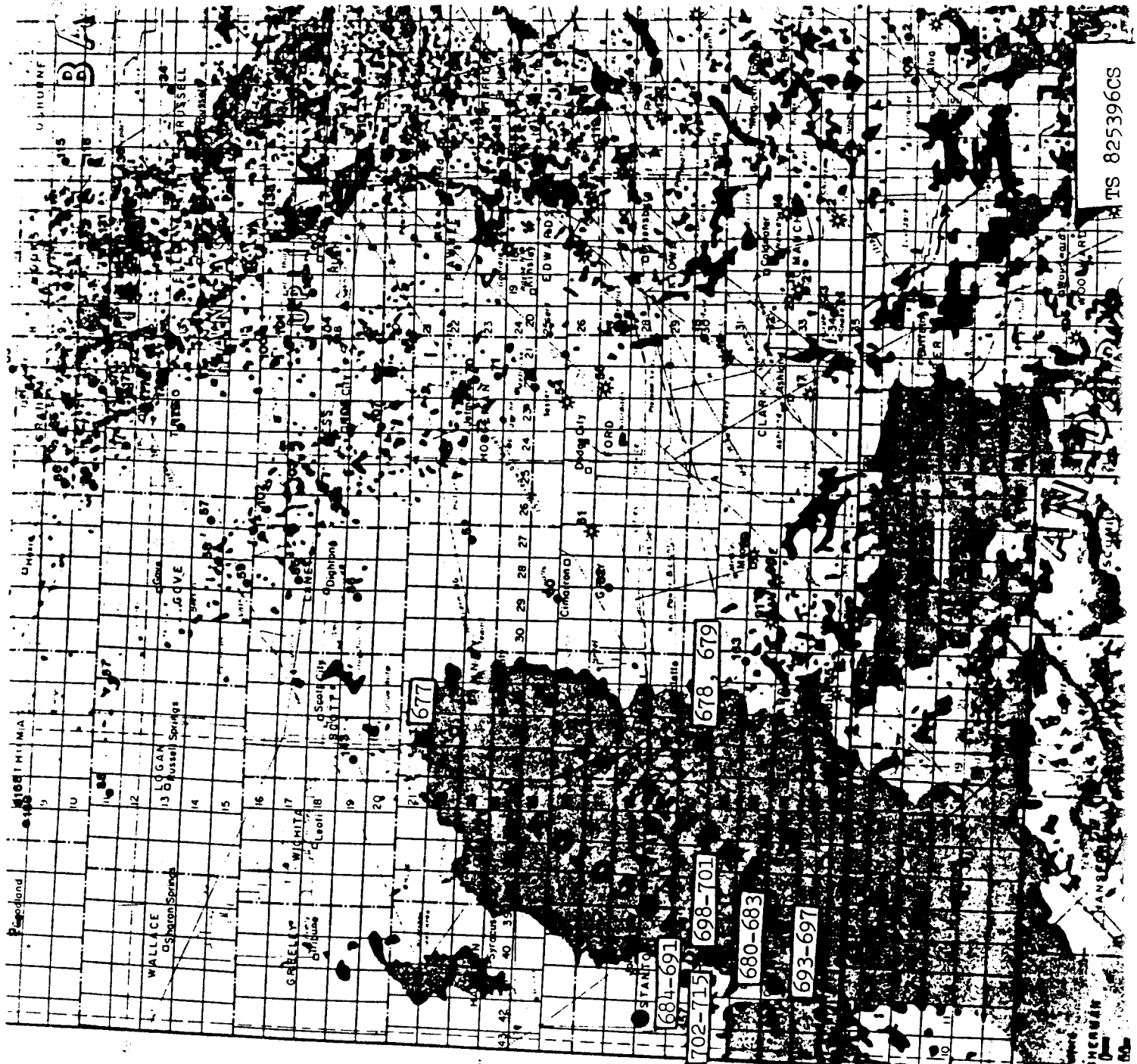
Technical Service 825396CS

Requested by K. C. Sawyer

APC (USA) DENVER SOUTHERN

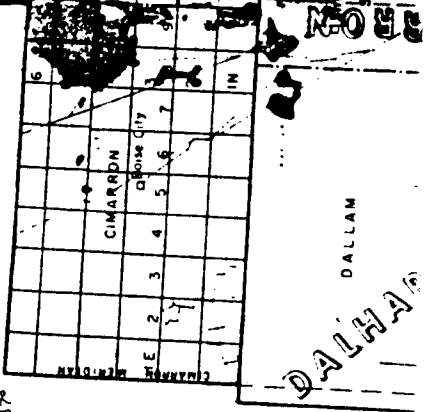
R. J. Harwood (1/12/83)
RRT

- Distribution: R. C. Brooke, Denver
- G. W. Henderson, Denver
- O. R. Hille, Denver
- K. C. Sawyer, Denver
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825396

SOURCE ROCK SUMMARY
TABLE 1a
DATE 01/04/83

SAMPLE NUMBER	SMPL TYPE	FORMATION	AGE	LITHOLOGY	FIELD NO. OR DEPTH FEET TOP***BASE	PETROLEUM GENERATION CAPABILITY	KEROGEN TYPE (OIL/GAS)	STAGE OF DIAGENESIS
STATE KS COUNTY FINNEY WELL LOCATION SEC31-T21S-R33W								
WELL NAME SHALLOW WATER LEASE MAUNE #4								
S-677	CR	ST LOUIS	MISS SH		4648	MARGINAL	GAS	EARLY GAS
STATE KS COUNTY HASKELL WELL LOCATION SEC31-T30S-R33W 115°F @ ~4600' Grad: 14.1°F/1000'								
WELL NAME CITIES SERVICE LEASE THOMPSON #2-E								
S-678	CR	LANSING	PENN SH		4531	VERY GOOD	OIL	EARLY PEAK OIL
S-679	CR	LANSING	PENN SH		4534	VERY GOOD	OIL	EARLY PEAK OIL
STATE KS COUNTY MORTON WELL LOCATION SEC29-T31S-R40W 121°F @ ~5000' Grad: 14.2°F/1000'								
WELL NAME AMOCO LEASE DOTTIE CHAFFIN #1								
S-680	CR	MORROW	PENN SH		4940	MARGINAL	GAS	EARLY GAS
S-681	CR	MORROW	PENN SH		4947	NON SOURCE		
S-682	CR	MORROW	PENN SH		4972	MARGINAL	GAS	EARLY GAS
S-683	CR	MORROW	PENN SH		4975	MARGINAL	GAS	EARLY GAS
STATE KS COUNTY STANTON WELL LOCATION SEC4-T29S-R42W								
WELL NAME SUPERIOR LEASE H L TUCKER #68-A4								
S-684	CR	MORROW	PENN SH		3348	MARGINAL	GAS	EARLY GAS
S-685	CR	MORROW	PENN SH		5246	5247 MARGINAL	GAS	EARLY GAS
S-686	CR	MORROW	PENN SH		5250	5251 MARGINAL	GAS	EARLY GAS
S-687	CR	MORROW	PENN SH		5254	5255 MARGINAL	GAS	EARLY GAS
S-688	CR	MORROW	PENN SH		5378	5379 MARGINAL	GAS	EARLY GAS
S-689	CR	MORROW	PENN SH		5384	5385 MARGINAL	GAS	EARLY GAS
S-690	CR	MORROW	PENN SH		5391	5392 MARGINAL	GAS	EARLY GAS

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R E S E A R C H C E N T E R

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TECHNICAL SERVICE NUMBER

DISTRICT SOUTHERN
825396

SOURCE ROCK SUMMARY
TABLE 1. b
DATE 01/04/83

SAMPLE NUMBER	SMPL TYPE	FORMATION	AGE	LITHOLOGY	FIELD NO. OR DEPTH FEET TOP***BASE	PETROLEUM GENERATION CAPABILITY	KEROGEN TYPE (OIL/GAS)	STAGE OF DIAGENESIS
STATE KS COUNTY STANTON WELL LOCATION SEC4-T29S-R42W WELL NAME SUPERIOR LEASE H L TUCKER #68-A4								
S-691	CR	MORROW	PENN SH		5397 5398	MARGInal	GAS	EARLY GAS
STATE KS COUNTY MORTON WELL LOCATION SEC9-T33S-R41W 120°F @ 5100' Grad: 13.7°F/1000' WELL NAME ANADARKO LEASE JONES #B-1								
S-693	CR	MORROW	PENN SH		5039	VERY GOOD	GAS-CONDE	EARLY GAS
S-694	CR	MORROW	PENN SH		5043	VERY GOOD	GAS-CONDE	EARLY GAS
S-695	CR	MORROW	PENN SH		5063	MARGInal	GAS	EARLY GAS
S-696	CR	MORROW	PENN SH		5067	MARGInal	GAS	EARLY GAS
S-697	CR	MORROW	PENN SH		5069	MARGInal	GAS	EARLY GAS
STATE KS COUNTY MORTON WELL LOCATION SEC21-T31S-R40W 110°F @ 5100' Grad: 11.8°F/1000' WELL NAME PAN AM LEASE P A WILLIAMS #2								
S-698	CR	MORROW	PENN SH		5048	MARGInal	GAS	EARLY GAS
S-699	CR	MORROW	PENN SH		5054	NON SOURCE		
S-700	CR	MORROW	PENN SH		5057	NON SOURCE		
S-701	CR	MORROW	PENN SH		5059	NON SOURCE		
STATE KS COUNTY MORTON WELL LOCATION SEC21-T31S-R40W 119°F @ 5100' Grad: 13.5°F/1000' WELL NAME AMOCO LEASE SLINKER #2								
S-702	CR	MORROW	PENN SH		3976	MARGInal	GAS	EARLY GAS
S-703	CR	MORROW	PENN SH		4979	MARGInal	GAS	EARLY GAS
S-704	CR	MORROW	PENN SH		4983	MARGInal	GAS	EARLY GAS
S-705	CR	MORROW	PENN SH		4986	MARGInal	GAS	EARLY GAS

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SOURCE ROCK SUMMARY
TABLE 1.C
DATE 01/04/83

SAMPLE NUMBER	SAMPL TYPE	FORMATION	AGE	LITHOLOGY	FIELD NO. OR DEPTH FEET TOP***BASE	PETROLEUM GENERATION CAPABILITY	KEROGEN TYPE (OIL/GAS)	STAGE OF DIAGENESIS
STATE KS		COUNTY MORTON	WELL LOCATION SEC21-T31S-R40W					
WELL NAME AMOCO			LEASE SLINKER #2					
S-706	CR	MORROW	PENN	SH	4989	MARGINAL	GAS	EARLY GAS
S-707	CR	MORROW	PENN	SH	4992	MARGINAL	GAS	EARLY GAS
S-708	CR	MORROW	PENN	COAL	4995	VERY GOOD	GAS	EARLY GAS
S-709	CR	MORROW	PENN	SH	5008	MARGINAL	GAS	EARLY GAS
S-710	CR	MORROW	PENN	COAL	5012	VERY GOOD	GAS	EARLY GAS
S-711	CR	MORROW	PENN	SH	5027	MARGINAL	GAS	EARLY GAS
S-712	CR	MORROW	PENN	SH	5033	MARGINAL	GAS	EARLY GAS
S-713	CR	MORROW	PENN	SH	5038	MARGINAL	GAS	EARLY GAS
S-714	CR	MORROW	PENN	SH	5043	MARGINAL	GAS	EARLY GAS
S-715	CR	MORROW	PENN	SH	5044	MARGINAL	GAS	EARLY GAS

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R825396 ROCKEVAL PYROLYSIS DATA

* SAMPLE NO.	TOP OF ANALYZED INTERVAL	FORMATION	TOTAL ORGANIC CARBON WT% (TOC)	PPM VOLATILE HYDROCARBONS (S1 X 1000)	VOL/ TOC	PPM GENERATED HYDROCARBONS (S2 X 1000)	GEN/ TOC	TEMP OF MAX GEN	VOL/ VOL + GEN
S-677	4648	ST. LOUIS	1.0	80	0.01	190	0.02	437	0.30
S-678	4531	LANSING	13.7	5160	0.04	65570	0.48	431	0.07
S-679	4534	LANSING	5.9	2630	0.04	25160	0.43	430	0.09
S-680	4940	MORROW	0.5	40	0.01	20	<.01	434	0.67
S-681	4947	MORROW	0.3	40	0.01	130	0.04	437	0.24
S-682	4972	MORROW	0.7	30	<.01	130	0.02		0.19
S-683	4975	MORROW	0.7	50	0.01	150	0.02		0.25
S-684	3348	MORROW	0.6	30	0.01	50	0.01		0.38
S-685	5246	MORROW	0.5	40	0.01	70	0.01		0.36
S-686	5250	MORROW	0.5	50	0.01	40	0.01		0.56
S-687	5255	MORROW	1.3	40	<.01	480	0.04	431	0.08
S-688	5378	MORROW	1.1	50	<.01	200	0.02	434	0.20
S-689	5384	MORROW	0.7	60	0.01	110	0.02	400	0.35
S-690	5391	MORROW	0.9	50	0.01	180	0.02	434	0.22
S-691	5397	MORROW	0.8	60	0.01	120	0.01	422	0.33
S-693	5039	MORROW	5.0	580	0.01	4270	0.09	434	0.12
S-694	5043	MORROW	3.9	440	0.01	4330	0.11	435	0.09
S-695	5063	MORROW	1.0	80	0.01	280	0.03	439	0.22
S-696	5067	MORROW	0.7	50	0.01	160	0.02	438	0.24
S-697	5069	MORROW	0.7	60	0.01	150	0.02	437	0.29
S-698	5048	MORROW	0.6	90	0.01	130	0.02	427	0.41
S-699	5045	MORROW	0.4	50	0.01	70	0.02		0.42
S-700	5057	MORROW	0.4	50	0.01	160	0.04		0.24
S-701	5059	MORROW	0.5	70	0.01	170	0.03		0.29
S-702	3976	MORROW	0.8	140	0.02	310	0.04	456	0.31
S-703	4979	MORROW	2.9	70	<.01	210	0.01	434	0.25
S-704	4983	MORROW	0.9	60	0.01	220	0.02	441	0.21
S-705	4986	MORROW	0.9	90	0.01	250	0.03	444	0.26
S-706	4989	MORROW	0.9	90	0.01	360	0.04	440	0.20
S-707	4992	MORROW	0.8	70	0.01	390	0.05	450	0.15
S-708	4995	MORROW	55.5	11230	0.02	135670	0.24	446	0.08
S-709	5008	MORROW	0.8	80	0.01	600	0.07	470	0.12
S-710	5012	MORROW	75.8	20200	0.03	173120	0.23	438	0.10
S-711	5027	MORROW	0.8	80	0.01	320	0.04	423	0.20
S-712	5033	MORROW	1.1	80	0.01	310	0.03	441	0.21
S-713	5038	MORROW	1.0	90	0.01	400	0.04	443	0.18
S-714	5043	MORROW	1.0	80	0.01	410	0.04	444	0.16
S-715	5044	MORROW	1.0	110	0.01	470	0.05	440	0.19

Table 2

Accuracy - To be maintained in Confidence
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OFFICE DENVER DISTRICT SOUTHERN
TECHNICAL SERVICE NUMBER 825396

