June 22, 2007

Ms. Karlene Fine
Executive Director
North Dakota Industrial Commission
State Capitol – 14th Floor
600 East Boulevard Avenue – Dept 405
Bismarck, ND 58505-0840

Dear Ms. Fine;

Please consider this correspondence as a letter of commitment to the Northwest Refining Feasibility Study project.

As the President of Northwest Refining, Inc., I can assure you the preliminary feasibility study will be completed according to the project description that is included in this application.

In order to meet the financial requirements of this grant application, Northwest Refining, Inc. will be contributing at least $ 40,000 of the total estimated cost of this project.

If there is any additional information or documentation your office may need to process or review this application, please contact my office at (701) 572-8527.

Sincerely,

NORTHWEST REFINING, INC.

Mel Falcon
President

NORTHWEST REFINING, Inc.

PRELIMINARY ENGINEERING FEASIBILITY STUDY

Applicant:	**Nortwest Refining, Inc.** **Mel Falcon - President** **13988 West Front Street** **Williston, ND 58801**
Principal Investigator:	**Northwest Refining, Inc.** **Mel Falcon - President** **13988 West Front Street** **Williston, ND 58801**
Date of Application:	**June 22, 2007**
Amount of Request:	**$ 40,000**

NORTHWEST REFINING, Inc.
PRELIMINARY ENGINEERING FEASIBILITY STUDY

Table of Contents

NORTHWEST REFINING, Inc.
PRELIMINARY ENGINEERING FEASIBILITY STUDY

Abstract

Objective: The purpose of this preliminary feasibility engineering study will be to explore all of the factors involved in the development, construction, and operation of an oil refinery that would be located near the Williston area.

Expected Results: It is anticipated that the preliminary feasibility engineering study will determine any suitable site location(s) for the proposed oil refinery; a study of the crude oil supply in the Williston Basin; product off-take; the available utility infrastructure; preliminary refinery configuration; and a capital cost estimate of the proposed oil refinery.

Duration: The project is expected to be completed within four (4) months.

Total Project Cost: The total estimated cost of the preliminary feasibility engineering study has been determined to be approximately $ 80,000. Northwest Refining, Inc. is committed to contributing $ 40,000 through its own resources with the balance of the project costs to come from a Oil and Gas Research Council grant, if approved.

Participants: Participants in the project will be the firm of ENGlobal Engineering, Inc. of Houston, Texas and Aqua-Envirotech Mfg., Inc. of Williston, North Dakota.

Project Description

Northwest Refining, Inc., a North Dakota for-profit corporation wholly owned by Mr. Mel Falcon of Williston, proposes to contract with ENGlobal Engineering, Inc. of Houston, Texas for the completion of a preliminary engineering feasibility study. The preliminary engineering feasibility study will explore and research all of the factors and elements involved in the determination of the need for a 50,000 bbl/day oil refinery facility in the Williston area.

Northwest Refinery, Inc., with the assistance of ENGlobal Engineering, Inc., proposes to meet with local utilities to review site characteristics, infrastructure, and area logistics. Once the initial site visit(s) are completed, evaluations will be done to determine potential barriers to the project such as an inadequate amount of water, emission issues, power issues, area traffic logistics, etc. If no barriers are found that could potentially stop the project, the preliminary engineering feasibility study would continue.

The preliminary engineering feasibility study, once completed, proposes to provide the following information:

- A preliminary site evaluation including the logistics, size, and infrastructure
- A preliminary site plot plan
- A fully developed processing unit scheme and preliminary product slate based on crude assay
- A preliminary block flow diagram of refinery configuration
- A preliminary process description
- A preliminary emissions estimate and permitting options

- A preliminary utility flow diagram
- An order of magnitude capital cost estimate of the refinery, including utilities and off sites (tankage). Operational, maintenance, or finance pricing will **not** be included
- A preliminary milestone project schedule

Northwest Refinery, Inc. does not anticipate any kind of environmental or economic impacts during the completion of the study. Soil samples may be taken and test holes for water may be drilled at the site locations depending on the amount of available information from local and state resources and/or agencies. Northwest Refinery, Inc. does not foresee any kind of economic impacts to the area while this project is underway.

If the preliminary engineering feasibility study determines there is a need for a oil refinery in the area, it is the intention of Northwest Refinery, Inc. to proceed with securing the financing and selecting a firm for the planning and design of the oil refinery. Depending on the size of the facility, the economic impacts to Williston and the surrounding area could be immense. During the construction phase of the project, which is anticipated between three to four years, anywhere from 500 to 1,000 new jobs can be created. Once the construction phase is completed and the facility becomes operational, it is estimated that the facility will employ between 250 and 500 full-time employees with salaries that can range anywhere from $ 20 to $ 35 per hour.

Oil prices are at an all time high and the United States is looking at alternatives to buying the bulk of its oil from the Middle East. As each day goes by, the United

States dependence on foreign oil increases. With the development of new technology and the horizontal drilling technique, oil is being extracted from formations that were once thought to be less than marginal in terms of production. In the Williston Basin, the Bakken Formation, depending on which study a person looks at, has the potential of producing 400 to 450 billion barrels of oil if the new horizontal drilling techniques are utilized. There are also other marginal producing formations that are becoming more lucrative due to the horizontal drilling technique. However, even though the drilling activity has increased and the new drilling technique is increasing production, the oil refining capacity in the United States has not increased since the mid 70's. This situation has created a bottleneck in the domestic oil industry of the United States. The refining process cannot keep up with the extraction and production due to the limited number of refineries, transmission pipelines, etc.

Standards of Success

It is hoped that the results of the preliminary engineering feasibility study will confirm what many officials in the local oil industry have been saying for years. That is, the need for new oil refinery capacity in the United States.

The development of a new oil refinery in North Dakota will have a huge impact on the whole state. New, high paying jobs will be created during the construction and operational phase of the project. Depending on the amount and use of byproducts, there is the potential for additional spin-off businesses along with the creation of additional jobs and revenue for the local area and state. With the development of new technology and processes that has taken place in the oil industry over the last

thirty years, some of the additional jobs that will be created will be highly technical and specialized. Along with new businesses and jobs, the local areas and the state will see an increase in tax revenues to the cities, counties, and State. The new wealth may also have the potential of revitalizing some of the small, rural communities in the surrounding area with the addition of new families.

