

EXHIBIT A:

**Application for Billings County Building
and Zoning Certificate and Conditional
Use Permit**



March 22, 2016

Ms. Stacey Swanson
Tax and Zoning Director
Billings County Planning and Zoning Department
Tax Equalization & Zoning Office
Billings County Courthouse
495 4th Street
Post Office Box 247
Medora, North Dakota 58645

Dear Ms. Swanson:

Meridian Energy Group, Inc. is pleased to submit the attached **Application for Building & Zoning Certificate** and the **Application for Conditional Use Permit** for the proposed Davis Refinery Project near Belfield, North Dakota. Meridian is seeking an Industrial Zoning Certificate and a Conditional Use Permit to construct the Davis Refinery, an approximately 55,000 barrel per day petroleum refinery. The Refinery will be constructed in two phases, with the initial design capacity of the Refinery being 27,500 bpd capacity.

The Applications have been prepared in accordance with the information requirements outlined within the Billings County Comprehensive Plan, Section B, paragraph ii – The Energy Industry, and Section C – Future Growth in Billings County, and Billings County Zoning Ordinance Article V: Zoning District Regulations, Section 5.5 Industrial District Purpose, and Section 5.5.2 - Conditionally Permitted Uses, Subsection e), and Article VII: Administration and Enforcement, Section 7.3 – Conditional Use Permits. In this regard, the attached Survey, Site and Location Maps were prepared by SEH Engineers Inc., Bismarck, North Dakota, (www.sehinc.com) and the Site Plan and General Plot Plan were prepared by the Houston offices of Vepica USA, Inc. (www.vepica.com/home/en), on behalf of Meridian.

Using state-of-the-art operating and controls technology, the proposed Davis Refinery will refine, once fully installed, approximately 55,000 barrels per day of a variety of locally produced crude oils brought to the facility by pipeline, truck and rail. Refined products include gasoline, diesel, jet fuel, heating oil, as well as lesser-known products such as lubricants, asphalt base, ethane for plastics, waxes and other specialty chemicals. The initial phase of the Refinery will focus on the production of jet fuel, diesel fuel and other distillate products, primarily for local markets.

The Applications' attachments in Exhibit J include environmental review reports from SEH Engineers (1) to assess the suitability of the Project site from a soils, geologic hazards, and flooding perspective, (2) to assess the impact on biological resources in the vicinity of the Project site, including potential environmental impacts from constructing and operating the refinery, (3) to assess cultural and

MERIDIAN ENERGY GROUP, INC.

Thomas Williams – Executive Vice President, Planning and Permitting
151 Kalmus Drive, Suite E-140, Costa Mesa, California 92626
707.299.0182 (c) - 949.207.3815 (o) - 949.207.6550 (f)
twilliams@meridianenergygroupinc.com
www.meridianenergygroupinc.com



paleontological resources and wetlands, and (4) visual impact mitigation attainment. These reviews will be used in the design phase of the refinery to minimize environmental impacts, including noise, light, and so forth. Exhibit J also includes a Memorandum from SEH that addresses the manner in which Meridian will mitigate construction period impacts.

The Refinery will employ up to 500 people at the peak of the construction period, and full-time permanent employment is expected to be approximately 150 – 200 people. A refinery job creation report from the state of Washington is attached as Exhibit K which concludes refinery employment creates total permanent employment, including indirect and induced jobs, equal to over twelve for each direct refinery employee. Pursuant to the Billings County Comprehensive Plan, “maintaining the energy industry in Billings County is of utmost importance to the citizens of the County and the County itself.”

State-of-the-art refinery safety equipment and technology will be utilized during construction and operation of the refinery. During construction, all local, state and federal construction site requirements will be met, such as, but not limited to, storm-water runoff control, erosion and sediment control, wash water control (concrete, tools, equipment), wastewater control (portable toilets) and dust and weed control, and site safety and security.

Meridian is requesting that Billings County provide, as part of its approval of the permits and approvals requested herein, the ability of Meridian to begin limited site work on the Project so that the Project does not lose this coming summer as part of the construction schedule for the Project. The work that would be initiated this summer would include grading and earthwork, work on rail sidings and switches, and construction of the agricultural visual buffer that Meridian will be designing with help from a local University. We have learned from Craig Thorstenson, Environmental Engineer for the North Dakota Department of Health, Division of Air Quality that all sources requiring an air quality permit can begin grading and site construction prior to receiving the air quality permit.

Meridian has entered into an agreement with BASIC Equipment, Inc. (www.basic-equipment.com), a Houston based turnkey engineering, procurement and construction firm to serve as its contractor for the refinery, and Vepica USA will continue as the Project’s engineer

Meridian would like to arrange to meet with you in the near future to discuss the Project in greater detail and address any questions concerning the Project that you may have based upon your review of the Applications. Please call me if you have any questions or comments in the interim.

Sincerely,

MERIDIAN ENERGY GROUP, INC.

Tom Williams
Executive Vice President, Planning & Permitting



MERIDIAN ENERGY GROUP, INC.

**Application for Building
and Zoning Certificate**

and

**Application for
Conditional Use Permit**

for the

DAVIS REFINERY PROJECT

**SUBMITTED TO THE BILLINGS COUNTY
PLANNING AND ZONING DEPARTMENT
TAX EQUALIZATION AND ZONING OFFICE**

MERIDIAN ENERGY GROUP, INC.

Corporate Offices: 51 Kalmus Drive, Suite E-140, Costa Mesa, California 92626
949.207.3815 (o) 949.207.6550 (f) www.meridianenergygroupinc.com

THE DAVIS REFINERY PROJECT

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Exhibit A – Application Forms for Building and Zoning Certificate and the Conditional Use Permit

- 1. Billings County Application for Building and Zoning Certificate**
- 2. Billings County Application for Conditional Use Permit**
- 3. Billings County Weed Control Plan**

BILLINGS COUNTY

APPLICATION FOR BUILDING & ZONING CERTIFICATE

TAX EQUALIZATION & ZONING OFFICE
PHONE: (701) 623.4810 • FAX: (701) 623.4761
495 4TH STREET • PO BOX 247 - MEDORA, ND 58645-0247
stswanson@nd.gov jpemberton@nd.gov

APPLICATION: _____

DATE ISSUED: _____ EXPIRES: _____

REVISED 5/2015

INSTRUCTIONS:

1. For new buildings and additions to existing buildings, complete entire form
2. Include all necessary drawings in the space provided and attach any house plans, surveys, etc. to the application
3. Return completed application and fees to the Tax Equalization & Zoning Office before proposed upcoming zoning meeting which is posted at <http://www.billingscountynd.gov/BillingsCountyZoning.htm>

CERTIFICATE FEES, CHECK ALL THAT APPLY:

- \$ 750 Zoning Application Fee*
 - \$ 250 Conditional Use Permit*
 - \$ 200.00..... Temporary Use Permit
 - \$ 200.00..... Variance
 - \$ 200.00.....Change in Zoning District
- \$ 1200 Total Paid Receipt: _____

*Fees vary by Zoning District. See Billings County Fee Structure for Planning & Zoning Applications.

Make Check Payable to: Billings County

LOCATION OF PROPOSED STRUCTURE:

Rural Billings County
Address: See attached Exhibit F

APPLICANT INFORMATION*: Name: Meridian Energy Group, Inc. - Executive Vice President Tom Williams
Mailing Address: 151 Kalmus Drive Suite E-140
City, State Zip: Costa Mesa, CA 92626
Phone Number: 949-207-3815 Cell: 707-299-0182
Email: twilliams@meridianenergygroupinc.com

*If applicant is not the owner of record, enclose a letter from the owner stating concurrence of this action for the proposed use of the property.

TYPE OF PERMIT:

- Zoning Certificate
- Zoning Change from Agricultural and Residential to Industrial
- Variance RequestedA variance is needed if the building proposal does not meet ordinance requirements and cannot reasonably be changed to meet standards. See Billings County Ordinance 7.4
- Conditional Use.....A conditional use is permitted in a district specifically permitting it, subject to the approval of the County Commission and only when the commission finds that such use meets all applicable, including but not limited to those contained in this ordinance. See Billings County Ordinance 7.3

ESTIMATED VALUE OF CONSTRUCTION AND IMPROVEMENTS: \$ Up to \$850 mm

LEGAL DESCRIPTION OF BUILDING SITE: * **See attached Exhibit F**

Lot: * _____ Block: * _____ Subdivision: * _____
Qtr/Qtr: * _____ Section: * _____ Township: * _____ Range: * _____

PARCEL NUMBER: _____ - _____ - _____ - _____

BILLINGS COUNTY

APPLICATION FOR BUILDING & ZONING CERTIFICATE

PROPOSED ACTION:

- New Construction
- Addition to Existing Structure
- Move-In Structure
- Shelterbelt

PROPOSED USE: PLEASE CHECK ALL THAT APPLY

- Residential
- Commercial
- Storage
- Recreational
- Garage
- Mobile Home Park
- Agricultural
- Industrial
- RV Park

PROPOSED INTENDED ACTION WILL BE USED BY:

- Owner
- Immediate Family Member of Owner
- Hired Hand
- Leased or Rented by the owner to: _____
- Other, please explain: _____

Note: If the intended use of this property changes, you are required to notify the Zoning Administrator and may need to rezone to comply with the change.

CONSTRUCTION TYPE:

- Wood Frame
- Wood Pole Frame
- Steel Frame
- Masonry or Concrete
- Dirt Floor Concrete Floor
- Mobile Home: Year: _____ Make & Model: _____
Serial #: _____

APPLICANT COMMENTS OR FURTHER INFORMATION:

Complete industrial facility - 27,500 barrels per day initial phase, 55,000 barrels per day final phase, crude oil refinery and associated buildings and structures.

DIMENSIONS OF STRUCTURE(S): *See attached Exhibit I

USE: * _____ * _____ X* _____ NUMBER OF STORIES: * _____ WALL HEIGHT: * _____

USE: * _____ * _____ X* _____ NUMBER OF STORIES: * _____ WALL HEIGHT: * _____

SIDING TYPE: * _____ INSULATION: Yes No

ROOF COVERING: * _____ INSULATION: Yes No

FOUNDATION TYPE: * _____ DEPTH: 8 Feet 4 Feet Concrete Slab

BASEMENT: Yes No TOTAL BASEMENT SQUARE FOOTAGE: * _____ FINISHED SQ FT: * _____

ELECTRICITY: Yes No

HEATING SYSTEM: Yes No TYPE: * _____

AIR CONDITIONING: Yes No TYPE: * _____

NOTE ON RESIDENTIAL DEVELOPMENT:

No lot shall contain more than one principal single family residential building, and no dwelling unit shall be built on a lot which does not abut a dedicated public right-of-way.

BILLINGS COUNTY

APPLICATION FOR BUILDING & ZONING CERTIFICATE

PAGE 4

HIGHWAY & LOT LINE SETBACK REQUIREMENTS:

All buildings or structures shall adhere to the following public road or highway setback requirements:

- 1) The minimum setback for buildings from the centerline of all section lines and the center line of county roads shall be one hundred three (103) feet.
- 2) The minimum setback for buildings from the centerline of all state highways shall be two hundred fifty (250) feet.
- 3) The minimum setback for tree plantings from all section lines and the centerline of county roads shall be one hundred three (103) feet.

AGRICULTURAL DISTRICT: MINIMUM LOT SIZE: 5 acres FRONT: 75 feet SIDE: 25 feet REAR: 25 feet

RESIDENTIAL DISTRICT SETBACKS: FRONT: 75 feet SIDE: 10 feet REAR: 25 feet

Note: Accessory buildings shall be smaller than the principal building and shall be limited to fifteen (15) feet in height and be located at least ten (10) feet from all lot lines.

APPLICABILITY OF HILLSIDE AND RIDGELINE GUIDELINES

The provisions of this section (according to 5.6.1 of the Billings County Zoning Ordinance) shall apply to any application for a land use permit or subdivision on land that meets either of the following two conditions:

- (1) Any portion of the building envelope that includes slopes in excess of fifteen (15) percent;
- (2) Land that is located on or within fifty (50) vertical feet of the elevation of any prominent ridgeline. Lands that meet either of these two provisions are herein referred to as hillside land or ridgeline land, respectively.

Prominent Ridgeline Defined

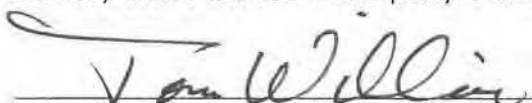
A prominent ridgeline shall be defined as any ridgeline, as viewed from any point along a designated major roadway corridor which create a silhouette with the sky. The currently designated roadway corridors are Interstate 94, including all business loops and US Highway 85, and all county roadways. Other potential major roadway corridors from which to identify prominent ridgelines, whether existing or proposed at the time a subdivision or land use permit application is submitted, may be designated by the Planning and Zoning Board during the development review process. These new major roadway corridors shall then establish view points from which to identify prominent ridgelines.

APPLICANT COMMENTS/FURTHER INFORMATION: (ATTACH SHEET IF NEEDED)

For additional information, see attached maps, surveys, and reports.

I the undersigned applicant for a permit do hereby attest that the information contained in this application is truthful and correct to the best of my ability. I further agree to comply with all building codes and standards as regulated by the State of North Dakota, and the requirements and conditions of this permit, and the zoning ordinance of Billings County.

I understand that any inappropriate use of this permit may cause me to be required to pay a penalty. I certify that I am the Property Owner Construction Contractor hired by the owner.


Tom Williams
March 23, 2016
 Signature of Applicant Printed Name of Applicant Date

A Scale Drawing must be submitted showing the dimensions of all structures on lot & distance from lot lines & setback requirements. Attach additional sheets if needed. Also include photocopies of all existing floor plans, site plans, surveys, etc with the application.

PLOT PLAN

LOT REAR

See Exhibit I and
attached maps,
surveys, and reports.

LOT FRONT

Information Needed on the Plot Plan: In order to help your permit process go as quickly as possible, the following information must be clearly shown on your Plot Plan, even if it is not to scale:

- | | |
|---|---|
| <input checked="" type="checkbox"/> North Arrow | <input checked="" type="checkbox"/> Proposed Structure(s), with Dimensions |
| <input checked="" type="checkbox"/> Adjacent Streets & Approach | <input type="checkbox"/> Existing Structure(s), with Dimensions |
| <input type="checkbox"/> Setbacks | <input checked="" type="checkbox"/> Septic tank, drainfield, & distance from structures |
| <input checked="" type="checkbox"/> Easements | <input checked="" type="checkbox"/> Water well or SW water line |
- Show the distance from the proposed structure to your property line in all four directions.
- Also include photocopies of all existing floor plans, site plans, surveys, etc with the application.