SOURCE ROCK DATA
TABLE 3a
DATE 01/04/83

SAMPLE NUMBER	FIELD NO. OR DEPTH FEET		GEOL. AGE	INSOL RESID%	TOTAL ORG C WT%	BITUMEN		SAT HC		SAT HC/BITUMEN	BITUMEN/TL ORG C	REMARKS	
	TOP	BOTTOM				BBL/AF	PPM	BBL/AF	PPM				
BBL/AF = (PPM X .0180)													
STATE KS	COUNTY FINNEY		WELL LOCATION SEC31-T21S-R33W										
WELL NAME	SHALLOW WATER		LEASE MAUNE #4										
S-677	4648		MISS	90	1.0	1	46				<.01	Pristane/ Phytane	
STATE KS	COUNTY HASKELL		WELL LOCATION SEC31-T30S-R33W										
WELL NAME	CITIES SERVICE		LEASE THOMPSON #2-E										
S-678	4531		PENN	87	13.7	97	5392	26	1459	.27	.04	-28.5	1.26
S-679	4534		PENN	71	5.9	75	4171	28	1571	.38	.07	-28.3	1.15
STATE KS	COUNTY MORTON		WELL LOCATION SEC29-T31S-R40W										
WELL NAME	AMOCO		LEASE DOTTIE CHAFFIN #1										
S-680	4940		PENN	88	.5								
S-681	4947		PENN	92	.3								
S-682	4972		PENN	78	.7	1	62				.01		
S-683	4975		PENN	87	.7	1	34				<.01		
STATE KS	COUNTY STANTON		WELL LOCATION SEC4-T29S-R42W										
WELL NAME	SUPERIOR		LEASE H L TUCKER #68-A4										
S-684	3348		PENN	72	.6	1	81				.01		
S-685	5246	5247	PENN	90	.5								
S-686	5250	5251	PENN	87	.5								
S-687	5254	5255	PENN	77	1.3	3	147				.01		
S-688	5378	5379	PENN	83	1.1	2	86				.01		
S-689	5384	5385	PENN	84	.7	3	140				.02		
S-690	5391	5392	PENN	83	.9	2	108				.01		

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OFFICE DENVER DISTRICT SOUTHERN
TECHNICAL SERVICE NUMBER 825396

SOURCE ROCK DATA
TABLE 3.D
DATE 01/04/83

SAMPLE NUMBER	FIELD NO. OR DEPTH FEET		GEOL. AGE	INSOL RESID%	TOTAL ORG C WT%	BITUMEN		SAT HC		SAT HC/BITUMEN	BITUMEN/TL ORG C	REMARKS	
	TOP	BOTTOM				BBL/AF	PPM	BBL/AF	PPM				

STATE KS WELL NAME	COUNTY SUPERIOR		STANTON	WELL LOCATION SEC4-T29S-R42W LEASE H L TUCKER #68-A4									BBL/AF = (PPM X .0180)
S-691	5397	5398	PENN	78	.8	2	99				.01	Sat. δC^{13} o/oo Pristane/ Phytane	
STATE KS WELL NAME	COUNTY ANADARKO		MORTON	WELL LOCATION SEC9-T33S-R41W LEASE JONES #B-1									
S-693	5039		PENN	92	5.0	20	1099	5	261	.24	.02	-27.6 4.29	
S-694	5043		PENN	94	3.9	10	549	2	103	.19	.01	-27.7 4.83	
S-695	5063		PENN	80	1.0	2	135				.01		
S-696	5067		PENN	75	.7	3	147				.02		
S-697	5069		PENN	73	.7	2	125				.02		
STATE KS WELL NAME	COUNTY PAN AM		MORTON	WELL LOCATION SEC21-T31S-R40W LEASE P A WILLIAMS #2									
S-698	5048		PENN	91	.6	1	53				.01		
S-699	5054		PFNN	53	.4								
S-700	5057		PENN	93	.4								
S-701	5059		PENN	93	.5	1	48				.01		
STATE KS WELL NAME	COUNTY AMOCO		MORTON	WELL LOCATION SEC21-T31S-R40W LEASE SLINKER #2									
S-702	3976		PENN	88	.8	2	86				.01		
S-703	4979		PENN	86	2.9	1	77				<.01		
S-704	4983		PENN	83	.9	2	93				.01		
S-705	4986		PENN	83	.9	2	93				.01		

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A M O C O P R O D U C T I O N C O M P A N Y
R E S E A R C H C E N T E R

OFFICE DENVER
TECHNICAL SERVICE NUMBER

DISTRICT SOUTHERN
825396

SOURCE ROCK DATA
TABLE 3. C
DATE 01/04/83

SAMPLE NUMBER	FIELD NO. OR DEPTH FEET		GEOLOGICAL AGE	INSOLUBLE RESIDUE %	TOTAL ORGANIC C WT%	BITUMEN		SAT HC		SAT HC/BITUMEN	BITUMEN/TOTAL ORGANIC C	REMARKS
	TOP	BOTTOM				BBL/AF	PPM	BBL/AF	PPM			
STATE KS	COUNTY MORTON					WELL LOCATION SEC21-T31S-R40W						
WELL NAME	AMOCO					LEASE	SLINKER #2					
S-706	4989		PENN	86	.9	4	214	2	113	.53	.02	BBL/AF = (PPM X .0180) Sat. $\delta C^{13}O/oo$ Pristane/Phytane
S-707	4992		PENN	88	.8	1	68				.01	
S-708	4995		PENN	72	55.5	109	6038	35	1952	.32	.01	-27.3 2.31
S-709	5008		PENN	92	.8	1	61				.01	
S-710	5012		PENN	96	75.8	106	5886	9	525	.09	.01	-28.5 4.00
S-711	5027		PENN	81	.8	2	83				.01	
S-712	5033		PENN	81	1.1	2	110				.01	
S-713	5038		PENN	83	1.0	2	83				.01	
S-714	5043		PENN	79	1.0	2	100				.01	
S-715	5044		PENN	83	1.0	1	82				.01	

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KEROGEN DATA
TABLE 4. a
DATE 01/04/83

LAB SAMPLE NUMBER	FIELD NO. OR DEPTH FEET TOP**BOTTOM		GEOL. AGE	NORM. ELEMENTAL ANALYSIS, WT.				ATOMIC RATIO O/C	ATOMIC RATIO H/C	VISUAL KEROGEN TYPE	CARBNZ. SCALE	VIT REFLECT %RO
				CARBON	HYDROGEN	OXYGEN	NITROGEN					
STATE KS WELL NAME	COUNTY FINNEY SHALLOW WATER			WELL LOCATION SEC31-T21S-R33W LEASE MAUNE #4								
S-677	4648		MISS	85	3.8	10	1.6	.08	.54	MIXED		.55
STATE KS WELL NAME	COUNTY HASKELL CITIES SERVICE			WELL LOCATION SEC31-T30S-R33W LEASE THOMPSON #2-E								
S-678	4531		PENN	84	7.4	6	3.1	.05	1.06	MIXED		.43
S-679	4534		PENN	84	7.1	6	2.6	.05	1.02	MIXED		.45
STATE KS WELL NAME	COUNTY MORTON AMOCO			WELL LOCATION SEC29-T31S-R40W LEASE DOTTIE CHAFFIN #1								
S-680	4940		PENN									
S-681	4947		PENN									
S-682	4972		PENN	88	3.3	7	1.7	.06	.45	MIXED		.81
S-683	4975		PENN	88	3.4	7	1.7	.06	.47	MIXED		.86
STATE KS WELL NAME	COUNTY STANTON SUPERIOR			WELL LOCATION SEC4-T29S-R42W LEASE H L TUCKER #68-A4								
S-684	3348		PENN							STRUCTURED		.76
S-685	5246	5247	PENN									
S-686	5250	5251	PENN									
S-687	5254	5255	PENN	86	4.0	8	2.0	.07	.56	MIXED		.81
S-688	5378	5379	PENN	86	3.7	8	1.8	.07	.51	MIXED		.57
S-689	5384	5385	PENN	87	3.6	8	1.6	.07	.50	MIXED		.57
S-690	5391	5392	PENN	87	3.8	8	1.3	.06	.52	MIXED		.55
S-691	5397	5398	PENN	84	4.0	10	2.2	.08	.58	MIXED		.59

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KEROGEN DATA
TABLE 4. b
DATE 01/04/83

LAB SAMPLE NUMBER	FIELD NO. OR DEPTH FEET		GEOL. AGE	NORM. ELEMENTAL ANALYSIS, WT.				ATOMIC RATIO O/C	ATOMIC RATIO H/C	VISUAL KEROGEN TYPE	CARBNZ. SCALE	VIT REFLECT %RO
	TOP***	BOTTOM		CARBON	HYDROGEN	OXYGEN	NITROGEN					
STATE KS WELL NAME	COUNTY	MORTON		WELL LOCATION SEC9-T33S-R41W								
	ANADARKO			LEASE	JONES	#B-1						
S-693	5039		PENN	83	5.3	10	2.2	.08	.76	STRUCTURED	.55	
S-694	5043		PENN	82	5.5	10	1.9	.09	.81	MIXED	.62	
S-695	5063		PENN	87	4.1	8	1.4	.06	.57	MIXED	.62	
S-696	5067		PENN	87	3.7	7	1.9	.06	.51	MIXED	.68	
S-697	5069		PENN	88	3.7	6	1.7	.05	.51	MIXED	.64	
STATE KS WELL NAME	COUNTY	MORTON		WELL LOCATION SEC21-T31S-R40W								
	PAN AM			LEASE	P A WILLIAMS	#2						
S-698	5048		PENN	84	4.1	10	2.5	.08	.59	MIXED	.47	
S-699	5054		PENN									
S-700	5057		PENN									
S-701	5059		PENN	85	4.0	9	2.4	.07	.56	MIXED	.52	
STATE KS WELL NAME	COUNTY	MORTON		WELL LOCATION SEC21-T31S-R40W								
	AMOCO			LEASE	SLINKER	#2						
S-702	3976		PENN	85	4.4	9	2.3	.07	.62	MIXED	.78	
S-703	4979		PENN	84	4.2	10	1.7	.08	.59	MIXED	.71	
S-704	4983		PENN	89	3.6	6	1.7	.05	.49	MIXED	.72	
S-705	4986		PENN	85	3.5	10	1.6	.08	.49	MIXED	.68	
S-706	4989		PENN	87	3.7	7	1.9	.06	.51	MIXED	.69	
S-707	4992		PENN	86	4.2	8	2.2	.06	.59	MIXED	.79	
S-708	4995		PENN	86	4.2	9	1.5	.07	.59	MIXED	.86	

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KEROGEN DATA
TABLE 4.C
DATE 01/04/83

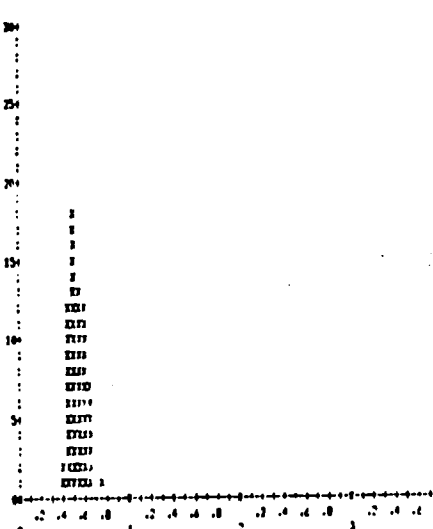
LAB SAMPLE NUMBER	FIELD NO. OR DEPTH FEET		GEOL. AGE	NORM. ELEMENTAL ANALYSIS, WT.				ATOMIC RATIO O/C	ATOMIC RATIO H/C	VISUAL KEROGEN TYPE	CARBNZ. SCALE	VIT REFLECT %RO
	TOP***	BOTTOM		CARBON	HYDROGEN	OXYGEN	NITROGEN					
STATE KS WELL NAME	COUNTY AMOCO	MORTON		WELL LOCATION SEC21-T31S-R40W LEASE SLINKER #2								
S-709	5008		PENN	81	5.1	12	2.0	.10	.75	MIXED	.72	
S-710	5012		PENN	84	5.6	9	1.2	.07	.80	STRUCTURED	.68	
S-711	5027		PENN	84	4.2	10	1.6	.09	.61	MIXED	.66	
S-712	5033		PENN							STRUCTURED	.68	
S-713	5038		PENN							STRUCTURED	.67	
S-714	5043		PENN							MIXED	.68	
S-715	5044		PENN	84	4.1	10	2.1	.08	.58	MIXED	.69	

Proprietary - To Be Maintained In Confidence
Amoco Production Company

CLIENT..... ARCO PROD. COMPANY FILE NAME..... 9-477
 DEPTH/SAMPLE NO.: BOTTLE WATER NAME-4 TYPE OF SAMPLE..... CORE CHIT, 4.447
 LOCATION..... FINNEY CO., KANSAS DATE..... 12-1-82
 ANALYST..... R. W. SCHWAB NO. OF OBSERVATIONS: 43

STANDARD 2% START: 1.43 FINISH: 1.43

REFLECTANCE DATA: MIN. 0.41 MAX. 0.75 AVG. 0.52 STD. DEV. 0.07



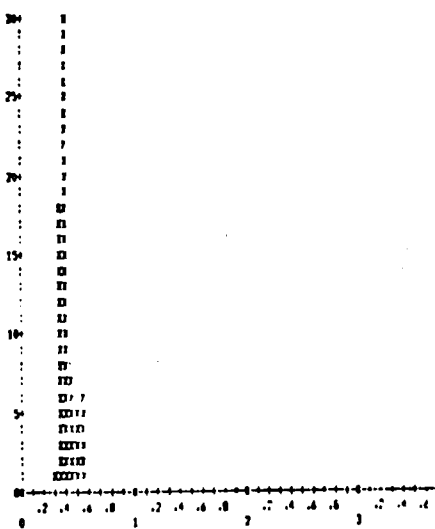
VITRINITE REFLECTANCE HISTOGRAM - 9a

POP. 1 TOTAL FTS. 42 MIN. 0.41 MAX. 0.75 AVG. 0.52 STD. DEV. 0.07

CLIENT..... ARCO PROD. COMPANY FILE NAME..... CS-478
 DEPTH/SAMPLE NO.: CITEO THOMPSON 12-4 TYPE OF SAMPLE..... CORE CHIT, 4.531
 LOCATION..... MARBLE CO., KANSAS DATE..... 12-1-82
 ANALYST..... R. W. SCHWAB NO. OF OBSERVATIONS: 74

STANDARD 2% START: 1.40 FINISH: 1.42

REFLECTANCE DATA: MIN. 0.31 MAX. 0.59 AVG. 0.43 STD. DEV. 0.06



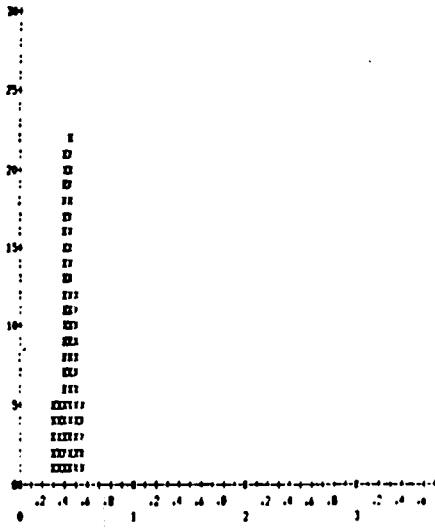
VITRINITE REFLECTANCE HISTOGRAM - 9b

POP. 1 TOTAL FTS. 70 MIN. 0.31 MAX. 0.59 AVG. 0.43 STD. DEV. 0.06

CLIENT..... ARCO PROD. COMPANY FILE NAME..... CS-479
 DEPTH/SAMPLE NO.: CITEO THOMPSON 12-4 TYPE OF SAMPLE..... CORE CHIT, 4.534
 LOCATION..... MARBLE CO., KANSAS DATE..... 12-1-82
 ANALYST..... R. W. SCHWAB NO. OF OBSERVATIONS: 74