The research and data of the preliminary engineering feasibility study may be used by other potential investors in the private sector looking at financing other oil refinery facilities, transmission lines, etc. in North Dakota; by other oil and energy companies planning to expand their base of operations to North Dakota; by agencies of North Dakota involved with the development of oil and gas resources; by the North Dakota State Legislature in exploring potential incentives to spur additional development in the oil and gas industry within the state; and by the colleges and universities to use as a template and guide to conduct additional studies related to the oil and gas resources within the State.

The success of this project will depend upon the results of the study and any additional action taken based on the results. If the study results are positive, it will enable Northwest Refinery, Inc. to proceed with the next step in the development of an oil refinery in northwest North Dakota. The ultimate goal of Northwest Refinery, Inc. is to plan, develop, and build an oil refinery in northwest North Dakota that will be environmentally friendly, create new jobs and wealth for the surrounding areas, build a facility that future facilities can be modeled after, spur additional exploration and production within the state, and continue to develop the oil and gas resources within the State.

Background/Qualifications

Mr. Mel Falcon is also the owner of Aqua-Envirotech Mfg., Inc. and has over 22 years of experience in the manufacturing, installation, and servicing of water and wastewater treatment systems. Aqua-Envirotech Mfg., Inc. has designed and manufactured systems for municipal, residential, commercial, and industrial applications. Although Mr. Falcon does not have any previous experience in the development of this type of project, he has partnered up with a firm that has a vast amount of experience and expertise in this area. ENGlobal Engineering, Inc. is a leading provider of engineering services and systems mainly in the areas of petroleum refining, petrochemical, pipeline, production and process industries throughout the United States and internationally. ENGlobal's multi-disciplinary engineering services group develops projects from the initial planning phase through detailed design, procurement and construction management. The system group develops, manufactures, installs, and services control and instrumentation systems utilized in various energy and process related industries, and provides services and products that support the advanced automation and environmental technology fields. The company currently employs over 2,200 employees.

ENGlobal Engineering, Inc. is working on and/or completed the following projects:

- Shell/Motiva Refinery – first stage FEL/FEED contract for a $ 1 billion upgrade.
- Motiva Enterprises LLC – performed EPCM services.

- Valero Energy Corporation – included front end engineering, detail engineering, AFE cost estimates, detail design, procurement, and construction management for a sour crude project.
- Catalyst Recovery of LA – included the front end study, scope book, engineering, procurement and construction management for retrofitting existing catalyst handling equipment and adding new equipment and technology to increase production throughput to the No. 4 line.
- Coffeyville Resources Refining & Marketing, LLC – included front end engineering, detail engineering, AFE cost estimates, detail design, procurement and construction.
- Huntsman Corporation – included the completion of a basic engineering package for a new Ethanolamines plant to be built in Thailand.

Additional information on the project summaries of ENGlobal Engineering, inc. is included in the appendices of this proposal.

The key staff from ENGlobal Engineering, Inc. that will be assigned to this project is as follows:

Gary G. Reeves, P.E. – 39 years of experience in process/environmental technology and water treating, including 17 years of field experience in operating facilities. Experienced in design, operation, and permitting of plant utilities/offsites, NOx control, water treating, wastewater treating, petrochemical, specialty chemical, polyolefin, refinery, oil field production, commercial hazardous waste disposal, permitting, design, detail design, and construction of client facilities.

Larry G. Smith – experienced petrochemical and refining manufacturing engineer/manager with particular expertise in ethylene and olefins processes. Comprehensive experience in all aspects of olefins-related process engineering and technical/operations management (including process simulation, fractionation, refrigeration, compression, hydraulics, unit operations and unit startups, process and business optimization, project feasibility and economic studies, project development and management.)

David B. Carpenter, P.E. – over 30 years as an engineer with experience in developing the lubricating base oil processes for Excel Paralubes, performed HAZOP reviews on various projects, and has completed studies analyzing the cost of producing waxes for the domestic producers of wax.

Additional information on the work experience and summaries of the above staff can be found in the appendices of this proposal.

Management

Northwest Refinery, Inc. will require monthly status reports from ENGlobal Engineering, Inc. to evaluate the amount of progress being made on the completion of the preliminary feasibility engineering study. The status reports will be compared to the scope of work to determine the progress, or lack of, in the delivery of services by ENGlobal Engineering, Inc.

Timetable

August 1, 2007	Project Start Date
August 31, 2007	Completion of Site Visits
September 1, 2007	Project Status Report

September 1 – 30, 2007	Conduct research and gather data
October 1, 2007	Project Status Report
October 1 – 31, 2007	Conduct research and gather data
November 1, 2007	Project Status Report
November 1 – 30, 2007	Compile information and complete study
November 30, 2007	Project Completion Date

Budget

OGRC Grant – Salaries/Fringe Benefits	$ 36,083.00
OGRC Grant - Travel	$ 3,917.00
Northwest Refinery, Inc. – Salaries/Fringe Benefits	$ 36,083.00
Northwest Refinery, Inc. – Travel	$ 3,917.00
Total Proposed Cost	**$ 80,000.00**

June 22, 2007

Ms. Karlene Fine
Executive Director
North Dakota Industrial Commission
State Capitol – 14th Floor
600 East Boulevard Avenue – Dept 405
Bismarck, ND 58505-0840

Dear Ms. Fine;

Please consider this correspondence as an affidavit that the business firm of Northwest Refining, Inc. does not owe any outstanding tax liability to the State of North Dakota or any of its political subdivisions.

If there is any additional information or documentation your office may need to process or review this application, please contact my office at (701) 572-8527.

Sincerely,

NORTHWEST REFINING, INC.

Mel Falcon
President

Appendices

Northwest Refinery, Inc. Certificate of Incorporation

Mel D. Falcon – Resume

ENGlobal Engineering, Inc. – Past Project History

ENGlobal Engineering, Inc. – Key Staff Resumes

- **David B. Carpenter**
- **Larry G. Smith**
- **Gary G. Reeves**

State of North Dakota

SECRETARY OF STATE

CERTIFICATE OF INCORPORATION
OF
NORTHWEST REFINING, INC.

Secretary of State ID#: 23,503,800

The undersigned, as Secretary of State of the State of North Dakota, hereby certifies that Articles of Incorporation for the incorporation of

NORTHWEST REFINING, INC.

duly signed and verified pursuant to the North Dakota statutes governing a North Dakota BUSINESS CORPORATION, have been received in this office and are found to conform to law.

ACCORDINGLY the undersigned, as such Secretary of State, and by virtue of the authority vested in him by law, hereby issues this Certificate of Incorporation to

NORTHWEST REFINING, INC.

