

FIGURE 112

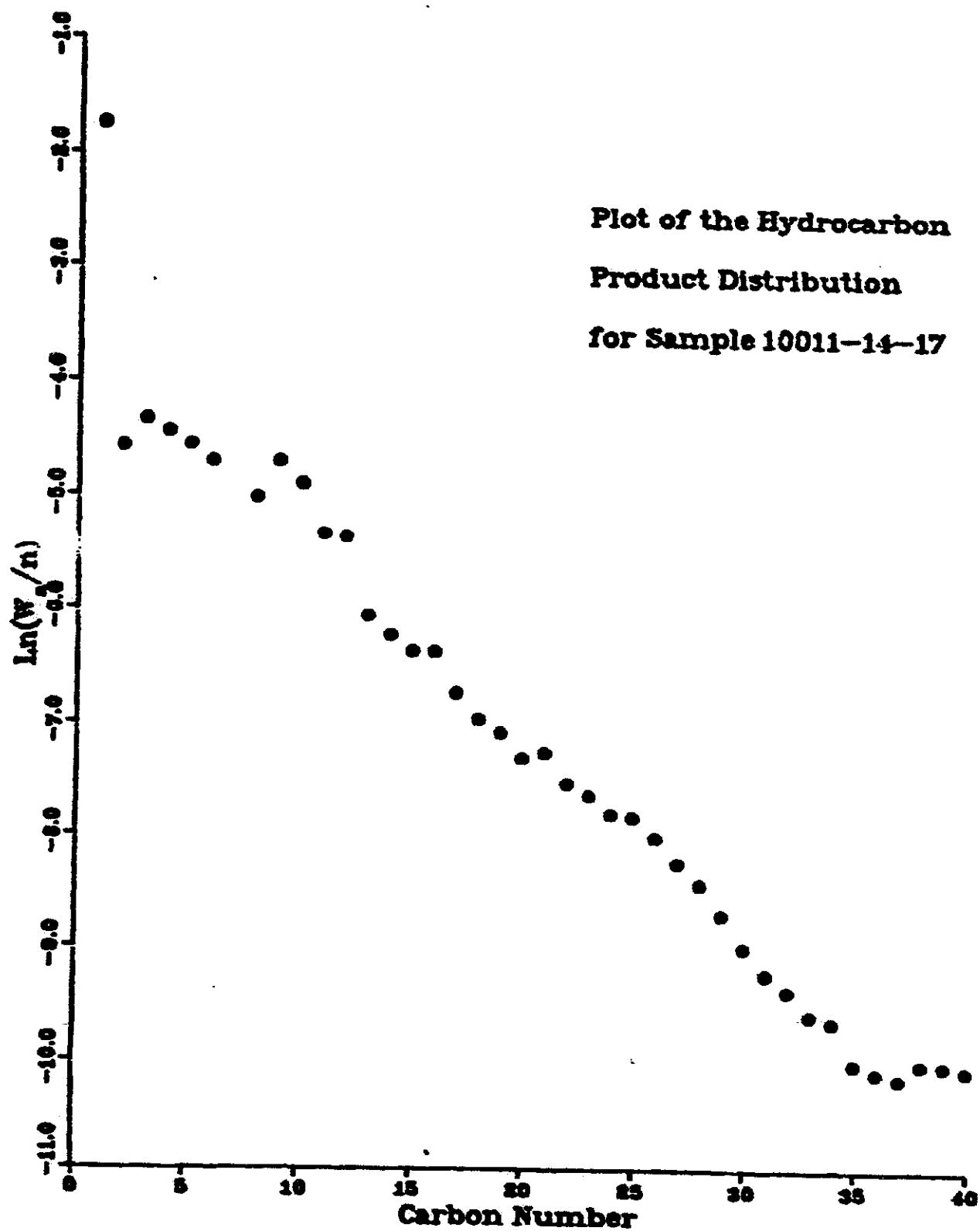


FIGURE 113

Plot of the Hydrocarbon
Product Distribution
for Sample 10011-14-18

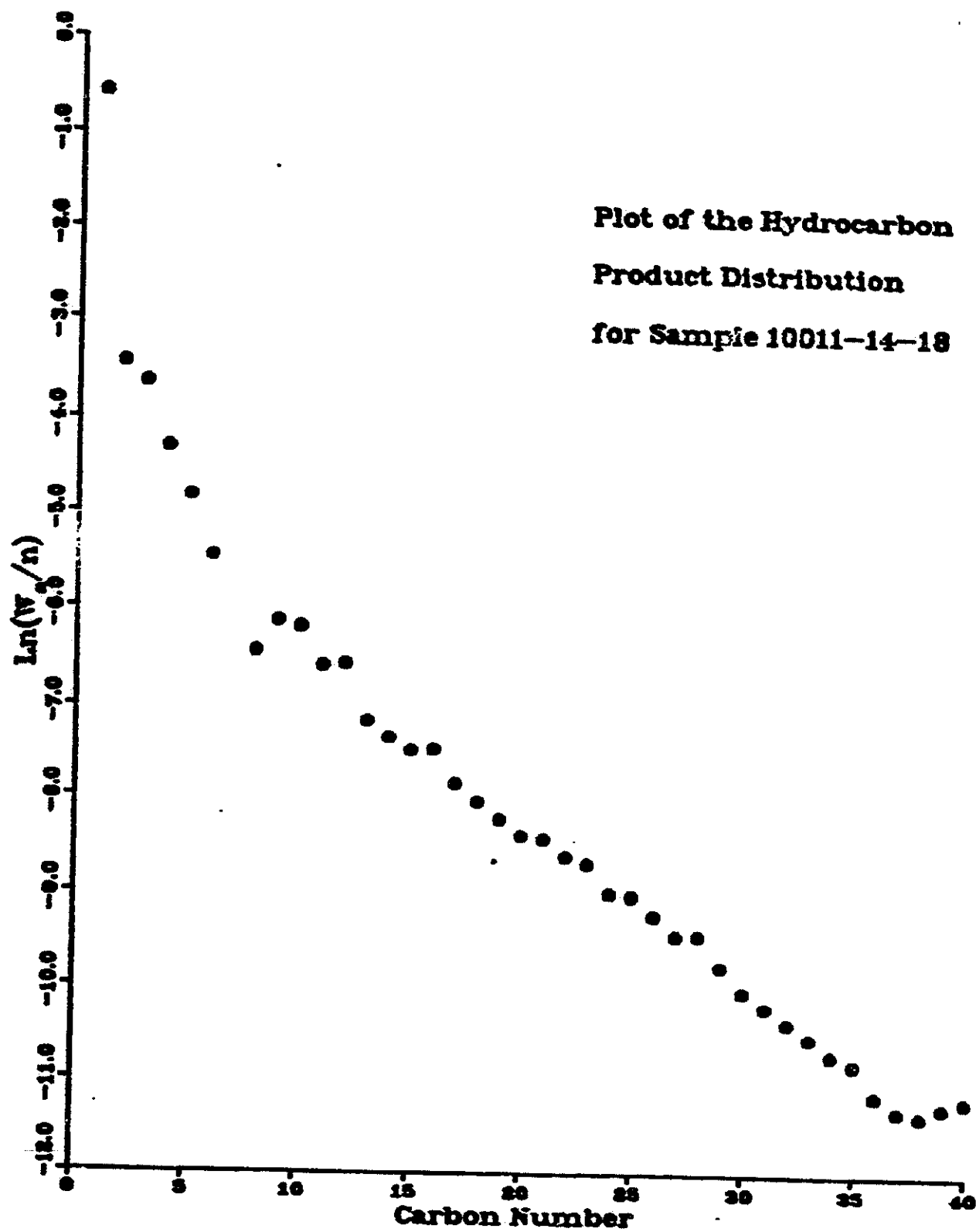


FIGURE 11.