BILLINGS COUNTY

APPLICATION: _____

APPLICATION FOR CONDITIONAL USE PERMIT ISSUED: _____ EXPIRES: _____

REQUIREMENTS OF ORDINANCE 7.3

REVISED 07/2015

Applications will be reviewed by the Zoning Director, followed by a public hearing before the Zoning Board and final action will be made by the Billings County Board of Commissioners. Fee: \$ _____ Paid: _____

APPLICANT*: Name: Meridian Energy Group, Inc. - Executive Vice President Tom Williams
Mailing Address: 151 Kalmus Drive Suite E-140
City, State Zip: Costa Mesa, CA 92626
Phone: 949-207-3814 Cell: 707-299-0182 Email: twilliams@meridianenergygro

*If applicant is not the owner of record, enclose a letter from the owner stating concurrence of this action for the proposed use of the property.

OWNER: Same as above Name: Greg Kessel ; Bonnie L. and Donald Heiser

LEGAL DESCRIPTION OF PROPERTY: * See attached Exhibit F

Lot: * _____ Block: * _____ Subdivision: * _____
Qtr/Qtr: * _____ Section: * _____ Township: * _____ Range: * _____
Parcel Number: _____ - _____ - _____ Acreage: * _____

CURRENT ZONING:

Agricultural Residential Recreational Commercial Industrial

Current Use: Existing Farmstead

Proposed Use: Crude oil refinery and associated structures.

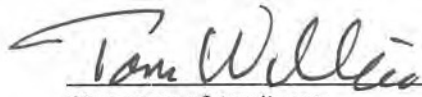
The proposed use is Conditionally Permitted in the following Zoning District under Section _____

Agricultural Residential Recreational Commercial Industrial

Please state in detail the reason for applying for this Conditional Use Permit (attach additional sheets if needed):
See attached documents.

I the undersigned applicant for a permit do hereby attest that the information contained in this application is truthful and correct to the best of my ability. I further agree to comply with all building codes and standards as regulated by the State of North Dakota, and the requirements and conditions of this permit, and the zoning ordinance of Billings County.

I understand that any inappropriate use of this permit may cause me to be required to pay a penalty.



Signature of Applicant

Tom Williams

Printed Name of Applicant

March 22, 2016

Date

March 22nd, 2013

Stacy Swanson
Director, Tax & Zoning
Billings County Planning and Zoning Department
Billings County Courthouse
495 4th Street, P.O. Box 247
Medora, North Dakota 58645

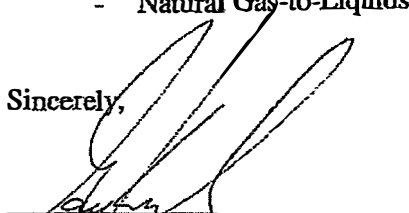
Dear Ms. Swanson:

I hereby give my authorization and concurrence to Billings County Planning and Zoning Department for any re-zoning, conditional use permits or building permits applied for by my land optionee, Middletown Farm & Cattle, Co., LLC, or its nominees or assignees.

This authorization and concurrence extends to the parcels of my land currently under option for any of the following projects or uses applied for and ultimately permitted by Billings County Planning and Zoning, and by any of the various State of North Dakota governmental agencies having jurisdiction;

- Oil Field Services & Storage
- Oil Field Transportation Facility
- Railway Transload Facility
- Crude Oil Refinery
- Natural Gas-to-Liquids Refinery

Sincerely,



Greg Kessel

March ~~13~~, 2016

Stacey Swanson
Director, Tax & Zoning
Billings County Planning and Zoning Department
Billings County Courthouse
495 4th Street, P.O. Box 247
Medora, North Dakota 58645

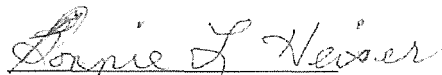
Dear Ms. Swanson:


I hereby give my authorization and concurrence to Billings County Planning and Zoning Department for any re-zoning, conditional use permits or building permits applied for by my land optionee, Meridian Energy Group, LLP., or its nominees or assignees.

This authorization and concurrence extends to the parcels of my land currently under option for any of the following projects or uses applied for and ultimately permitted by Billings County Planning and Zoning, and by any of the various State of North Dakota governmental agencies having jurisdiction;

- Oil Field Services & Storage
- Oil Field Transportation Facility
- Railway Crude-by-Rail Transload Facility
- Rail Car and Truck Maintenance & Repair
- Crude Oil Refinery
- Natural Gas-to-Liquids Refinery

Sincerely,


Bonnie L. Heiser


Donald Heiser

APPLICATION: _____

CONDITIONAL USE PERMIT REVIEW

BILLINGS COUNTY ORDINANCE DEFINITION OF CONDITIONAL USE: The development and administration of this Ordinance is based on the division of the County into districts within which the uses as land and buildings are mutually compatible. However, there are certain uses which, because of their unique characteristics cannot be classified as unrestricted permitted uses in any particular district or districts without consideration in each particular case of the impact of those uses upon adjoining lands or public facilities. Such uses nevertheless, may be necessary or desirable in a particular district provided that due consideration is given to location, development and operation of such uses.

No conditional use permit shall be recommended by the Planning and Zoning Board or approved by the Commission unless the applicant shall have met all the following criteria:

1. Is proposed conditional use detrimental to or does it endanger the public health, safety, comfort or general welfare? _____ If yes, please explain.

2. Does the proposed conditional use substantially impair or diminish the value and enjoyment of other property in the area? _____ If yes, please explain why and who opposes.

3. Does the proposed conditional use impede the normal orderly development of the surrounding property? _____ If yes, please explain.

4. Are adequate utilities, access roads, drainage or other necessary site improvements being provided? _____ If no, please explain.

5. Have adequate measures been taken to provide ingress and egress to the property without adverse effects on the adjoining properties and traffic congestion in the public street? _____ If no, please explain.

6. Does the proposed conditional use conform to all applicable regulations of the district within which it is located? _____ If no, please explain.

RECOMMENDATION TO THE PLANNING & ZONING BOARD FROM THE ZONING DIRECTOR

Approve Deny Modify Conditions Imposed Date of Public Hearing: _____

APPLICATION: _____

ACTION AND RECOMMENDATION BY THE COUNTY PLANNING & ZONING BOARD

Approve Deny Modify Conditions Imposed Date of Public Hearing: _____

Modifications:

1. * _____
2. * _____
3. _____

Conditions:

1. _____
2. _____
3. _____

ACTION BY THE BOARD OF COUNTY COMMISSIONERS

Approve Deny Modify Conditions Imposed Date: _____

Modifications:

1. _____
2. _____
3. _____

Conditions:

1. _____
2. _____
3. _____

WEED CONTROL PLAN

TO BE SUBMITTED WITH ZONING APPLICATION: _____

BILLINGS COUNTY WEED CONTROL BOARD
PO BOX 168 - MEDORA, ND 58645-0168
PHONE: (701) 575.2215
Website: www.bcwcb.com Email: bcweed09@live.com

INSTRUCTIONS:
Include photos or a map of the property
Contact the BCWCB for approval of plan

APPLICANT: Name: Meridian Energy Group, Inc. - Executive Vice President Tom Williams
Phone: 949-207-3814 Cell: 707-299-0182 Email: twilliams@meridianenergygroupinc.com

OWNER: Same as above Name: Greg Kessel ; Bonnie L. and Donald Heiser

LEGAL DESCRIPTION OF PROPERTY: Parcel Number: _____ - _____ - _____ - _____
Lot: * _____ Block: * _____ Subdivision: * _____ Acreage: * _____
Qtr/Qtr: * _____ Section: * _____ Township: * _____ Range: * _____
Existing Land Use: _____ Proposed Land Use: _____ * See attached Exhibit F

The applicant and all interested parties will cooperate to monitor and control the following invasive and noxious weeds as prescribed by the ND Century Code and Billings County:

- Canada Thistle
- Diffuse Knapweed
- Leafy Spurge
- Musk Thistle
- Purple Loosestrife (Lythrum)
- Russian Knapweed
- Spotted Knapweed
- Yellow Toadflax
- Absinth Wormwood (American or common wormwood, mugwort, madderwort, or wormwood sage)
- Dalmatian Toadflax
- Salt Cedar
- Hoary Cress (white top)
- Field Bindweed (creeping jenny)
- Houndstongue
- Black Henbane
- Common Burdock (wild rhubarb)

Method of Control: Mechanical Chemical _____ Biological Other _____
(Check all that apply) (Herbicide)

Area(s) of Concern & Type of Weeds:	Acreage	Method of Control	Date Treated

Tom Williams
Signature of Applicant

March 22, 2016
Date

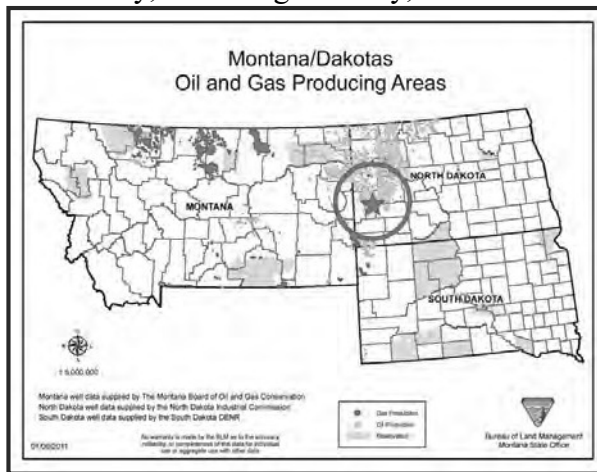
Signature of BCWCB Officer

Date

Exhibit B – Overall Project Description

The Davis Refinery Project

Meridian Energy Group, Inc. ("*Meridian*" or the "*Company*") is a closely-held South Dakota corporation formed to build and operate the Davis Refinery ("*Davis*" or the "*Refinery*"), a phased approximately 55,000 bpd high conversion crude oil refinery, in Billings County, North Dakota, in the heart of the Bakken Formation (see maps below). The majority of the oil being produced in the Bakken is transported to distant refineries, and products consumed in the area are imported all the way back. By building the Refinery near the source of crude oil, the Company can take advantage of low-cost sources of crude oil as feedstock and natural gas as refinery fuel. The Refinery will also benefit from a transportation cost advantage for its refined products.



Meridian will build and operate the Refinery on a 708-acre site in Billings County, North Dakota, just west of the town of Belfield (*the "Site"*). The Site was selected because it is close to the major oil and gas producing operations of the Bakken, is in close proximity to major north-south and east-west highways, adjacent to oil and gas pipeline gathering systems and to the Burlington Northern Santa Fe ("*BNSF*") primary rail line that runs through the property.

Meridian is designing and building the Refinery in two phases. Phase 1 will be an approximately 27,500 bpd facility focusing on the production of Jet Fuel and Auto Diesel using a combination of local crudes as feedstock. In Phase 2, Meridian will increase the capacity of the Refinery to 55,000 bpd at a higher complexity, producing a full slate of refined products including LPG, Gasoline, Jet Fuel, Auto Diesel and Fuel Oil.

Project Impacts

As expected in the case of any substantial industrial facility, the Refinery will have a number of impacts on the surrounding community and environment. These impacts, the Company's planned mitigation measures, and the relevant documents included herein, can be summarized as follows:

Air Emissions – Phase 1 of the Refinery will be a Minor Source of air emissions. The Company is preparing its application for a Permit to Construct for submittal to the State of North Dakota, Department of Health, and expects to submit that application during April 2016. A copy of that permit application will be provided to Billings County when submitted.

Water Consumption – The Facility is expected to utilize less than 100 gallons per minute of water, and is exploring a number of different sources, including the use of local municipal wastewater for process makeup water. Once the design of the Refinery and the discussions with various potential

sources of water have been completed, Meridian may be submitting a water allocation application with the appropriate Agency.

Wastewater Discharge – The Refinery will treat its wastewater and will be complying with all applicable regulations regarding discharge. The Refinery will be applying for the appropriate wastewater permits from the State of North Dakota Department of Health.

Community Impacts – The Refinery will employ up to 200 persons when completed. As indicated in the documentation included as Exhibit K hereto, a multiple of total employment to direct employment can be as high as 12:1, meaning total employment as a result of the Refinery will be as much as 2,400 (see also Exhibit J). This will result in substantial demands on community services in the area. When Meridian first began working on this project, the oil and gas boom was in full swing, and housing and community services were sorely pressed. Meridian has been informed, and believes it to be true, that since drilling activity has been reduced over the past two years this situation has been reversed, and in fact additional employment and fuller use of community services would be welcome in the area.



Construction Period Impacts – During construction, approximately 400 to 500 workers will be employed at the site, and will require local housing, but current hotel and apartment vacancies in the area indicate that there is sufficient availability to accommodate the work force. Other construction impacts include those associated with activities at the site, including dust and noise. The construction impact mitigation measures that will be implemented at the Refinery are typically addressed in detail as specific construction permits are obtained, but have been outlined in general in Exhibit J hereto.

Visual Impacts – Meridian is aware of the sensitive nature of the area in which the proposed Project is to be located, including the proximity of the Theodore Roosevelt National Park, and has taken steps to reduce visual impact to a minor level. This includes the use of minimal plant lighting at night (but within applicable safety standards), and the proposed installation of an agricultural buffer consisting of berms and trees placed around the North and West sides of the Project process areas. With respect to this Buffer, Meridian has requested that North Dakota State University develop a plan for developing detail plans for the buffer and assistance in implementing and

maintaining this feature of the Project. As shown in Exhibit G hereto, the Project will not be visible from the Park.

Public Health, Safety, Comfort, General Welfare – Meridian has taken steps, as described herein, to substantially mitigate the adverse impacts of the Project on the surrounding area, including air quality (permit application for Permit to Construct from North Dakota Department of Health will be submitted within 30 days), typical construction period impacts (dust, noise, weed control, traffic), water quality and visual impacts. In addition, the overall socioeconomic impact of the Project should be a positive one, with substantial job creation to promote the general welfare of the surrounding community.

Value and Enjoyment of Other Property in the Area – The Project can be expected to increase the value of other property in the area by providing more general rail, power and other utility access to other commercial and industrial uses, and by attracting compatible industrial process units. For example, Meridian has received inquiries from agricultural chemicals firms, brewing companies, and others interested in locating facilities nearby once the Project is in operation.