Effective date of Incorporation: June 13, 2007

Issued: June 13, 2007

Alvin A. Jaeger
Secretary of State

Mel D. Falcon

Position: President and CEO

Mr. Falcon is president and CEO Aqua-Envirotech Mfg., Inc. of Williston, ND, a company that specializes in the manufacturing, installation, and servicing of water and wastewater treatment systems. Mr. Falcon has designed and manufactured systems for municipal, residential, commercial, and industrial applications. He has over 22 years of experience in water and soils related remediation projects.

Skills & Experience

Aqua-Envirotech Mfg., Inc. 1994 to present
Responsible for all day to day and long range planning and decision making.
Duties and experience include:

- General accounting and cost accounting
- Overall management
- New products designing, manufacturing, testing, and implementing
- Welding, painting, fabricating products and machinery
- Estimating and cost analysis of new products and projects
- Personnel management
- Operating machine tools and construction equipment
- Consulting on water and wastewater projects

Fluids Control, Inc. 14 years as Regional and General Manager of the Central Division, Canadian & Alaskan Divisions.

- Responsible for the Williston, ND office and District offices of Gillette (Wyoming), Calgary (Alberta-Canada), and Anchorage & Fairbanks (Alaska)
  - Oversee District Managers
  - Design and manufacture, oilfield water filtration systems, drilling fluids processing systems, soil remediation systems, potable water treatment systems
  - Sales and customer service
  - Construction of plants, tanks, water & wastewater treatment systems
  - Install piping above and below ground
  - Cleanup of oilfield wastes, water, salt and oil spills contamination
  - Solidification of drilling fluid waste pits
  - Recovery of waste oil
  - Filtration of drilling and production fluids
  - Drilling mud processing and pit restoration

TISA Corporation 3 years as finance officer and accountant for a government type of organization. Supervised four accounting staff personnel. Member of Board of Directors

- Responsible for all accounting
- Budgeting
- Personnel manager for 51 employees
- Controlling and managing government contracts

General Construction Reef Development and Murchison Construction of Hawaii, 5 years. Jacob Construction and Commercial Builders of Williston, ND, 8 years. Superintendent and foreman for construction of schools, houses, high rise buildings, shopping centers, and businesses.
Skills include:

- Carpentry
- Masonry
- Steel
- Concrete
- Water & sewer
- Excavating

Bomac Drilling, G & O Roustabout, and Natco, Williston, ND Worked as a general oilfield hand such as:

- Roughneck
- Derrick hand
- Painter
- Sandblaster
- Pipe fitter
- Machine operator
- Steel worker

Education
Bachelor of Science, Business Adm. and Accounting, University of Mary, Bismarck, ND

40 hour hazwoper certification

Organization Participation

- Chairman of Board of Supervisors, Trenton Township ND, 12 years
- Chairman of Board of Directors, Trenton Rural Fire Dept. and volunteer fireman
- Member of School Board, Trenton Public School
- Member of Williston, ND Chamber of Commerce
- Member of National Federation of Independent Businesses
- Member of Montana Rural Water Association

GARY G. REEVES, P.E.

MANAGER PROCESS ENGINEERING

BACKGROUND SUMMARY

Mr. Reeves has 39 years of experience in process/environmental technology and water treating, including 17 years of field experience in operating facilities. He has also spent over two years of his engineering and construction experience in the field either participating in start ups or expanding existing facilities. He is a experienced in design, operation, and permitting of plant utilities/offsites, NOx control, water treating, wastewater treating, petrochemical, specialty chemical, polyolefin, refinery, oil field production, commercial hazardous waste disposal, permitting, design, detailed design, and construction of client facilities.

Mr. Reeves is ENGlobal's Manager of Process Engineering, responsible for the process portion of projects and environmental portions of projects from the proposal phase through project completion. He is also responsible for obtaining operational permits and preparing Environmental Impact Assessments (EIA) as required. He is experienced in permitting, design, detailed design, and construction of client facilities.

His expertise in water treating includes: complete raw water treatment, boiler feedwater treatment, cooling water systems and water treatment for reuse. He has commercial and industrial waste disposal experience in pretreating biological treatment, recovery, filtration, sludge processing, stripping and evaporation. Mr. Reeves also has experience in permitting, design and operation of industrial and commercial hazardous waste disposal facilities. His offsite experience includes tankage, fire water loops, oil water separation, sewer systems, cooling towers, loading facilities, mixing ponds, pH control, sour water stripping and fuel gas systems.

EDUCATION

University of Michigan, Michigan
BSChE, 1968
C.S. Mott College, Michigan
Associate in Science, 1963

PROFESSIONAL REGISTRATIONS

Texas Professional Engineer License #44569 (Chemical Engineering)

PROFESSIONAL AFFILIATIONS

American Institute of Chemical Engineers

PROJECT EXPERIENCE

The following list of projects includes, but is not limited to, home office and in-plant assignments completed.

- **Regulatory permitting**
  Directed permitting efforts for air and water, both for domestic plants and overseas plants. He prepared permit applications and EIA's for large polyolefin complexes, small specialty chemical plants, refineries, oil

field production, stabilization, LNG vaporization terminals and pipeline projects. His permitting experience includes working with consultants plus modifying designs so facilities would be under PSD limits or a non-major source allowing them to be constructed under a permit amendment.

- **Environmental studies and models**
  Performed and consulted on many environmental studies and preformed computer modeling. The studies range from small single-problem studies to full detail environmental impact assessments for large, complex processing plants. On large projects, he directed a team effort to run several air dispersion and dense phase models to generate isopleth maps showing resultant plant emissions. Air emissions modeling ranges from screening models to full US EPA ISC models. He has also completed several hazardous chemical release and flare radiation studies using PHAST. He has prepared several air permits incorporating this data.

- **Refinery experience**
  Completed many refinery projects including both offsite facilities and process designs. His range of experience extends from small studies to complete plant expansions involving many processing units. He concentrated on flare systems, relief load calculations, utility and offsite facilities design, drainage systems, and process modifications which helped the offsite facilities costs and reduced the environmental problems.

- **Utilities and offsite facilities designs**
  Numerous utilities and offsite facilities designs and modifications have been designed and operated by Mr. Reeves over the last 39 years. The projects include all aspects of utility and offsite facilities including firewater supply systems, tankage, loading and unloading, compressed air, cooling water, nitrogen generation, steam networks, topping turbines for power generation and steam let down, raw water treating, and wastewater treating. The projects he designed range from small revamps to large grassroots chemical complexes and cover many types of facilities from chemical plants to refinery and oil field production sites.