STANDARD 2% START: 1.43 FINISH: 1.42

REFLECTANCE DATA: MIN. 0.31 MAX. 0.59 AVG. 0.43 STD. DEV. 0.06



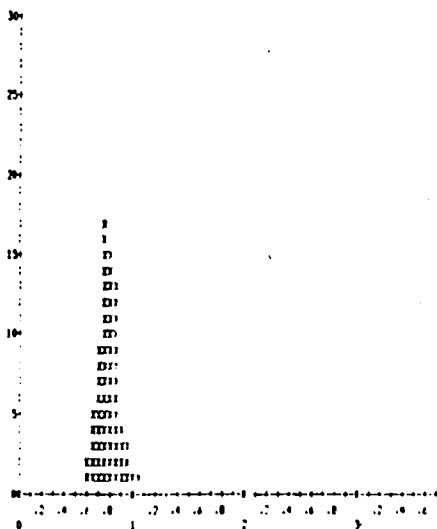
VITRINITE REFLECTANCE HISTOGRAM - 9c

POP. 1 TOTAL FTS. 70 MIN. 0.31 MAX. 0.59 AVG. 0.43 STD. DEV. 0.06

CLIENT..... ARCO PROD. COMPANY FILE NAME..... CS-482
 DEPTH/SAMPLE NO.: BOTTLE CHIT 0.1 TYPE OF SAMPLE..... CORE CHIT, 4.972
 LOCATION..... HORTON CO., KANSAS DATE..... 12-1-82
 ANALYST..... R. W. SCHWAB NO. OF OBSERVATIONS: 74

STANDARD 2% START: 1.42 FINISH: 1.42

REFLECTANCE DATA: MIN. 0.41 MAX. 1.09 AVG. 0.81 STD. DEV. 0.09



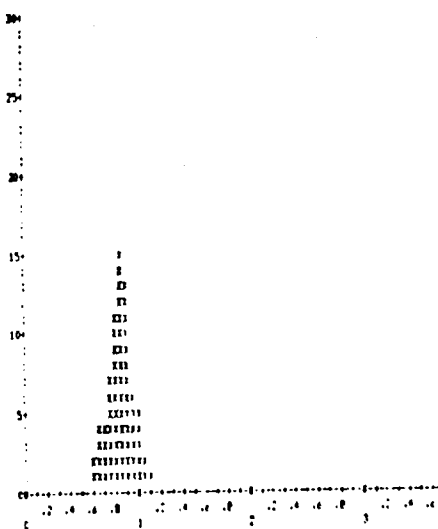
VITRINITE REFLECTANCE HISTOGRAM - 9d

POP. 1 TOTAL FTS. 70 MIN. 0.41 MAX. 1.09 AVG. 0.81 STD. DEV. 0.09

CLIENT..... ARCO PROD. COMPANY FILE NAME..... CS-483
 DEPTH/SAMPLE NO.: BOTTLE CHIT 0.1 TYPE OF SAMPLE..... CORE CHIT, 4.972
 LOCATION..... HORTON CO., KANSAS DATE..... 12-1-82
 ANALYST..... R. W. SCHWAB NO. OF OBSERVATIONS: 74

STANDARD 2% START: 1.42 FINISH: 1.43

REFLECTANCE DATA: MIN. 0.44 MAX. 1.11 AVG. 0.84 STD. DEV. 0.11



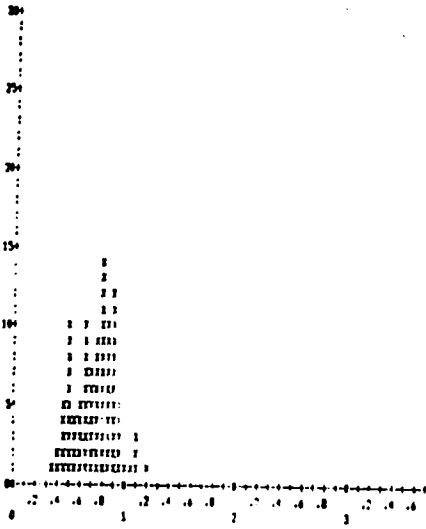
VITRINITE REFLECTANCE HISTOGRAM - 9e

POP. 1 TOTAL FTS. 74 MIN. 0.44 MAX. 1.11 AVG. 0.84 STD. DEV. 0.11

CLIENT..... ARCO PROD. COMPANY FILE NAME..... CS-684
 DEPTH/SAMPLE NO. N.L. TICKET # 68-44 TYPE OF SAMPLE..... CORE CHIP, 3.25"
 LOCATION..... STANTON CO., KANSAS DATE..... 12-1-82
 ANALYST..... R. V. SCHWAB NO. OF OBSERVATIONS, 10

STANDARD DEVIATION START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.20 MAX. 1.21 AVG. 0.76 STD. DEV. 0.18



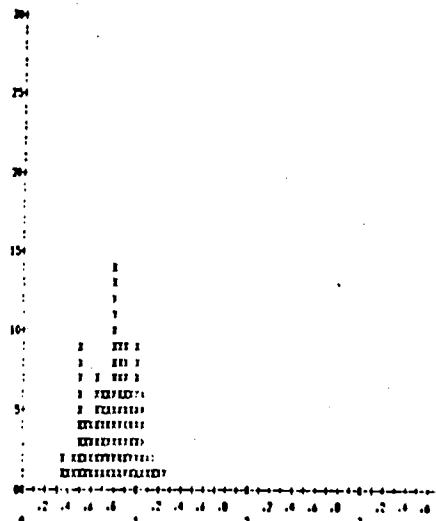
VITRINITE REFLECTANCE HISTOGRAM - De

POP. # 1 TOTAL CTS. 27 MIN. 0.37 MAX. 0.64 AVG. 0.53 STD. DEV. 0.07
 POP. # 2 TOTAL CTS. 67 MIN. 0.62 MAX. 0.94 AVG. 0.80 STD. DEV. 0.09
 POP. # 3 TOTAL CTS. 6 MIN. 1.07 MAX. 1.21 AVG. 1.12 STD. DEV. 0.07

CLIENT..... ARCO PROD. COMPANY FILE NAME..... CS-687
 DEPTH/SAMPLE NO. N.L. TICKET # 68-44 TYPE OF SAMPLE..... CORE CHIP, 3.25"
 LOCATION..... STANTON CO., KANSAS DATE..... 12-1-82
 ANALYST..... R. V. SCHWAB NO. OF OBSERVATIONS, 10

STANDARD DEVIATION START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.39 MAX. 1.29 AVG. 0.81 STD. DEV. 0.20



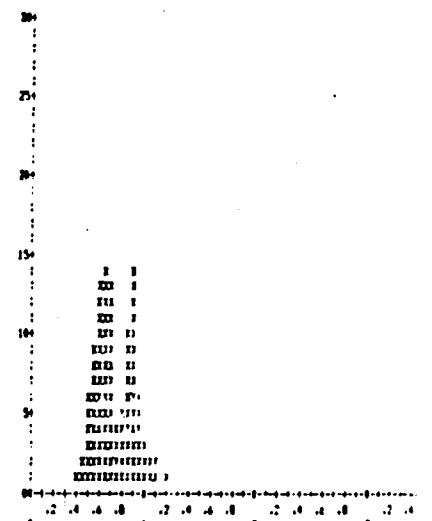
VITRINITE REFLECTANCE HISTOGRAM - De

POP. # 1 TOTAL CTS. 22 MIN. 0.39 MAX. 0.62 AVG. 0.52 STD. DEV. 0.07
 POP. # 2 TOTAL CTS. 72 MIN. 0.65 MAX. 1.09 AVG. 0.87 STD. DEV. 0.12
 POP. # 3 TOTAL CTS. 6 MIN. 1.11 MAX. 1.29 AVG. 1.18 STD. DEV. 0.07

CLIENT..... ARCO PROD. COMPANY FILE NAME..... CS-688
 DEPTH/SAMPLE NO. N.L. TICKET # 68-44 TYPE OF SAMPLE..... CORE CHIP
 LOCATION..... STANTON CO., KANSAS DATE..... 12-1-82
 ANALYST..... R. V. SCHWAB NO. OF OBSERVATIONS, 10

STANDARD DEVIATION START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.43 MAX. 1.22 AVG. 0.76 STD. DEV. 0.18



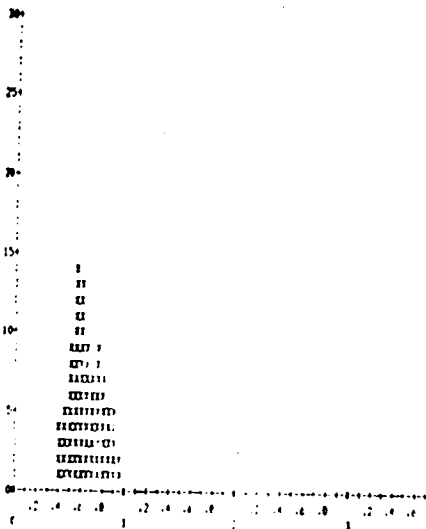
VITRINITE REFLECTANCE HISTOGRAM - De

POP. # 1 TOTAL CTS. 31 MIN. 0.43 MAX. 0.64 AVG. 0.57 STD. DEV. 0.07
 POP. # 2 TOTAL CTS. 74 MIN. 0.67 MAX. 1.22 AVG. 0.84 STD. DEV. 0.12

CLIENT..... ARCO PROD. COMPANY FILE NAME..... CS-689
 DEPTH/SAMPLE NO. N.L. TICKET # 68-44 TYPE OF SAMPLE..... CORE CHIP, 3.25"
 LOCATION..... STANTON CO., KANSAS DATE..... 12-1-82
 ANALYST..... R. V. SCHWAB NO. OF OBSERVATIONS, 10

STANDARD DEVIATION START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.41 MAX. 0.96 AVG. 0.67 STD. DEV. 0.16



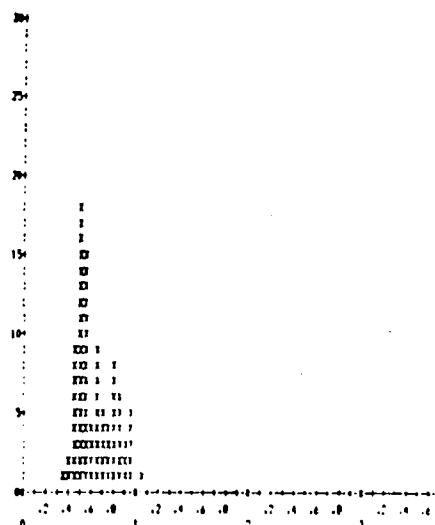
VITRINITE REFLECTANCE HISTOGRAM - De

POP. # 1 TOTAL CTS. 54 MIN. 0.41 MAX. 0.64 AVG. 0.57 STD. DEV. 0.07
 POP. # 2 TOTAL CTS. 51 MIN. 0.71 MAX. 0.96 AVG. 0.82 STD. DEV. 0.08

CLIENT..... ARCO PROD. COMPANY FILE NAME..... CS-690
 DEPTH/SAMPLE NO. N.L. TICKET # 68-44 TYPE OF SAMPLE..... CORE CHIP, 3.25"
 LOCATION..... STANTON CO., KANSAS DATE..... 12-1-82
 ANALYST..... R. V. SCHWAB NO. OF OBSERVATIONS, 10

STANDARD DEVIATION START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.39 MAX. 1.04 AVG. 0.64 STD. DEV. 0.16



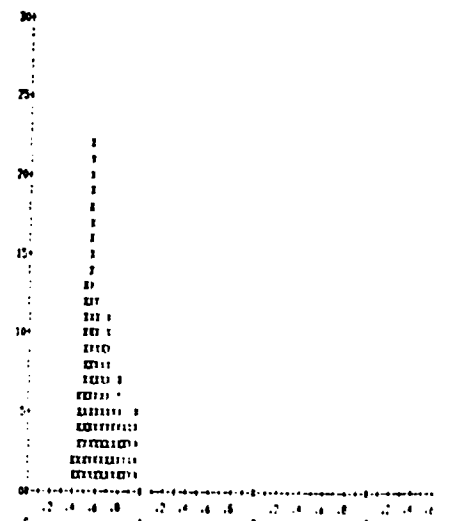
VITRINITE REFLECTANCE HISTOGRAM - De

POP. # 1 TOTAL CTS. 36 MIN. 0.39 MAX. 0.64 AVG. 0.52 STD. DEV. 0.07
 POP. # 2 TOTAL CTS. 32 MIN. 0.71 MAX. 1.04 AVG. 0.82 STD. DEV. 0.09

CLIENT..... ARCO PROD. COMPANY FILE NAME..... CS-691
 DEPTH/SAMPLE NO. N.L. TICKET # 68-44 TYPE OF SAMPLE..... CORE CHIP
 LOCATION..... STANTON CO., KANSAS DATE..... 12-1-82
 ANALYST..... R. V. SCHWAB NO. OF OBSERVATIONS, 10

STANDARD DEVIATION START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.41 MAX. 0.99 AVG. 0.64 STD. DEV. 0.13



VITRINITE REFLECTANCE HISTOGRAM - De

POP. # 1 TOTAL CTS. 77 MIN. 0.41 MAX. 0.74 AVG. 0.54 STD. DEV. 0.07
 POP. # 2 TOTAL CTS. 25 MIN. 0.71 MAX. 0.99 AVG. 0.82 STD. DEV. 0.07

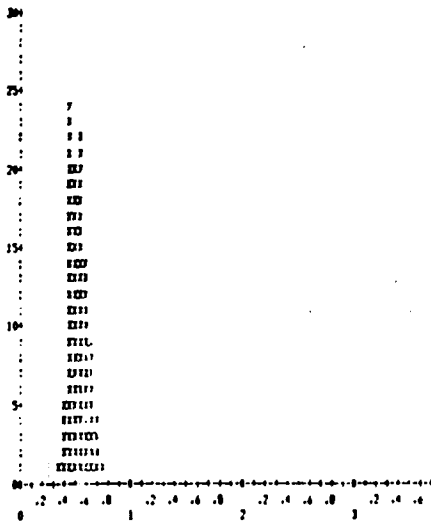
Proprietary - To Be Maintained in Confidence
 Arco Products Company

TS 825396CS
 Figure 2b

CLIENT..... AMOCO PROD. COMPANY FILE NAME..... CS-472
 DEPTH/SAMPLE NO. ANWARAWIC JONES 0 8-1 TYPE OF SAMPLE..... CORE CHIP, 5.043"
 LOCATION..... WERTON CO., KANSAS DATE..... 12-1-82
 ANALYST..... R. U. SCHWAB NO. OF OBSERVATIONS: 100

STANDARD Dev START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.36 MAX. 0.78 AVG. 0.57 STD. DEV. 0.06



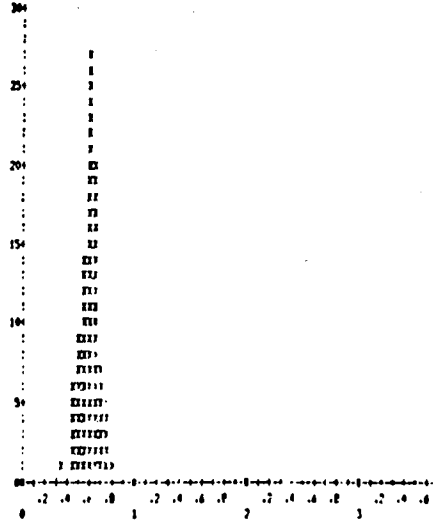
VITRINITE REFLECTANCE HISTOGRAM - 82c

POP. 1 TOTAL CTS. 100 MIN. 0.36 MAX. 0.78 AVG. 0.57 STD. DEV. 0.06

CLIENT..... AMOCO PROD. COMPANY FILE NAME..... CS-474
 DEPTH/SAMPLE NO. ANWARAWIC JONES 0 8-1 TYPE OF SAMPLE..... CORE CHIP, 5.043"
 LOCATION..... WERTON CO., KANSAS DATE..... 12-1-82
 ANALYST..... R. U. SCHWAB NO. OF OBSERVATIONS: 96

