3.0 ALTERNATIVES, INCLUDING THE NO ACTION ALTERNATIVE

3.1 ALTERNATIVES TO BE CONSIDERED

Alternatives considered in this Environmental Assessment are limited to the Proposed Action and the No Action Alternative. The Proposed Action results from consideration of a proposal submitted by Integrated Concepts & Research Corporation (ICRC) and Syntroleum Corporation for a project to demonstrate gas-to-liquids technology. The proposal established the scope and location of a project designed to meet U.S. needs for technological advancement in the production of ultra-clean transportation fuels for cars, trucks, and other heavy vehicles. The decision to be made is whether or not to provide funds for supporting the proposal, based on its merit in meeting U.S. needs and considering the potential environmental consequences of the project. No alternatives to the Proposed Action, other than the No Action Alternative, are thus considered by DOE in this Environmental Assessment.

3.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, DOE would not provide funds to support the project proposed by ICRC and Syntroleum. Implementation of this Alternative would probably result in termination of plans for the proposed project, in which case an opportunity for near-term development of ultra-clean transportation fuels would not be achieved. The proposed 10-acre project site at the Tulsa Port of Catoosa Industrial Park would remain available for other industrial or commercial tenants.

3.3 THE PROPOSED ACTION

The DOE, through the National Energy Technology Laboratory (NETL), proposes to provide funds to ICRC for developing a gas-to-liquids (GTL) technology fuels production and demonstration project. This project was proposed to DOE/NETL for co-funding under a DOE program for development of technology to produce ultra-clean transportation fuels using low-cost, domestic fuel resources.

The proposed GTL system would be based on synthesis gas production and Fischer-Tropsch (F-T) technologies previously demonstrated by Syntroleum Corporation at the Cherry Point Refinery near Bellingham, Washington, and on product upgrading technology demonstrated by Syntroleum in various pilot plant facilities. The proposed plant would produce (nominally) 70 barrels per day (bpd) of ultra-clean fuel, consisting of about 54 bpd of Syntroleum diesel and 14 bpd of synthetic naphtha. This technology uses air rather than oxygen in the process, thus avoiding the high cost and added complexity of an oxygen production plant.

Diesel fuel produced by the proposed GTL plant would be tested in various engines, including fleet tests in buses. The Washington (DC) Metropolitan Area Transit Authority (WMATA) and Denali National Park bus fleets were chosen to evaluate diesel fuels, primarily because they represent nearly opposite ends of several spectra when considering climate, topography, engine load factor, mean distance between stops, and composition of normally used conventional diesel fuel. Also, the operators of these fleets share the strong desire to participate in a program aimed at minimizing exhaust emissions, especially emissions that are most apparent to riders, people in other vehicles, and by-standers.

Previous research by Syntroleum has shown that extremely low-sulfur, high-quality diesel fuels significantly reduce exhaust emissions from current diesel engines. The ultra-clean, hydrogen-saturated F-T fuels to be produced in the proposed project would have virtually no sulfur (less than 1 part per million) and would provide extremely high quality fuel in terms of ignition quality, saturate content, backend volatility, etc. However, these fuels lack lubricity and could cause compatibility problems with legacy fuel injection system components, in the absence of appropriate additives and formulation technology. With future improvements to the diesel engine, this may not be a problem. Tests would be run on prototype diesel engines equipped with exhaust after-treatment emission control systems to determine how well those future engine systems would perform with an ultra-clean F-T diesel fuel, both neat and blended.

The proposed plant would also produce synthetic naphtha (in addition to synthetic diesel fuel), which would provide an opportunity for additional ultra-clean fuels study, since hydrogen-saturated naphtha would be an ideal fuel for fuel cell systems that use a reformer to produce hydrogen.

3.3.1 Proposed GTL Fuels Production Plant

The proposed action is for DOE, through a three-year cooperative agreement between the NETL and ICRC (and ICRC's team), to share the cost of testing technology developed by Syntroleum Corporation for conversion of natural gas to liquid fuels, particularly diesel fuel. The goals of the agreement would be to:

- Produce test quantities of ultra-clean synthetic transportation fuels
- Demonstrate use of synthetic fuels in test engines and fleet vehicles
- Evaluate performance of the synthetic fuels in advanced engines and emission control technologies

To provide fuels for engine testing, Syntroleum Corporation, in coordination with Marathon Oil Company, would produce ultra-clean synthetic fuels using Syntroleum's GTL technology. Syntroleum previously tested similar GTL synthetic oil production in equipment operated at the Cherry Point Refinery in the State of Washington. The equipment would be installed at an undeveloped, partially wooded site in the Tulsa Port of Catoosa Industrial Park and used to provide the essential process components for the GTL fuels production plant. New modules would be added to enable production of finished fuels. The project area is not characterized by farmlands or special management areas. The proposed site is not located within the 100-year or 500-year floodplains, and no wild or scenic rivers are located in the area of project influence.

The produced diesel fuel would be tested in engines and vehicles to establish compatibility with fuel injection system components and to determine the effects on emissions. The fuel would also be tested in prototype engines to demonstrate compatibility with next-generation emission control systems, with particular focus on NO_x and particulate emissions.