Impede Orderly Development of Surrounding Property – As described above, the Project should promote the value of surrounding properties and promote additional development in specialty agricultural, commercial and industrial uses.

Adequacy of Utilities, Access Roads, Drainage, Other Site Improvements – The Project will be entering into a tariff arrangement with Roughrider Electric Cooperative, Inc. for the supply of electric power to the Project, with Montana-Dakota Utilities for the supply of natural gas to the Project, and will be entering into other arrangements (including wastewater treatment arrangements with local communities) for the supply of water. Drainage from the site will be fully contained and controlled and will be established early during on-site activities, and local access roads will be improved and maintained to avoid road damage and traffic problems during construction and operations.

Ingress and Egress to Property Without Adverse Impact to Surrounding Properties – The Project is planning on paving and otherwise improving the surrounding roads that provide access to the Property, and to collaborate with Billings County, Stark County, and the City of Belfield on traffic studies and requirements for employee ingress and egress. Truck traffic associated with the supply of crude oil and transportation of refined products will be minimized in favor of rail and pipeline transportation.

Conditional Use Conformance to Applicable Regulations of District – The Project complies with the relevant regulations of the district, including, but not limited to, the following: (a) as a refinery, it is a permitted use in an industrial district; (b) the Project complies with such regulations as parking regulations, and such performance standards as incorporating a buffer strip, and having no open storage within 100 feet of residential units; (c) the lot area is well over five (5) acres; (d) the Project complies with all setbacks and other layout requirements; and, (e) the property boundary enclosing the Project is well over 1,250 feet away from any residential districts (Belfield city limits).

Exhibit C – Refinery Process and Operations Description

Once it is fully constructed and operational, the Refinery will utilize conventional distillation and high-conversion technology to process feedstock crude oils into a full slate of refined products. Meridian intends to install and operate the Refinery in phases, with the initial phase designed to process up to 27,500 bpd of crude oil feedstock to produce primarily Jet Fuel and Auto Diesel. The Refinery will be brought to full capacity in the second phase, at which time it will process up to 55,000 bpd of crude feedstock into a full slate of refined products including LPG, Gasoline, Jet Fuel, Auto Diesel, and Fuel Oil. The process for the full 55,000 bpd Refinery is described below.

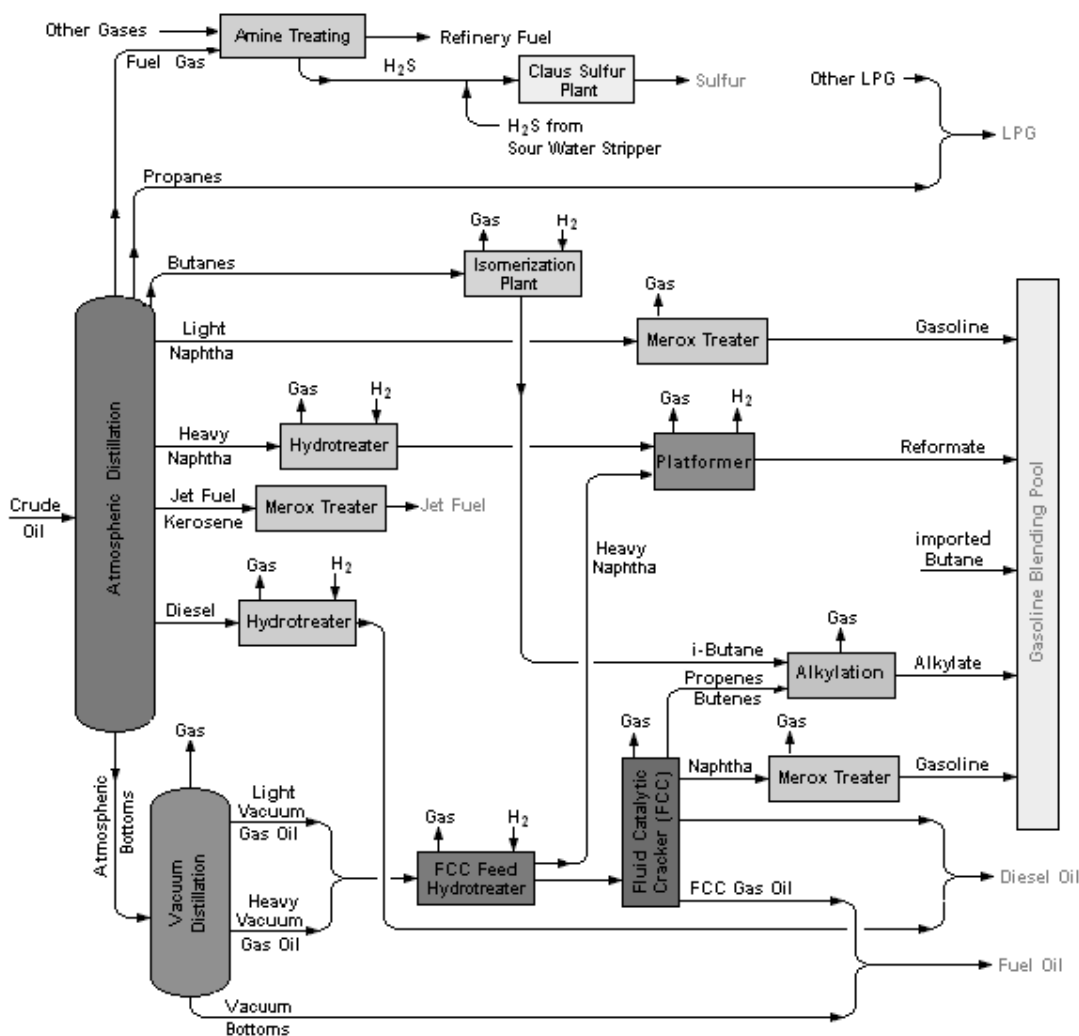
Feedstock to the refinery will be delivered via a combination of pipeline and rail and pumped into storage tanks. From the storage tanks crude oil will be fed to Crude Atmospheric Distillation Units to separate feedstock into Naphtha, Kerosene and Diesel which will be sent to other units for further processing. From the overhead hydrocarbon liquid product of the atmospheric units Fuel Gas, Propane and Butane will be obtained. Butanes from the atmospheric distillation units will undergo further processing in the Isomerization and Alkylation units to obtain alkylate for the gasoline blending stock. Crude residues from the atmospheric distillation units will be sent to a vacuum distillation unit for further fractionation.

Intermediates from the vacuum distillation are sent to a Hydrotreating and a Fluid Catalytic Cracking (FCC) Units for conversion into lighter products such as LPG, gasolines, light cycle oil, and decant oil. Gasoline from the FCC Unit will be further treated in a Merox Unit prior to being sent to the gasoline blending stock.

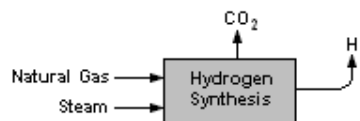
Light Naphtha from the atmospheric distillation units will undergo further processing through a Merox unit to meet gasoline blending specifications. Heavy Naphtha from the atmospheric distillation units will pass through a Hydrotreater prior to being combined with heavy naphthas produced in the FCC Hydrotreater. The combined naphtha streams will be fed to two Platformer Units that will process the low-octane components to obtain higher octane reformat to be used in gasoline blending. The Kerosene cut from the atmospheric distillation unit will be further processed in the Jet/Kerosene Merox Unit to meet Jet Fuel product specifications. The Diesel cut will be sent through a middle distillate Hydrotreating Unit where sulfur and nitrogen are removed to produce finished product.

To support the plant's main processes an amine unit will remove H₂S from plant offgas streams, a hydrogen unit will process amine-treated offgases to generate high purity hydrogen, and a sulfur recovery unit will convert removed H₂S to elemental sulfur. Ancillary equipment for the refinery will include utilities such as Fresh Water, Fire Water, Cooling Water, Demineralized Water, Steam Generation, Condensate, Plant Air, Instrument Air, Electrical Distribution and Emergency Power Generation, Stormwater and Waste Water Treatment. A tank farm will include incoming feedstock tankage as well as refined product storage. Loading facilities will include accommodations for both truck and rail transportation. Refinery buildings will include the main control room, administrative offices, and maintenance shop and warehousing.

Simplified Block Diagram for Full Refinery Buildout



- Finished products are shown in blue
- The "other LPG" entering the LPG pool includes all the LPG streams from the various process units
- The "other gases" entering the gas processing unit includes all the gas streams from the various process units



Simplified Block Diagram for Phase 1 Davis Refinery

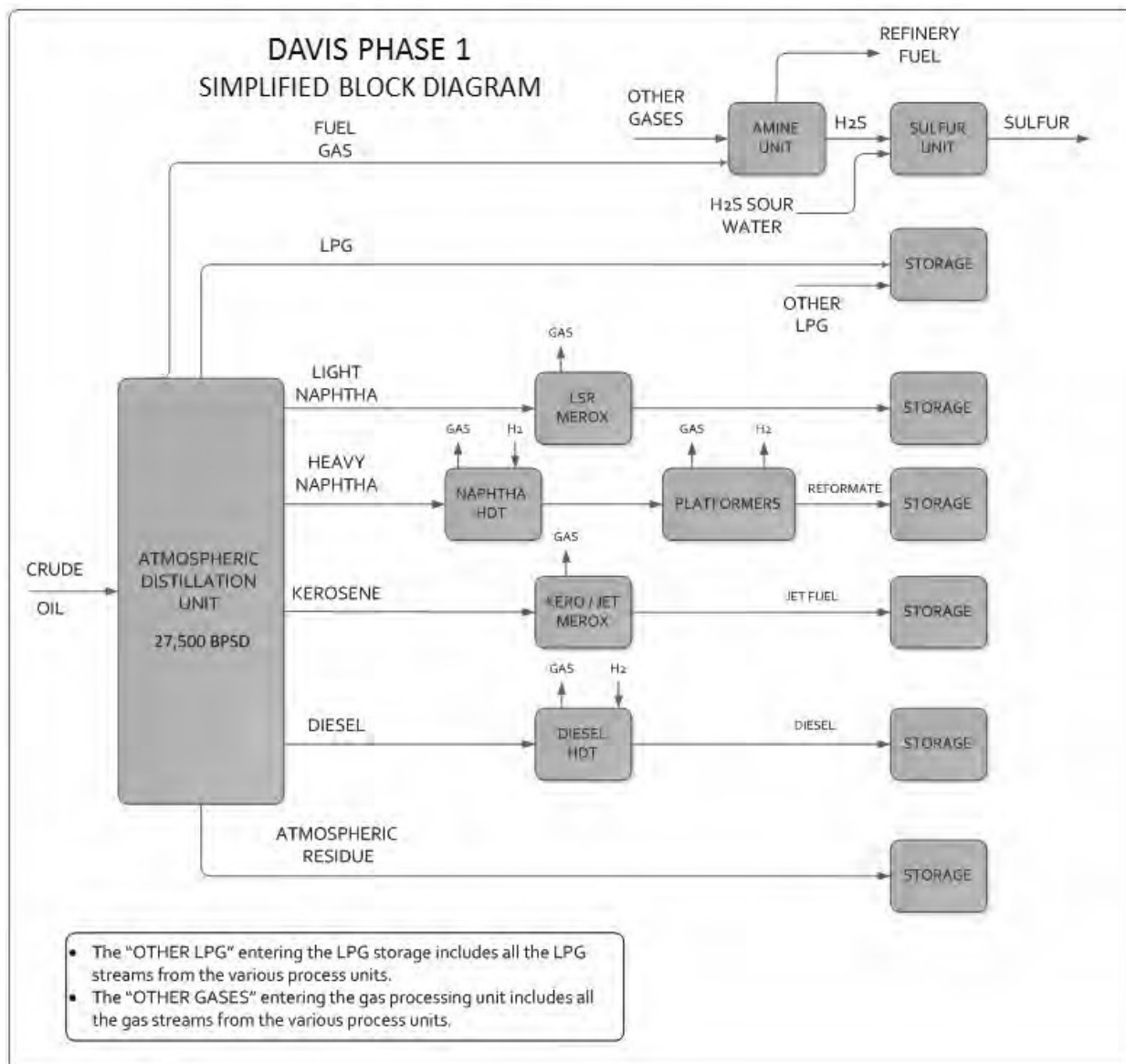
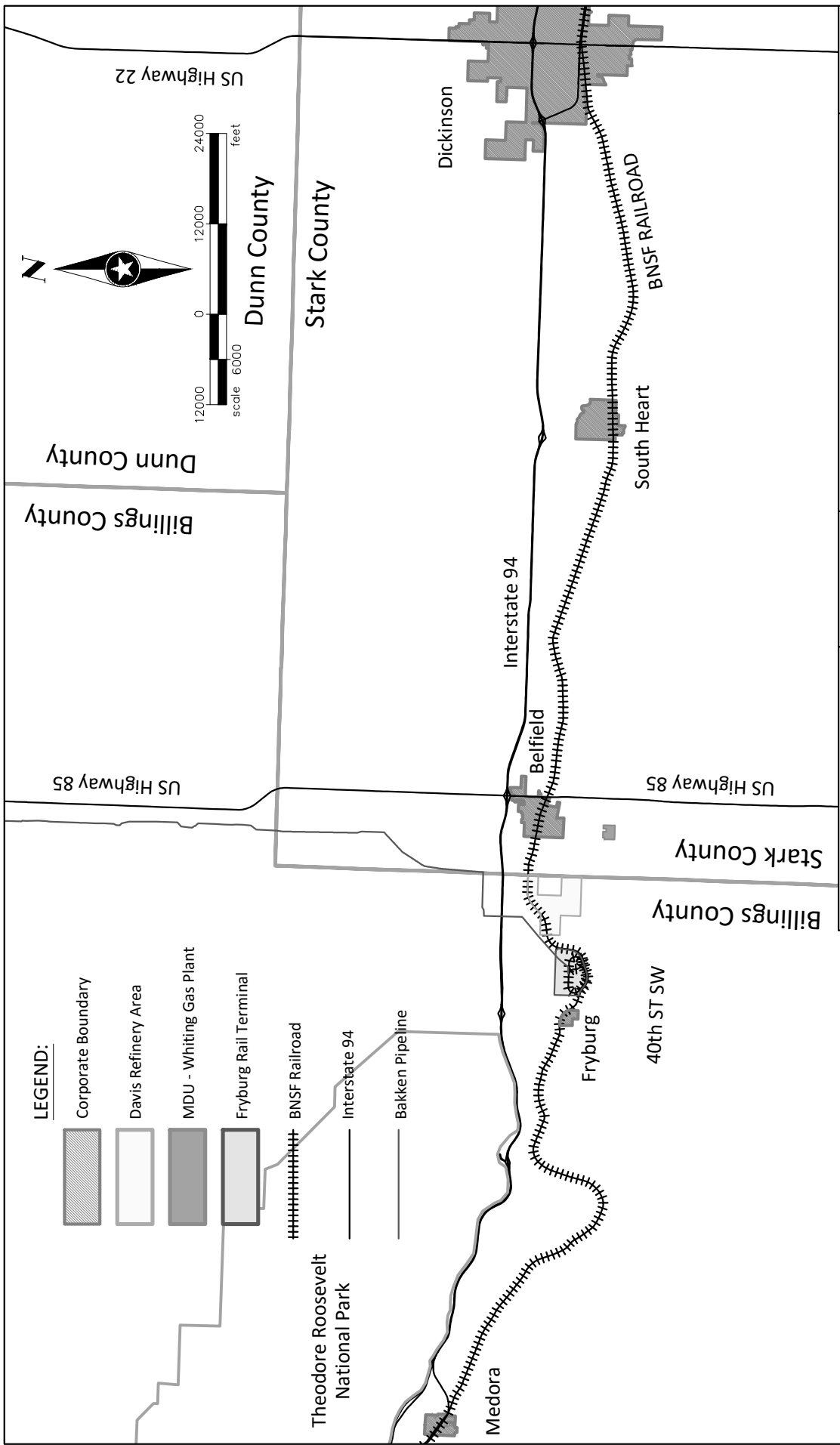