STANDARD Dev START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.35 MAX. 0.80 AVG. 0.62 STD. DEV. 0.08



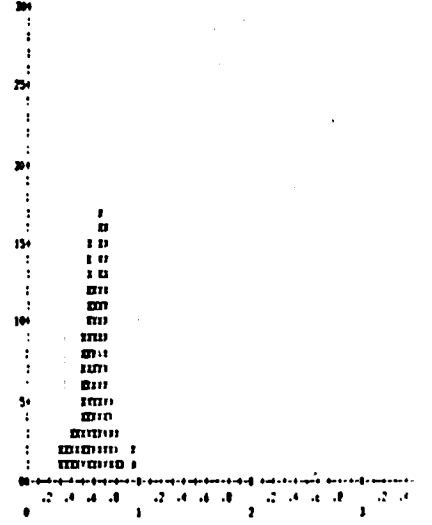
VITRINITE REFLECTANCE HISTOGRAM - 82c

POP. 1 TOTAL CTS. 96 MIN. 0.35 MAX. 0.80 AVG. 0.62 STD. DEV. 0.08

CLIENT..... AMOCO PROD. COMPANY FILE NAME..... CS-476
 DEPTH/SAMPLE NO. ANWARAWIC JONES 0 8-1 TYPE OF SAMPLE..... CORE CH
 LOCATION..... WERTON CO., KANSAS DATE..... 12-1-82
 ANALYST..... R. U. SCHWAB NO. OF OBSERVATIONS: 96

STANDARD Dev START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.32 MAX. 0.79 AVG. 0.63 STD. DEV. 0.08



VITRINITE REFLECTANCE HISTOGRAM - 82c

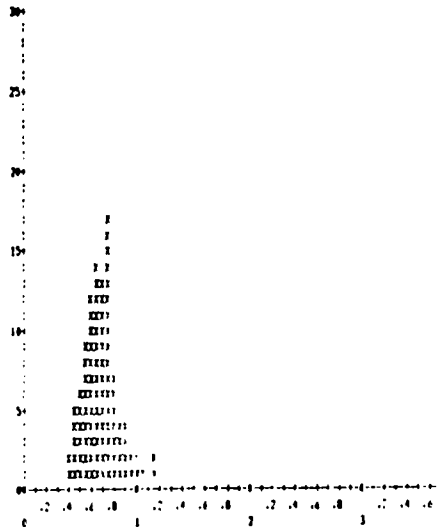
POP. 1 TOTAL CTS. 96 MIN. 0.32 MAX. 0.80 AVG. 0.63 STD. DEV. 0.08

POP. 2 TOTAL CTS. 2 MIN. 0.78 MAX. 0.79 AVG. 0.79 STD. DEV. 0.01

CLIENT..... AMOCO PROD. COMPANY FILE NAME..... CS-478
 DEPTH/SAMPLE NO. ANWARAWIC JONES 0 8-1 TYPE OF SAMPLE..... CORE CHIP, 5.043"
 LOCATION..... WERTON CO., KANSAS DATE..... 12-1-82
 ANALYST..... R. U. SCHWAB NO. OF OBSERVATIONS: 100

STANDARD Dev START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.43 MAX. 1.10 AVG. 0.71 STD. DEV. 0.15



VITRINITE REFLECTANCE HISTOGRAM - 82c

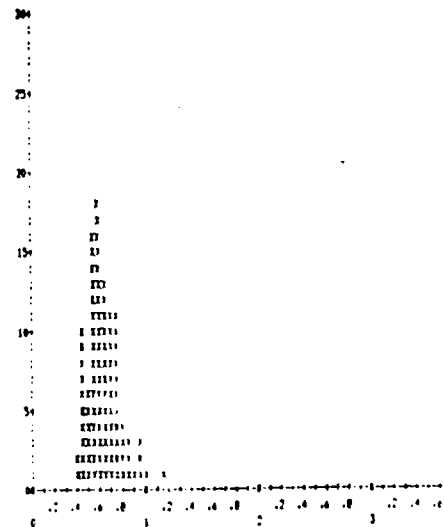
POP. 1 TOTAL CTS. 92 MIN. 0.43 MAX. 0.92 AVG. 0.68 STD. DEV. 0.12

POP. 2 TOTAL CTS. 8 MIN. 0.99 MAX. 1.10 AVG. 1.06 STD. DEV. 0.08

CLIENT..... AMOCO PROD. COMPANY FILE NAME..... CS-477
 DEPTH/SAMPLE NO. ANWARAWIC JONES 0 8-1 TYPE OF SAMPLE..... CORE CHIP, 5.043"
 LOCATION..... WERTON CO., KANSAS DATE..... 12-1-82
 ANALYST..... R. U. SCHWAB NO. OF OBSERVATIONS: 100

STANDARD Dev START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.41 MAX. 1.10 AVG. 0.64 STD. DEV. 0.14



VITRINITE REFLECTANCE HISTOGRAM - 82c

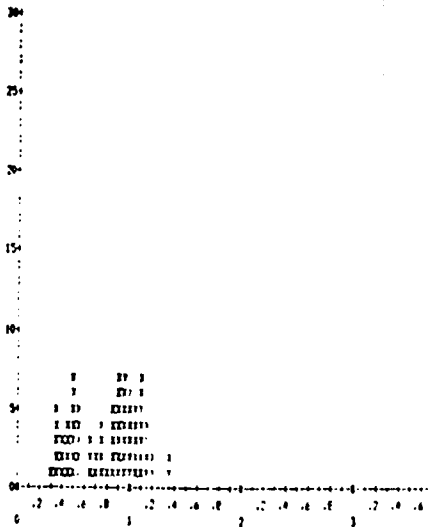
POP. 1 TOTAL CTS. 94 MIN. 0.41 MAX. 0.98 AVG. 0.64 STD. DEV. 0.12

POP. 2 TOTAL CTS. 6 MIN. 0.94 MAX. 1.10 AVG. 1.02 STD. DEV. 0.08

CLIENT..... AMOCO PROD. COMPANY FILE NAME..... CS-698
 DEPTH/SAMPLE NO. P.A. BILLIARD #1 TYPE OF SAMPLE..... CORE CHIP, 5.048
 LOCATION..... HORTON CO., MARYLAND DATE..... 12-1-82
 ANALYST..... G. B. SCHNAI NO. OF OBSERVATIONS: 80

STANDARD 246 START: 1.02 FINISH: 1.02

REFLECTANCE DATA MIN. 0.34 MAX. 1.29 AVG. 0.82 STD. DEV. 0.28



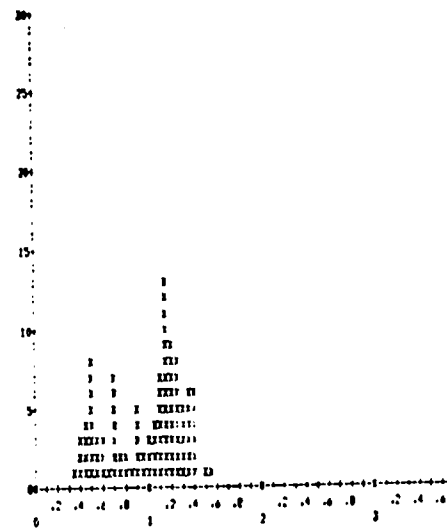
VIBRATING REFLECTANCE HISTOGRAM - DR

POP. 1 TOTAL CTS. 22 MIN. 0.34 MAX. 0.58 AVG. 0.47 STD. DEV. 0.17
 POP. 2 TOTAL CTS. 16 MIN. 0.62 MAX. 0.82 AVG. 0.74 STD. DEV. 0.10
 POP. 3 TOTAL CTS. 41 MIN. 0.82 MAX. 1.27 AVG. 1.02 STD. DEV. 0.24
 POP. 4 TOTAL CTS. 4 MIN. 1.22 MAX. 1.29 AVG. 1.30 STD. DEV. 0.10

CLIENT..... AMOCO PROD. COMPANY FILE NAME..... CS-701
 DEPTH/SAMPLE NO. P.A. BILLIARD #2 TYPE OF SAMPLE..... CORE CHIP, 5.070
 LOCATION..... HORTON CO., MARYLAND DATE..... 12-1-82
 ANALYST..... G. B. SCHNAI NO. OF OBSERVATIONS: 102

STANDARD 246 START: 1.02 FINISH: 1.02

REFLECTANCE DATA MIN. 0.27 MAX. 1.23 AVG. 1.01 STD. DEV. 0.32



VIBRATING REFLECTANCE HISTOGRAM - DR

POP. 1 TOTAL CTS. 23 MIN. 0.27 MAX. 0.67 AVG. 0.52 STD. DEV. 0.17
 POP. 2 TOTAL CTS. 27 MIN. 0.70 MAX. 1.04 AVG. 0.82 STD. DEV. 0.13
 POP. 3 TOTAL CTS. 50 MIN. 1.00 MAX. 1.44 AVG. 1.24 STD. DEV. 0.16
 POP. 4 TOTAL CTS. 2 MIN. 1.22 MAX. 1.23 AVG. 1.24 STD. DEV. 0.02

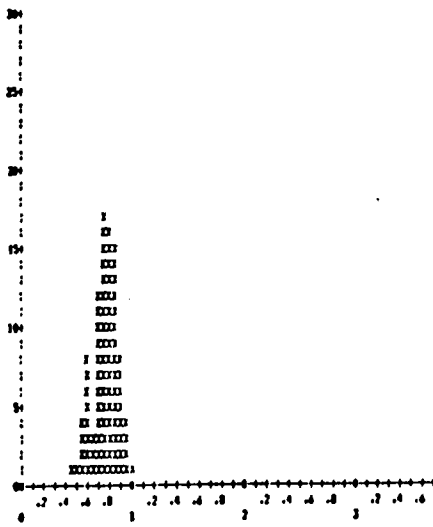
TS 825396CS
 Figure 2d

Proprietary - To Be Maintained In Confidence
 Amoco Production Company

CLIENT..... AMCO PROD. COMPANY FILE NAME..... CS-702
 BPTN/SAMPLE NO. AMCO SLINER # 2 TYPE OF SAMPLE..... CORE CHIP, 3.97%
 LOCATION..... BERTON CO., KANSAS DATE..... 12-7-82
 ANALYST..... K. G. SCHMID ID. OF OBSERVATIONS, 79

STANDARD 2% START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.47 MAX. 1.01 AVG. 0.72 STD. DEV. 0.11



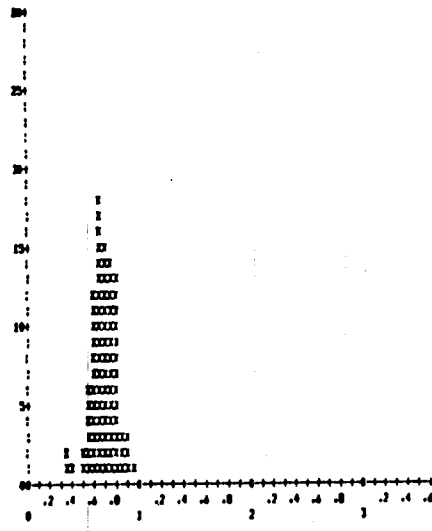
POP. # 1 TOTAL CTS. 14 MIN. 0.47 MAX. 0.64 AVG. 0.59 STD. DEV. 0.05

POP. # 2 TOTAL CTS. 74 MIN. 0.67 MAX. 1.01 AVG. 0.82 STD. DEV. 0.09

CLIENT..... AMCO PROD. COMPANY FILE NAME..... CS-703
 BPTN/SAMPLE NO. AMCO SLINER # 2 TYPE OF SAMPLE..... CORE CHIP, 4.9
 LOCATION..... BERTON CO., KANSAS DATE..... 12-7-82
 ANALYST..... K. G. SCHMID ID. OF OBSERVATIONS, 79

STANDARD 2% START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.36 MAX. 0.97 AVG. 0.71 STD. DEV. 0.11



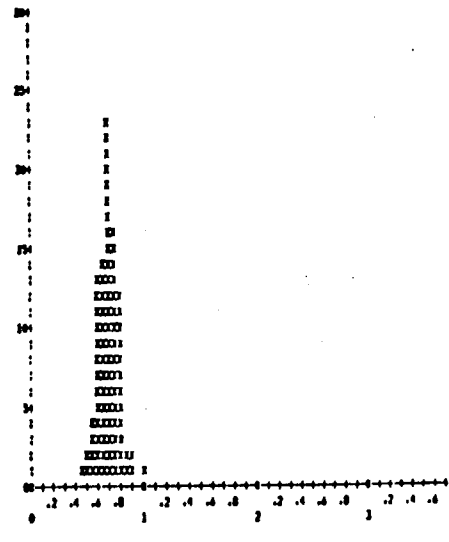
POP. # 1 TOTAL CTS. 3 MIN. 0.36 MAX. 0.42 AVG. 0.39 STD. DEV. 0.03

POP. # 2 TOTAL CTS. 67 MIN. 0.52 MAX. 0.97 AVG. 0.72 STD. DEV. 0.10

CLIENT..... AMCO PROD. COMPANY FILE NAME..... CS-704
 BPTN/SAMPLE NO. AMCO SLINER # 2 TYPE OF SAMPLE..... CORE CHIP, 4.98
 LOCATION..... BERTON CO., KANSAS DATE..... 12-7-82
 ANALYST..... K. G. SCHMID ID. OF OBSERVATIONS, 79

STANDARD 2% START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.43 MAX. 1.00 AVG. 0.72 STD. DEV. 0.09

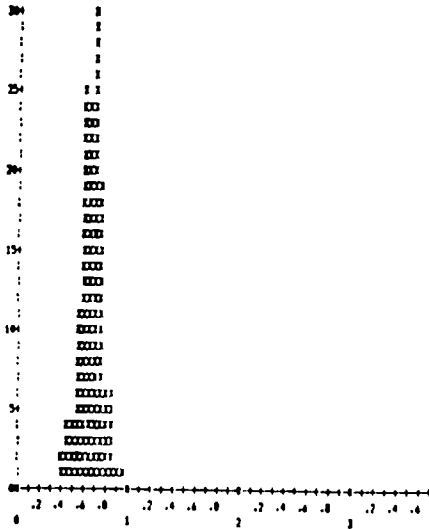


POP. # 1 TOTAL CTS. 90 MIN. 0.45 MAX. 1.00 AVG. 0.72 STD. DEV. 0.09

CLIENT..... AMCO PROD. COMPANY FILE NAME..... CS-705
 BPTN/SAMPLE NO. AMCO SLINER # 2 TYPE OF SAMPLE..... CORE CHIP, 4.96%
 LOCATION..... BERTON CO., KANSAS DATE..... 12-7-82
 ANALYST..... K. G. SCHMID ID. OF OBSERVATIONS, 79

STANDARD 2% START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.43 MAX. 0.98 AVG. 0.68 STD. DEV. 0.10