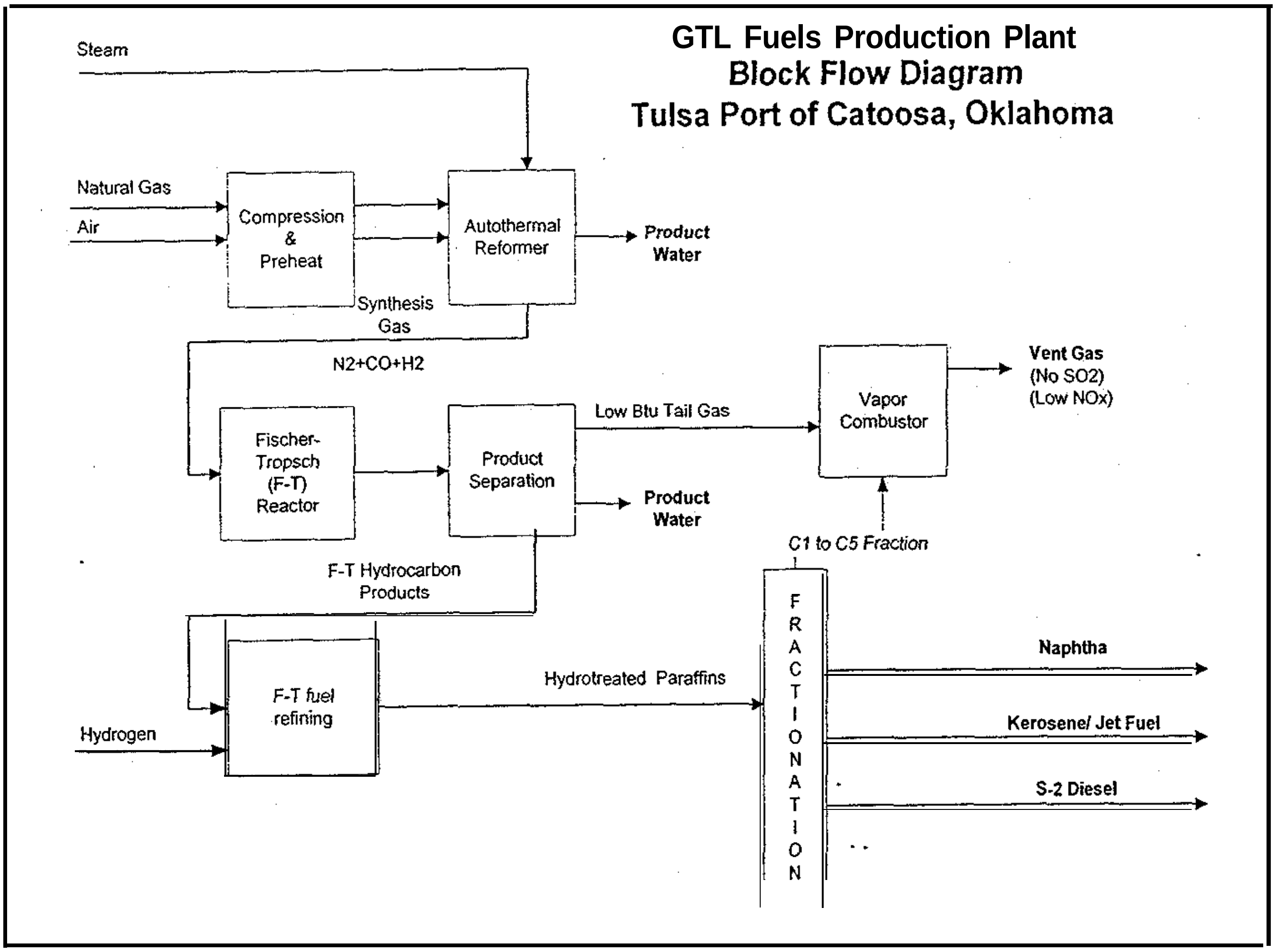
ICRC would conduct dynamometer testing of diesel bus engines and oversee vehicle tests. An automobile company (DaimlerChrysler Corporation) would evaluate product fuels in prototype light and heavy-duty diesel engines combined with exhaust after-treatment systems. Two candidate transportation systems for diesel fuel testing include the Washington (DC) Metropolitan Area Transit Authority and the Denali National Park bus fleet. GTL diesel fuel would contain virtually no sulfur (less than 1 part per million) and possess high quality in terms of ignition quality and volatility. However, problems could occur due to potential compatibility problems with fuel injection system components, and the engine tests would provide information to determine and mitigate potential compatibility problems.

3.3.1.1 Project Description

The proposed gas-to-liquids plant would produce approximately 70 bpd of synthetic fuels – about 2,300 gallons per day (gpd) of ultra-clean diesel fuel for engine testing and about 600 gpd of sulfur-free synthetic naphtha, which could be used in fuel cell testing programs. Under specialized operating conditions, the production capacity of the plant could be increased to about 90 bpd.

Figure 3-I presents a block flow diagram of the proposed GTL plant. In this GTL plant, natural gas would be reacted with air in a proprietary auto-thermal reformer (ATR) reactor to produce a nitrogen-diluted "synthesis" gas, consisting primarily of carbon monoxide and hydrogen. A proprietary catalyst would be used to convert the synthesis gas into synthetic hydrocarbons, referred to as synthetic crude oil, in a Fischer-Tropsch reactor (FTR). Hydrotreating and hydrocracking technology would be used to convert the synthetic crude into sulfur-free, clean transportation fuels. By-product gases would be eliminated in a vapor combustor. Tail gas or undesirable by-products, which would contain ammonia, methanol, pentane, and hexane, would be sent to the 98%-efficient vapor combustor.