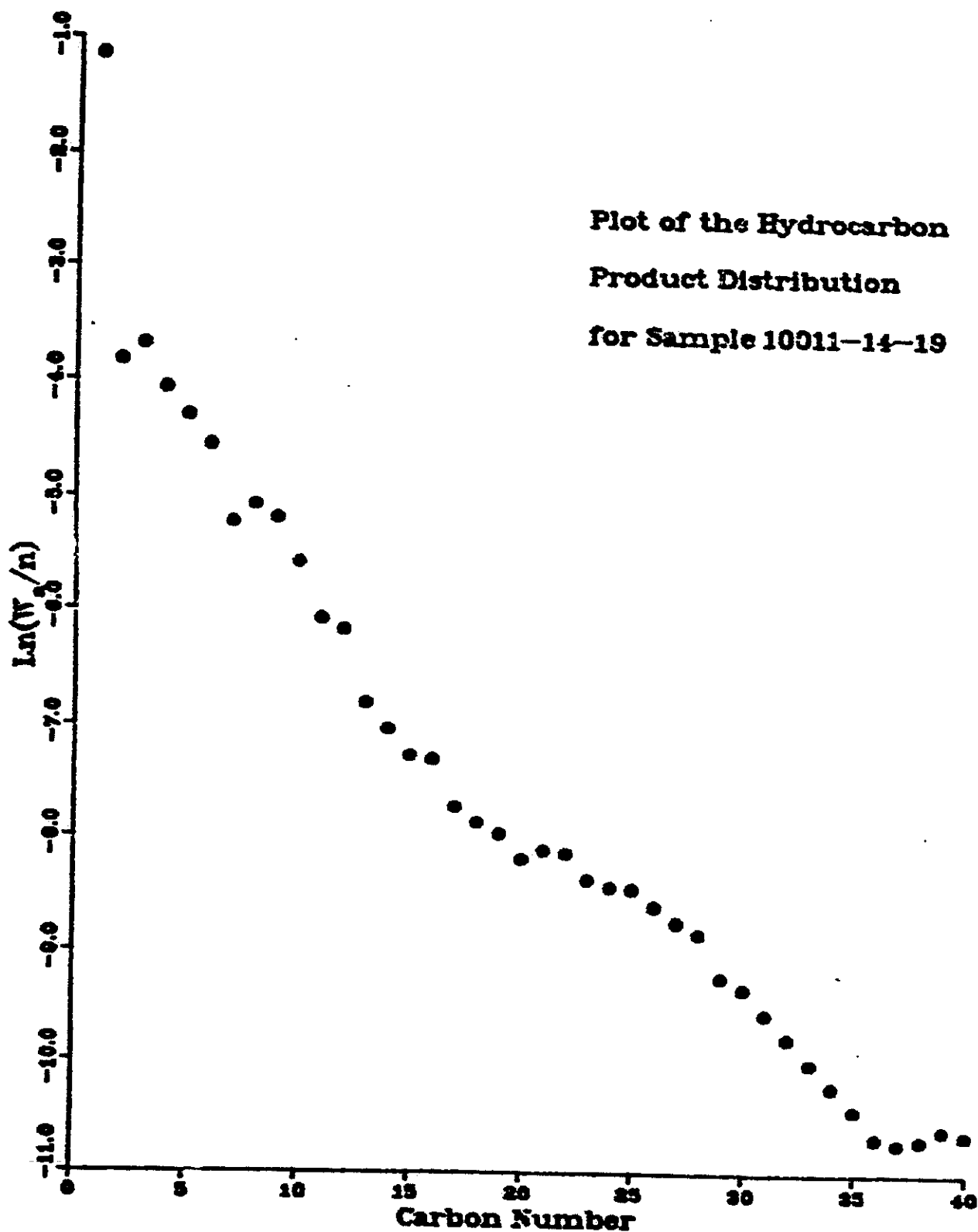


FIGURE 115