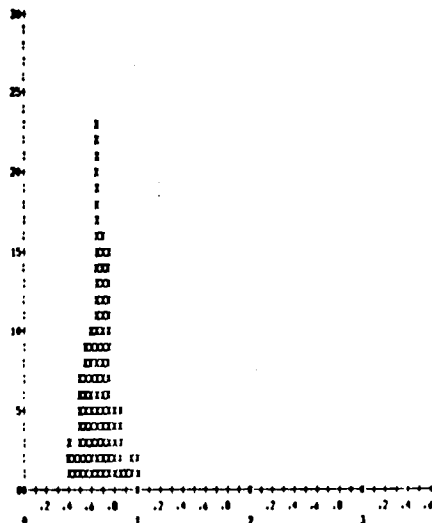


POP. # 1 TOTAL CTS. 140 MIN. 0.43 MAX. 0.76 AVG. 0.68 STD. DEV. 0.10

CLIENT..... AMCO PROD. COMPANY FILE NAME..... CS-706
 BPTN/SAMPLE NO. AMCO SLINER # 2 TYPE OF SAMPLE..... CORE CHIP, 4.99%
 LOCATION..... BERTON CO., KANSAS DATE..... 12-7-82
 ANALYST..... K. G. SCHMID ID. OF OBSERVATIONS, 100

STANDARD 2% START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.41 MAX. 1.00 AVG. 0.69 STD. DEV. 0.12

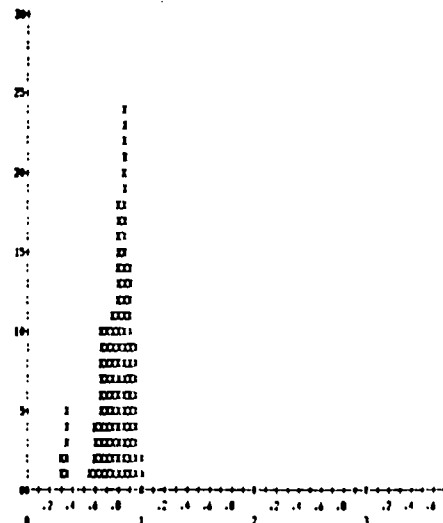


POP. # 1 TOTAL CTS. 100 MIN. 0.41 MAX. 1.00 AVG. 0.69 STD. DEV. 0.12

CLIENT..... AMCO PROD. COMPANY FILE NAME..... CS-707
 BPTN/SAMPLE NO. AMCO SLINER # 2 TYPE OF SAMPLE..... CORE CHIP, 4.99%
 LOCATION..... BERTON CO., KANSAS DATE..... 12-7-82
 ANALYST..... K. G. SCHMID ID. OF OBSERVATIONS, 110

STANDARD 2% START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.31 MAX. 1.04 AVG. 0.79 STD. DEV. 0.13



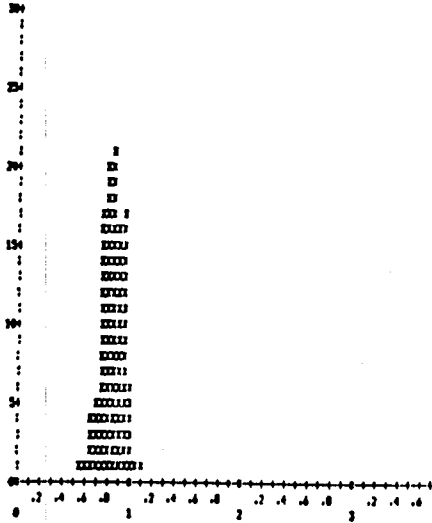
POP. # 1 TOTAL CTS. 7 MIN. 0.31 MAX. 0.37 AVG. 0.35 STD. DEV. 0.02

POP. # 2 TOTAL CTS. 103 MIN. 0.39 MAX. 1.04 AVG. 0.82 STD. DEV. 0.10

CLIENT..... AMOCO PROD. COMPANY FILE NAME..... CS-700
 DEPTH/SAMPLE NO. AMOCO BLIND# 1 2 TYPE OF SAMPLE..... CORE CHIP, 5.995'
 LOCATION..... BERTON CO., KANSAS DATE..... 12-3-62
 ANALYST..... E. B. SCHWAB NO. OF OBSERVATIONS, 110

STANDARD DEVIATION START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.20 MAX. 1.13 AVG. 0.66 STD. DEV. 0.10



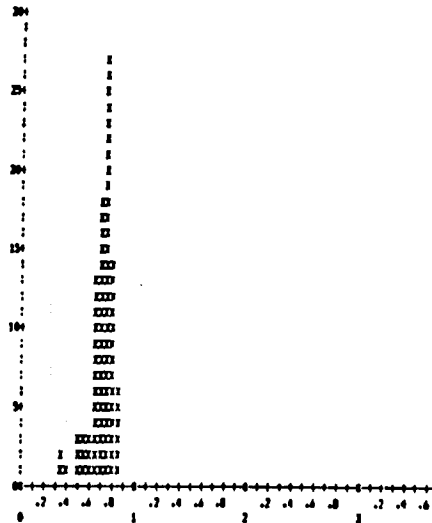
VITRULITE REFLECTANCE HISTOGRAM - 2%

POP. # 1 TOTAL CTS. 110 MIN. 0.20 MAX. 1.13 AVG. 0.66 STD. DEV. 0.10

CLIENT..... AMOCO PROD. COMPANY FILE NAME..... CS-700
 DEPTH/SAMPLE NO. AMOCO BLIND# 1 2 TYPE OF SAMPLE..... CORE CHIP, 5.995'
 LOCATION..... BERTON CO., KANSAS DATE..... 12-3-62
 ANALYST..... E. B. SCHWAB NO. OF OBSERVATIONS, 90

STANDARD DEVIATION START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.27 MAX. 0.99 AVG. 0.72 STD. DEV. 0.10



VITRULITE REFLECTANCE HISTOGRAM - 2%

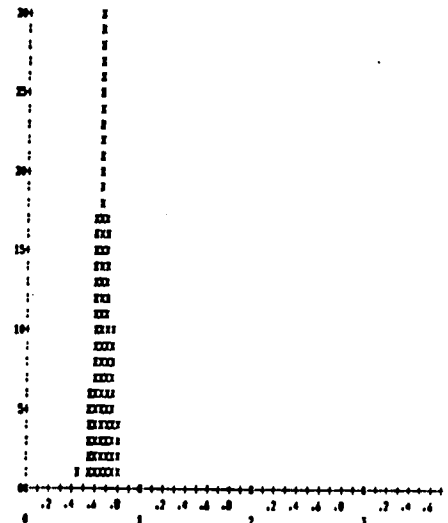
POP. # 1 TOTAL CTS. 90 MIN. 0.27 MAX. 0.99 AVG. 0.72 STD. DEV. 0.10

POP. # 2 TOTAL CTS. 87 MIN. 0.50 MAX. 0.99 AVG. 0.74 STD. DEV. 0.08

CLIENT..... AMOCO PROD. COMPANY FILE NAME..... CS-710
 DEPTH/SAMPLE NO. AMOCO BLIND# 1 2 TYPE OF SAMPLE..... CORE CHIP, 5.812'
 LOCATION..... BERTON CO., KANSAS DATE..... 12-3-62
 ANALYST..... E. B. SCHWAB NO. OF OBSERVATIONS, 90

STANDARD DEVIATION START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.40 MAX. 0.82 AVG. 0.68 STD. DEV. 0.06



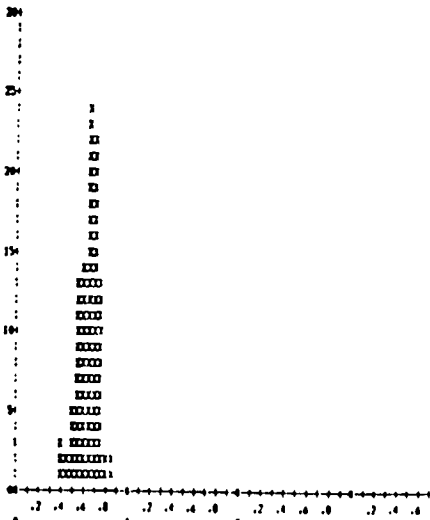
VITRULITE REFLECTANCE HISTOGRAM - 2%

POP. # 1 TOTAL CTS. 90 MIN. 0.40 MAX. 0.82 AVG. 0.68 STD. DEV. 0.06

CLIENT..... AMOCO PROD. COMPANY FILE NAME..... CS-711
 DEPTH/SAMPLE NO. AMOCO BLIND# 1 2 TYPE OF SAMPLE..... CORE CHIP, 5.027'
 LOCATION..... BERTON CO., KANSAS DATE..... 12-3-62
 ANALYST..... E. B. SCHWAB NO. OF OBSERVATIONS, 100

STANDARD DEVIATION START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.40 MAX. 0.90 AVG. 0.66 STD. DEV. 0.09



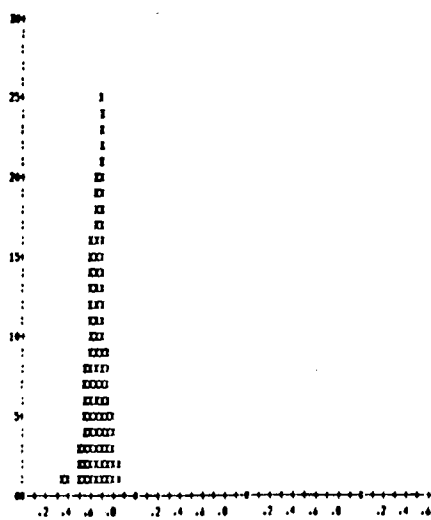
VITRULITE REFLECTANCE HISTOGRAM - 2%

POP. # 1 TOTAL CTS. 100 MIN. 0.40 MAX. 0.90 AVG. 0.66 STD. DEV. 0.09

CLIENT..... AMOCO PROD. COMPANY FILE NAME..... CS-712
 DEPTH/SAMPLE NO. AMOCO BLIND# 1 2 TYPE OF SAMPLE..... CORE CHIP, 5.032'
 LOCATION..... BERTON CO., KANSAS DATE..... 12-3-62
 ANALYST..... E. B. SCHWAB NO. OF OBSERVATIONS, 90

STANDARD DEVIATION START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.25 MAX. 0.87 AVG. 0.68 STD. DEV. 0.09



VITRULITE REFLECTANCE HISTOGRAM - 2%

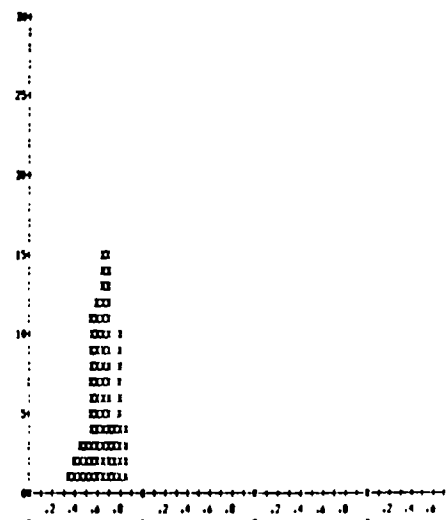
POP. # 1 TOTAL CTS. 90 MIN. 0.25 MAX. 0.87 AVG. 0.68 STD. DEV. 0.09

POP. # 2 TOTAL CTS. 88 MIN. 0.53 MAX. 0.87 AVG. 0.68 STD. DEV. 0.08

CLIENT..... AMOCO PROD. COMPANY FILE NAME..... CS-713
 DEPTH/SAMPLE NO. AMOCO BLIND# 1 2 TYPE OF SAMPLE..... CORE CHIP, 5.030'
 LOCATION..... BERTON CO., KANSAS DATE..... 12-3-62
 ANALYST..... E. B. SCHWAB NO. OF OBSERVATIONS, 80

STANDARD DEVIATION START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.29 MAX. 0.89 AVG. 0.67 STD. DEV. 0.11



VITRULITE REFLECTANCE HISTOGRAM - 2%

POP. # 1 TOTAL CTS. 90 MIN. 0.29 MAX. 0.89 AVG. 0.67 STD. DEV. 0.11

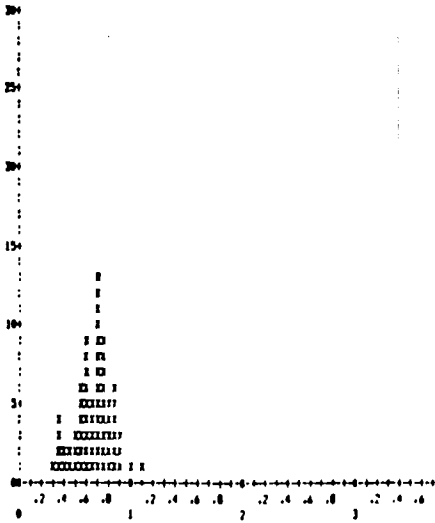
POP. # 2 TOTAL CTS. 53 MIN. 0.20 MAX. 0.74 AVG. 0.65 STD. DEV. 0.06

POP. # 3 TOTAL CTS. 18 MIN. 0.76 MAX. 0.89 AVG. 0.87 STD. DEV. 0.04

CLIENT..... AMOCO PROD. COMPANY FILE NAME..... CS-714
 DEPTH/SAMPLE NO.. AMOCO BLINDED # 2 TYPE OF SAMPLE..... CORE CHIP, S.043
 LOCATION..... WORTHEN CO., KANSAS DATE..... 12-3-82
 ANALYST..... E. G. SCHMIDT NO. OF OBSERVATIONS. 70

STANDARD Dev START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.33 MAX. 1.12 AVG. 0.68 STD. DEV. 0.16

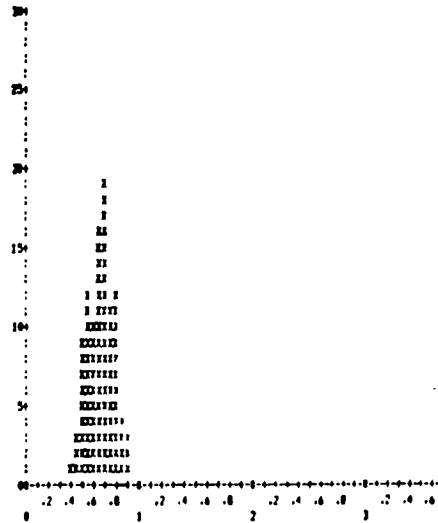


POP. # 1 TOTAL CTS. 9 MIN. 0.33 MAX. 0.47 AVG. 0.40 STD. DEV. 0.05
 POP. # 2 TOTAL CTS. 39 MIN. 0.52 MAX. 0.91 AVG. 0.71 STD. DEV. 0.11
 POP. # 3 TOTAL CTS. 2 MIN. 1.00 MAX. 1.12 AVG. 1.04 STD. DEV. 0.06

CLIENT..... AMOCO PROD. COMPANY FILE NAME..... CS-715
 DEPTH/SAMPLE NO.. AMOCO BLINDED # 2 TYPE OF SAMPLE..... CORE CHIP, S.044
 LOCATION..... WORTHEN CO., KANSAS DATE..... 12-3-82
 ANALYST..... E. G. SCHMIDT NO. OF OBSERVATIONS. 140