Confidential Client Site selection study

Evaluated two potential sites for a new chemical plant based on waste disposal options, environmental requirements and available infrastructure at each site. This resulted in follow up assistance with permitting at the chosen site for both an air permit and waste disposal well permit amendment.

Exxon Neftegas Project Services Sakhalin Island, Russia Odoptu project

Exxon Neftegas Project Services Odoptu project Sakhalin Island, Russia. Prepared a preliminary Environmental Report which included quantifying all the air emission point sources, including several options on the types of drivers to reduce pollution. The air emissions were modeled in Houston and in Russia by AGRA consulting using the Russian Prizma dispersion model The Russian results were compared and presented as a comparison to the screening results and presented in the Environmental Report. An Environmental matrix was generated to look at the impacts and options for reducing environmental impacts from the project. Several options were looked at and presented to reduce the environmental impact to the area. An ecological review meeting was held with the Exxon project team to present the environmental options.

Conoco Syria DEZ Gas Project:

Detailed engineering design of a DEZ Gas Project located in the Eastern desert of Syria. The project includes six (6) compression stations, five (5) gathering stations and pipelines, and a 460 MMSCFD gas plant. Scope included redesigning the raw water and wastewater treating facilities to provide workable facilities that would supply adequate quality water for the plant and wastewater suitable for discharge. The gas plant is designed to recover, fractionate, store and export approximately 12,000 BPD LPG and 36,000 BPD of hydrocarbon condensate products. A part of the residue gas (150 MMSCFD) is compressed and routed to a new pipeline for export. The excess gas is re-injected back into the gas field. The project also includes all the offsite facilities required for the operation of this stand-alone gas plant: Refrigeration, Hot Oil, Fuel Gas, Flare, Diesel, Fire Protection, Fire & Gas Detection, Water Treatment, Wastewater Treatment, Truck Loading and Unloading, Chemical Injection, Plant air and Instrument air, Blowdown and Drain systems. The project also includes all administration, maintenance, living quarters and control buildings and their associated sanitation systems.

Cerro Negro Project - Heavy oil production and shipping facilities
Mobil/PDVSA Partnership, Caracas, Venezuela

Performed an environmental due diligence review of the oil production, collection, field processing, pipelines, upgrader plant, and shipping of heavy oil for the Cerro Negro Project. The review included all current Environmental conditions, design and construction and potential future environmental liabilities. The review was preformed by reviewing the project documents and interviewing the project personnel to determine what the design would and would not include.

Wastewater Characterization and Treatment Plant Design
Kuwait National Petroleum Company, Mina Al-Ahmadi Refinery, Kuwait

As part of the Multi Project Development at KNPC, sampled and characterized the wastewater produced by the existing facilities as well as the proposed new facilities. He lead a team of engineers and the plant personnel in a task force to assure that the results produced from the plant laboratory for wastewater treating tests are reliable and repeatable for the test period and beyond. The team conducted a 2.5 month sampling and testing effort that resulted in a complete characterization and water balance for the entire refinery complex including the additional units that are planned for KNPC. The efforts coordinated the preparation of the personnel in Kuwait to assure that everything required to conduct the testing was either completed or available when the sampling team arrived. The treatment design reused as much of the existing wastewater treatment equipment as possible, and modified the system where required to provide the most economical system that would consistently produce compliant wastewater discharge from the refinery.

Drainage Upgrade
Saudi ARAMCO, Riyadh, Saudi Arabia

Designed upgraded drainage facilities to provide adequate oily water, firewater, and stormwater drainage for the Riyadh refinery. The project included a new API separator, several lift stations, and segregated clean and oily water sewer systems for a zero discharge refinery. The project also included studies on the condition and improvements on the evaporation pond operation. The condition of the existing API separator was also evaluated and studied as to the requirements for making it operational. Due to his efforts a drainage system that

accomplishes the project goals, reduces pollution levels, and allows recycling of the clean stormwater was designed at a reduced cost to the client.

Value Engineering, Clean Fuels Project-Offsites -
Shell Oil Company, Martinez, California

Participated in the Value Engineering Analysis Team of the process flow diagrams for facilities to support the planned new process units at Shell Oil Company's Martinez Manufacturing Complex located in Martinez, California. Contributed cost/benefit analysis on environmental, utilities, and offsite facilities. Mr. Reeves was able with his background and experience not influenced by the clients engineering standards and practices to provide a fresh look at the systems involved in the analysis. The team developed thirty two cost saving design alternatives into proposals.

LARRY G. SMITH

PRINCIPAL PROCESS ENGINEER

BACKGROUND SUMMARY

Experienced Petrochemical and Refining Manufacturing Engineer/Manager with particular expertise in Ethylene and Olefins processes. Comprehensive experience in all aspects of olefins-related process engineering and technical/operations management (including process simulation, fractionation, refrigeration, compression, hydraulics, **unit operations and unit startups**, process and business optimization, project feasibility and economic studies, project development and management.) Proven leader that effectively interacts with personnel across all levels of an organization.

EDUCATION

Washington State University
Bachelor of Science in Chemical Engineering, 1969
Chevron
Extensive company-sponsored training including programs in Leadership, Management, Project Management, Quality Principles and Tools, Ethics, Diversity and Safety.

PROJECT EXPERIENCE

The following list of projects includes, but is not limited to, home office and in-plant assignments completed.

Technical Consultant to Petrochemical and Refining Industries
(Process Engineering and Operations)

- Provided process/operations technical expertise to help develop and evaluate new technologies and engineering software products for use in the energy industry (i.e., petroleum refining, petrochemicals, chemicals, and other related processes). Determined potential markets and provided technical assistance in the marketing of these products.
- Evaluated and provided technical assistance in the development, marketing and utilization of engineering based software for QMC (Quality Monitoring and Control Company).
- Provided technical evaluation and determined potential markets for Accrutru International's innovative "High Temperature, Self-Verifying Sensor System". The system is now successful in the ceramics industry and has great potential for use in high temperature ethylene cracking furnaces.

GULF OIL COMPANY (SRC Project)
Project Management Coordinator - Solvent Refined Coal (SRC) Project
Coordinated the efforts of the operations group, engineering design group and others with project management for the design and construction of a plant that would convert coal to a liquid fuel oil.