Exhibit D – Regional Map



SEH
 PHONE: 701.354.7121
 4719 SHELBURNE ST., SUITE 6
 BISMARCK, ND 58503-5677
 www.sehinc.com

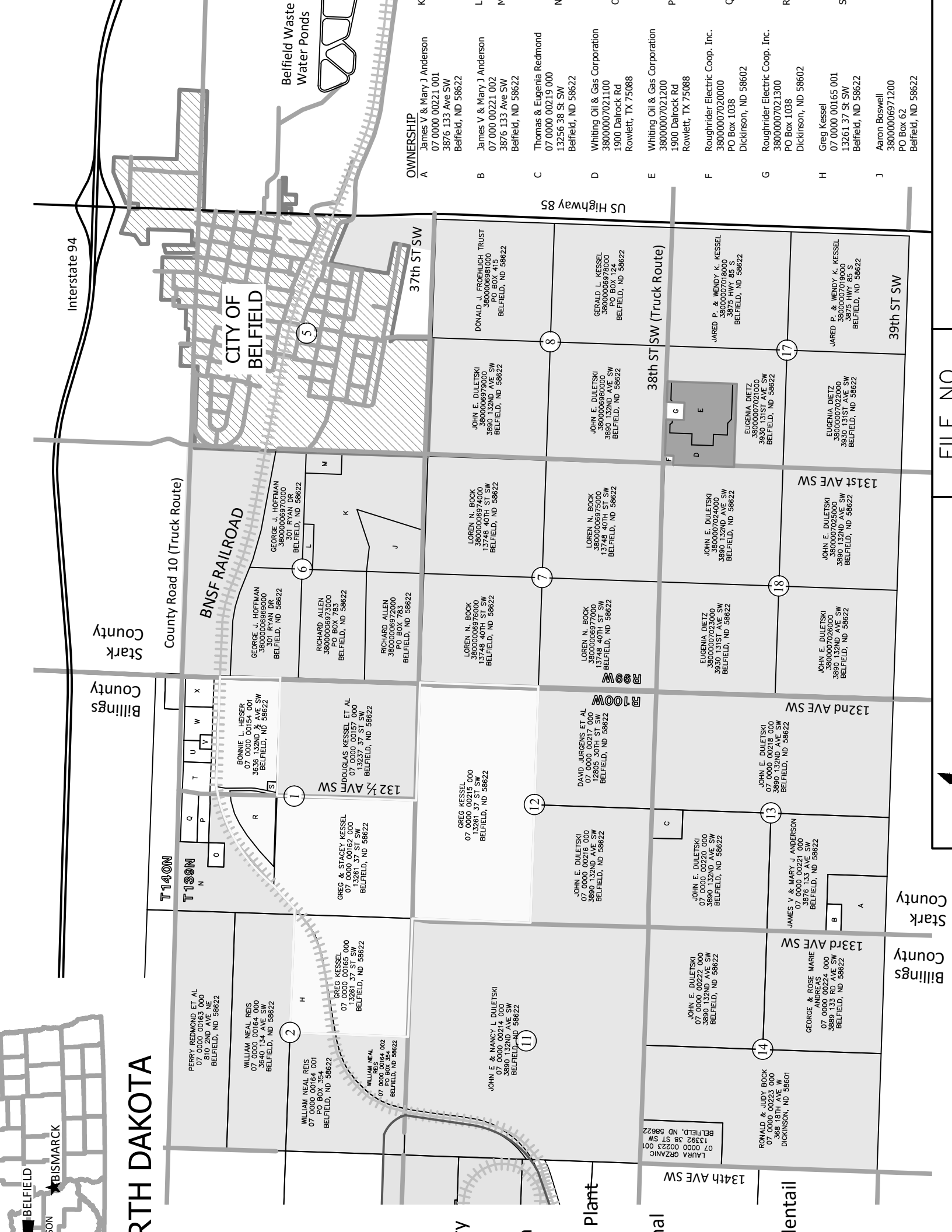
FILE NO.
135471

DATE:
3/18/16

**REGIONAL MAP
DAVIS REFINERY AREA**

**EXHIBIT
D**

**Exhibit E – Project Location Map Showing Land Ownership and
Land Use in the Vicinity of the Project Site**



ORTH DAKOTA

CITY OF BELFIELD

BNSF RAILROAD

13th Ave SW

132 1/2 Ave SW

131st Ave SW

37th St SW

38th St SW (Truck Route)

39th St SW

County Road 10 (Truck Route)

Interstate 94

US Highway 85

Stark County

Billings County

Stark County

Billings County

Stark County

Billings County

Stark County

Billings County

Plant

al

entail

OWNERSHIP

A James V & Mary J Anderson

B James V & Mary J Anderson

C Thomas & Eugenia Redmond

D Whiting Oil & Gas Corporation

E Whiting Oil & Gas Corporation

F Roughrider Electric Coop. Inc.

G Roughrider Electric Coop. Inc.

H Greg Kessel

J Aaron Boswell

134th Ave SW

13th Ave SW

132nd Ave SW

131st Ave SW

132nd Ave SW

132nd Ave SW

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131st Ave SW

132 1/2 Ave SW

132nd Ave SW

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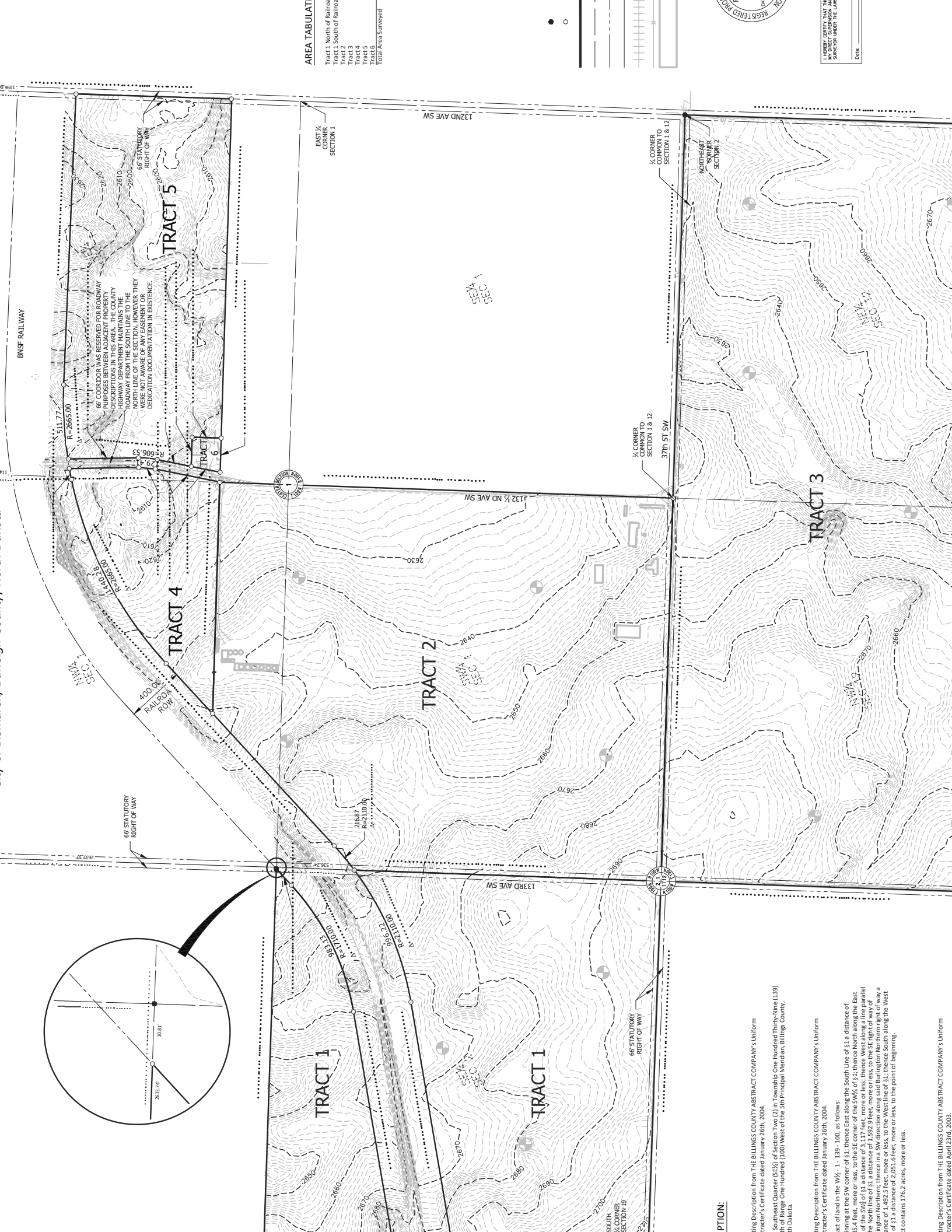
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132nd Ave SW

131st Ave SW

132nd Ave SW

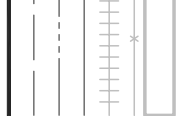
Exhibit F – Draft Certificate of Survey



AREA TABULATION

Tract 1 North of Railroad	1.132
Tract 2 South of Railroad	1.132
Tract 3	1.132
Tract 4	1.132
Tract 5	1.132
Tract 6	1.132
TOTAL AREA SURVEYED	6.792

•
○

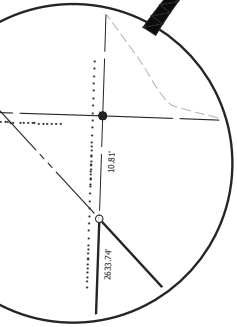


REGISTRED PRO...

UNIFORM CERTIFY THAT THE SURVEYOR UNDER THE LAWS OF THE STATE OF MONTANA HAS PERSONALLY EXAMINED THE ORIGINAL RECORDS OF THIS SURVEY AND THAT THE SAME ACCURATELY REPRESENT THE ACTUAL SURVEYED DATA.

66' CORRIDOR WAS RESERVED FOR ROADWAY PURPOSES BETWEEN ADJACENT PROPERTY LOTS IN THE BNSF RAILWAY RIGHT-OF-WAY. THE BNSF RAILWAY DEPARTMENT MAINTAINS THE ROADWAY FROM THE SOUTH LINE TO THE NORTH LINE OF THE SECTION, HOWEVER THEY WERE NOT AWARE OF ANY EASEMENT OR DEDICATION DOCUMENTATION IN EXISTENCE.

66' STATUTORY RIGHT OF WAY



NOTATION:

Being Description from THE BILLINGS COUNTY ABSTRACT COMPANY'S Uniform Tract's Certificate dated January 26th, 2004.

Southwest Quarter (SE1/4) of Section Two (2) in Township One Hundred Thirty-Nine (139) North of Range One Hundred (100) West of the 5th Principal Meridian, Billings County, Montana.

Being Description from THE BILLINGS COUNTY ABSTRACT COMPANY'S Uniform Tract's Certificate dated January 26th, 2004.

act of land in the W1/4 - 1 - 139 - 100, as follows:
 Beginning at the SW corner of §1; thence East along the South Line of §1 a distance of 46.4 feet, more or less, to the SE corner of the SW1/4 of §1; thence North along the East line of the SW1/4 of §1 a distance of 3.117 feet, more or less; thence West along a line parallel to the North line of §1 a distance of 1,192.9 feet, more or less, to the SE right of way of the 66' Statutory Right of Way; thence North along the West line of §1 a distance of 11,482.5 feet, more or less, to the West line of §1; thence South along the West line of §1 a distance of 2,051.6 feet, more or less, to the point of beginning.
 The above described land contains 176.2 acres, more or less.

Being Description from THE BILLINGS COUNTY ABSTRACT COMPANY'S Uniform Tract's Certificate dated April 23rd, 2003.

**Exhibit G – Elevation View of the Project and Vicinity from
Theodore Roosevelt National Park (Northwest to Southeast)**



Horizon Line

Highest point of refinery hidden
from view

500A
500

NOTE: The rendering of the proposed refinery has been placed in front of the horizon to show rough scale. The exhibit shows that the refinery will be hidden from this view.



Horizon Line

Highest point of refinery hidden from view

500A
500

NOTE: The rendering of the proposed refinery has been placed in front of the horizon to show rough scale. The exhibit shows that the refinery will be hidden from this view.