STANDARD Dev START: 1.02 FINISH: 1.02

REFLECTANCE DATA: MIN. 0.44 MAX. 0.93 AVG. 0.67 STD. DEV. 0.11



POP. # 1 TOTAL CTS. 100 MIN. 0.44 MAX. 0.93 AVG. 0.67 STD. DEV. 0.11

TS 825396CS
 Figure 2g

No. 4 Maune

S-677
4648'
St. Louis

No. 2E Thompson

S-678
4531'
Lansing

S-679
4534'
Lansing

No. 1 Chaffin

S-682
4972'
Morrow

Contamination

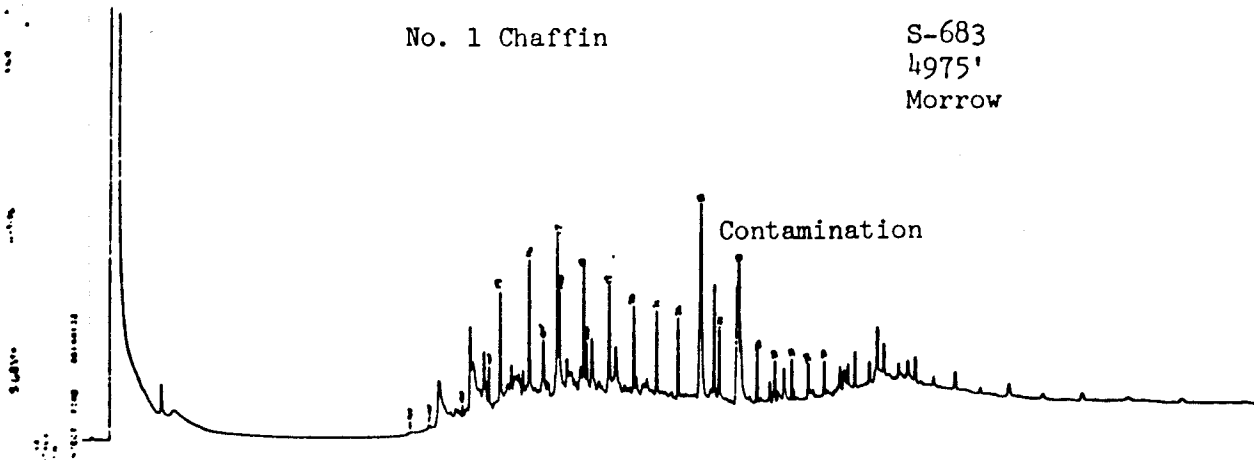
Whole Extract Chromatograms

Proprietary - To Be Maintained in Confidence
Amoco Production Company

TS 825396CS
Figure 3a

No. 1 Chaffin

S-683
4975'
Morrow



Whole Extract Chromatogram

TS 825396CS
Figure 3b

NO. 00-A4 TUCKER

S-004
3348'
Morrow

Contamination

S-687
5254'
Morrow

Contamination

S-688
5378'
Morrow

Contamination

S-689
5384'
Morrow

Contamination

Whole Extract Chromatograms

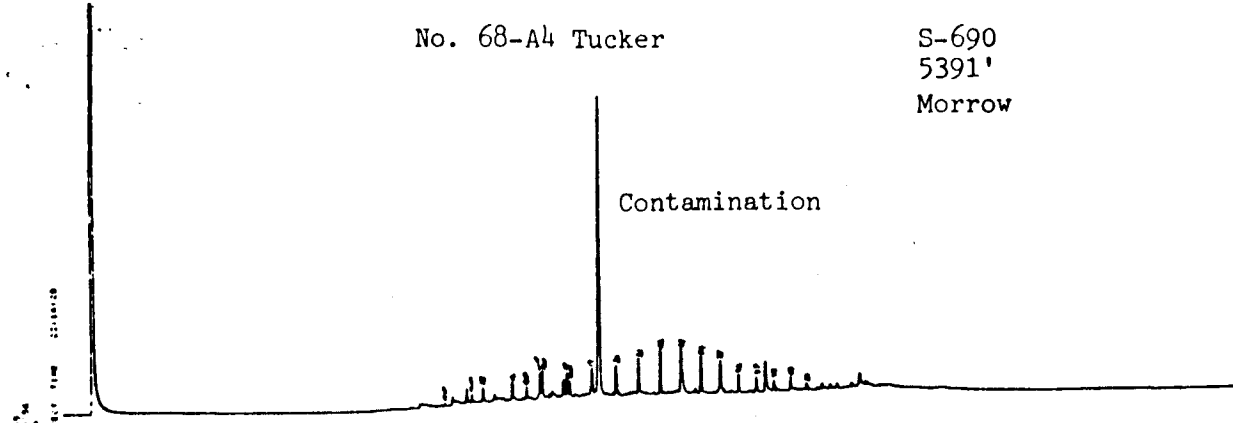
TS 825396CS
Figure 3c

Proprietary - To Be Maintained In Confidence
Amoco Production Company

No. 68-A4 Tucker

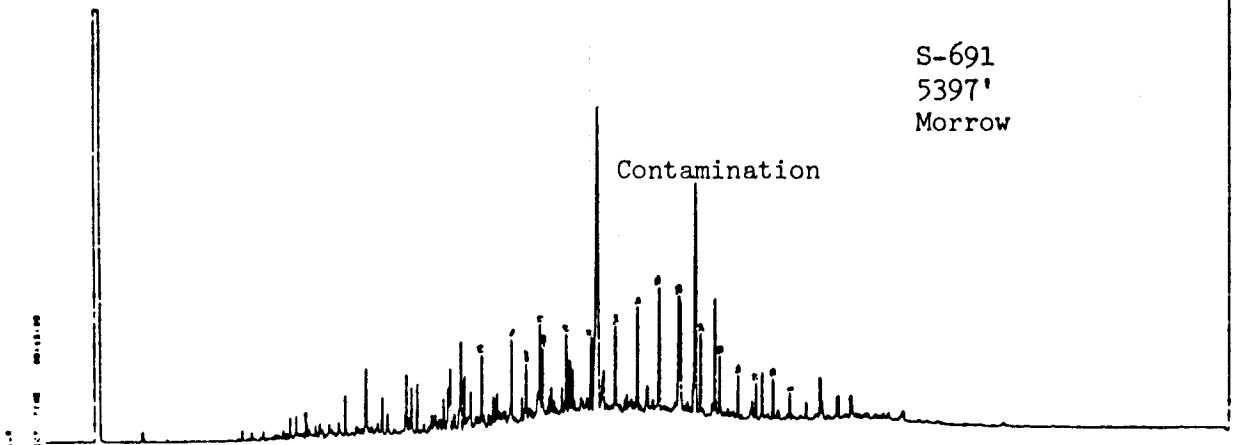
S-690
5391'
Morrow

Contamination

A chromatogram plot with a vertical axis on the left and a horizontal axis at the bottom. A very tall, narrow peak is located near the left side of the plot. To its right, there is a cluster of smaller, more numerous peaks. A label 'Contamination' is placed above the tallest of these smaller peaks.

S-691
5397'
Morrow

Contamination

A chromatogram plot similar to the one above. It features a tall peak on the left and a series of smaller peaks to its right. A label 'Contamination' is positioned above the tallest of these smaller peaks.

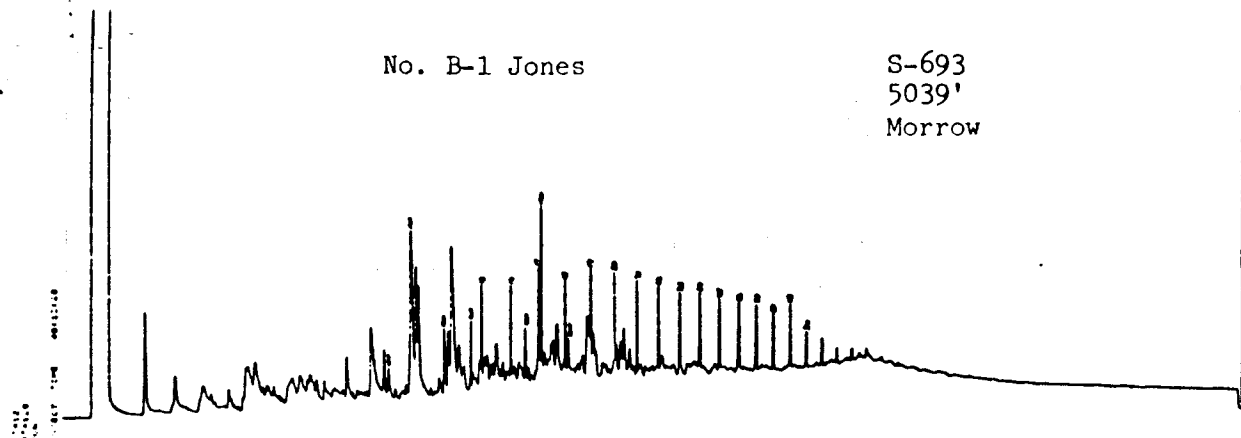
Whole Extract Chromatograms

TS 825396CS
Figure 3d

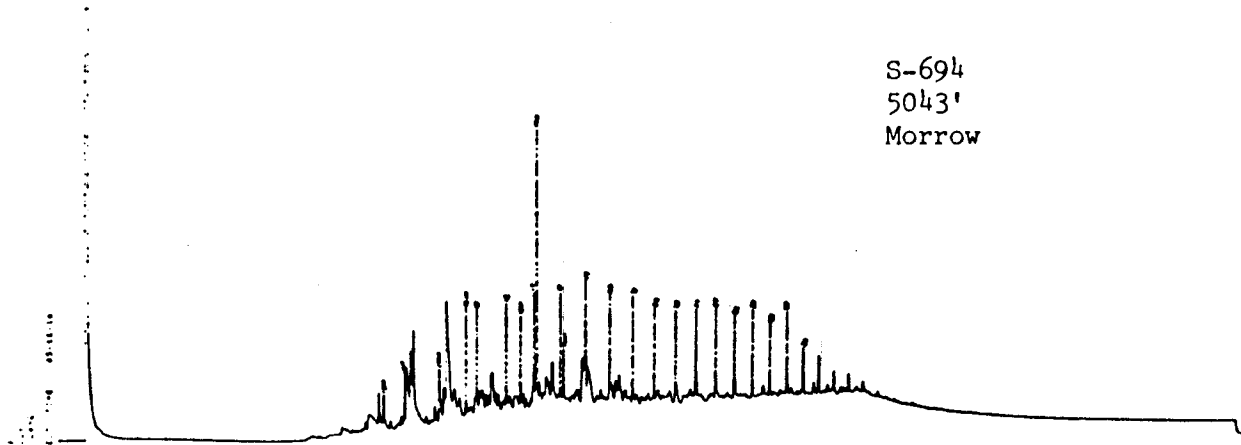
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Amoco Production Company

No. B-1 Jones

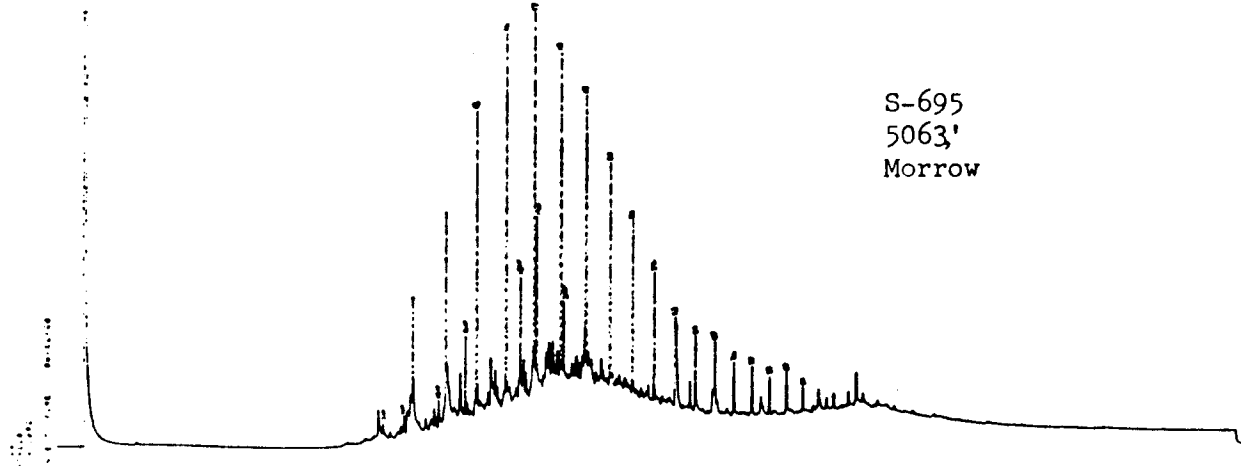
S-693
5039'
Morrow



S-694
5043'
Morrow



S-695
5063'
Morrow



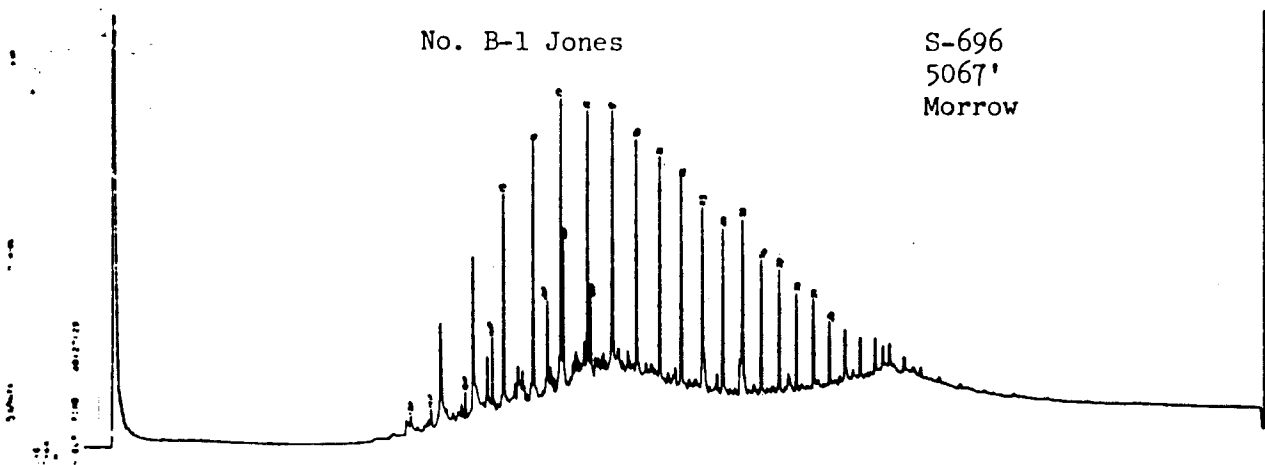
Whole Extract Chromatograms

TS 825396CS
Figure 3e

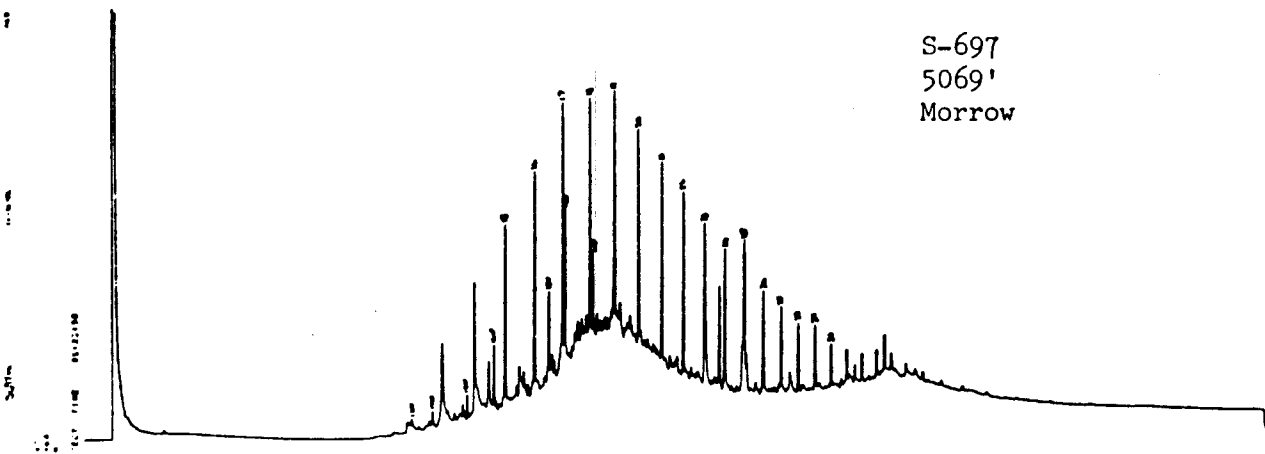
Proprietary - To Be Maintained In Confidence
Amoco Production Company