CENEX Petroleum Refinery
Operations Superintendent
Managed the process unit operations of the 45,000-barrel per day refinery. Units included naphtha and mid-distillate hydro-treaters, FCC, alkylation, C4 isomerization, sulfur recovery and supporting facilities.

Engineering and Operations Assignments
Managed the design, construction and startup of a 15,000 barrel per day Naphtha Reformer. Project was completed on schedule and within budget.

UNIVERSAL OIL PRODUCTS (UOP)
Refinery Process Units Start-up Engineer
Training and unit start-up assignments in Illinois, Montana and Canada

CHEVRON CHEMICAL COMPANY
Olefins Technical Superintendent
(Process Engineering Department)

Directed the process engineering services for the Cedar Bayou Complex with thirty process engineers. Three groups provided the process engineering functions for the complex's units (Olefins, Utilities, Intermediate Polyolefin's, Low and High density Polyolefin's).

- Managed an ethylene/propylene capacity expansion that eliminated cracking furnace and fractionation bottlenecks. Increased ethylene capacity by 300 million pounds per year and propylene 100 million pounds.
- Directed the project management of a grassroots Polyolefin's Unit and the preliminary development of a grassroots Intermediate Polyolefin's Unit.
- Instrumental in promoting and implementation of a computer control system resulting in optimization of furnace throughput and yields and maximum ethylene production. Annual savings ranging from $7million to $12million.
- Implemented the development and growth of the department from a limited group of eight engineers to a group of thirty engineers providing full range of process engineering services for the facility.
- Led the development of an Engineering Training Program for new Engineers with the assistance of Chevron University.
- Instituted a cultural change in supervision and management methods by following the guidelines set forth in a Reinforcement Based Leadership Program.

Olefins Senior Staff Engineer (Kingwood Technical Center)
Provided comprehensive technical services (process engineering and operations assistance) to the Olefins Facilities at Baytown and Port Arthur, Texas.

- Completed a feasibility study and prepared a budget estimate for a major ethylene capacity expansion of the Port Arthur, Texas facility.
- Developed a preliminary process design, cost estimates and economic evaluation of the e ethylene expansion project that eventually resulted in an ethylene capacity increase of more than fifty per cent.

Process Engineering Supervisor
Directed the Ethylene and Utilities Process Engineering Group at the Cedar Bayou Petrochemical Complex. Approximately 1.2 billion pound per year ethylene unit, utilities included the water and waste water treatment facilities, all steam production facilities (400, 700,1500 psi boilers).

- Directed the development of a computer model (includes feedstock product yields, a unit material/energy balancer, and unit cost analyzer) that resulted in significant cost saving from improved energy efficiency and optimized feed slate selection.
- Actively involved in operations optimization and troubleshooting.
- Led the group in the development and implementation of a major debottleneck project resulting in ethylene capacity increase of over 200 million pounds per year.
- Directed studies of the large compression systems (cracked gas, ethylene and propylene refrigeration) resulting in modifications that led to major energy savings.
- Led a study to determine the feasibility of a power co-generation study unit.
- Implemented a major project to increase propylene by ~100,000 pounds per year.

DAVID B. CARPENTER, P.E.

PRINCIPLE PROCESS ENGINEER

EDUCATION
Rice University, Houston, Texas
Bachelor of Arts, 1962

Rice University, Houston, Texas
Bachelor of Science, Chemical Engineering

Marshall University, Huntington, West Virginia
Master of Business Administration, 1969

PROFESSIONAL REGISTRATIONS
Licensed Professional Engineer, P.E. #40067, State of Texas

PROFESSIONAL/TECHNICAL TRAINING
Lube Oil and Wax Processing Technology – Refining Process Services, 1995

PROFESSIONAL AFFILIATIONS
American Institute of Chemical Engineers
South Texas Section of AIChE
Commercial Development and Marketing Association

PUBLICATIONS
"Uses of Custom Processing" – *Chemical Engineering Magazine*, 1977

PATENTS
US 3,689,404 with LJE Hofer
US 3,697,414 with EA Thompson
US 3,835,183 with JW Mittendorf

PROJECT EXPERIENCE
The following list of projects includes, but is not limited to, home office and in-plant assignments completed.

January 1992 – May 1999

Served on the team than developed the lubricating base oil process for Excel Paralubes. This process had three distinct areas that ran concurrently.

> ***Distillation*** – Cut three different crude oils into three different cuts by vacuum distillation. A light and a heavy Arabian crude, and a heavy Mexican crude were all cut to determine the yields and to produce the feedstock for further processing. The distillation produced 5 cuts, three of which were suitable for producing 100, 300, and 600 SUS (Saybolt Universal Seconds) viscosity base oils. The light ends were suitable for diesel fuel, and the heavy ends were only suitable for residual fuel. A two vacuum column system was used in the process. The light ends,

and the 100 SUS viscosity cut was produced in the first pass through the system. The bottoms from the first pass was redistilled to produce the 300 and 600 SUS viscosity products, and the residual oil material.

Hydrocracking – Hydrocracked each of the three cuts from each of the three crude oils was processed to produce a hydrocrackate. The processing was done over a Ni-Mo catalyst at approximately 3000 psi, and 650 °F and an LHSV (Liquid Hourly Space Velocity) of about 1. The target VI (viscosity index) was 100 SUS in each case. Each of the crude oils was evaluated on the yields of the various cuts, the overall yield from the crude, and the quality of the products produced.

Dewaxing – The Hydrocracked products were dewaxed, using the Chevron Isodewaxing® process. This process utilized a zeolite catalyst. This catalyst broke pieces off the straight chain paraffin, but unlike traditional dewaxing processes, it reattached the shorter chain to the side of the longer paraffinic chain, making an isoparaffin. The composition of the catalyst was proprietary. The process was still run under fairly severe conditions (~ 1000 psi, 650 °F) The advantage of this process in that it has a much higher yield than traditional catalytic dewaxing, and that the reformed paraffin molecules had a high VI.

Process Hazards Analysis - Led the HAZOP team that reviewed the pilot plant units involved in this project. Assembled the team. Assembled the P&IDs for each of the three units involved. Led the review HAZOP review and wrote the report on the findings of the team.

When the crude and catalysts were selected, production runs were made to generate enough material for engine testing, using the standard Pennzoil additive package. Overall yields and product quality information were provided to the Pennzoil process engineering group for detail process design.