Figure 3-l. Block Flow Diagram of the Proposed GTL Fuels Production Plant



Construction of the proposed plant would require approximately 9 to 12 months following completion of mechanical design. Following construction, the plant would undergo start-up activities for approximately 2.5 months. Start-up activities would be planned to demonstrate the following:

- Sustained operations using natural gas
- Operational safety
- Continuous production of high quality fuels that meet the specification included in Table 3-2

Following start-up, the plant would be operated for approximately 4 additional months to provide the fuel types and volumes required for fleet and vehicle demonstrations and fuel/engine technology development tasks. Up to10,000 gallons of fuel product would be made to the Jet A-1 specification of ASTM D-1655 and would be provided to NETL. This fuel would be available for use in test programs with other DOE partners. ICRC would develop a fuel production and distribution plan, including:

- Specifications for the types of fuels to be produced
- Schedule for producing the desired types of fuels in the quantities required for evaluation
- Destinations for the fuels, including type and quantity
- Fuel storage and distribution requirements to support the fleet tests

Up to 25% of the operating hours of the proposed plant during the DOE project (i.e., up to about one week per month) may be used for fuels production outside the scope of the DOE program. Such intervals would be designated by Syntroleum but would be coordinated with the DOE program to ensure that operations for Syntroleum would not impair the achievement of DOE's project objectives.

Under the DOE agreement, the GTL plant would be operated to produce the following quantities of fuel:

- 10,000 gallons of Jet A-1 fuel
- 150,000 gallons of S-2 diesel fuel meeting the diesel specification included on Table 3-2

If additional quantities of diesel fuel should be needed to complete fuel testing, the proposed plant would be operated to provide additional specification fuel. Storage requirements at the proposed site would exist for compressed hydrogen gas, pressurized liquid nitrogen, and liquid fuel products. The anticipated feedstock and product storage requirements are shown in Table 3-1.

Storage tanks, with a maximum fuel storage potential of 262,500 gallons, or 6,250 barrels (bbl), would be contained within a concrete dike sized for 110% of the largest tank volume, plus stormwater. All process areas would be provided with spill containment. The ATR/FTR reactor units would be exposed to stormwater. Hydrotreating and hydrocracking units would be housed within a partially enclosed structure (roof and partial sidewalls) that would provide spill containment in case of an accidental release.

Table 3-1. Feedstock Material & Product Storage

TANK NUMBER	HEIGHT (FT)	DIAMETER (FT)	CAPACITY	CONTENTS
1	7	8	2,520 gallons	Naphtha
2	7	8	2,520 gallons	Naphtha
3	11	13	10,080 gallons	Diesel
4	11	13	10,080 gallons	Diesel
5	14	16	18,900 gallons	Naphtha
6	14	16	18,900 gallons	Naphtha
7	14	16	18,900 gallons	Naphtha
8	14	16	21,000 gallons	Re-run
9	14	16	21,000 gallons	C10+
10	19	25	69,300 gallons	Diesel
11	19	25	69,300 gallons	Diesel
Pressure Vessels (3)			≤275,000 standard cubic feet	Compressed Hydrogen Gas
Pressure Vessel			5,000 gallons	Pressurized Liquid Nitrogen
ISO Containers (maximum of 67)			6,341 gallons/container	Diesel

Construction activities would include removal of existing vegetation, removal and storage of existing topsoil, plant construction, paving, and installation of new landscaping. The proposed project site is currently vegetated with woodlands. Existing vegetation surrounding the project area would not be altered. Upon completing construction activities, the project area would be replanted in a manner typical of other developments at the Tulsa Port of Catoosa Industrial Park. Site preparation and construction would begin in 2002, and all construction activities would conform to applicable building and utility codes.

Using DOE funds, the plant would be operated for 6 months, during which time the total anticipated fuel production would be 8,800 bbl of ultra-clean diesel fuel and 560 bbl of ultra-clean naphtha. Syntroleum could continue to operate the plant following completion of the 6-months of DOE-funded work.

3.3.1.2 Project Location

The proposed project would be located on approximately 10 acres of property within the boundaries of the Tulsa Port of Catoosa Industrial Park. The proposed site is located in the southeast quadrant of the northeast quarter of Section 6, Township 20 North, Range 14 East, in Rogers County, Oklahoma. The location of the site is depicted in Figures 3-2 and 3-3.

The Industrial Park is a 2,000-acre property approximately 3 miles from the central business district of Catoosa, OK, with a population of 2,950, and approximately 12 miles from the central business district of Tulsa, OK, with a population of 386,000. The Industrial Park offers prime industrial sites for lease and is supported by barge, truck, rail, and other modes of transportation. Approximately 50 corporate enterprises employing 2,600 people are currently located in the Industrial Park.

The Tulsa Port of Catoosa (Port) is an international shipping port and intermodal transportation center in northeast Oklahoma, at the head of the McCellan-Kerr Arkansas River Navigation System. Within the Industrial Park at the Port are industrial operations involving bulk liquids handling, agricultural products distribution, chemicals production, metals fabrication, and primary steel processing. Specifically, tenants currently located within the Industrial Park conduct the following types of business operations:

- Agricultural products blending and storage
- Fertilizer storage and distribution
- Grain storage and shipment
- Nitrogen-based fertilizer manufacture
- Bleach manufacture
- Chlor-alkali product storage and distribution
- Refined oil storage
- Manufacture of asphalt emulsions for pavement
- Storage and distribution of liquid petroleum products
- Manufacture of inorganic and specialty chemicals (e.g., inorganic fluorine chemicals)
- Production of automotive catalysts
- Production of ultra-high purity gas
- Metal fabrication for heat exchangers, storage tanks, and drilling rigs
- Steel coil processing for production of steel sheets and plates

The proposed 10-acre site for the GTL plant is a currently undeveloped, gradually sloping, and irregular tract of land at the northwest boundary of the Industrial Park. Land surface at the site slopes from an elevation of approximately 625 feet above mean sea level (amsl) at the northwest boundary to 595 feet amsl at the southeast boundary. Rail transport and waterfront terminal capabilities are conveniently available at the Industrial Park.