No. B-1 Jones

S-696
5067'
Morrow



S-697
5069'
Morrow



Whole Extract Chromatograms

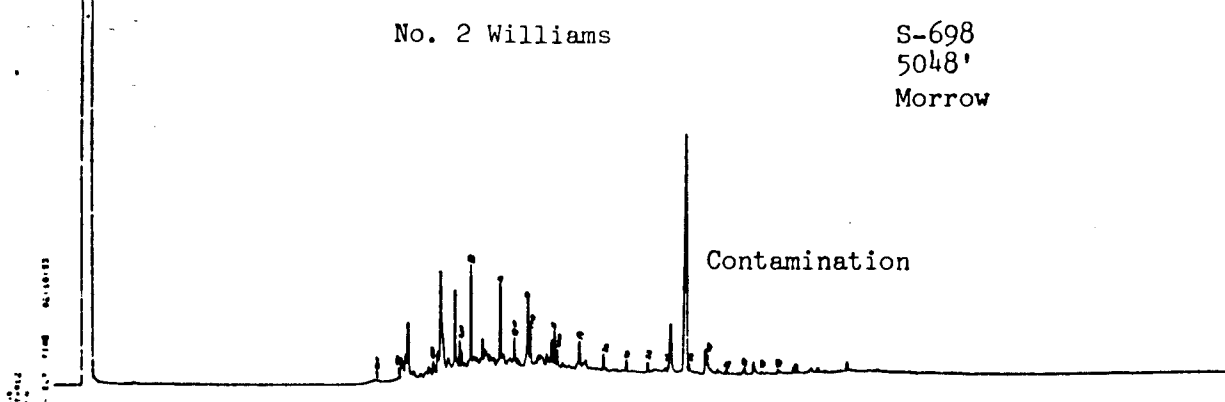
TS 825396CS
Figure 3f

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Amoco Production Company

No. 2 Williams

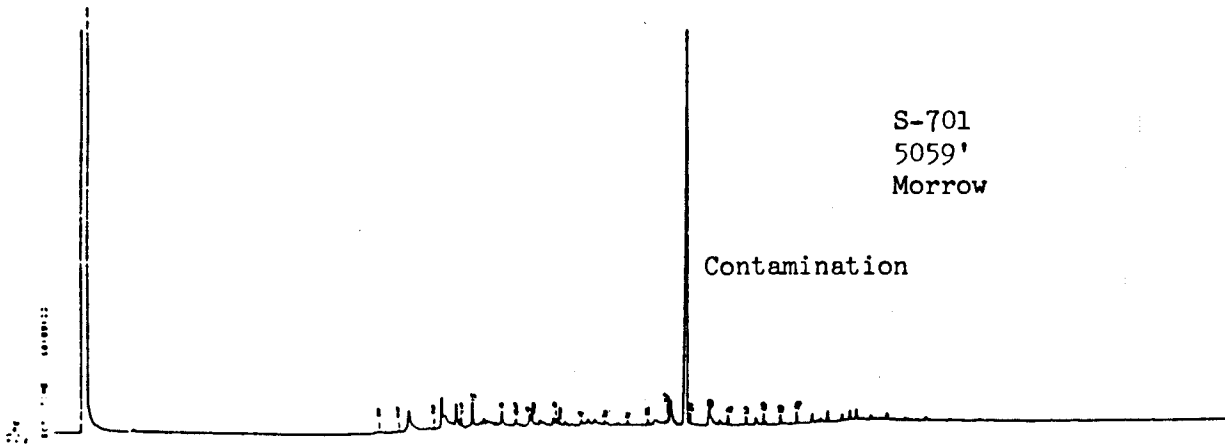
S-698
5048'
Morrow

Contamination



S-701
5059'
Morrow

Contamination



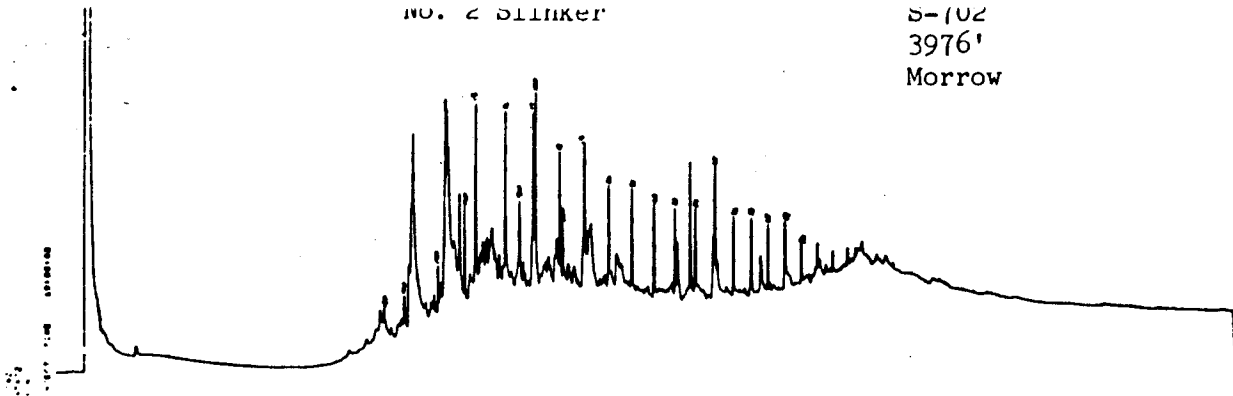
Whole Extract Chromatograms

TS 825396CS
Figure 3g

Proprietary - To Be Maintained In Confidence
Amoco Production Company

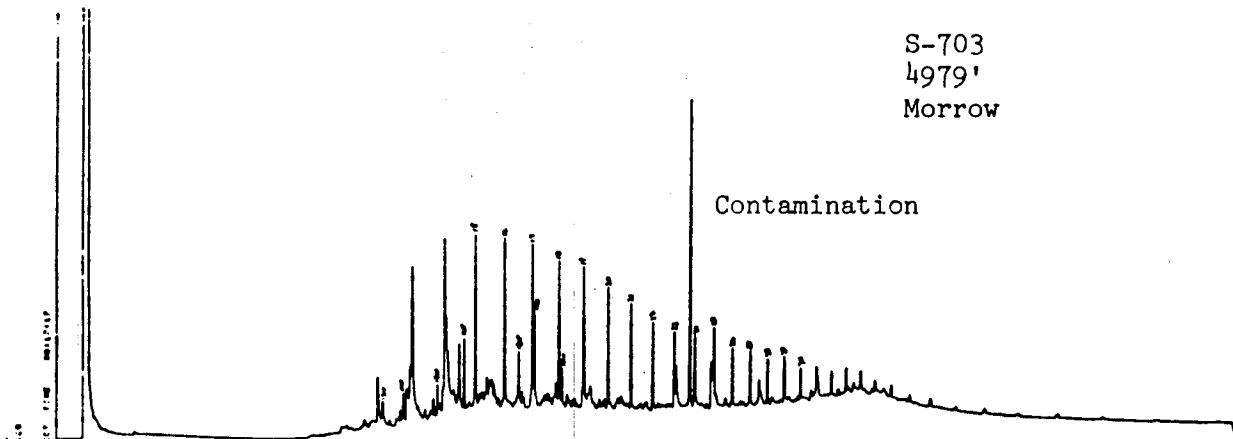
NO. 2 Sinker

S-702
3976'
Morrow



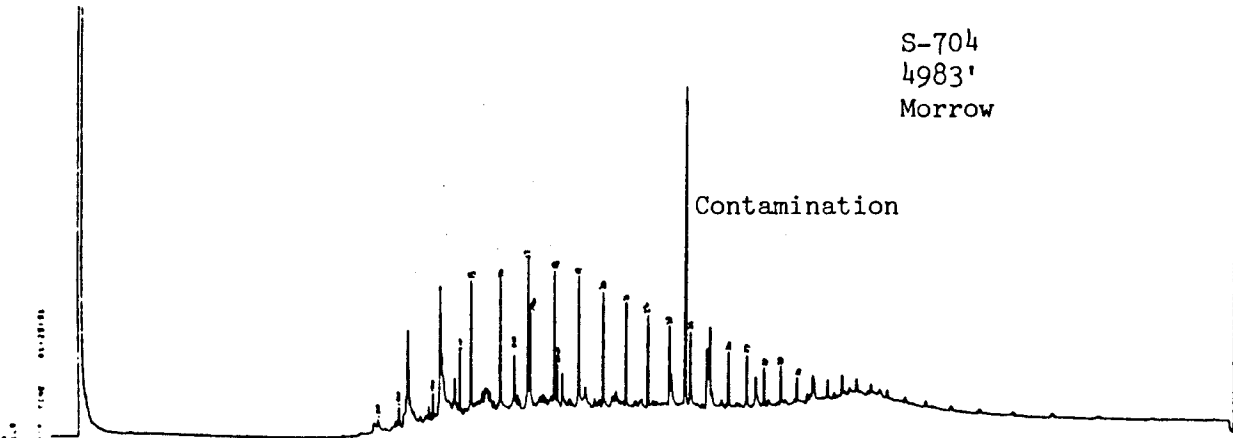
S-703
4979'
Morrow

Contamination



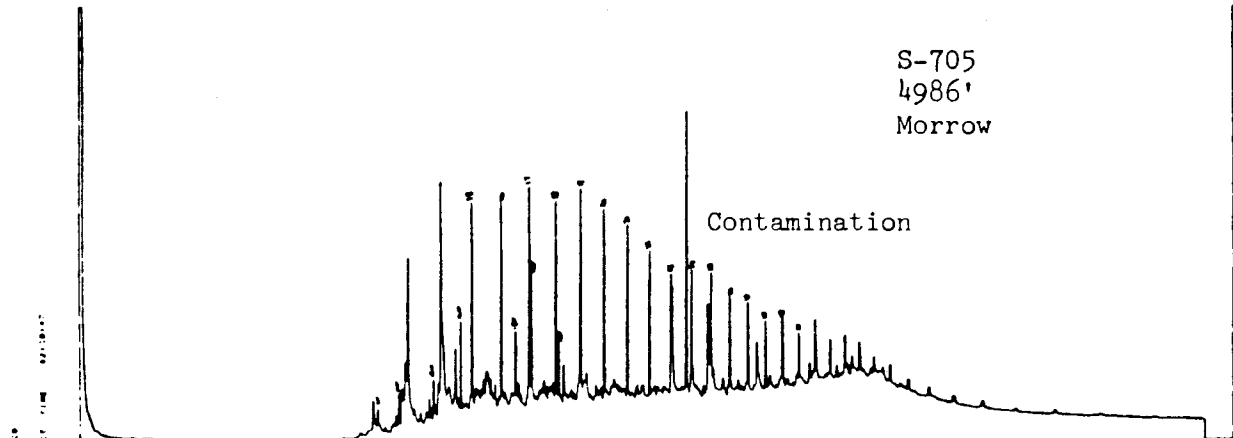
S-704
4983'
Morrow

Contamination



S-705
4986'
Morrow

Contamination



Whole Extract Chromatograms

Proprietary - To Be Maintained In Confidence
Amoco Production Company

TS 825396CS
Figure 3h

No. 2 Slinker

S-706
4989'
Morrow

Contamination

S-707
4992'
Morrow

Contamination

S-708
4995'
Morrow

S-709
5008'
Morrow

Contamination

Whole Extract Chromatograms

TS 825396CS

Proprietary - To Be Maintained In Confidence
Amoco Productica Company

Figure 3i

No. 2 Slinker

S-710
5012'
Morrow

S-711
5027'
Morrow

Contamination

S-712
5033'
Morrow

S-713
5038'
Morrow

Whole Extract Chromatograms

TS 825396CS
Figure 3J

Proprietary - To Be Maintained In Confidence
Amoco Production Company

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER
AUTHORIZED BY O R HILLE
TECHNICAL SERVICE NUMBER 825396
DISTRICT SOUTHERN
825396

SOURCE ROCK SUMMARY
TABLE 1-A
DATE 01/04/83

SAMPLE NUMBER	SMP TYPE	FORMATION	AGE LITHOLOGY	FIELD NO. OR DEPTH FEET TOP**BASE	PETROLEUM (KEROGEN GENERATION) TYPE	STAGE OF DIAGENESIS
STATE KS WELL NAME SHALLOW WATER	COUNTY FINNEY			WELL LOCATION SEC31-T21S-R33W LEASE MAUNE #4		1w
S-677	CR	ST LOUIS	MISS SH	4648		

STATE KS
WELL NAME CITIES SERVICE

COUNTY HASKELL

WELL LOCATION SEC31-T30S-R33W 115°F @ ~4600' Grad: 14.1°F/1000'

LEASE THOMPSON #2-E

S-678	CR	LANSING	PENN SH	4531		VERY GOOD
S-679	CR	LANSING	PENN SH	4534		VERY GOOD

STATE KS
WELL NAME SUPERIOR

COUNTY STANTON

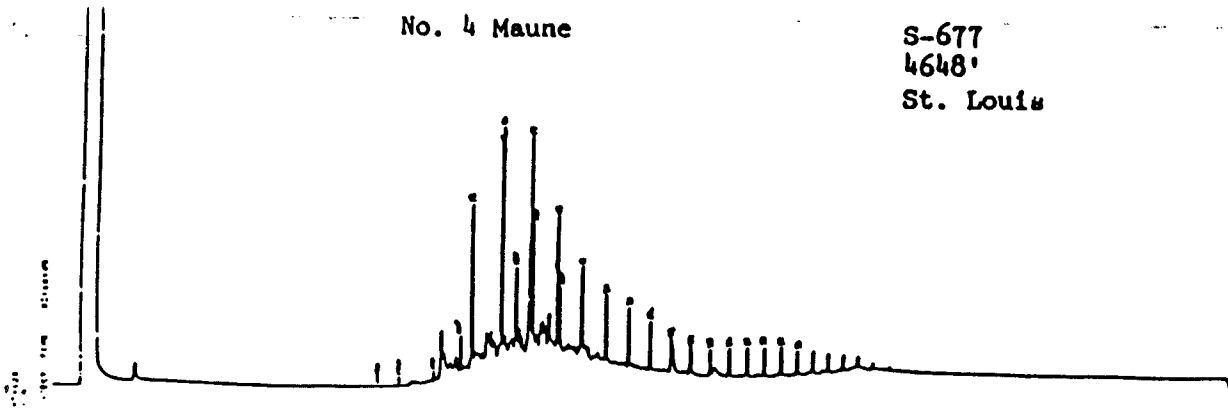
WELL LOCATION SEC4-T29S-R42W
LEASE H I. TUCKER #68-A4