April 1997 – May 1999

White Oil Manufacture by Hydrogenation - Led a project to perform a process variable study on the production of white oils by hydrogenation. The process was run at about 2000 psi and 600 °F over a nickel catalyst. Designed the experiments to find the correct set of conditions for the production of white oils from lube oil base oils by hydrogenation. Ran the experiments and reported the results. This project showed that hydrogenation was both technically and economically preferable to the existing sulfuric acid treating and partial hydrogenation / sulfuric acid treating processes, but that for Pennzoil, the advantages were not great enough to justify the capital expenditure required.

June 1996 – September 1997

Diolefin Hydrogenation - Led a project to demonstrate a process for hydrogenating the diolefins in catalytically cracked gasoline to monoolefins, using reactive distillation technology. The process was reviewed, and the feedstock matching the expected commercial feed for the pilot runs was obtained. This process had two advantages in that it would process light cat cracked gasoline continuously during distillation before the diolefins had an opportunity to polymerize, and that it tended to produce higher value pentenes that could used to produce high octane alkylate. Worked with the technology supplier in planning and making pilot runs at their site. Analyzed the data from the pilot runs, and reported the results to the Pennzoil process design group. Participated in the start up of the commercial unit start up at the Pennzoil Shreveport refinery to assure that the plant was started up and operated properly.

February 2006 – March 2007

Fluid Catalytic Cracker Incident - Investigated the cause and origin of a fire that occurred during the restart of a Fluid Catalytic Cracking Unit after a forced shut down for Hurricane Rita. Determined that there were two separate incidents during the shut down and restart, and that only one of them had a causal effect on the fire. During the course of the

investigation, it was determined that there were ten events in the chain of events that led from the root cause of the incident to the fire.

March 1998 – September 1998

Diesel Fuel Catalytic Dewaxing and Desulfurization - Led a project for the catalytic dewaxing of diesel fuel at the Pennzoil Shreveport refinery. This was a stacked bed process that both catalytically dewaxed and desulfurized the diesel fuel. The desulfurization catalyst also hydrogenated the olefins that were created in the catalytic dewaxing bed, so that the overall process was slightly exothermic. A process variable study was run in the pilot plant to establish the operating conditions for the process. This process was transferred to the Shreveport refinery. The start up and initial runs in the refinery were supervised to assure that everything operated properly.

April 1995 – October 1995

Dewaxing Processes & Costs - Investigated the cost of producing waxes for the domestic producers of wax. Constructed a cost curve for paraffin waxes, showing the volume of waxes and the cost for producing the waxes by producer. This analysis enabled my employer to assess their cost position within the market. It was necessary to study and evaluate the Texaco and Dilchill™ processes for dewaxing oil and deoiling wax to complete this study.

March 2005 – Three weeks

Hydrocracker Incident - Investigated the cause and origin of an overheating incident that led to the catastrophic failure of a Hydrocracker reactor. Determined that the reactor had been fed olefinic oil in the presence of hydrogen and catalyst during the start up of another unit operated from the same control room. The olefins reacted, increasing the temperature of the reactor to the point that the metal in the reactor failed, causing the reactor body to bulge and rupture, leading to a fire.

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CLIENT	***PROJECT***	***ENGLOBAL'S SCOPE OF WORK***
Shell/Motiva Refinery	Crude Expansion OSBL	ENGlobal has recently been awarded the first stage FEL/FEED contract for a major refinery upgrade at Shell/Motiva's Port Arthur refinery. The project will involve increasing capacity of the refinery from 300,000 barrels per day to 600,000 barrels per day with total installed cost expected to exceed $3.5 billion dollars. Kellogg Brown & Root has been awarded the onsite front end loading work, while ENGlobal's contract covers front end loading for all offsite facilities. ENGlobal's scope will include the following: • New Central Control Building with all associated DCS connections from the new process units as well as from the old units. • New pipe racks for transfer lines, utilities, and product lines throughout the entire refinery. • Demolition and relocation of old facilities. • New water treating plant and API separators. • New cogeneration facilities. • Sulfur Recovery and Tail Gas Treating process units. • Gas treating process units. • New power distribution in conjunction with another subcontractor. • Relocation and design of new storage tanks. ENGlobal's portion of the work covers approximately one billion dollars of new and revamped facilities. The front end development effort will involve approximately eighty (80) ENGlobal people and will be completed mid-year 2006. Assuming approval of the project, ENGlobal will continue on with detailed design, procurement, and construction management of the required facilities.
Motiva Enterprises LLC	Power Station 3 Instrumentation Modernization	ENGlobal is performing EPCM services for this $27 Million project. ENGlobal began the FEED/FEL phase for this project in June 2004 and was awarded the project upon client approval in February 2005. The scope includes modernization of a water plant with eight demineralization trains, boiler house with four gas fired and two heat recovery steam generators with supplemental firing and power generation facilities including three steam turbine generators and two gas turbines.

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Valero Energy Corporation Ardmore, OK	Sour Crude Project	Project scope included: front end engineering, detail engineering, AFE cost estimates, detail design, procurement, and construction management. Project included the replacement of naptha hydrotreater reactors and installation of chloride scrubber, installation of cat feed hydrotreater 4th reactor and 3rd hydrogen make-up compressor, a sulfur recovery unit including tail gas amine treating unit, two asphalt loading spots and loading pump, installation of a new 13.2 KVA power feed with step down transformers and MCC, and all associated piping, valves, instrumentation and controls.
Catalyst Recovery of LA Lafayette, LA		No. 4 Rebuild Project. Front end study, scope book, engineering, procurement and construction management for retrofitting existing catalyst handling equipment and adding new equipment and technology to increase production throughput to the No. 4 line. The controls for the new equipment were integrated into the existing control system. The control room for the plant was also reworked.
Coffeyville Resources Refining & Marketing, LLC Coffeyville, KS	Ultra Low Sulfur Diesel Project	Project scope included: front end engineering, detail engineering, AFE cost estimates, detail design, procurement, and construction. Project included a grass root 23,000 bpd HDS unit including a new flare, revamp of the existing 24,000 bdp HDS unit, revamp of the Unifiner, a grass root 60 LTP Sulfur Plant, a grass root 20 MMSCFD hydrogen plant, the addition of an amine contactor, a 3rd cooling tower bay, a new feed line and its associated pumps, a 12.47 KV power distribution system, and all associated OSBL including piping, valves, instrumentation and controls.
Huntsman Corporation	Thai Olefins Ethanolamines Plant	Project scope includes: producing a complete Basic Engineering Package for a new Ethanolamines plant to be built in Thailand, owned and operated by the Thai Olefins Company. Huntsman Licensing Technology, Performance Products Group has sold a license for proprietary technology to TOC, and as part of the signed agreement, must provide a complete BEP package within six months. ENGlobal began this project in early September and plans to finish the package by late February 2006. Process engineering is producing new PFD's and P&ID's, Equipment Data Sheets, and a Preliminary Plot Plan, among other deliverables, based on a similar facility that Huntsman operates in Port Neches, Texas. The final package will be delivered to the Thai Olefins Company, which will issue it for EPC bidding and ultimately, an EPC contract.