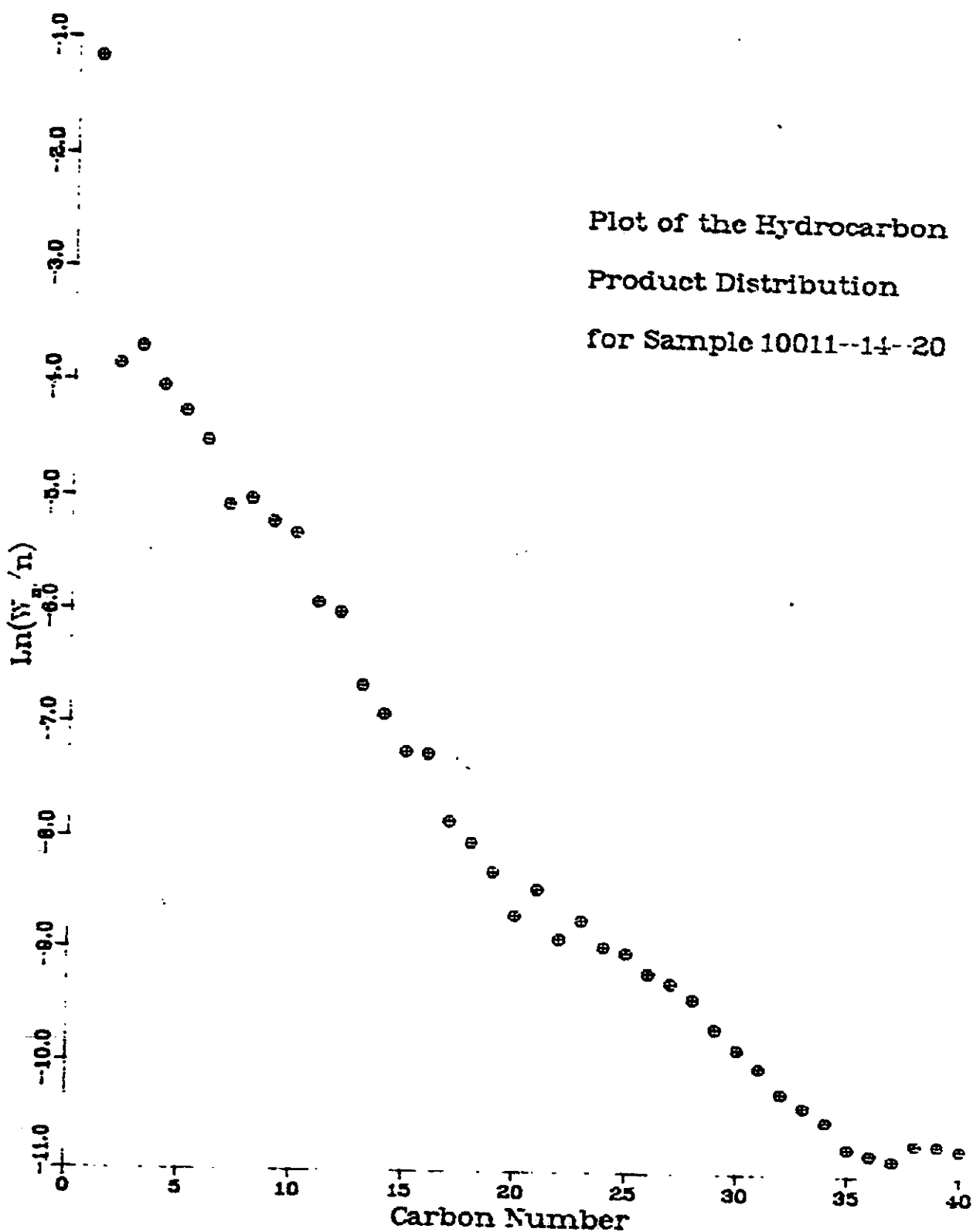
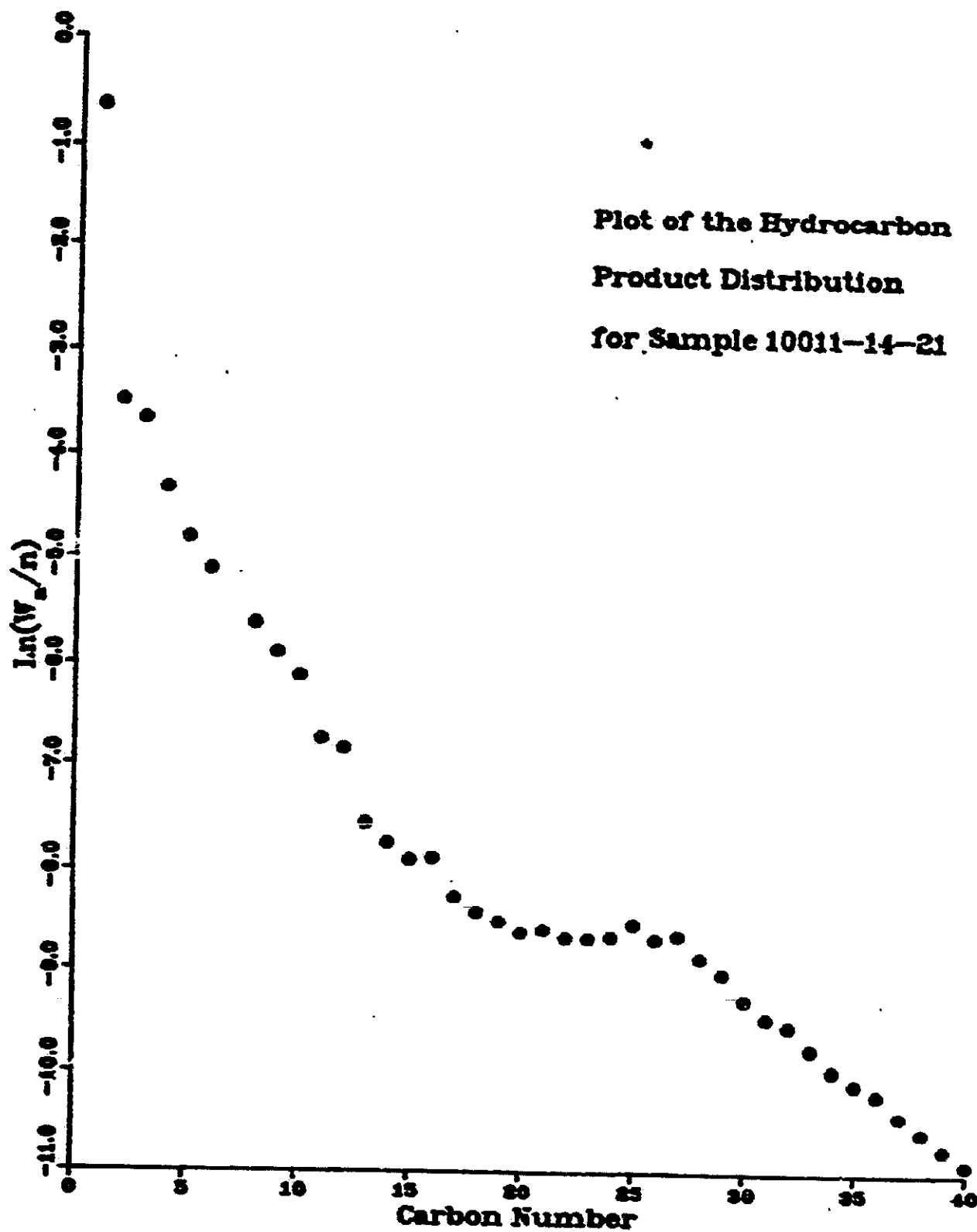