S-684	CR	MORROW	PENN SH	3348		MARGINAL
S-685	CR	MORROW	PENN SH	5246	5247	MARGINAL
S-686	CR	MORROW	PENN SH	5250	5251	MARGINAL
S-687	CR	MORROW	PENN SH	5254	5255	MARGINAL
S-688	CR	MORROW	PENN SH	5378	5379	MARGINAL
S-689	CR	MORROW	PENN SH	5384	5385	MARGINAL
S-690	CR	MORROW	PENN SH	5391	5392	MARGINAL

1w

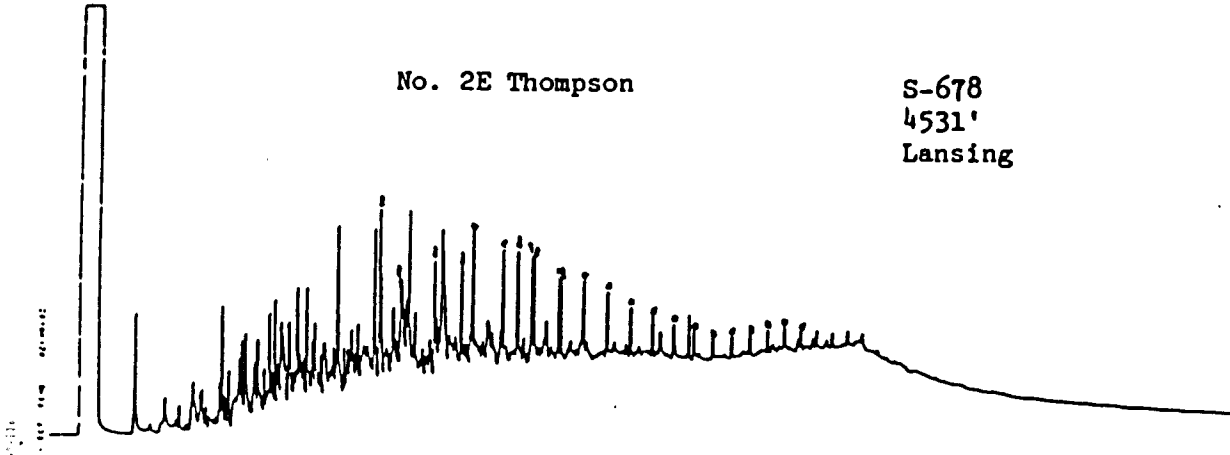
No. 4 Maune

S-677
4648'
St. Louis

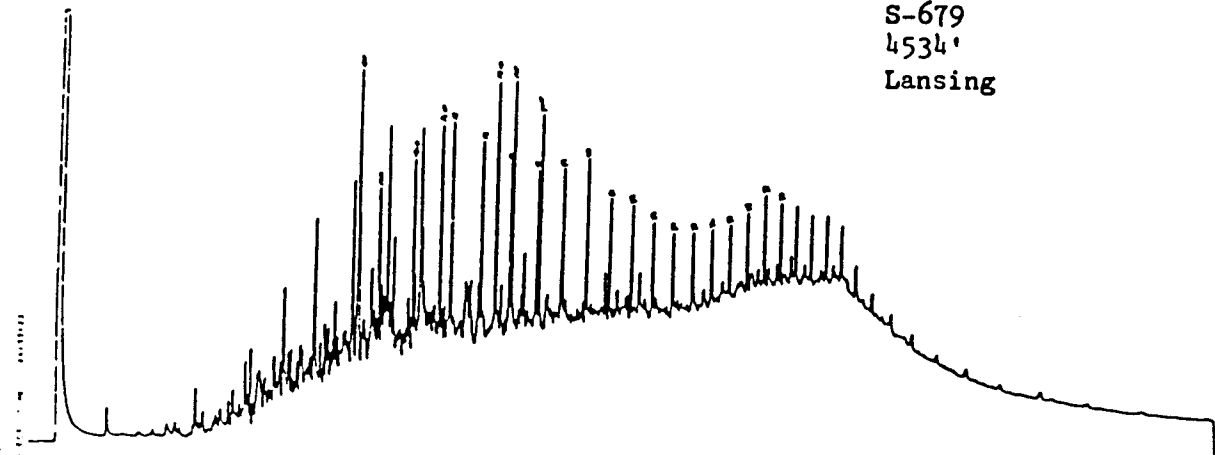


No. 2E Thompson

S-678
4531'
Lansing



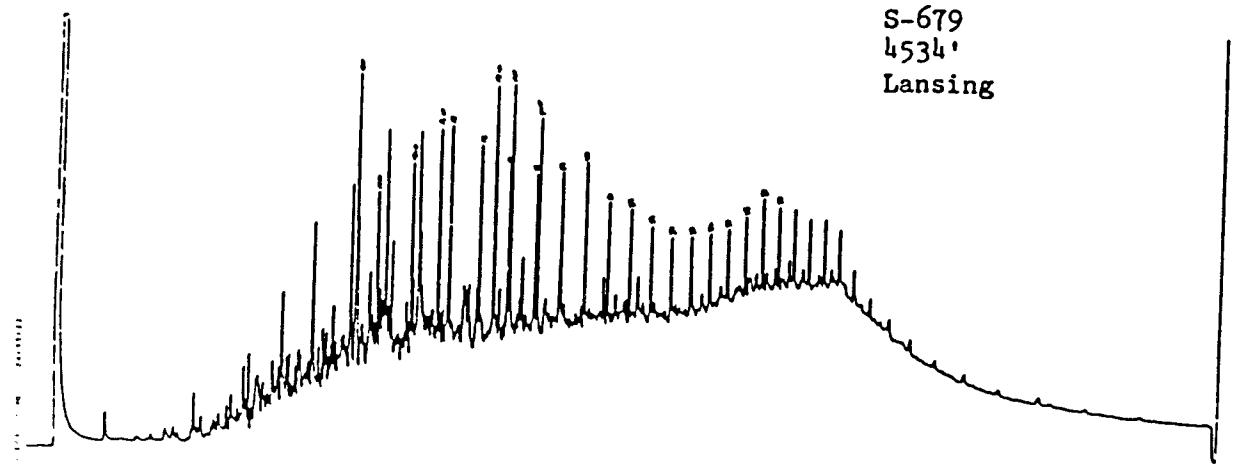
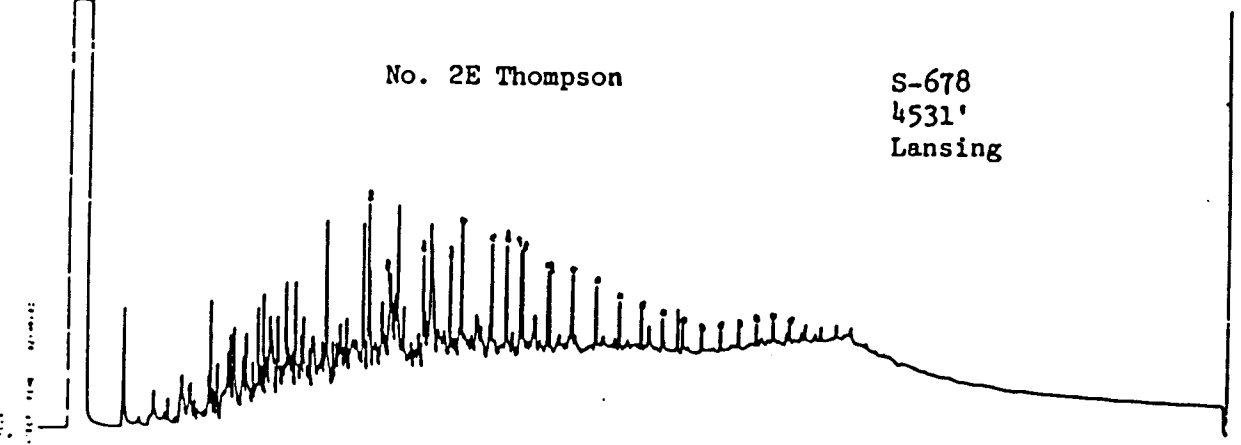
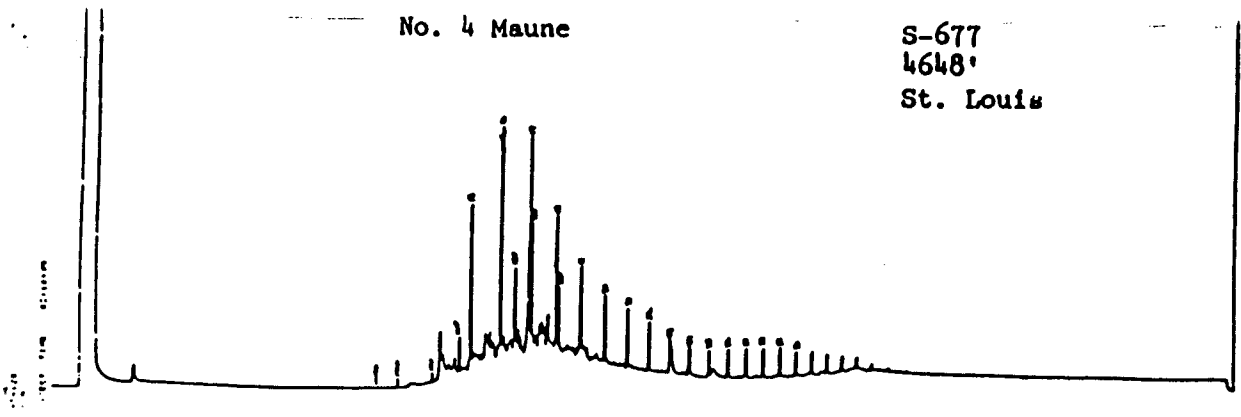
S-679
4534'
Lansing



Whole Extract Chromatograms

Proprietary - To Be Maintained in Confidence
Amoco Production Company

TS 825396CS
Figure 3a



Whole Extract Chromatograms

Proprietary - To Be Maintained in Confidence
Amoco Production Company

TS 825396CS
Figure 3a

AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER
TECHNICAL SERVICE NUMBER

DISTRICT SOUTHERN
825396

SOURCE ROCK DATA
TABLE 3a
DATE 01/04/83

SAMPLE NUMBER	FIELD NO. OR DEPTH FEET		GEOL. AGE	INSOL RESID %	TOTAL ORG C WT %	BITUMEN		SAT HC		SAT HC / BITUMEN	BITUMEN / TL ORG C	REMARKS	
	TOP	BOTTOM				BBL/AF	PPM	BBL/AF	PPM				

STATE KS	COUNTY FINNEY					WELL LOCATION SEC31-T21S-R33W						BBL/AF = (PPM X .0180)	
WELL NAME	SHALLOW WATER					LEASE	MAUNE #4					Sat. $\delta^{13}C$ /oo	Pristane/Phytane
S-677	4648		MISS	90	1.0	1	46					<.01	

STATE KS	COUNTY HASKELL					WELL LOCATION SEC31-T30S-R33W							
WELL NAME	CITIES SERVICE					LEASE	THOMPSON #2-E						
S-678	4531		PENN	87	13.7	97	5392	26	1459	.27	.04	-28.5	1.26
S-679	4534		PENN	71	5.9	75	4171	28	1571	.38	.07	-28.3	1.15

STATE KS	COUNTY STANTON					WELL LOCATION SEC4-T29S-R42W							
WELL NAME	SUPERIOR					LEASE	H L TUCKER #68-A4						
S-684	3348		PENN	72	.6	1	81					.01	
S-685	5246	5247	PENN	90	.5								
S-686	5250	5251	PENN	87	.5								
S-687	5254	5255	PENN	77	1.3	3	147					.01	
S-688	5378	5379	PENN	83	1.1	2	86					.01	
S-689	5384	5385	PENN	84	.7	3	140					.02	
S-690	5391	5392	PENN	83	.9	2	108					.01	

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AMOCO PRODUCTION COMPANY
RESEARCH CENTER

OFFICE DENVER
TECHNICAL SERVICE NUMBER

DISTRICT SOUTHERN
825396

KEROGEN DATA
TABLE 4. 8
DATE 01/04/83

LAB SAMPLE NUMBER	FIELD NO. OR DEPTH FEET TOP**BOTTOM	GEOL. AGE	NORM. ELEMENTAL ANALYSIS, WT.				ATOMIC	ATOMIC	VISUAL KEROGEN TYPE	CARBNZ. SCALE	VIT REFLECT %RO
			CARBON	HYDROGEN	OXYGEN	NITROGEN	RATIO O/C	RATIO H/C			
STATE KS WELL NAME	COUNTY FINNEY SHALLOW WATER		WELL LOCATION SEC31-T21S-R33W LEASE MAUNE #11								
S-677	4648	MISS	85	3.8	10	1.6	.08	.54	MIXED	.55	
STATE KS WELL NAME	COUNTY HASKELL CITIES SERVICE		WELL LOCATION SEC31-T30S-R33W LEASE THOMPSON #2-E								
S-678	4531	PENN	84	7.4	6	3.1	.05	1.06	MIXED	.43	
S-679	4534	PENN	84	7.1	6	2.6	.05	1.02	MIXED	.45	
STATE KS WELL NAME	COUNTY STANTON SUPERIOR		WELL LOCATION SEC4-T29S-R112W LEASE H L TUCKER #68-A4								
S-684	3348	PENN							STRUCTURED	.76	
S-685	5246	5247	PENN								
S-686	5250	5251	PENN								
S-687	5254	5255	PENN	86	4.0	8	2.0	.07	.56	MIXED .81	
S-688	5378	5379	PENN	86	3.7	8	1.8	.07	.51	MIXED .57	
S-689	5384	5385	PENN	87	3.6	8	1.6	.07	.50	MIXED .57	
S-690	5391	5392	PENN	87	3.8	8	1.3	.06	.52	MIXED .55	
S-691	5397	5398	PENN	84	4.0	10	2.2	.08	.58	MIXED .59	

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8:45 THURSDAY, DECEMBER 30, 1982

R825396 ROCKEVAL PYROLYSIS DATA

SAMPLE NO.	TOP OF ANALYZED INTERVAL	FORMATION	TOTAL ORGANIC CARBON WT% (TOC)	PPM VOLATILE HYDROCARBONS (S1 X 1000)	VOL/ TOC	PPM GENERATED HYDROCARBONS (S2 X 1000)	GEN/ TOC	TEMP OF MAX GEN	VOL/ VOL + GEN
S-677	4648	ST. LOUIS	1.0	80	0.01	190	0.02	437	0.30
S-678	4531	LANSING	13.7	5160	0.04	65570	0.48	431	0.07
S-679	4534	LANSING	5.9	2630	0.04	25160	0.43	430	0.09
S-684	3348	MORROW	0.6	30	0.01	50	0.01		0.38
S-685	5246	MORROW	0.5	40	0.01	70	0.01		0.36
S-686	5250	MORROW	0.5	50	0.01	40	0.01		0.56
S-687	5255	MORROW	1.3	40	<.01	480	0.04	431	0.08
S-688	5378	MORROW	1.1	50	<.01	200	0.02	434	0.20
S-689	5384	MORROW	0.7	60	0.01	110	0.02	400	0.35
S-690	5391	MORROW	0.9	50	0.01	180	0.02	434	0.22
S-691	5397	MORROW	0.8	60	0.01	120	0.01	422	0.33
S-693	5039	MORROW	5.0	580	0.01	4270	0.09	434	0.12
S-694	5043	MORROW	3.9	440	0.01	4330	0.11	435	0.09
S-695	5063	MORROW	1.0	80	0.01	280	0.03	439	0.22
S-696	5067	MORROW	0.7	50	0.01	160	0.02	438	0.24
S-697	5069	MORROW	0.7	60	0.01	150	0.02	437	0.29