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Safra Company Limited	Naptha and Aromatics Complex	Project scope of work includes the development of the FEED Package and process package for this grassroots project which consists of four main processing units, two offsite units and other combined facilities such as a central control room, instrument air compressors, etc. The four main process units to be installed are: • Naphtha Hydrodesulphurization (HDS) Unit • Continuous Catalytic Reformer (CCR) Unit • Extractive Distillation (ED) Unit • Zeoformer Unit In addition to the four major units, there will also be a small sour water stripper unit, and a sour gas treating unit. The main products from this complex are propane, butane, benzene, toluene, mixed xylenes and motor gasoline.
TOTAL, Port Arthur, TX Refinery	NAC Revamp	Project Scope included: FEED Package for a revamp of the Naptha and Aromatics Complex which included upgrades of equipment in three unites: Naptha Hydrodesulphurization (HDS), Continuous Catalytic Reformer (CCR) and the BTX Unit. This project resulted in upgrades to numerous pumps and heat exchangers in addition to retraying of 2 distillation towers, installation of a Packinox exchanger in the CCR Unit and a total revamp of the CCR Furnace and Air Preheater system.
TOTAL, Port Arthur, TX Refinery		Project scope included: FEED package for a new 8 MMSCFD refinery sour gas compressor system. The old compressor was poorly designed and undersized resulting in fines due to flaring and several serious safety incidents including one explosion. ENGlobal determined the full range of sour gas composition that would be possible at the compressor from all the refinery units feeding it. Many different operating and upset scenarios were studied to make sure the compressor could perform under all conditions. The project was funded and ENGlobal also performed the detailed design, DCS configuration, wrote the operating procedures, etc. The project was built and successfully started up with the new compressor system able to handle large swings in molecular weight, flow, etc. without tripping offline.
Client Information Confidential	Flue Gas Scrubber & Waste Heat Recovery	Project scope of work included: front end engineering, AFE cost estimates, procurement, and field support. Units included: two CO boilers, a flue gas scrubber and dearator / demineralizer / boiler feed water pumps, two steam turbine generators, hydrogen unit modifications, DCS upgrade, and all associated piping, valves, instrumentation and controls.

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BASF Fina Limited Partnership	Steam, Demineralized Water and Condensate Study	Project scope included: Performed a study to determine where bottlenecks would occur in the TOTAL (Fina) Refinery after the startup of the BFLP Steam Cracker, Condensate Splitter Unit (CSU) and the SABINA C4 Complex. The study included a complete steam, condensate and demineralized water balance for the entire refinery / petrochemical complex. Several options for debottlenecking the system were presented. The study resulted in production of a FEED package for funding of the modifications needed that were agreed upon by BASF, Fina and **Shell**. This project was on a very fast track and successfully installed with no interruptions to intended operations. ENGlobal also performed the resulting detailed design which included the following to be installed in the TOTAL Refinery: Boiler Feedwater pump, BFW control valve trim changes at FCCU, new demineralized water train, new high pressure deaerator, new sand filter and several pump upgrades.

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REFINERY FEED PACKAGE EXPERIENCE MATRIX	SCOPE/SCHEDULE A												
Client/Project	Site Investigation	Feasibility Analysis	Capital Budgeting	Economic Evaluations	AFE Documentation Preparation	Process Flow Diagrams	Heat & Material Balance	Process Simulation	P&IDs	Equipment Data Sheets	HAZOPs & PSM	Equipment Specifications	Cost Estimates
ATOFINA Petrochemicals, Inc. Condensate Splitter	X		X	X		X	X	X	X	X	X	X	X
ATOFINA Petrochemicals, Inc. Sour Gas Compressor Upgrade	X	X	X			X	X	X	X	X	X	X	X
ExxonMobil Refinery Alkylation Upgrade					X	X	X	X	X	X		X	X
ExxonMobil Refinery Coker Unit / Crude Unit Hydraulics								X		X			
ATOFINA Petrochemicals. Inc. Refinery Flare Gas Recovery	X	X						X	X	X	X	X	
ATOFINA Petrochemicals, Inc. Asphalt Blending Facilities	X	X				X	X	X	X	X	X	X	X
Alon, U. S. A. (Big Spring Refinery) Gasoline Desulfurization Unit	X	X				X			X	X		X	X
Mobil Chemical Environmental Compliance/Beaumont Tx					X			X	X	X		X	X
Star Enterprise Wastewater Project/Pt Arthur, Tx	X					X			X	X		X	
Mobil Oil Process Control Project/Beaumont, Tx									X	X		X	X
Mobil Oil Expansion Project/Beaumont, Tx									X	X		X	X
Mobil Oil Gasoline Blending/Beaumont, Tx									X	X		X	X
Lyondell-Citgo Refinery Refinery Conversion/Houston, Tx									X	X		X	X
Exxon Refinery Process Engineering/Baton Rouge. La								X	X	X			X
TransAmerican Refining 150,000 bbd Expansion/Norco, La					X								X
Chevron Chemical Cyclohexane Unit/Pt Arthur, Tx									X	X	X	X	X
TransAmerican Refining Dehydrogeneration Unit/Norco, La						X		X	X				
Sinclair Refinery Plant Shutdown Compliance Study/OK		X											
Sinclair Refinery Penex, Isom, & Poly Unit DCS Study/OK		X											
Valero Energy Corporation Sour Crude Project/Ardmore, OK	X	X	X	X	X	X	X	X	X	X	X	X	X
Client Information Confidential Flue Gas Scrubber & Waste Heat Recovery	X	X	X	X	X	X	X	X	X	X	X	X	X

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2. In terms of working with Shell in the past we have several projects that come to mind. All of the following were performed using Shell's DEP standards.
   a. Shell Yellowhammer in Alabama – Gas processing plant and a sulfur removal plant.
   b. Shell Belpre in Ohio – A complete upgrade to the instrumentation and controls system.
   c. Shell Deer Park in Texas – Refinery metering project along with other controls and instrumentation.
   d. Shell Petronas in Malaysia – OGP being the prime we used the DEP for our portion of the overall facility engineering and design.