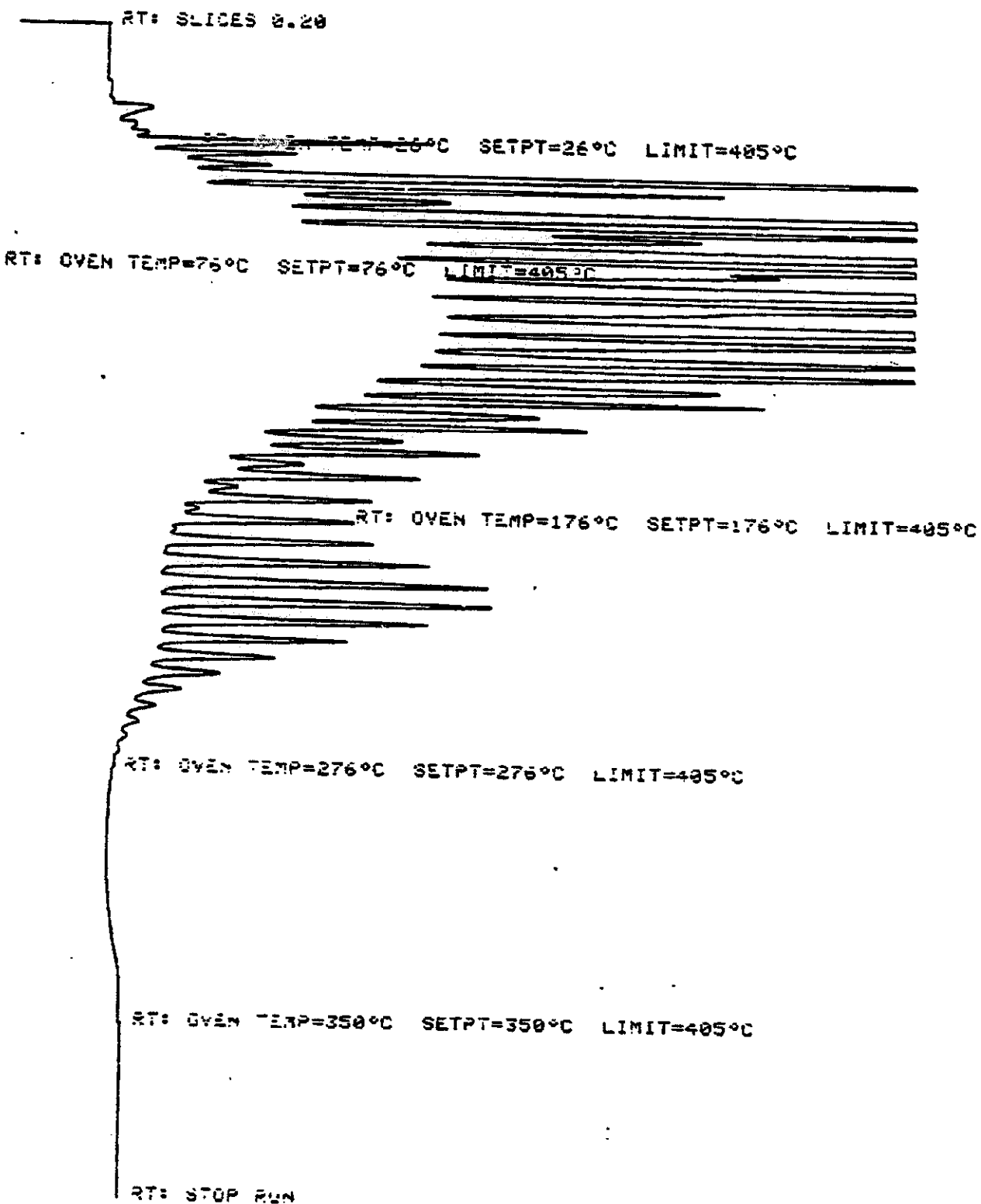
FIGURE 116

Plot of the Hydrocarbon
Product Distribution
for Sample 10011-14-21



OVEN TEMP NOT READY

FIGURE 117



65-...XIII...AJD.

OVEN TEMP NOT READY

FIGURE 118

RT: SLICES 0.29

RT: OVEN TEMP=26°C SETPT=26°C LIMIT=405°C

RT: OVEN TEMP=76°C SETPT=76°C LIMIT=405°C

RT: OVEN TEMP=176°C SETPT=176°C LIMIT=405°C

RT: OVEN TEMP=276°C SETPT=276°C LIMIT=405°C

RT: OVEN TEMP=350°C SETPT=350°C LIMIT=405°C

RT: STOP RUN

SAMPLE: D10011-14-2L

213

IN GRAPHIC LUNARON 5 COMPARISON RUN TAO RT W/ION

QC QC WAI 7003/15-07200033

066

OVEN TEMP NOT READY

FIGURE 119

RT: SLICES 0.20

RT: OVEN TEMP=26°C SETPT=26°C LIMIT=405°C

RT: OVEN TEMP=176°C SETPT=176°C LIMIT=405°C

RT: OVEN TEMP=176°C SETPT=176°C LIMIT=405°C

RT: OVEN TEMP=276°C SETPT=276°C LIMIT=405°C

RT: OVEN TEMP=350°C SETPT=350°C LIMIT=405°C

RT: STOP RUN

SAMPLE: D12011-14-3L

219

070

RT: SLICES 9.10

FIGURE 120

RT: OVEN TEMP=26°C SETPT=26°C LIMIT=405°C

RT: OVEN TEMP=76°C SETPT=76°C LIMIT=405°C

RT: OVEN TEMP=176°C SETPT=176°C LIMIT=405°C

RT: OVEN TEMP=276°C SETPT=276°C LIMIT=405°C

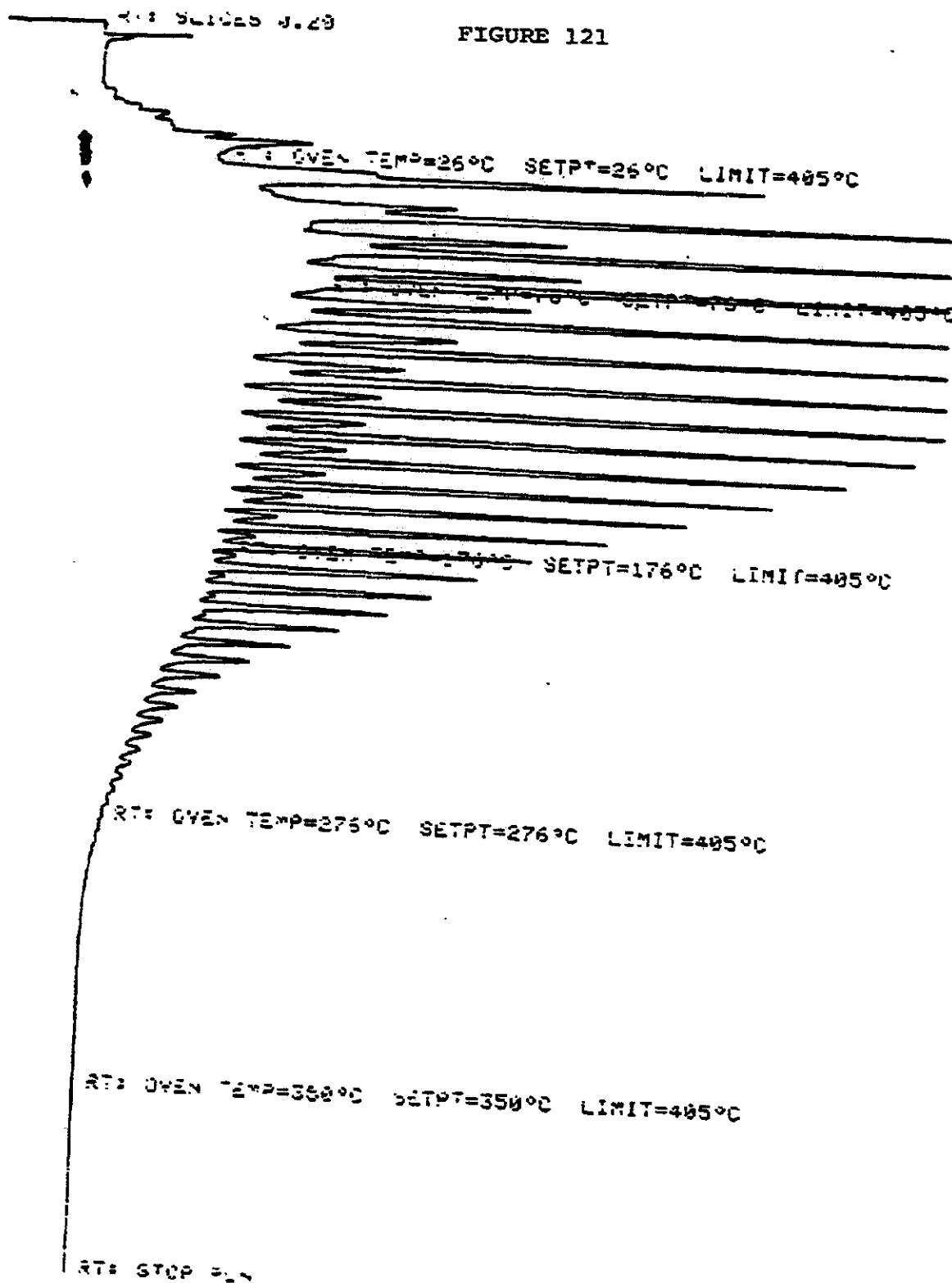
RT: OVEN TEMP=350°C SETPT=350°C LIMIT=405°C