Figure 3-2. Site Location; Tulsa Port of Catoosa Industrial Park

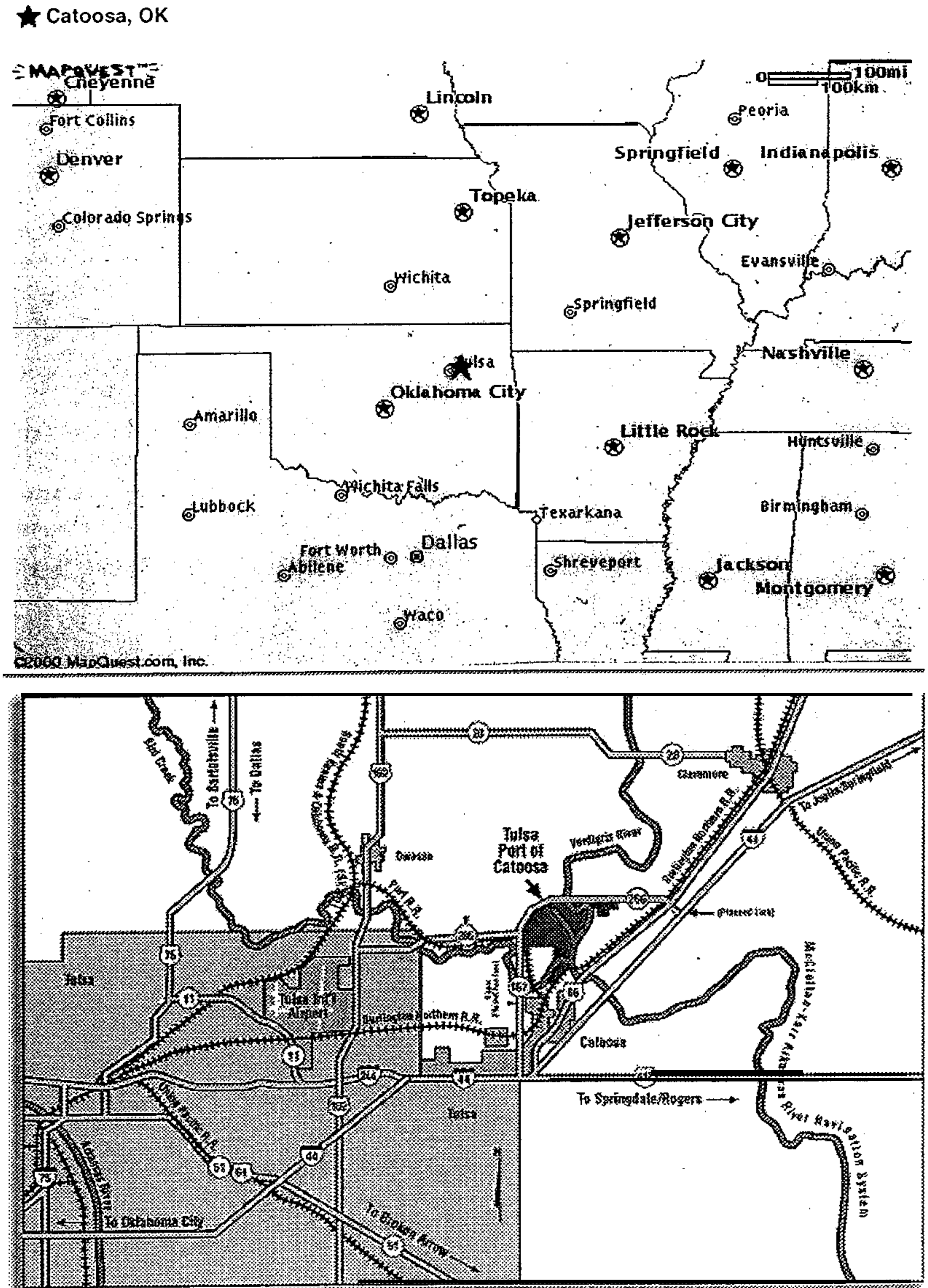
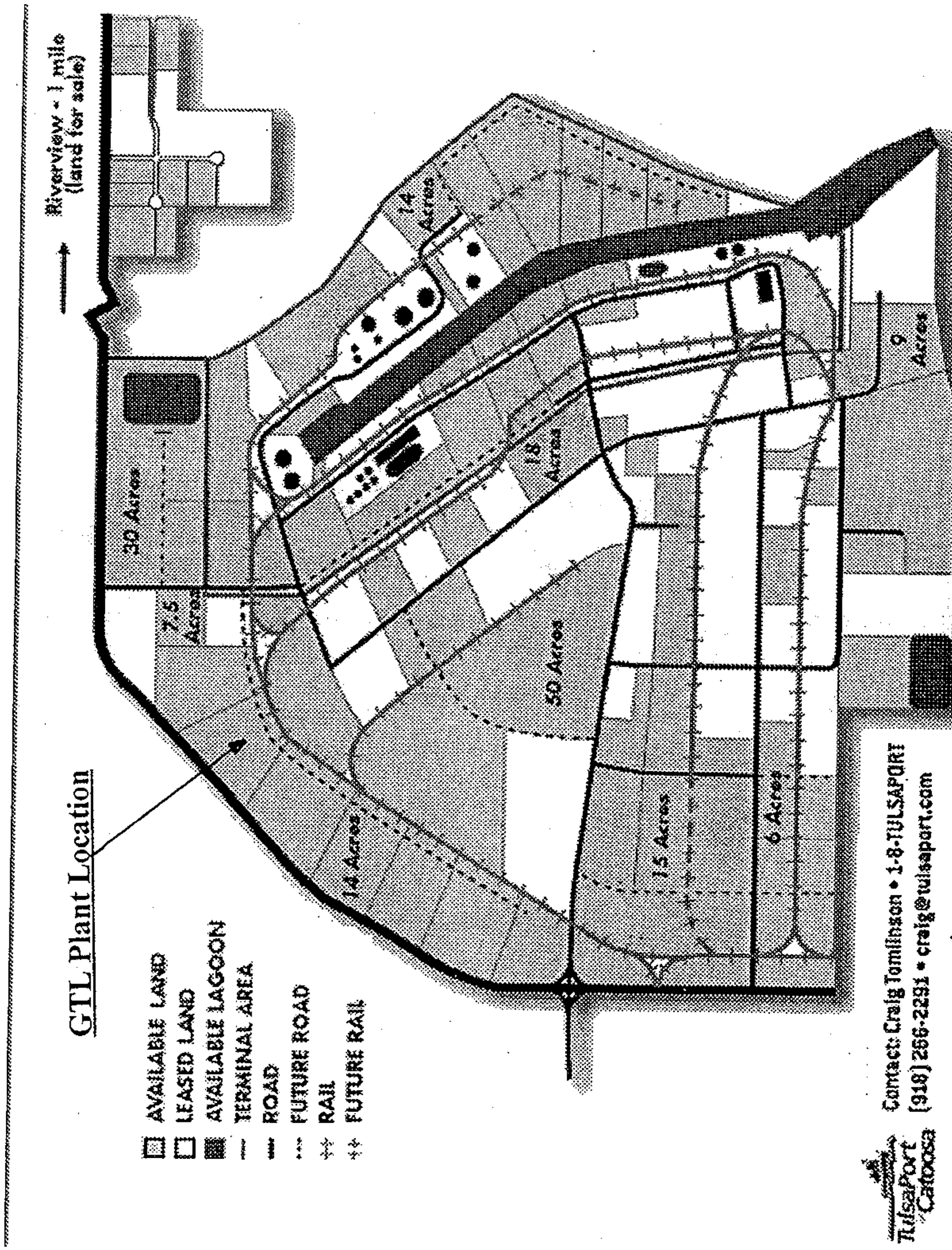