Elevation View of the Project and Vicinity from Visitor's Center of Theodore Roosevelt National Park (Northwest to Southeast)

Billings County, North Dakota

G2

**Exhibit H – Profile View of the Line-of-Sight from the Nearest Point
in the Theodore Roosevelt National Park Across the Project Site**

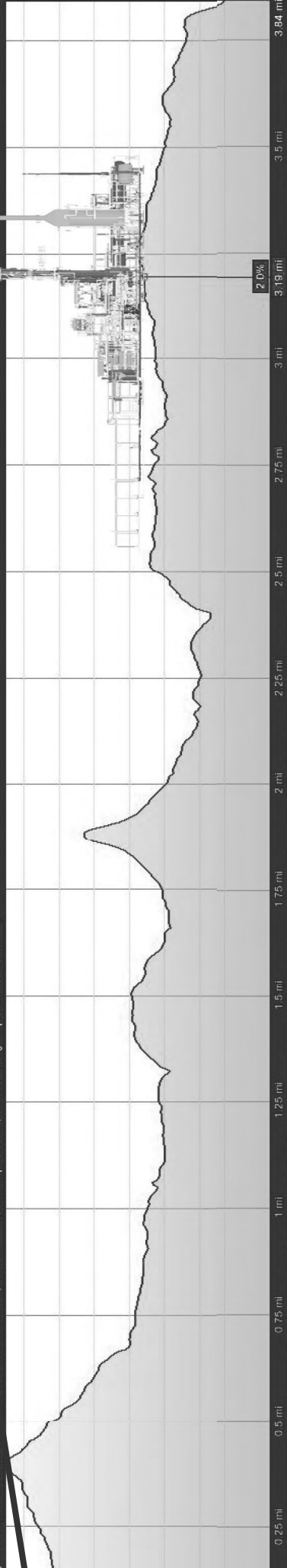
94

NP 2762

Top 2842 @ Ground 2692

LINE OF SIGHT

Avg. Max Elevation: 2831, 2933, 2788 ft
Avg. Max Slope: 21.8%, -22.1%, 2.9%, -3.3%
Avg. Total Loss: 274 ft, -404 ft



2.9%

0.25 mi 0.5 mi 0.75 mi 1 mi 1.25 mi 1.5 mi 1.75 mi 2 mi 2.25 mi 2.5 mi 2.75 mi 3 mi 3.19 mi 3.5 mi 3.84 mi

IP VISITORS CENTER 2779

Top 28



LINE OF SIGHT

g, Max Elevation: 2561, 2733, 2827 ft

Totals: Distance: 7 mi

Elev Gain/Loss: 772 ft, -318 ft

Max Slope: 42.9%, -50.1%

Avg Slope: 2.2%, -4.4%

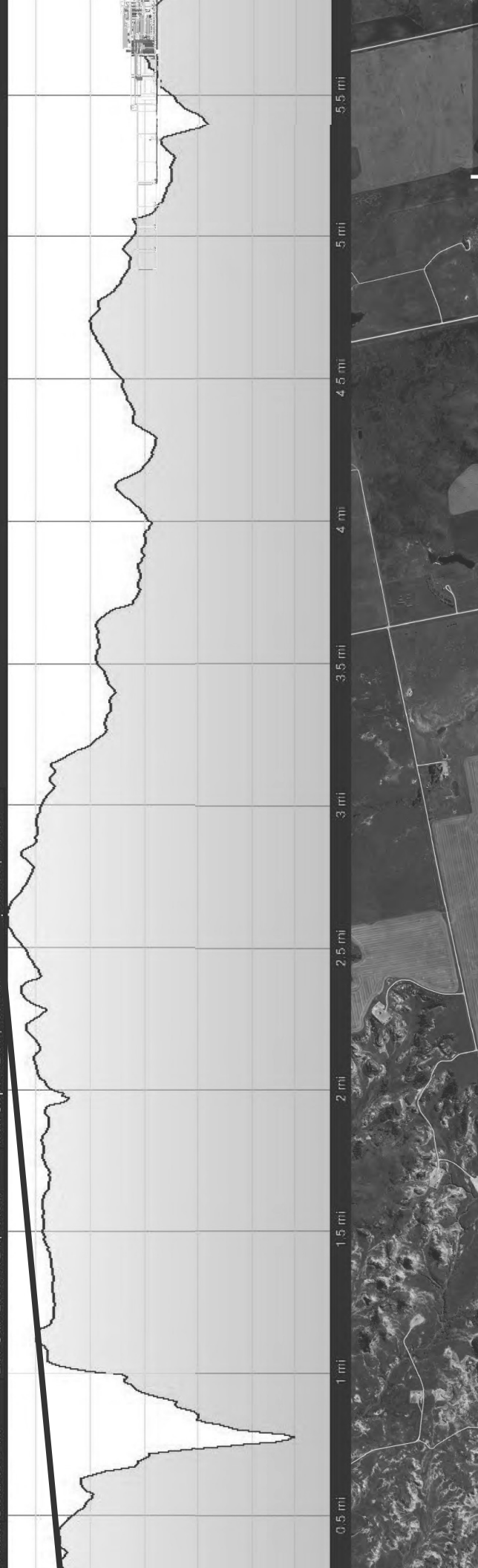




Exhibit I – Project Site Plan and General Plot Plan

	BUILDINGS LIST	VEPICA CODE: TBD	
		CLIENT CODE: TBD	
		ISSUE: DATE: 03/18/16	
		SHEET: 1 OF 1	

1.1 DAVIS PHASE 1

BUILDING	ESTIMATED AREA PER BUILDING (SF)	QTY
CONTROL ROOM	1,500.00	1
MCC	600.00	1

1.2 DAVIS REFINERY

BUILDING	ESTIMATED AREA PER BUILDING (SF)	QTY
ELECTRICAL SUBSTATION	31,500.00	1
ADMINISTRATION BUILDING	25,500.00	1
SHOP	22,000.00	1
WAREHOUSE	15,300.00	1
MAIN CONTROL ROOM	12,500.00	1
FIREFIGHTING AND FIRST AID BUILDING	6,500.00	1
LABORATORY	6,500.00	1
DRIVERS ROOM	3,500.00	2
SECURITY OFFICE	1,065.00	2
DISPATCH ROOM	1,300.00	2
SATELLITE MCC	1,200.00	6*
SATELLITE SCR	1,200.00	6*

(*) One Satellite MCC and one Satellite SCR to be built during Davis Phase 1.

Exhibit J – Environmental Impact Reports



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MEMORANDUM

TO: William C. Prentice
Meridian Energy Group, Inc.

FROM: Scott A. Lange, PE

DATE: March 18, 2016

RE: 2016 Davis Refinery
Management of the Construction Environment
SEH No. MERID 135471 14.00

This memo outlines our project management approach to minimize impact of the construction on the neighboring property and the environment. Each of the items below will be planned in detail throughout the design process. These plans will be forwarded for review by the governing agencies prior to construction.

- Soils and Site Geology:
 - American Engineering and Testing, Inc. (AET) completed a preliminary soils investigation in February 2016. AET placed 14 borings across the site to determine the nature of the soils and their suitability for construction. In general, the soils are as expected in the region, with 6" of clayey sand topsoil over mostly lean clay. These soils are conducive to supporting typical project foundations and construction loads. The project site does have some softer clays, with silt, lignite, and sandstone. These are poor soils from a construction standpoint, but of lesser quantity and can be removed from key foundation areas. The lignite specifically, where found, will be removed from the foundation areas and placed elsewhere on site and covered with an earthen cap.
 - Few borings indicated ground water, only those in the lowest area of the site. Overall, this site is suitable for the proposed construction and ground water will not be a factor.
- Site Stormwater Management:
 - This site generally drains from the southwest (elevation 2,710) to the northeast (elevation 2,610), towards the Heart River. The change in elevation keeps this site free from significant flood concerns. The plan for drainage of the proposed project will follow the same general direction.
 - The storm water will be managed through a series of ponds located throughout the site. These ponds are sized to limit the discharge rates from rain events to be no more than that which runs off the site in the current agricultural use. In addition, the ponds provide water treatment, including sediment capture, prior to the water reaching the Heart River.

- Site Management During Construction:
 - Erosion Control:
 - Erosion control and construction storm water management are major elements to good site housekeeping. The site will require a NPDES Construction Storm Water permit and a Storm Water Pollution Prevention Plan (SWPPP) to control site erosion and ensure the quality of the water leaving the site. Elements of the SWPPP and Storm Water Permit include use of silt fence, construction storm basins (prior to the construction of the permanent ponds), rock construction entrances to reduce sediment leaving the site, and inspections of all erosion control management features weekly and after each rain event to insure they are functioning properly.
 - Dust Control:
 - Dust control on the site during construction will be managed by use of water trucks to keep fugitive dust under control during construction. This often includes several applications per day during active grading operations.
 - Weed Control:
 - During the construction period, the agricultural operations of previous years will end. However, if there are segments of the site that will not have ground broken during the growing season, they may remain in Ag production. For those areas not in Ag production, where there is no active excavation, weed control will be managed by mowing or seeding a cover crop. In western North Dakota, control of noxious weeds and tumble weeds is very important to prevent impacts on adjacent properties.

- Site Access:
 - The active construction site will be closed to all but authorized personnel. Prior to construction, a security plan will be developed to manage access to the site. In addition, emergency access and response will be reviewed with the County Emergency Management Director to ensure there is required coverage for emergency services.
 - Materials brought to the site will be delivered by both truck and rail. The split between truck and rail will be more towards truck early, and then be supported by rail as the site track is constructed. Access to the site will be from the truck route of 38th Street. At this point, 133rd Avenue is the likely route from 38th Street to the site. A truck access plan will be coordinated with the Billings County Highway Superintendent, to ensure addressing area concerns. Dust control will be a topic of the access plan.

- Site Final Treatments:
 - Storm Water Management:
 - Upon completion the storm water ponds will provide the water quality treatment and rate control of storm water runoff. Maintenance of the ponds will be included as part of the site management standard operating procedures.
 - Landscaping:
 - With completion of grading operations of a segment of the site, permanent seed is placed for establishment of permanent erosion control. The seed will include recommended native grass varieties. Blending the site into the environment will be a site design consideration. This will include construction of berms and plantings of native tree species to aid in site screening.
 - Weed management:
 - As part of site management and standard operating procedures, weed management is a component. This will involve a combination of mowing and herbicide treatments, developed to maintain the native landscapes and prevent weed impacts on neighboring properties.

2016 Davis Refinery
March 18, 2016
Page 3

- Final Emergency Management Plan:
 - During the course of the project design, the final emergency management plan is developed. County Emergency Management Director, and others as needed, will be included in the plans development.
- Traffic:
 - Traffic to a new industrial facility is always an important design consideration. As the project design is further refined, a more detailed analysis of the traffic generated by the facility can be reviewed. A guiding principal will be primary access to the site will be from 38th Street, as it is a designated truck route. County Road 10, north of the facility, is not a truck route and will not be relied upon for site access.

sal/mrb

c: Tom Williams, Meridian Energy Group, Inc.

Dan Hedrington, SEH

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Davis Refinery
Natural Resources Review
Meridian Energy Group, Inc.
BILLINGS COUNTY, NORTH DAKOTA

SEH No. MERID 135471 30.90

March 18, 2016



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Engineers | Architects | Planners | Scientists

Natural Resources Review
Davis Refinery
Meridian Energy Group, Inc.
Billings County, North Dakota

SEH No. MERID 135471

March 18, 2016

I hereby certify that this Wetland Permit Application was prepared by me. The procedures and field methods used to delineation wetlands within the area of interest constitute an official wetland delineation in accordance with the 1987 U.S. Army Corps of Engineers *Wetlands Delineation Manual* and applicable *Regional Supplement*.

Prepared by: Joel Asp 03/18/16
Joel Asp, Biologist Date

Reviewed by: Deric Deuschle 03/18/16
Deric Deuschle, Senior Biologist Date

Short Elliott Hendrickson Inc.
1200 25th Avenue South
P.O. Box 1717
St. Cloud, MN 56302-1717
320.229.4300



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Certification
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- Appendix B Hydric Soils Map
- Appendix C Beaver Creek Archeaology Survey Letter

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Natural Resources Review

Davis Refinery

Prepared for Meridian Energy Group, Inc.

1.0 Introduction

The purpose of this report is to identify potential regulatory jurisdictional and permitting/approval needs related to the proposed development of a new refinery by Meridian Energy Group, Inc. The refinery, and its associated infrastructure, will be privately funded.

The purpose of the refinery is to process Bakken crude oil locally. The refinery will be built in a phased manner. The primary derivative of the first phase will be jet fuel, diesel fuel and additional distillate products, which will be primarily utilized locally, while the second phase will focus on a complete slate of refined products and specialty chemicals, which will have a broader regional market. Recent crude oil production in the Bakken exceeded one million barrels per day, yet greater than 95% is shipped to out of state refineries for processing. The majority, upwards of two-thirds, of the crude oil that is extracted is transferred by truck to local transfer stations. The process of trucking large quantities of crude oil requires many trucks, which operate using diesel fuel. Because the crude oil processing occurs at distant refineries, there is great cost to deliver the diesel fuel that is needed locally. This need, and distant processing, has led to local diesel shortages, which has the potential to affect the transport capacity of the raw crude oil to the transfer stations, in addition to having a much greater cost to purchase the fuel. Because of the high demand for diesel fuel, and the shortages under the current distribution system, a local refinery is required, and would contribute to the economic well-being of local crude oil producers through greater competitive choices. This refinery will provide fuels locally, eliminating the need to ship raw materials, process them, and return a finished product.

1.1 Project Location

The project is located near the City of Belfield, ND in Township 139 North, Range 100 West, Sections 1 (SW $\frac{1}{4}$), 2 (SE $\frac{1}{4}$), and 12 (N $\frac{1}{2}$) as shown in **Figure 1**. The project area is detailed in **Figure 2**.

2.0 Project Description

The proposed project is the development of the Davis Refinery. The refinery is being designed to be highly efficient and converting crude into liquid fuels. The new refinery will be capable of producing very low sulfur-content diesel and jet fuels, which are anticipated to be new standards under recently authorized mandates by the Environmental Protection Agency. The refinery will utilize natural gas to provide energy for operations. The use of natural gas provides many advantages, including reduced operating costs, lower emissions than other base energy sources, and fewer air emission permitting requirements.

The Davis Refinery will be privately funded. In addition to the refinery itself, the project seeks to address needs for improved infrastructure housing shortages, commercial business diversity, industrial space availability, and basic utility distributions.

2.1 Existing Conditions

The proposed refinery, and ancillary support infrastructure, encompass approximately 720 acres. The current land use can be divided into two separate categories. The northern most parcel (~100 acres) is primarily used as pasture. The Heart River meanders throughout this parcel with remnant oxbows present, and likely wetland habitat associated with the oxbows. There appears to be one active farm site in this northern parcel.

The remaining 620 acres appear to be agricultural row crops (wheat). The landscape is rolling hills with approximately 20 feet of relief over the site. There are two farm sites within the southern parcel. Both sites have grain bins, equipment, and storage sheds. A residential home is present on the southernmost farm site (Intersection of 37th Street SW and 132 ½ Avenue).