RT: STOP RUN

SAMPLE: 010W11-14-L

010W11-14-L
RT: OVEN TEMP=26°C SETPT=26°C LIMIT=405°C
RT: OVEN TEMP=76°C SETPT=76°C LIMIT=405°C
RT: OVEN TEMP=176°C SETPT=176°C LIMIT=405°C
RT: OVEN TEMP=276°C SETPT=276°C LIMIT=405°C
RT: OVEN TEMP=350°C SETPT=350°C LIMIT=405°C
RT: STOP RUN

FIGURE 121



SAMPLE: 310911-14-12

1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 26

FIGURE 122

444

OC OC-WA 74703/11P-9270 0623

176

RT: 9-11-88 8.28

FIGURE 123

: OVEN TEMP=25°C SETPT=405°C

405°C

SETPT=176°C LIMIT=405°C

RT: OVEN TEMP=276°C SETPT=276°C LIMIT=405°C

RT: OVEN TEMP=350°C SETPT=350°C LIMIT=405°C

RT: STOP RUN

SAMPLE: 010011-12-20

TABLE 15A RESULT OF SYNGAS OPERATION

RUN NO.	10011-14				
CATALYST	COBALT-UCC-101 #10042-17 80CC 49.6G (58.1 AFTER RUN,+8.4G)				
FEED	H2:CO:ARGON OF 50:50: 0 @ 400 CC/MN OR 300 GHSV				
RUN & SAMPLE NO.	10011-14-01	011-14-02	011-14-03	011-14-04	011-14-05
FEED H2:CO:AR	50:50: 0	50:50: 0	50:50: 0	50:50: 0	50:50: 0
HRS ON STREAM	6.08	24.58	30.5	55.5	75.33
PRESSURE, PSIG	290	292	291	297	295
TEMP. C	218	219	219	219	219
FEED CC/MIN	400	400	400	400	400
HOURS FEEDING	6.08	18.50	5.92	25.00	19.83
EFFLNT GAS LITER	78.45	398.80	128.50	541.32	435.98
GM AQUEOUS LAYER	12.50	17.58	4.91	23.13	16.27
GM OIL	0.87	2.66	0.99	4.19	3.31
MATERIAL BALANCE					
GM ATOM CARBON %	63.84	102.66	102.35	101.18	102.54
GM ATOM HYDROGEN %	78.70	101.14	101.99	103.85	103.93
GM ATOM OXYGEN %	82.75	109.61	107.59	107.50	107.87
RATIO CHX/(H2O+CO2)	0.2500	0.5099	0.5914	0.5464	0.5853
RATIO X IN CHX	2.3248	2.4265	2.3603	2.3820	2.3974
USAGE H2/CO PRODT	2.0546	2.1192	2.1127	2.1072	2.1066
RATIO CO2/(H2O+CO2)	0.0021	0.0060	0.0054	0.0069	0.0102
K SHIFT IN EFFLNT	0.00	0.00	0.00	0.01	0.01
CONVERSION					
ON CO %	9.96	7.13	7.48	7.61	7.45
ON H2 %	41.27	22.61	21.29	22.04	20.89
ON CO+H2 %	27.25	14.81	14.37	14.92	14.22
PRDT SELECTIVITY, WT %					
CH4	14.43	20.56	17.34	17.78	18.93
C2 HC'S	1.31	1.85	1.59	2.92	2.13
C3H8	1.72	1.64	1.61	1.75	2.01
C3H6=	1.55	3.12	3.11	3.05	2.33
C4H10	2.67	1.97	1.85	1.88	1.83
C4H8=	1.83	3.58	3.76	4.06	3.65
C5H12	3.47	2.19	1.92	2.18	2.09
C5H10=	0.13	0.44	0.44	0.60	0.57
C6H14	5.37	3.18	2.94	2.98	2.73
C6H12= & CYCLO'S	1.01	2.55	3.66	3.17	3.29
C7+ IN GAS	34.47	31.07	30.76	28.68	29.24
LIQ HC'S	32.03	27.86	31.02	30.95	31.19

TOTAL	100.00	100.00	100.00	100.00	100.00
SUB-GROUPING					
C1 -C4	23.51	32.72	29.26	31.44	30.89
C5 --420 F	60.64	48.70	48.10	45.84	55.08
420-700 F	13.07	17.08	20.60	19.38	10.92
700-END PT	2.79	1.50	2.05	3.34	3.12
C5+-END PT	76.49	67.28	70.74	68.56	69.11
ISO/NORMAL MOLE RATIO					
C4	0.5628	0.1916	0.1818	0.1180	0.0625
C5	1.0050	0.3383	0.2538	0.1772	0.1242
C6	2.0347	0.8870	0.7712	0.5435	0.4462
C4+	0.0000	0.0000	0.0250	0.0324	0.0404
PARAFFIN/OLEFIN RATIO					
C3	1.0547	0.5000	0.4923	0.5481	0.8262
C4	1.4088	0.5307	0.4756	0.4462	0.4845
C5	25.3125	4.8108	4.2895	3.5094	3.5833
LIQ HC COLLECTION					
PHYS. APPEARANCE	CLEAR OIL	CLEAR OIL	CLEAR OIL	CLEAR OIL	YLW OIL
DENSITY				0.779	0.770
N, REFRACTIVE INDEX				1.4380	1.4366
SIMULT'D DISTILLATN					
10 WT % @ DEG F	311	334	344	351	367
16	326	362	381	384	389
50	419	474	513	523	522
84	589	604	645	674	679
90	685	644	674	705	711
RANGE(16-84 %)	263	242	264	290	290
WT % @ 420 F	50.50	33.30	27.00	26.60	25.33
WT % @ 700 F	91.30	94.60	93.40	89.20	87.83