Figure 3-3. GTL Plant Location; Tulsa Port of Catoosa Industrial Park



Utilities available at the project site include electric service from American Electric Power, natural gas service via a 16-inch supply line from Oklahoma Natural Gas, and Water Supply and Treatment via the City of Tulsa municipal water systems. Additional infrastructure available at the Industrial Park includes outdoor staging areas for construction equipment and a full-service occupational health clinic, complete with helipad. Highway access is available via controlled-access gates and after-hours security.

The Tulsa Port of Catoosa Industrial Park was selected as the site for the proposed project for several reasons. The primary benefit of the selected site is the variety of available transportation options. In addition to being an international waterway, the Port also has rail facilities. The proposed location has access to high-pressure natural gas lines and electrical power, both of which are required by the proposed GTL plant.

3.3.2 Proposed Fuels Utilization

ICRC would conduct multiple demonstrations and tests of fuels produced by the GTL plant, including demonstrations in two different bus fleets and in prototype engines using advanced power train and emission control technologies. The diesel fuel tests would be planned to evaluate operability and potential for reducing exhaust emissions in diesel engines. The demonstrations and tests would be performed by project participants, including DaimlerChrysler, Washington (DC) Metropolitan Area Transit Authority, Massachusetts Institute of Technology's Sloan Automotive Laboratory, University of Alaska, and West Virginia University's transportable emissions testing laboratory. In addition, Arthur D. Little would perform a wellhead-to-wheels economic analysis of the potential for the fuel to enter the transportation market.

For the DOE program, up to 10,000 gallons of fuel product would be made to Jet A-1 specification and used in test programs with other stakeholders identified by DOE to determine potential for aircraft use. The DOE program would also provide for production of 150,000 gallons of specification diesel fuel, which would be used for vehicle and vehicle-related tests.

Dynamometer durability engine tests using a new diesel bus engine representative of engines used in the Washington DC Metropolitan Area Transit Authority fleet test would be performed for up to 1,500 hours. Engine inspections would be performed before and after testing for fuel lubricity, seal compatibility, and cold-temperature problems. Testing for compatibility with conventional diesel fuel would also be monitored. A second, 1,500-hour dynamometer test would be performed using a new diesel bus engine representative of the engines used in the bus fleet at Denali National Park. Similar engine and fuel tests would be conducted in the two dynamometer studies.

Three buses in each of the two fleets would be used to field test the diesel fuels. Each bus would be matched to a bus of the same type operated with conventional diesel fuel in similar service within each fleet. Data collected from the fleet tests would include operating time and travel distance, fuel consumption, engine oil degradation, and ambient conditions. Exhaust emissions would be determined during the fleet tests.