3.0 Potential Regulatory Agencies

3.1 U.S. Fish and Wildlife Services

The U.S. Fish and Wildlife Service (USFWS) has primary oversight of threatened and endangered species. North Dakota has eleven (11) species listed via the Endangered Species Act. Generally, these species need larger tracks of land with the proper habitat present. The best potential of any of these threatened or endangered species utilizing the site is in or near the Heart River. It is unlikely that this parcel is large enough to provide the critical habitats these species require. The project area is located east of larger tracts of land that have been dedicated for wildlife (**Figure 3**) and while may provide temporary habitat, it is unlikely this project would have long term impacts on the threatened or endangered species of North Dakota.

3.2 North Dakota Game and Fish Department

North Dakota Game and Fish Department (G&FD) reviews proposed projects for Species of Conservation Priority and for the presence of Private Land Open to Sportsmen (PLOTS) program land. The State Wildlife Action Plan (SWAP) is the guiding document for this review. The SWAP identifies 115 species (47 birds, 2 amphibians, 9 reptiles, 21 mammals, 22 fish, 10 mussels, and 4 insects) and the critical habitats that should be conserved when possible in the state of North Dakota. Critical habitats are generally described as non-disturbed areas comprised of native vegetative species.

The proposed project area can be divided into two separate habitat types. **Figure 4** shows the Gap Analysis Program (GAP) land use from 2010. The northern 100 acre portion encompasses the Heart River, utilized as cattle pasture, and the remaining 620 acres that has a long crop history. The northern 100 acre parcel has potential for native vegetation to be present within the project area. The Heart River meanders throughout this parcel, with potential of wetland habitat at the toe of the hillsides and adjacent to the river. This area appears to have been utilized as cattle pasture for an extended period of time. Traditionally, areas used as cattle pasture are dominated by non-native pasture grass, but may contain remnant pockets of native vegetation either on the peaks of the hills or in the low areas adjacent to the streams. Species included in the SWAP could potentially to use this area, but due to its relatively small size and long history of cattle use it is not likely classified as critical habitat. South of the Heart River is the remainder of the proposed project area. The majority of this 620 acres has a long crop history. A tributary of the Heart River does extend into a

portion of the southern project area (see Figure 2), which may have some associated wetland habitats and tree species. While the potential that one or more of the species listed in the SWAP may occasionally use the project area, it is unlikely the proposed project will have any direct impacts for species listed in the SWAP.

Review the PLOTS Guide map shown on the G&FD website indicates PLOTS land are not present in or adjacent to this proposed project.

3.3 North Dakota Natural Resources Conservation Service (NRCS)

One of the responsibilities of the NRCS is soil health and management of state farmlands. A soils map showing the soil types and their “Farmland” classification are shown in **Appendix A**. The vast majority of the soils is listed as non-prime farmland with two small area mapped as prime farmland if drained.

3.4 U.S. Army Corps of Engineers

3.4.1 Wetlands Definition and Delineation Methodology

Wetlands are defined in federal Executive Order 11990 as “*areas that are inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, and that under normal circumstances, do support a prevalence of vegetation or aquatic life typically adapted for saturated soil conditions.*”

The project area will be delineated in the spring of 2016 for any areas meeting the wetland criteria in accordance with the U.S. Army Corps of Engineers *Wetland Delineation Manual* (USACE 1987) and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region* (USACE 2010). One positive indicator (except in certain situations) from each of three elements must be present in order to make a positive wetland determination, which are as follows:

- Greater than 50 percent dominance of hydrophytic plant species.
- Presence of hydric soil.
- The area is either permanently or periodically inundated, or soil is saturated to the surface during the growing season of the dominant vegetation.

Topographic maps (**Figure 5**), the National Wetlands Inventory (NWI) map (**Figure 6**), the Soil Survey, and the hydric soil (**Appendix B**) list will be reviewed prior to the field delineation to locate potential wetland habitat. These sources showed wetland areas that were investigated in greater detail during the field delineation.

Field notes, samples, and photographs will be taken at representative locations in each wetland basin and the information transferred to Wetland Determination Data Forms.

Wetland plant species nomenclature follows the *National Wetland Plant List* (USACE 2014). Identification was aided when necessary with field guides for the region.

Wetland boundaries will be located and mapped. **Figure 7** is a desktop delineation to provide guidance of where the expected wetland habitat will be present. These boundaries will be adjusted when an “in the field” delineation is completed.

3.5 State Historical Society

A Class I survey was completed for the proposed project area by Beaver Creek Archaeology. The survey was completed for Sections 1, 2, and 12. The review identified six isolated finds (considered ineligible to the National Register of Historic Properties) within these sections. One of these isolated finds was within the refinery property, but was outside on any proposed construction zones. **Figure 8** shows the proposed project layout.

3.6 Future Tasks

- 1) During the growing season, on-site visits will be completed to document the natural resources and habitats present on-site will occur. The primary activity will be the completion of a wetland delineation to survey and map the presence of wetland habitat. During this visit, the areas around the Heart River will be observed and habitat types confirmed.
- 2) Each of the agencies listed above will be contacted and provided opportunity to review and comment on methodology and conclusions of this report.

4.0 Conclusions

- The proposed project is not expected to have direct impacts on endangered or threatened species.
- The proposed project site is not listed as prime farmland.
- The cultural resources review did not reveal any significant previously recorded cultural resources within the proposed construction boundaries of the refinery. One ineligible isolated find was within the projects property boundaries, but is not located near the potential construction zone.
- The potential wetland habitat, as determined in the desktop study, can be worked into the site design, or if impacted, there are options for mitigation. Final confirmation of the wetland locations is pending a spring delineation process.

List of Figures

Figure 1 – Site Location Map

Figure 2 – Site Aerial Map

Figure 3 – State and Federal Lands Map

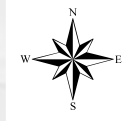
Figure 4 – GAP Map

Figure 5 – USGS Topographic Map


Figure 6 – National Wetlands Inventory Map

Figure 7 – Estimated Wetland Location Map

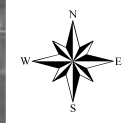
Figure 8 – Davis Refinery Layout Map



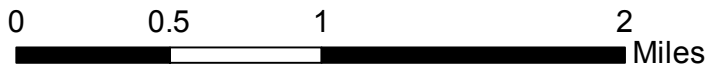
Path: P:\KCOM\MERID135471\5-final\design\51-drawings\90-GIS\DAVIS REFINERY SITE\FIG 1_LOCATION MAP_031416.mxd

	1200 25TH AVENUE SOUTH P.O. BOX 1717 ST. CLOUD, MN 56302 PHONE: (320) 229.4300 www.sehinc.com	Project: MERID 135471 Print Date: 3/14/2016	PROJECT LOCATION DAVIS REFINERY BILLINGS COUNTY, NORTH DAKOTA	Figure 1
	Map by: jasp Projection: UTM 14N Source: BING, NDGIS HUB & SEH			

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.



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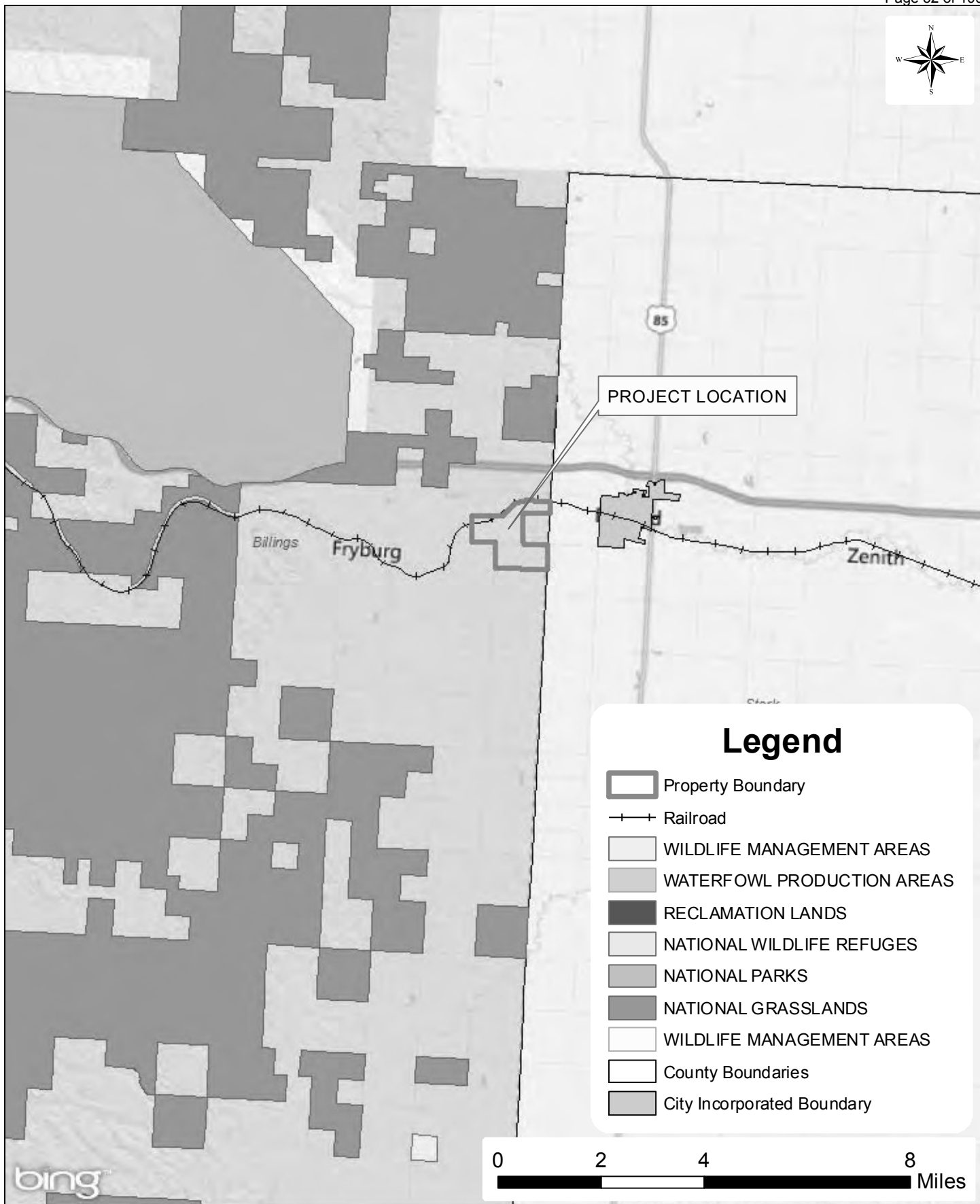
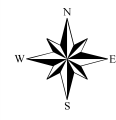
Project: MERID 135471
Print Date: 3/14/2016

Map by: jasp
Projection: UTM 14N
Source: BING, NDGIS HUB & SEH

PROJECT AERIAL
DAVIS REFINERY
BILLINGS COUNTY, NORTH DAKOTA

Figure
2

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.

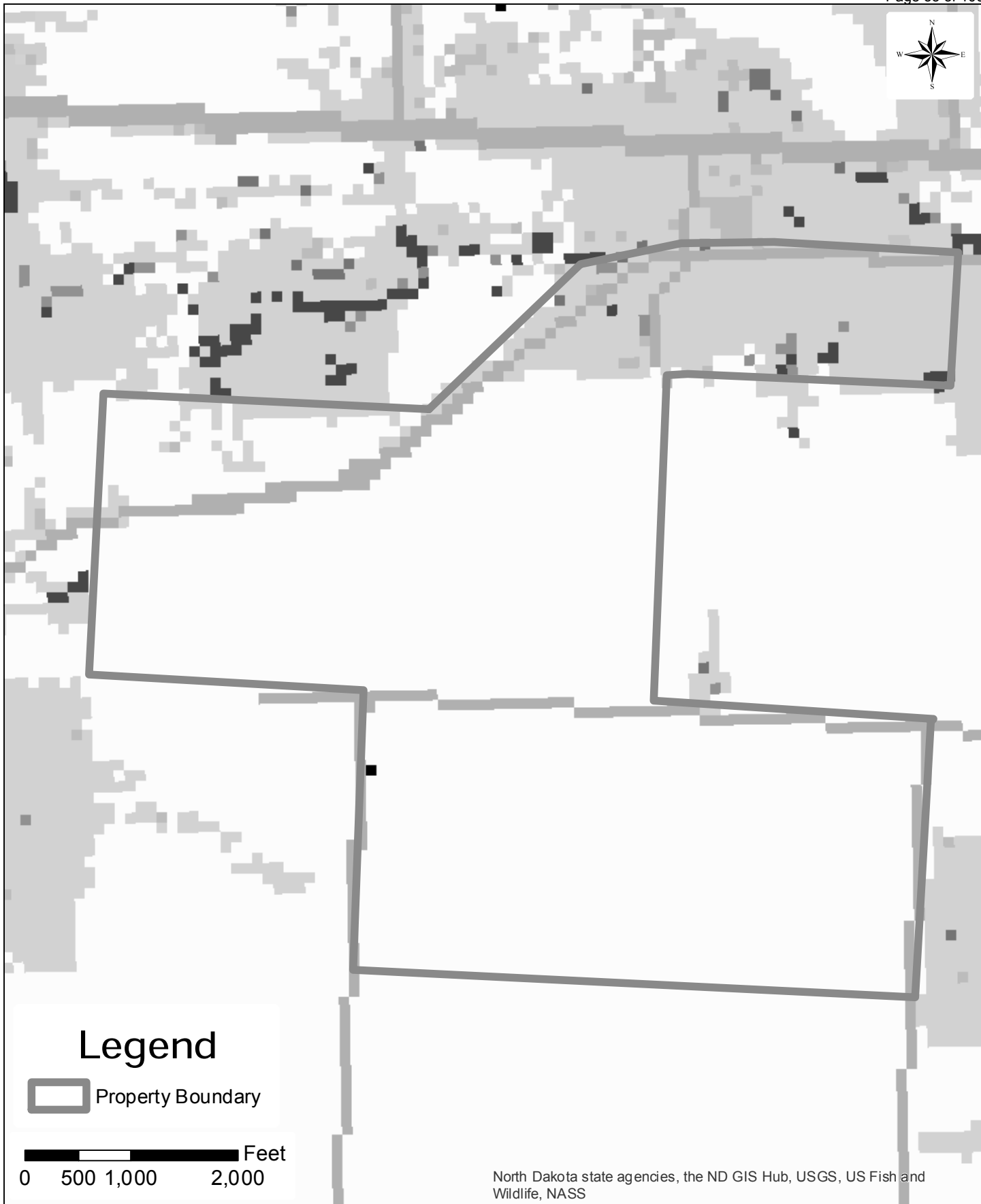


Path: P:\KOM\MERID135471\5-final\design\51-drawings\80-GIS\DAVIS REFINERY SITE\FIG 3_STATE_FEDERAL LANDS MAP_031416.mxd



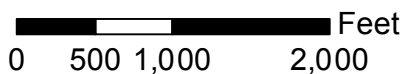
	1200 25TH AVENUE SOUTH P.O. BOX 1717 ST. CLOUD, MN 56302 PHONE: (320) 229.4300 www.sehinc.com	Project: MERID 135471 Print Date: 3/14/2016 Map by: jasp Projection: UTM 14N Source: BING, NDGIS HUB & SEH	STATE AND FEDERAL LANDS DAVIS REFINERY BILLINGS COUNTY, NORTH DAKOTA	Figure 3
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This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.