TABLE 15B RESULT OF SYNGAS OPERATION

RUN NO.	10011-14				
CATALYST	CORALT-UCC-101 #10042-17 80CC 49.6G (58.1G AFTER RUN,+8.4G)				
FEED	H2:CO:ARGON OF 50:50: 0 @ 400 CC/MN OR 300 GHSV				
RUN & SAMPLE NO.	10011-14-06	011-14-07	011-14-08	011-14-09	011-14-10
	=====	=====	=====	=====	=====
FEED H2:CO:AR	50:50: 0	50:50: 0	50:50: 0	50:50: 0	50:50: 0
HRS ON STREAM	78.41	95.41	102.33	119.5	126.25
PRESSURE, PSIG	289	291	290	292	296
TEMP. C	251	251	251	252	252
FEED CC/MIN	400	400	400	400	400
HOURS FEEDING	3.08	20.08	6.92	24.09	6.75
EFFLNT GAS LITER	52.81	314.78	109.15	384.59	109.82
GM AQUEOUS LAYER	7.39	48.15	16.92	58.91	16.63
GM OIL	2.32	15.10	5.75	20.00	6.97
MATERIAL BALANCE					
GM ATOM CARBON %	110.28	101.91	102.50	103.96	107.53
GM ATOM HYDROGEN %	110.43	102.79	105.44	106.50	109.35
GM ATOM OXYGEN %	116.15	108.31	108.40	109.30	111.44
RATIO CHX/(H2O+CO2)	0.8178	0.7923	0.8112	0.8290	0.8758
RATIO X IN CHX	2.3970	2.3427	2.3289	2.3247	2.3130
USAGE H2/CO PRODT	1.9268	2.0001	2.0096	2.0198	2.0200
RATIO CO2/(H2O+CO2)	0.0782	0.0452	0.0414	0.0386	0.0392
K SHIFT IN EFFLNT	0.05	0.03	0.03	0.02	0.02
CONVERSION					
ON CO %	26.16	25.34	26.02	26.05	26.81
ON H2 %	55.47	56.48	56.46	56.43	56.87
ON CO+H2 %	40.83	40.98	41.45	41.43	41.96
PRDT SELECTIVITY, WT %					
CH4	17.85	15.81	15.26	15.11	14.54
C2 HC'S	2.51	1.98	1.87	1.83	1.83
C3H8	2.54	1.90	1.85	1.79	1.74
C3H6=	2.03	2.18	2.13	2.15	2.04
C4H10	2.15	1.63	1.55	1.50	1.49
C4H8=	3.45	3.46	3.34	3.38	3.31
C5H12	3.08	2.38	2.24	2.10	1.96
C5H10=	3.89	3.86	3.76	3.80	0.47
C6H14	3.80	3.24	2.74	2.81	2.70
C6H12= & CYCLO'S	2.94	3.31	3.20	4.65	2.72
C7+ IN GAS	15.62	16.88	15.87	15.62	14.37
LIQ HC'S	40.15	43.37	46.19	45.26	52.84

TOTAL	100.00	100.00	100.00	100.00	100.00
SUB-GROUPING					
C1 -C4	30.52	26.94	26.01	25.76	24.94
C5 -420 F	51.42	47.51	53.21	46.77	51.29
420-700 F	14.05	21.25	16.17	22.67	18.49
700-END PT	4.01	4.29	4.62	4.80	5.28
C5+-END PT	69.48	73.06	73.99	74.24	75.06
ISO/NORMAL MOLE RATIO					
C4	0.1779	0.1718	0.1617	0.1431	0.1338
C5	0.4215	0.3520	0.3112	0.2866	0.2531
C6	0.8722	0.7599	0.5689	0.6935	0.6801
C4=	0.0377	0.0399	0.0420	0.0449	0.0434
PARAFFIN/OLEFIN RATIO					
C3	1.1944	0.8323	0.8293	0.7937	0.8122
C4	0.6007	0.4538	0.4489	0.4293	0.4358
C5	0.7708	0.5999	0.5787	0.5362	4.0253
LIQ HC COLLECTION					
PHYS. APPEARANCE	---	CLEAR OIL	---	CLEAR OIL	---
DENSITY	---	0.764	---	0.768	---
N, REFRACTIVE INDEX	---	1.4330	---	1.4335	---
SIMULT'D DISTILATN					
10 WT % @ DEG F	---	293	---	301	---
16	---	327	---	332	---
50	---	463	---	473	---
84	---	656	---	665	---
90	---	699	---	705	---
RANGE(16-84 %)	---	329	---	333	---
WT % @ 420 F	---	41.10	---	39.30	---
WT % @ 700 F	---	90.10	---	89.40	---

TABLE 15C RESULT OF SYNGAS OPERATION

RUN NO.	10011-14				
CATALYST	COBALT-UCC-101 #10042-17 80CC 49.6G (58.1G AFTER RUN,+8.4G)				
FEED	H2:CO:ARGON OF 50:50: 0 @ 400 CC/MIN OR 300 GHSV				
RUN & SAMPLE NO.	10011-14-11	011-14-12	011-14-13	011-14-14	011-14-15
FEED H2:CO:AR	50:50: 0	50:50: 0	50:50: 0	50:50: 0	50:50: 0
HRS ON STREAM	143.67	150.25	168.83	174.16	192.99
PRESSURE, PSIG	290	298	300	292	292
TEMP. C	252	252	252	252	252
FEED CC/MIN	400	800	800	800	800
HOURS FEEDING	24.17	6.58	18.58	5.33	18.83
EFFLNT GAS LITER	388.93	231.21	638.74	183.69	652.57
GM AQUEOUS LAYER	59.55	19.72	58.12	16.32	58.69
GM OIL	24.94	8.23	22.22	6.80	23.00
MATERIAL BALANCE					
GM ATOM CARBON %	107.63	97.34	93.62	95.12	94.87
GM ATOM HYDROGEN %	107.79	103.91	100.53	101.92	101.82
GM ATOM OXYGEN %	111.36	97.72	97.17	96.80	97.67
RATIO CHX/(H2O+CO2)	0.8813	0.9813	0.8292	0.9180	0.8655
RATIO X IN CHX	2.3038	2.3413	2.3820	2.3605	2.3765
USAGE H2/CO PRODT	2.0271	2.0921	2.0958	2.0943	2.0908
RATIO CO2/(H2O+CO2)	0.0358	0.0246	0.0228	0.0243	0.0253
K SHIFT IN EFFLNT	0.02	0.02	0.02	0.02	0.02
CONVERSION					
ON CO %	26.73	20.79	18.91	20.24	19.52
ON H2 %	57.60	41.13	40.61	41.29	40.90
ON CO+H2 %	42.17	31.30	30.15	31.13	30.59
PRDT SELECTIVITY, WT %					
CH4	14.28	16.07	18.07	17.04	17.78
C2 HC'S	1.72	1.84	2.09	1.92	2.02
C3H8	1.56	1.86	1.90	1.85	1.92
C3H6=	1.96	2.11	2.21	2.15	2.12
C4H10	1.33	1.52	1.57	1.50	1.58
C4H8=	3.09	3.27	3.43	3.32	3.56
C5H12	1.81	1.92	1.96	1.93	2.00
C5H10=	3.30	3.70	0.59	3.47	2.13
C6H14	2.43	2.36	2.50	2.50	2.65
C6H12= & CYCLO'S	3.06	3.28	1.41	1.43	1.46
C7+ IN GAS	12.72	17.45	15.49	15.03	15.06
LIQ HC'S	52.74	44.63	48.77	47.86	47.72