Further work which ENGlobal has performed for Shell includes but is not limited to the following:

SHELL DIVISION	***UNIT***	***ENGLOBAL'S SCOPE OF WORK***
Shell Chemical Co. Deer Park, TX		Process unit modification (confidential).
Shell Oil Company Geismar, LA		Series of modernization projects to convert the Shell Geismar Plant from pneumatic controls to Honeywell TDC Distributed Controls. The projects were phased over a 7 year period to minimize impact on Shell. On each of these projects, responsibility included development of the AFE estimate submitted for funds allocation, and conduct of the engineering, design, procurement, and construction management. Home office construction support was provided on an as-need basis.
Shell Chemical Company Geismar, LA	Olefins	Branched Olefins - Neoflex 9 Project. Facilities modification to produce new product with an existing process unit including raw material receiving, storage, product storage and shipping by truck, rail or barge. 60,000+ home office manhours.
Shell Oil Norco, LA	Catalytic Cracking Unit	Catalytic Cracking Unit (CCU) Energy Conservation Project. Project undertaken to reduce energy consumption and increase the temperature and quantity of heat recovered in the fractionation section of the plant. 219,000 manhours (65,000 home office, 154,000 field).
Shell Chemical Co. Geismar, LA	C_{10} Alpha Olefin	C_{10} alpha olefin recovery unit and offsites; and P,C C_{16}/C_{18} alpha olefin separation unit and offsites (modifications of existing process units to new services).
Shell Chemical Co. Geismar, LA		Offsite facilities.
Shell Chemical Co. Geismar, LA	Ethylene Oxide/Ethylene Glycol	Ethylene oxide/ethylene glycol unit. High pressure steam generator.

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Shell Chemical Co. Geismar, LA	Alpha-Olefins	A major debottlenecking and operability project on the first installation of Shell's Higher Olefin's Process for the production of alpha-olefins. Additions included expanded purification and isomerization beds, expansion of the regeneration system, and modification to the catalyst preparation and separation facilities. Also, heat transfer additions and modifications were made to the feed, intermediates and products areas.
Shell Chemical Co. Geismar, LA	Heat Recovery	Unit Waste Heat Recovery Project.
Shell Chemical Co. Geismar, LA	M-Unit	M-Unit Dual Rundown Project.
Shell Chemical Co. Geismar, LA		Utilities computer system monitor and reports on all plant utilities and provide control on a number of loops.
Shell Chemical Co. Geismar, LA		Miscellaneous offsites including compressor installations, rail and truck loading facilities, tankage and piping systems.
Shell Chemical Co. Geismar, LA	Ethylene Oxide Alpha Olefin	Miscellaneous projects including ethylene oxide unloading and tie to storage facility, pressure swing absorption hydrogen unit; alpha olefin catalyst residue storage, drumming and truck loading station.
Shell Chemical Co. Geismar, LA	Ethoxylation	Batch process unit addition to ethoxylation plant including offsites.
Shell Chemical Co. Geismar, LA	Neodol® Ethoxylates	Two "grass roots" batch-type process units to manufacture biologically degradable Neodol® ethoxylates; approximate capacity 250 million pounds annually.
Shell Chemical Company Geismar, LA	Olefin	AO/ID-1 Modernization Project. Modernization of instrumentation/control system for two olefin units. Performed the architectural design for enlargement and renovation of existing control building to accommodate new control system consoles, control equipment racks, and computer equipment. Design included installation of redundant air conditioning systems, dehumidification equipment, and air filtration equipment. Also provided construction management for installation of new instrumentation/control system, and hot cutover from the existing pneumatic system to the new electronic system. CM responsibilities also included control building addition and renovations.

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Shell Chemical Co. Houston, TX	Ethylene Oxide/Ethylene	Ethylene oxide/ethylene glycol offsites facilities at Geismar, LA plant including nitrogen and oxygen systems, raw water (river system, process and shipping tankage, ethylene system, fire protection system, boiler (200,000 lb/hr) and steam system, water treating facilities and inter-unit ties.
Shell Oil Norco, LA	Residue Catalytic Cracking Unit	Residue Catalytic Cracking Unit (RCCU) Offsites Project. Offsites installation encompassing 16 operating units which were all ultimately connected to the new RCCU. 325,000 home office manhours.
Shell Oil Company Norco, LA	Coker	Coker Revamp Projects consisting of blowdown recovery, modernization and debottlenecking and computer control. Significant items of work included: new coker charge heater, jet pump, new steam-air decoking shutdown header, coke drum bottom head handling facilities, replacement motors to critical equipment, control room modifications for new instrument panel, installation design for new VAX/DEC computer system and spare computer system, and power supply and distribution system. All work designed and constructed during normal plant operations.
Shell Oil Company Norco, LA		Norco Effluent Treatment (NET) Project. Project undertaken to allow the discontinuation of deep well disposal of sour water and various other effluent streams. Prepared scope definition package for comprehensive sour/non-sour waste water collection and treatment system from both refinery and chemicals operations for the entire Norco manufacturing complex. Scope included collection and segregation of streams, organics, and solids separation by CPI, IGF and DAF processing, sludge handling, sour water stripping and biological treatment. Definitive detail scope package was prepared for the solicitation of Lump Sum E,P,C proposals and included demolition definition, P&ID's, plot plan and general arrangements, equipment list, equipment specifications, all project specifications, electrical one-line, instrument list, instrument specifications, etc.
Shell Chemical Co. Norco, LA		Miscellaneous modifications of on-site and site facilities.
Shell Chemical Co. Norco, LA		Process unit modification (confidential).
Shell Chemical		Major upgrade to batch process surfactants plant, all process sections, utilities, controls, power, safeguards, product & send out.

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Shell Oil Company Norco, LA	C-Unit	C-Unit protective instruments project. A two stage reactor was added to the air conditioning system by others. The Class I shutdown system for the C-Unit interfaced with this work and picked up new solenoid valves, TDC alarms, transmitters and switches. Other shutdown valves were also added to the Class I shutdown systems in chlorine, nitrogen purge and AC service.
Shell Oil Company Norco, LA		Capital Improvements Projects. Series of capital improvement and maintenance projects performed for the OL-5 Unit and RCCU Turnarounds and other plantwide improvements over a two year period.