The diesel fuel would also be tested in advanced prototype light-duty and heavy-duty engines, and both emissions and operability would be compared to engines using conventional diesel fuels. Tests in engines equipped with prototype exhaust after-treatment devices for particulates and nitrogen oxides would be conducted.

GTL fuels are highly paraffinic, high-cetane synthetic distillate products suitable for use in fuel cell and compression ignition engine applications. The technical viability and commercial feasibility of using produced naphtha as a candidate fuel for automotive fuel cells may also be determined through laboratory fuel cell studies. Environmental performance of the GTL diesel fuel would be compared to the emissions that would result from combustion of conventional diesel fuel.

Typical characteristics of the synthetic diesel fuel (Syntroleum S-2) to be produced from the proposed GTL plant are presented in Table 3-2. Both the synthetic diesel fuel and the synthetic jet fuel that would be obtained from the proposed facility would be composed of saturated (>99%) paraffin components, which are minimally soluble in water and highly biodegradable, thus possessing characteristics relatively benign to the environment.

Table 3-2. Characteristics of Syntroleum Synthetic Diesel Fuel, S-2

PHYSICAL PROPERTY	TEST METHOD	UNITS	TYPICAL VALUE
Specific Gravity	ASTM D-1298		0.771
API Gravity	ASTM D-1298	°	52.0
Flash Point	ASTM D-93	°F (°C)	148 (64)
Cloud Point	ASTM D-2500	°F (°C)	<0 (<-18)
Color	ASTM D-1500		L0.5
Sulfur	ASTM D-2622	Wt%	Not detected
Viscosity	ASTM D-445		
@ -20°C		CSt	10.3
@ 40°C		CSt	2.1
@100°C		CSt	1.0
Carbon Residue	ASTM D-524	Wt%	Not detected
Copper Strip	ASTM D-130		1a
Aromatics	ASTM D-1319	Vol%	Not detected
Olefins	ASTM D-1319	Vol%	Not detected
Saturates	ASTM D-1319	Vol%	>99%
Cetane Number	ASTM D-613		>74
Distillation,	ASTM D-86		
IBP, vol %		°F (°C)	320 (160)
10 %		°F (°C)	390 (199)
50 %		°F (°C)	493 (256)
90 %		°F (°C)	601 (316)
FBP, vol %		°F (°C)	662 (350)
Lubricity	ASTM D-6079	mm	<0.37
Ash	ASTM D-482	wt%	<0.001

3.3.2.1 Bus Fleet Demonstrations of GTL Synthetic Diesel

Three buses in each of two fleets (six buses) would be used to field test the F-T diesel fuel produced by the GTL plant. Each set of three test buses would be matched to three buses of the same type in the same fleet running on conventional diesel fuel and providing service that would be as similar as possible. Separate fueling facilities and fueling regimens would be established for the field tests and monitored closely to maintain the integrity of the GTL and conventional diesel fuels. The buses would also be marked with simple, easy-to-understand panels identifying the project, the project sponsors, and the purpose of the project, and both web site and telephone contacts for obtaining additional information would be identified. During the fleet tests, the buses would be monitored for any problems that might occur. Data from the fleet tests (including operating time and travel distance, fuel consumption, engine oil degradation, and pertinent ambient conditions) would be catalogued, reduced, and analyzed. Whenever possible, appropriate action would be taken to correct vehicle problems and continue the fleet tests.

The ultra-clean diesel fuel, with appropriate additives, would be tested in buses from each fleet during normal service, for a period of about six months in each fleet. One fleet test would occur in urban transit service buses from the Washington (DC) Metropolitan Area Transit Authority (WMATA). WMATA operates the 5th largest bus network in the United States, serving a population of about 3.4 million in the District of Columbia, the Maryland counties of Montgomery and Prince George's, the northern Virginia counties of Arlington, Fairfax, and Loudoun, and the cities of Alexandria, Fairfax, and Falls Church.

The other fleet test would occur at the opposite end of several spectra (i.e., climate, topography, load factor, etc.), in the Denali National Park and Preserve bus fleet in Alaska. At Denali National Park, bus tours were established in 1972 to replace automobile traffic in the Park, for limiting impact on wildlife. Shuttle buses operate from the Park entrance and have various destinations along the length of Denali Park Road. Bus tours typically extend from 3 to 8 hours in duration.

Both bus fleets operate under the auspices of government authorities, and they, as well as the individuals charged with running and maintaining the buses on a daily basis, strive to minimize emissions and the overall environmental impact of fleet operations. Both fleets either use, or have a phase-in plan to begin using, relatively low-sulfur conventional diesel fuels (occasionally referred to as "city diesel" or "CARB diesel," for California Air Resources Board) that are currently available at a premium price.

The three buses in each fleet, operating for a period of six months (or one season in Denali National Park, normally a maximum of five months from May through September), would consume a maximum of 24,000 gallons of near-zero sulfur, zero aromatic content GTL fuel. This fuel would displace approximately the same amount of conventional fuel that would otherwise be used – the energy content of synthetic diesel is 1% to 6% less than conventional #2 diesel. The three buses in each fleet would perform normal service for their fleet. The only additional running for the fleet-test program would result from exhaust emission testing on the three GTL-fueled buses and the three control buses in each fleet that would use conventional fuel.

The GTL diesel fuel would be handled by the installed fuel infrastructure in each of the demonstration localities. However, for the purpose of this program, the GTL fuel would be segregated from the conventional fuel system to maintain purity. At WMATA, an existing 4,000-gallon tank would be used for storage of the GTL diesel. At Denali National Park, a 6,000-gallon tank to hold the GTL diesel fuel would be installed in the bus fueling area near the entrance of the Park. GTL diesel fuel would be replenished, as needed, by normal truck deliveries from the GTL fuels production facility.