TOTAL	100.00	100.00	100.00	100.00	100.00
SUB-GROUPING					
C1 -C4	23.94	26.67	29.28	27.79	28.98
C5 -420 F	44.42	44.10	40.19	41.83	42.01
420-700 F	24.47	21.51	22.24	22.59	21.28
700-END PT	7.17	7.72	8.29	7.80	7.73
C5+-END PT	76.06	73.33	70.72	72.21	71.02
ISO/NORMAL MOLE RATIO					
C4	0.1269	0.0913	0.0845	0.0978	0.0788
C5	0.2401	0.1693	0.1384	0.1425	0.1537
C6	0.6401	0.5284	0.4139	0.4184	0.4853
C4+	0.0459	0.0399	0.0438	0.0442	0.0493
PARAFFIN/OLEFIN RATIO					
C3	0.7614	0.8438	0.8203	0.8223	0.8629
C4	0.4168	0.4481	0.4427	0.4352	0.4291
C5	0.5331	0.5063	3.2230	0.5411	0.9145
LIQ HC COLLECTION					
PHYS. APPEARANCE	CLDY OIL	CLDY OIL	CLDY OIL	CLDY OIL	CLDY OIL
DENSITY	0.767	0.774	0.771	0.771	0.769
N. REFRACTIVE INDEX	1.4332	1.4362	1.4348	1.4342	1.4337
SIMULT'D DISTILATN					
10 WT % @ DEG F	299	323	314	320	311
16	330	344	336	341	335
50	471	505	490	485	476
84	680	713	710	702	702
90	730	767	757	756	756
RANGE(16-84 %)	350	369	374	361	367
WT % @ 420 F	40.00	34.50	37.40	36.50	39.20
WT % @ 700 F	86.40	82.70	83.00	83.70	83.80

TABLE 15D

RESULT OF SYNGAS OPERATION

RUN NO.	10011-14				
CATALYST	COBALT-UCC-101 #10042-17 80CC 49.6G (58.1G AFTER RUN,+8.4G)				
FEED	H2:CO:ARGON OF 50:50: 0 @ 800 CC/MN & 60:30:10 @ 400 CCMN				
RUN & SAMPLE NO.	10011-14-16	011-14-17	011-14-18	011-14-19	011-14-20
FEED H2:CO:AR	50:50: 0	50:50: 0	63:26:11	60:30:10	60:30:10
HRS ON STREAM	198.99	215.66	223.25	239.75	247.50
PRESSURE, PSIG	291	291	293	301	295
TEMP. C	251	252	252	252	252
FEED CC/MIN	800	800	480	400	400
HOURS FEEDING	6.00	16.67	7.59	16.50	7.75
EFFLNT GAS LITER	209.60	587.56	116.90	187.10	88.23
GM AQUEOUS LAYER	17.67	48.51	18.72	48.40	23.88
GM OIL	6.97	20.19	3.88	12.21	5.39
MATERIAL BALANCE					
GM ATOM CARBON %	94.39	96.66	103.00	103.89	102.25
GM ATOM HYDROGEN %	101.43	101.83	103.03	101.22	100.85
GM ATOM OXYGEN %	96.73	98.04	82.11	101.25	105.01
RATIO CHX/(H2O+CO2)	0.8820	0.9298	1.3903	1.0423	0.9572
RATIO X IN CHX	2.3810	2.3691	3.2234	2.7349	2.7167
USAGE H2/CO PRODT	2.0981	2.0929	2.4580	2.1561	2.1519
RATIO CO2/(H2O+CO2)	0.0244	0.0265	0.0877	0.0708	0.0617
K SHIFT IN EFFLNT	0.02	0.02	0.33	0.12	0.10
CONVERSION					
ON CO %	19.02	19.46	76.82	66.83	64.50
ON H2 %	39.55	40.08	67.05	72.54	71.83
ON CO+H2 %	29.65	30.04	69.89	70.60	69.37
PRDT SELECTIVITY, WT %					
CH4	18.02	17.53	55.63	31.81	31.11
C2 HC'S	1.99	2.07	6.40	4.32	4.21
C3H8	1.96	1.89	7.44	6.42	6.21
C3H6=	2.28	2.05	0.46	1.05	1.14
C4H10	1.60	1.52	4.84	4.88	4.75
C4H8=	3.47	3.18	0.62	1.99	2.23
C5H12	1.96	1.95	3.60	5.13	4.98
C5H10=	3.38	3.32	0.46	1.72	2.05
C6H14	2.66	2.29	2.30	5.11	4.89
C6H12= & CYCLO'S	1.38	3.17	0.23	1.30	1.67
C7+ IN GAS	14.57	14.47	3.28	10.23	11.05
LIQ HC'S	46.73	46.57	14.76	26.02	25.69