Legend

 Property Boundary

 Feet
 0 500 1,000 2,000

North Dakota state agencies, the ND GIS Hub, USGS, US Fish and Wildlife, NASS

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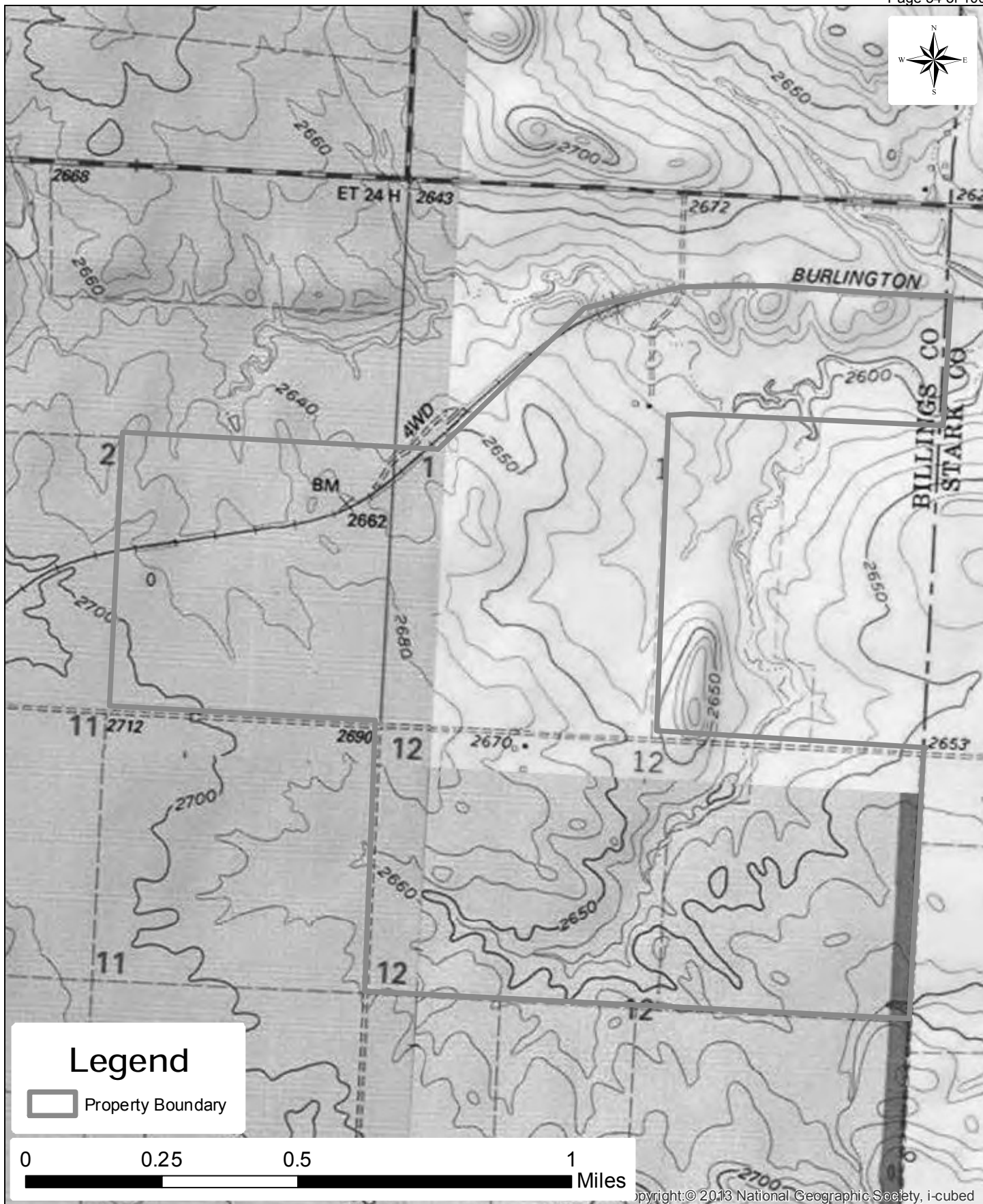
Project: MERID 135471
 Print Date: 3/14/2016

Map by: jasp
 Projection: UTM 14N
 Source: BING, NDGISHUB & SEH

2010 GAP LAND USE DAVIS REFINERY BILLINGS COUNTY, NORTH DAKOTA

Figure
 4

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.



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	<p>1200 25TH AVENUE SOUTH P.O. BOX 1717 ST. CLOUD, MN 56302 PHONE: (320) 229.4300 www.sehnc.com</p>	<p>Project: MERID 135471 Print Date: 3/14/2016 Map by: jasp Projection: UTM 14N Source: BING, NDGIS HUB & SEH</p>	<p>TOPOGRAPHIC MAP DAVIS REFINERY BILLINGS COUNTY, NORTH DAKOTA</p>	<p>Figure 5</p>
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This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.



Path: P:\KCOM\MERID135471\5-final\design\51-drawings\80-GIS\DAVIS REFINERY SITE\FIG 6_NWI WETLAND MAP_031416.mxd

Legend

-  NWI Wetlands
-  Property Boundary

0 500 1,000 2,000
 Feet



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Project: MERID 135471
 Print Date: 3/14/2016

Map by: jasp
 Projection: UTM 14N
 Source: BING, NDGIS HUB & SEH

NWI WETLAND MAP

DAVIS REFINERY

BILLINGS COUNTY, NORTH DAKOTA

Figure
6

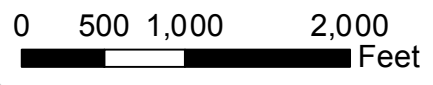
This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.




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Legend

- Estimated Wetland Boundary
- Property Boundary










	1200 25TH AVENUE SOUTH P.O. BOX 1717 ST. CLOUD, MN 56302 PHONE: (320) 229.4300 www.sehinc.com	Project: MERID 135471 Print Date: 3/14/2016 Map by: jasp Projection: UTM 14N Source: BING, NDGIS HUB & SEH	<h2 style="margin: 0;">POTENTIAL WETLAND AREAS</h2> <h3 style="margin: 0;">DAVIS REFINERY</h3> <h3 style="margin: 0;">BILLINGS COUNTY, NORTH DAKOTA</h3>	<h2 style="margin: 0;">Figure 7</h2>
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This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.

Appendix A

Farmland Classification Map

MAP INFORMATION

-  Streams and Canals
- Transportation**
-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads
- Background**
-  Aerial Photography

The soil surveys that comprise your AOI were mapped at scales ranging from 1:20,000 to 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Billings County, North Dakota
Survey Area Data: Version 18, Sep 24, 2015

Soil Survey Area: Stark County, North Dakota
Survey Area Data: Version 15, Sep 25, 2015

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 3, 2011—Jun 6, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — Billings County, North Dakota (ND007)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
E0454B	Daglum-Rhoades complex, 0 to 6 percent slopes	Not prime farmland	455.2	16.5%
E0515B	Rhoades-Daglum complex, 0 to 6 percent slopes	Not prime farmland	123.5	4.5%
E0559B	Dogtooth-Janesburg silt loams, 0 to 6 percent slopes	Not prime farmland	122.5	4.4%
E0561D	Dogtooth-Janesburg complex, 6 to 15 percent slopes	Not prime farmland	36.3	1.3%
E0563B	Janesburg-Dogtooth silt loams, 0 to 6 percent slopes	Not prime farmland	513.6	18.6%
E0651B	Regent-Janesburg complex, 3 to 6 percent slopes	Not prime farmland	7.1	0.3%
E0701F	Dogtooth-Janesburg-Cabba complex, 6 to 35 percent slopes	Not prime farmland	4.1	0.2%
E0835A	Savage-Grail silty clay loams, 0 to 2 percent slopes	Farmland of statewide importance	208.0	7.5%
E0931C	Wayden-Moreau silty clays, 3 to 9 percent slopes	Not prime farmland	18.4	0.7%
E1025B	Regent-Savage silty clay loams, 3 to 6 percent slopes	Farmland of statewide importance	16.7	0.6%
E2107A	Arnegard loam, 0 to 2 percent slopes	All areas are prime farmland	3.9	0.1%
E2145B	Shambo loam, 2 to 6 percent slopes	Farmland of statewide importance	27.4	1.0%
E2439B	Sen-Janesburg silt loams, 3 to 6 percent slopes	Not prime farmland	723.4	26.2%
E2439C	Sen-Janesburg silt loams, 6 to 9 percent slopes	Not prime farmland	13.1	0.5%
E2617F	Cabba-Chama-Shambo loams, 9 to 50 percent slopes	Not prime farmland	51.6	1.9%
E2737C	Chama-Cabba-Sen silt loams, 6 to 9 percent slopes	Not prime farmland	41.7	1.5%

Farmland Classification— Summary by Map Unit — Billings County, North Dakota (ND007)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
E2741D	Cabba-Chama-Sen silt loams, 9 to 15 percent slopes	Not prime farmland	52.3	1.9%
E2913B	Chama-Sen-Cabba silt loams, 3 to 6 percent slopes	Farmland of statewide importance	9.8	0.4%
E3003E	Amor-Brandenburg complex, 3 to 25 percent slopes	Not prime farmland	115.3	4.2%
E4180A	Korell-Daglum-Fluvaquents complex, channeled, 0 to 2 percent slopes, frequently flooded	Not prime farmland	163.0	5.9%
E4561F	Manning-Schaller-Wabek complex, 6 to 35 percent slopes	Not prime farmland	25.0	0.9%
Subtotals for Soil Survey Area			2,732.0	99.0%
Totals for Area of Interest			2,760.0	100.0%

Farmland Classification— Summary by Map Unit — Stark County, North Dakota (ND089)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
E0454B	Daglum-Rhoades complex, 0 to 6 percent slopes	Not prime farmland	1.9	0.1%
E0563B	Janesburg-Dogtooth silt loams, 0 to 6 percent slopes	Not prime farmland	19.1	0.7%
E0634B	Lawther-Daglum complex, 2 to 6 percent slopes	Not prime farmland	0.0	0.0%
E0651B	Regent-Janesburg complex, 3 to 6 percent slopes	Not prime farmland	2.9	0.1%
E0727B	Barkof-Janesburg complex, 3 to 6 percent slopes	Not prime farmland	0.2	0.0%
E2439B	Sen-Janesburg silt loams, 3 to 6 percent slopes	Not prime farmland	0.2	0.0%
E2439C	Sen-Janesburg silt loams, 6 to 9 percent slopes	Not prime farmland	0.1	0.0%
E2741D	Cabba-Chama-Sen silt loams, 9 to 15 percent slopes	Not prime farmland	0.6	0.0%
E2913B	Chama-Sen-Cabba silt loams, 3 to 6 percent slopes	Farmland of statewide importance	2.5	0.1%

Farmland Classification— Summary by Map Unit — Stark County, North Dakota (ND089)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
E4180A	Korell-Daglum-Fluvaquents complex, channeled, 0 to 2 percent slopes, frequently flooded	Not prime farmland	0.4	0.0%
Subtotals for Soil Survey Area			28.0	1.0%
Totals for Area of Interest			2,760.0	100.0%

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options



























Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Appendix B

Hydric Soils Map

MAP LEGEND

- Area of Interest (AOI)**
 -  Area of Interest (AOI)
- Soils**
 - Soil Rating Polygons**
 -  Hydric (100%)
 -  Hydric (66 to 99%)
 -  Hydric (33 to 65%)
 -  Hydric (1 to 32%)
 -  Not Hydric (0%)
 -  Not rated or not available
 - Soil Rating Lines**
 -  Hydric (100%)
 -  Hydric (66 to 99%)
 -  Hydric (33 to 65%)
 -  Hydric (1 to 32%)
 -  Not Hydric (0%)
 -  Not rated or not available
 - Soil Rating Points**
 -  Hydric (100%)
 -  Hydric (66 to 99%)
 -  Hydric (33 to 65%)
 -  Hydric (1 to 32%)
 -  Not Hydric (0%)
 -  Not rated or not available
 - Water Features**
 -  Streams and Canals
- Transportation**
 -  Rails
 -  Interstate Highways
 -  US Routes
 -  Major Roads
 -  Local Roads
- Background**
 -  Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:20,000 to 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Billings County, North Dakota
Survey Area Data: Version 18, Sep 24, 2015

Soil Survey Area: Stark County, North Dakota
Survey Area Data: Version 15, Sep 25, 2015

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 3, 2011—Jun 6, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Billings County, North Dakota (ND007)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
E0454B	Daglum-Rhoades complex, 0 to 6 percent slopes	0	455.2	16.5%
E0515B	Rhoades-Daglum complex, 0 to 6 percent slopes	0	123.5	4.5%
E0559B	Dogtooth-Janesburg silt loams, 0 to 6 percent slopes	0	122.5	4.4%
E0561D	Dogtooth-Janesburg complex, 6 to 15 percent slopes	0	36.3	1.3%
E0563B	Janesburg-Dogtooth silt loams, 0 to 6 percent slopes	0	513.6	18.6%
E0651B	Regent-Janesburg complex, 3 to 6 percent slopes	0	7.1	0.3%
E0701F	Dogtooth-Janesburg-Cabba complex, 6 to 35 percent slopes	3	4.1	0.2%
E0835A	Savage-Grail silty clay loams, 0 to 2 percent slopes	0	208.0	7.5%
E0931C	Wayden-Moreau silty clays, 3 to 9 percent slopes	0	18.4	0.7%
E1025B	Regent-Savage silty clay loams, 3 to 6 percent slopes	0	16.7	0.6%
E2107A	Arnegard loam, 0 to 2 percent slopes	0	3.9	0.1%
E2145B	Shambo loam, 2 to 6 percent slopes	0	27.4	1.0%
E2439B	Sen-Janesburg silt loams, 3 to 6 percent slopes	0	723.4	26.2%
E2439C	Sen-Janesburg silt loams, 6 to 9 percent slopes	0	13.1	0.5%
E2617F	Cabba-Chama-Shambo loams, 9 to 50 percent slopes	0	51.6	1.9%
E2737C	Chama-Cabba-Sen silt loams, 6 to 9 percent slopes	0	41.7	1.5%