3.3.2.2 Exhaust Emission Testing of the Buses

Engine emission testing would be performed by West Virginia University (WVU), which has pioneered development of a transportable heavy-duty vehicle exhaust emission measurement laboratory. Bus emissions would be evaluated on a portable heavy-duty chassis dynamometer, which allows the drive wheels to spin freely, while test-shafts connecting the wheel hubs to a computer-controlled dynamometer on each side of the bus would allow the engine and drivetrain to be loaded according to a prescribed driving speed and load cycle. Exhaust emission sampling systems and analysis methods would be designed and operated in accordance with industry-accepted standards, to obtain representative emission results for particulates, oxides of nitrogen, hydrocarbons, and carbon monoxide. The ultimate objective of these tests would be to determine the effect of improved fuel properties on real-world exhaust emissions.

Exhaust emissions would be tested on two occasions during the fleet tests. As the buses begin operations, exhaust emissions from each of the six buses in each fleet (12 buses in total) would be measured. At the end of the fuel evaluation field test program, exhaust emissions from all six buses in the WMATA field test would again be measured by WVU.

3.3.2.3 Fuel System Durability Tests on an Engine

Although undesirable from a combustion and emissions standpoint, sulfur and aromatics in fuel can provide some protection to hard steel surfaces during the equipment movement that occurs in high-pressure pumping and fuel injector assemblies. To provide additional protection for metal surfaces, petroleum chemical companies have developed effective fuel additive packages, sometimes called lubricity additives. These additive packages are both needed and effective for fuel testing programs that use relatively ultra-low sulfur and aromatic diesel fuels.

The composition of GTL fuel is virtually 100% saturates, normal and iso-paraffins, with no sulfur or aromatics compounds. Even with appropriate levels of proven additives, and with a limited history of trouble-free use in other engines, the GTL fuel could present a more severe operating environment for the fuel system in a long term field test. Potential incompatibility of the fuel with existing elastomer seals in some fuel systems, if experienced, could also eventually lead to fuel leakage, either from increased seal-swell with subsequent seal wear or, conversely, from seal-shrinkage. Thus, two 1,500-hour fuel-system dynamometer durability tests would be run on two engines representative of the WMATA and Denali bus fleets.

The dynamometer testing would be performed using fuel with the same additives that would be used during the fleet tests. These tests would result in collection of data on fuels representative of those to be produced from the proposed GTL plant. Early performance testing could also provide evidence that the ultra-clean diesel fuel would not cause operational problems. The engines would be inspected during and after the tests. The engines would be closely monitored for the following:

- Insufficient fuel lubricity, which could cause damage to fuel-injection system components
- Seal compatibility or seal-swell differences between F-T and conventional diesel fuels, which could cause leaks or other problems
- Cold-temperature problems such as filter-plugging, etc.

Fuel incompatibility, which could occur with blends of F-T fuels and conventional diesel, would be monitored with separate equipment. If any significant problems occur during the tests, alternative solutions would be identified and validated before proceeding with the bus fleet tests.

These two dynamometer tests would each use approximately 24,000 gallons of fuel. ICRC employees, using ICRC test facilities that are co-located within test laboratories in Plymouth and Ann Arbor, Michigan, would run the tests. The laboratories are commonly used for engine development and emissions testing. These laboratories comply with all applicable state and local laws and regulations regarding performance and emission testing of engines on dynamometers.

3.3.2.4 Evaluation of GTL Fuel in Prototype Diesel Engine and Emission Control Systems

The ultra-clean diesel fuel would be tested in advanced prototype light- and heavy-duty engines to achieve the following:

- Compare performance with conventional diesel fuels in terms of both emissions and operating functions

- Compare performance with other available low sulfur fuels in diesel engines equipped with prototype exhaust after-treatment devices used to reduce particulate and NO_x emissions
- Investigate the effects that addition of various low levels of aromatics to the ultra-clean diesel fuel would have on performance degradation with respect to emissions and emission control systems

This evaluation would be conducted over a sufficiently long operating interval to observe any potential effects that fuel properties might have on degradation of emission control efficiency. Both heavy-duty and light-duty engines would be tested.

DaimlerChrysler, and its subsidiaries Detroit Diesel and Freightliner, would perform the extended-duration tests on prototype engines and emission control systems as part of their on-going diesel engine and emission control system development efforts. Testing would be conducted on heavy-duty diesel engine dynamometers at Detroit Diesel's laboratory in Detroit, Michigan, and at Daimler's light-duty diesel vehicle emission lab and test-track in Germany.

These tests would be run for time durations that the DaimlerChrysler groups typically use to determine the practicality of a particular emission control concept. Approximate test durations would be a few hundred hours of dynamometer testing, or a few tens-of-thousands of vehicle-miles on the test track, with frequent intermediate determinations of exhaust emissions. Single or multiple engines and/or vehicles could be used.

The quantity of fuel that would be consumed in this type of prototype system testing is estimated to be 15,000 gallons.