TOTAL	100.00	100.00	100.00	100.00	100.00
SUB-GROUPING					
C1 - C4	29.31	28.23	75.38	50.49	49.66
C5 -420 F	42.79	43.08	15.18	36.01	39.11
420-700 F	20.98	20.87	6.79	8.90	8.27
700--END PT	6.92	7.82	2.66	4.61	2.95
C5+--END PT	70.69	71.77	24.62	49.51	50.34
ISO/NORMAL MOLE RATIO					
C4	0.0926	0.0760	0.0722	0.0566	0.0582
C5	0.1391	0.1422	0.1175	0.1045	0.1077
C6	0.3897	0.4407	0.2195	0.2499	0.2736
C4=	0.0464	0.0478	0.1486	0.0760	0.0710
PARAFFIN/OLEFIN RATIO					
C3	0.8209	0.8799	15.4174	5.8714	5.2156
C4	0.4469	0.4633	7.5589	2.3635	2.0548
C5	0.5615	0.5724	7.5833	2.9033	2.3572
LIQ HC COLLECTION					
PHYS. APPEARANCE	CLDY OIL	CLDY OIL	CLDY OIL	CLDY OIL	CLDY OIL
DENSITY	0.770	0.769	0.766	0.755	0.752
N, REFRACTIVE INDEX	1.4344	1.4345	1.4345	1.4280	1.4226
SIMULT'D DISTILATN					
10 WT % @ DEG F	307	311	321	263	260
16	334	335	340	297	296
50	470	480	492	432	403
84	693	710	717	717	628
90	748	764	777	776	721
RANGE(16-84 %)	359	375	377	420	332
WT % @ 420 F	40.30	38.40	36.00	48.10	56.30
WT % @ 700 F	85.20	83.20	82.00	82.30	88.50

TABLE 15E RESULT OF SYNGAS OPERATION

RUN NO. 10011-14
 CATALYST COBALT-UCC-101 #10042-17 80CC 49.6G (58.1G AFTER RUN, +8.4G)
 FEED H₂:CO:ARGON OF 60:30:10 @ 400 CC/MN OR 300 GHSV

RUN & SAMPLE NO. 10011-14-21

FEED H₂:CO:AR 60:30:10
 HRS ON STREAM 263.92
 PRESSURE, PSIG 294
 TEMP. C 284

FEED CC/MIN 400
 HOURS FEEDING 16.42
 EFFLNT GAS LITER 191.90
 GM AQUEOUS LAYER 41.39
 GM OIL 7.52

MATERIAL BALANCE
 GM ATOM CARBON % 110.34
 GM ATOM HYDROGEN % 104.24
 GM ATOM OXYGEN % 100.22
 RATIO CH_x/(H₂O+CO₂) 1.1626
 RATIO X IN CH_x 3.1505
 USAGE H₂/CO PRODT 2.0743
 RATIO CO₂/(H₂O+CO₂) 0.1914
 K SHIFT IN EFFLNT 0.40

CONVERSION
 ON CO % 76.35
 ON H₂ % 78.79
 ON CO+H₂ % 77.95

PRDT SELECTIVITY, WT %
 CH₄ 52.82
 C₂ HC'S 6.25
 C₃H₈ 6.45
 C₃H₆= 1.41
 C₄H₁₀ 3.75
 C₄H₈= 1.50
 C₅H₁₂ 3.24
 C₅H₁₀= 0.81
 C₆H₁₄ 3.10
 C₆H₁₂= & CYCLO'S 0.53
 C₇+ IN GAS 6.07
 LIQ HC'S 14.07

TOTAL	100.00
SUB-GROUPING	
C1 -C4	72.18
C5 -420 F	18.01
420-700 F	4.88
700-END PT	4.92
C5+ -END PT	27.82
ISO/NORMAL MOLE RATIO	
C4	0.2224
C5	0.6701
C6	1.4904
C4=	0.0739
PARAFFIN/OLEFIN RATIO	
C3	4.3597
C4	2.4060
C5	3.8948
LIQ HC COLLECTION	
PHYS. APPEARANCE	CLD-CR OIL
DENSITY	0.769
N, REFRACTIVE INDEX	-
SIMULT'D DISTILATN	
10 WT % @ DEG F	317
16	346
50	567
84	817
90	866
RANGE(16-84 %)	471
WT % @ 420 F	30.30
WT % @ 700 F	65.00

Summary of Task 2 Testing

This year has been very successful for Task 2 screening. Catalysts with superior qualities were identified. Data on octane number of the gasoline is not yet available due to the size of the samples. Qualitative statements about product quality have been made by looking at the degree of isomerization of the product. Samples large enough to measure the octane number will be collected in the near future.

Table 16 summarizes the status of the Task 2 testing to date. The true reference catalyst for any new system is that used at Sasol. The second column marked Sasol was taken from data in Mobil's final report to DOE for contract EX-76-C-01-2276. The motor fuel selectivity values are quite low. Column one has data from our reference iron catalyst in Run 10011-6. These numbers are more in line with what a state-of-the-art F-T catalyst like Sasol's could produce. The octane number of the gasoline produced by such a catalyst is in the range of ~55, the octane number of straight chain products. The data in column 3 is from Mobil's SG-A4 catalyst taken from the previously mentioned Mobil report. The data in columns 4 to 8 are from Runs 10011-7, -11, -9, -10 and -14 respectively. The iron based catalysts produce approximately as much total motor fuel as either the Mobil or the reference catalysts. The catalyst with UCC-104 has a slightly lower selectivity. The major differences are in the ratios of gasoline to diesel oil.

Fe on UCC-101 and Fe/K+UCC-104 produce primarily gasoline. (Note: "on" means pore-filled or precipitated; "+" means physical mixture). The Fe/K+UCC-104 produces a gasoline which should have a high research octane number. The Fe on UCC-101 produces a less isomerized product. Fe/K on UCC-101 and Fe/K+UCC-101 both produce more diesel oil than the previous catalysts. The product from the physical mixture catalyst is more isomerized than that of the precipitation catalysts. The potassium promotion of the Fe on UCC-101 significantly lowers the acid activity of the molecular sieve. The quality of any of the diesel oil produced is unknown at this time.

The really outstanding catalyst, from the standpoint of the amount of total motor fuels production, is the cobalt catalyst (pore-filled on UCC-101). The gasoline fraction is somewhat isomerized but not nearly to the extent with UCC-104.

The screening phase of Task 2, with little optimization, has produced catalysts apparently at least as good as Mobil's, and because of product quality superior to Sasol's. The UCC-104 (or UCC-108) and cobalt on UCC-101 catalysts show the most promise to be optimized to truly superior catalysts.

TABLE 16

Catalyst	Ref. Iron	Sasol	Mobil	Fe on UCC-101	Fe/K on UCC-101	Physical Mixtures		Pore-Filled Co UCC-101
						Fe/K UCC-101	Fe/K UCC-104	
C ₁ -C ₂	15	23	29+34	19.4	19.7	16.9	22.8	16.0
C ₃ -C ₄	18	29	17+7	25.5	24.0	23.2	26.7	7.9
Gasoline	42	34	54+59	50.1	42.8	42.3	41.5	44.4
Fuel Oil	18	5		4.9	11.3	14.4	7.8	24.5
Wax	9			.2	2.3	3.2	1.2	7.2
Oxygenates	<1	9	<1	<1	<1	<1	<1	<1
Aromatics			43+21					
Total Motor Fuel	59	39	54-59	54.9	54.1	56.7	49.3	68.9
Octane		55	92					