3.3.2.5 Economic Analysis

Arthur D. Little, Inc., would provide a well-to-wheels economic and market analysis of small GTL plants and an evaluation of the potential future transportation markets for ultra-clean liquid fuels products from GTL plants. The study would be based on the following:

- Data obtained for feedstock resource base, GTL plant construction and operation, modifications (for feedstock and product variations) and mobility costs; fuel types, quality, quantity, and manufacturing costs; and commercial usefulness of the resultant fuels
- Data for the production, type, and location of feedstocks, using various feedstock types for the analysis
- Data obtained from the fleet and dynamometer tests

3.4 COMPARISON OF ALTERNATIVES

A comparison of the effects of the No Action Alternative and the proposed action, for supporting development of the GTL project, is provided in Table 3-3. For this comparison, No Action is considered to result in termination of plans for construction and operation of the proposed facility at the Tulsa Port of Catoosa Industrial Park.

Table 3-3. Comparison of the Effects of Alternatives

RESOURCE	NO ACTION	PROPOSED ACTION
Threatened & Endangered Species	No effect.	No effect. No threatened or endangered species, or special habitat areas, are located on or near the project site.

RESOURCE	NO ACTION	PROPOSED ACTION
Wetlands	No effect.	No effect. No wetlands exist at the site proposed for the project.
Floodplains	No effect.	No effect. The site is not within either a 100-year or a 500-year floodplain.
Noise	Since the 10-acre site would remain available for lease, noise effects would be dependent on the future industrial tenant.	Noise levels to local receptors at the Industrial Park would increase to either a maximum of 60 dB or 4 dBs above background. Noise levels from fuel testing would be expected to be reduced from levels created by use of conventional diesel fuel.
Water	Since the 10-acre site would remain available for lease, water effects would be dependent on the future industrial tenant.	No surface or ground water would be used. Possible short-term effect due to stormwater contact with process materials. Potable water usage of about 10 gpm during the 6-month operating period.
Wastewater	Since the 10-acre site would remain available for lease, wastewater effects would be dependent on the future industrial tenant.	Wastewater generation of about 6.7 gpm, treated for oil separation and pH adjustment prior to discharge to the City of Tulsa's POTW.
Geology & Soils	Since the 10-acre site would remain available for lease, geology and soil effects would be dependent on the future industrial tenant.	Possible short term effect due to erosion during construction on the 10-acre site. A SWPPP for construction activities would be used to control and minimize erosion.
Infrastructure	Since the 10-acre site would remain available for lease, infrastructure effects would be dependent on the future industrial tenant.	No new gas or electric transmission lines. Installation of paved access road to the 10-acre site; concrete foundations placed under gas and liquid processing and storage areas. A fuel storage tank (6,000 gallon) to hold the ultra-clean diesel fuel would be temporarily located in the bus fueling area near the entrance to Denali National Park. An existing 4,000-gallon tank owned by WMATA at Landover, MD, would be used for storing and dispensing ultra-clean diesel fuel.
Traffic and Transportation	Since the 10-acre site would remain available for lease, traffic and transportation effects would be dependent on the future industrial tenant.	Short term increase in vehicular traffic and emissions during construction. Approximately 1% increase in vehicle traffic during facility operation. Fleet vehicles used for testing diesel fuel product would be selected from the existing fleets and operating routes; no increase in vehicle traffic or mileage would result.
Aesthetics and Visual Resources	Since the 10-acre site would remain available for lease, aesthetics and visual resource effects would be dependent on the future industrial tenant.	Installation of processing equipment consistent in type with other tenants at the Industrial Park. Tank and exhaust stack vertical profiles would range from 20 ft to 50 ft. The temporary tank used for dispensing ultra-clean diesel fuel would not be visible to visitors entering Denali National Park, but would be a visible addition to the bus fueling area from trails near the Park's entrance.

RESOURCE	NO ACTION	PROPOSED ACTION
Air	Since the 10-acre site would remain available for lease, air effects would be dependent on the future industrial tenant.	Possible short term impacts during construction. Operation would result in PM_{10}, NO_x, CO, VOC, and SO_2 emissions at levels substantially below levels requiring designation as a major emission source. Process vent emissions would be destructed at 98% efficiency. Toxic air pollutants would be generated at *de minimus* levels. Reductions in SO_2, CO, hydrocarbons, particulates, and NO_x emissions from the 6 buses used at WMATA and Denali National Park.
Solid Waste (Non-hazardous)	Since the 10-acre site would remain available for lease, solid waste effects would be dependent on the future industrial tenant.	Solid waste volume of 8,640 cubic ft, or a daily average of about 8 cubic ft for the 3-year project.
Hazardous Waste	Since the 10-acre site would remain available for lease, hazardous waste effects would be dependent on the future industrial tenant.	Small quantities of used catalysts, caustic material for water treating, and oil-water separator waste could be hazardous. Materials requiring disposal would be transported to an appropriate, permitted disposal location outside Oklahoma.
Socioeconomics	Since the 10-acre site would remain available for lease, socioeconomic effects would be dependent on the future industrial tenant.	Slight beneficial impact from additional 24 employees/jobs at the Port, about a 1% increase over the current level of 2,600 employees.
Historic and Cultural Resources	No effect.	No historic or cultural resources have been identified on or near the project site.
Native American Concerns	No effect.	No concerns identified.
Land Use	Since the 10-acre site would remain available for lease, land use effects would be dependent on the future industrial tenant.	Development of an undeveloped 10-acre land parcel, currently vegetated with woodlands, grasses, and forbs, for industrial use. Development would be consistent with local planning commissions plans and policies.
Safety and Health	Since the 10-acre site would remain available for lease, safety and health effects would be dependent on the future industrial tenant.	Occupational hazards would exist during facility construction and plant operation. Safety and Health measures established by OSHA would be implemented to protect workers and the public.
Environmental Justice	No effect.	No disproportionate adverse effects on low-income or minority populations.