Hydric Rating by Map Unit— Summary by Map Unit — Billings County, North Dakota (ND007)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
E2741D	Cabba-Chama-Sen silt loams, 9 to 15 percent slopes	0	52.3	1.9%
E2913B	Chama-Sen-Cabba silt loams, 3 to 6 percent slopes	0	9.8	0.4%
E3003E	Amor-Brandenburg complex, 3 to 25 percent slopes	0	115.3	4.2%
E4180A	Korell-Daglum-Fluvaquents complex, channeled, 0 to 2 percent slopes, frequently flooded	42	163.0	5.9%
E4561F	Manning-Schaller-Wabek complex, 6 to 35 percent slopes	0	25.0	0.9%
Subtotals for Soil Survey Area			2,732.0	99.0%
Totals for Area of Interest			2,760.0	100.0%

Hydric Rating by Map Unit— Summary by Map Unit — Stark County, North Dakota (ND089)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
E0454B	Daglum-Rhoades complex, 0 to 6 percent slopes	0	1.9	0.1%
E0563B	Janesburg-Dogtooth silt loams, 0 to 6 percent slopes	0	19.1	0.7%
E0634B	Lawther-Daglum complex, 2 to 6 percent slopes	0	0.0	0.0%
E0651B	Regent-Janesburg complex, 3 to 6 percent slopes	0	2.9	0.1%
E0727B	Barkof-Janesburg complex, 3 to 6 percent slopes	0	0.2	0.0%
E2439B	Sen-Janesburg silt loams, 3 to 6 percent slopes	0	0.2	0.0%
E2439C	Sen-Janesburg silt loams, 6 to 9 percent slopes	0	0.1	0.0%
E2741D	Cabba-Chama-Sen silt loams, 9 to 15 percent slopes	0	0.6	0.0%
E2913B	Chama-Sen-Cabba silt loams, 3 to 6 percent slopes	0	2.5	0.1%

Hydric Rating by Map Unit— Summary by Map Unit — Stark County, North Dakota (ND089)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
E4180A	Korell-Daglum- Fluvaquents complex, channeled, 0 to 2 percent slopes, frequently flooded	42	0.4	0.0%
Subtotals for Soil Survey Area			28.0	1.0%
Totals for Area of Interest			2,760.0	100.0%

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

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Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Appendix C

Beaver Creek Archaeology Survey Letter

Joel D. Asp
Restoration Ecologist
SEH
1200 25th Avenue South
P.O. Box 1717
St. Cloud, MN 56302-1717

3/14/2016

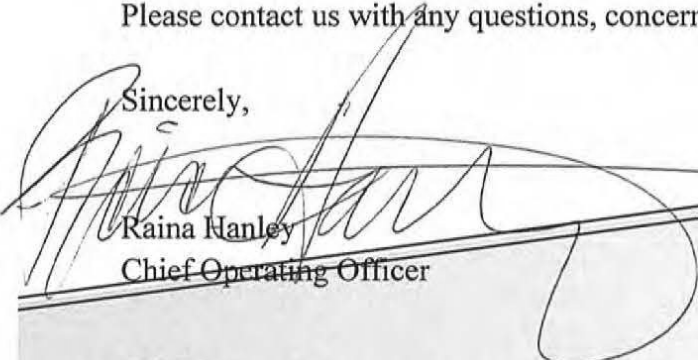
Dear Mr. Asp,

As requested, a file search was done by Beaver Creek Archaeology (BCA) at the North Dakota State Historic Preservation Office (NDSHPO). The area(s) searched were Sections 1, 2, and 12 of T139N R100W located in Billings County, North Dakota. The search of records at the NDSHPO revealed the following results: No sites are on file within Section 12. Six isolated finds (isolated finds are considered ineligible to the National Register of Historic Properties (NRHP)) on file within Section 2. One isolated find and one architectural site are located within Section 1.

The specific quarter sections in question did not reveal any significant previously recorded cultural resources within their boundaries. Specifically, SW $\frac{1}{4}$ of Section 1 in T139N R100W, SE $\frac{1}{4}$ of Section 2 in T139N R100W, and the N $\frac{1}{2}$ of Section 12 in T139N R100W are all clear of any known location of cultural properties. The S $\frac{1}{2}$ N $\frac{1}{2}$ of Section 1 in T139N R100W did reveal one ineligible isolated find. The search was completed on Friday, March 11, 2016.

Please contact us with any questions, concerns, or clarifications you may have.

Sincerely,


Raina Hanley
Chief Operating Officer



Beaver Creek
ARCHAEOLOGY

WHERE PROGRESS MEETS PRESERVATION

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Exhibit K – Socioeconomic Impacts and Job Creation Report

The principal socio-economic impact from the Refinery will be the creation of up to 2,400 local jobs (up to 200 directly employed with a multiple of 12:1). Among other things, this increased level of employment will result in an increased demand for community services, and an offsetting level of tax revenues for state and local government.

The attached Economic Profile report published in December, 2014 by the *Washington Research Council* calculates the number of “indirect” and “induced” jobs created by each full time refinery worker in 2013. On page 2 of the report, Table 2.1 *Summary of Multipliers and Economic Impacts* indicates that the multiplier is 12.88 indirect and induced jobs created in the state of Washington in 2013 by each full time refinery worker.

Based upon this report, since the Davis Refinery is expected to employ between 150 and 200 full time refinery workers, it is anticipated that between 1900 and 2500 indirect and induced jobs can be created in the Billings County and Stark County area. On page 14 of the attached report, it is stated that indirect jobs are defined as including suppliers of crude oil and other materials, construction companies and contract workers used for maintenance and repair, and office product and equipment suppliers. The report also states that induced jobs will include employees of firms in industries that supply consumables such as food, dry cleaning, banking and other service industries.



December 2014

THE ECONOMIC CONTRIBUTION OF WASHINGTON STATE'S PETROLEUM REFINING INDUSTRY IN 2013

ACKNOWLEDGEMENTS

Washington Research Council has produced this report with funding from the Western States Petroleum Association. Washington state's economy is simulated using the Washington Research Council-Regional Economic Models, Inc. (WRC-REMI) model, based on a detailed survey of the five oil refiners operating in Washington. The results of this analysis are the sole responsibility of the Washington Research Council, a nonprofit organization committed to objective analysis of economic and public policy issues in Washington state.

1. Report Overview

This report quantifies the impact of Washington's five major petroleum refiners on the state's economy in 2013.

In 2013, the refiners directly provided 2,024 full-time jobs, paying an annual average wage of \$121,114. In addition, the refiners employed, at high wages, 2,727 contract workers on an average day, doing maintenance, capital repair and capital replacement. The refiners indirectly created additional Washington state jobs in industries from which they purchased goods and services, including transportation, construction, utilities and business services. Spending of the income earned in these direct and indirect jobs created even more jobs.

The sum of all these effects was more than 26,060 jobs and almost \$1.8 billion in personal income for Washington state in 2013. From this activity, state and local governments received \$53.4 million in sales and use taxes and \$124.9 million in business and occupation taxes.

Also, downstream industries, which distributed refined petroleum prod-

ucts, paid \$428 million in wages to 16,044 workers in 2013. Excise taxes collected by the state from these industries exceeded \$236 million in 2013.

Because of Washington's unique tax structure, a Washington refinery's state and local tax burden in 2013 was almost three times higher than the state and local tax burden of a comparable refinery located in California.

The report updates the economic impact analyses of petroleum refining for 2003, 2005, 2007, 2009 and 2011 previously prepared by the Washington Research Council (WRC 2004, 2006, 2009, 2010 and 2012), drawing upon a survey of Washington refiners conducted by the Council in 2014 (Appendix A) and the WRC-REMI model of the Washington state economy (Appendix C).

2. Summary of Findings

Washington's five refineries provide 3.4 percent of the United States' refining capacity. In 2013 they processed 572,300 barrels of crude oil per day. Gasoline, diesel oil, and jet

Table 2.1: Summary of Multipliers and Economic Impacts

Refining Jobs	Multiplier	Indirect and Induced Economic Effect	Major Petroleum Refiners Total Economic Impact
2,024 jobs	12.88	24,036 jobs	26,060 jobs
	\$880,142	\$1,445,719,917 personal income	\$1,781,406,866 personal income
	\$26,324	\$43,239,183 sales and use taxes	\$53,380,261 sales and use taxes
	\$61,696	\$14,844,634 B&O taxes	\$124,873,001 B&O taxes

Source: 2014 Refiner Survey, WRC-REMI Model

fuel are the largest finished product categories, representing 42 percent, 26 percent, and 14 percent, respectively, of total production, with gasoline production averaging 257,100 barrels per day.

According to the refiners survey, the five major refineries employed 2,024 workers in 2013, paying them an average annual wage of \$121,114—more than twice the Washington state average.

As illustrated in Table 2.1, these jobs have a total employment multiplier of 12.88, meaning that each direct refining job generates an additional 11.88 jobs in the state, for a total employment impact of 26,060 jobs resulting from the five refineries.

Petroleum refining’s extraordinarily high capital intensity, high wages and extensive use of highly paid contract labor are the major reasons for its high jobs multiplier. The WRC-REMI model, which is used here to determine the economic impact of the industry, calculates that each petroleum job adds \$880,000 of state personal income, a total income contribution of nearly \$1.8 billion to the state economy.

The industry is highly taxed and regulated, producing a bounty of tax

and fee revenues for state and local government.

The five refiners paid \$268.6 million in state and local taxes in 2013. This total included \$110.0 million in business and occupation (B&O) tax, \$116.7 million in hazardous substance tax, \$24.3 million in property tax and \$5.9 million in sales and use taxes (Table 7.2).

In addition, the refiners \$12.7 million in regulatory fees in 2013 (Table 7.3).

Including the indirect and induced effects, the refining industry generated \$53 million in sales and use and \$125 million in B&O taxes (Table 2.1)

Calculations of state and local taxes paid by hypothetical 160,000 barrels-per-day refineries located in Washington and California indicate that the tax burden on refineries in Washington is almost three times greater than that in California (Table 8.1).

Finally, refiners contribute generously to the communities in which they are located. The five refiners and their employees contributed \$1.7 million to various community causes in 2013. The firms themselves contributed about 47 percent of this, with the balance provided by firm-sponsored employee giving (Appendix A, Table A.11).

Table 3.1: Washington Refineries

Firm	Year Constructed	Location	Major Products	Capacity (barrels/day)
BP Cherry Point (formerly ARCO)	1971	Whatcom County, northwest of Ferndale	Gasoline, diesel oil, jet fuel, calcinated coke	234,000
Phillips 66 Ferndale (formerly ConocoPhillips Tosco, BP Oil and Mobil Oil)	Mid-1950s by General Petroleum (subsidiary of Socony-Mobil)	Whatcom County, west of Ferndale	Gasoline, diesel oil, jet fuel, liquid petroleum, residual fuel oil	107,500
Shell Oil (formerly Equilon Enterprises and Texaco)	1957	Skagit County, five miles east of Anacortes	Gasoline, diesel oil, jet fuel, propane, coke, sulfur	149,000
Tesoro (formerly Tesoro Northwest and Shell Oil)	1955	Skagit County, on March Point	Gasoline, diesel oil, turbine & jet fuel, liquid petroleum gas, residual fuel oil	125,000
U.S. Oil	1957	Pierce County, Tacoma Tideflats	Gasoline, diesel oil, jet fuel, marine fuel, gas oils, emulsified & road asphalt	42,000

3. Oil Refining in Washington State

Building and development of the industry. The oil refining industry in Washington state began in the mid-1950s with construction of refineries by Shell in Anacortes (Skagit County) and Mobil west of Ferndale on the Strait of Georgia (Whatcom County). Following closely in 1957, Texaco built in Anacortes, and U.S. Oil constructed its refinery on the Tacoma Tideflats. In the early 1970s, in anticipation of the crude oil that would begin flowing from Alaska's North Slope, Atlantic Richfield (Arco) built its refinery at Cherry Point. Now owned by BP, this plant remains one of the nation's newest refineries.

Ownership of all these facilities has been fluid over the years, but today Washington's refining activity is concentrated at the four major plants in Whatcom and Skagit counties and the U.S. Oil plant in Tacoma. (See Table 3.1.)

Federal restrictions. Oil companies invest tremendous sums in their facilities in order to maintain their assets, to increase refining capacities, and to remain viable in a highly competitive global industry. In the 1970s, Washington's older oil refineries embarked on major plant modifications in anticipation of the Alaskan crude. Plans for new port facilities on Puget Sound to receive su-

persized tankers and new pipelines to carry Alaskan oil on to the Midwest were debated. But in 1977, before these plans could be finalized, the Marine Mammal Protection Act came up for reauthorization in Congress. Washington's then-senior senator, Warren Magnuson, preempted these plans by attaching an amendment to the reauthorization bill prohibiting construction of new ports east of Port Angeles.

Geographic isolation. This decision sealed Washington's isolation from the rest of the country's petroleum supplies by preempting pipeline construction to the upper Midwest that would have provided the Northwest with easier access to Eastern and Midwestern distribution systems.

Today, Washington's five refineries make up 3.4 percent of the nation's total refining capacity (EIA 2014a). With this state accounting for 2.1 percent of national petroleum consumption, in-state refineries produce quantities more than sufficient for Washington's needs (EIA 2014b).

Dependence on in-state refining. Other areas of the country—the Midwest and the East—are connected to a larger distribution system that allows their short-term petroleum supply disruptions to be accommodated more easily than those in the West, which are not connected to the Gulf Coast and Midwest pipeline systems. West Coast consumers are supplied primarily from refineries in California and Washington.

Geographically, the three most important sources of crude oil for Washington refineries are Alaska's North Slope, the Canadian province of Alberta and the Bakken oil field of North Dakota.

Nationally, plant obsolescence and federal and state regulations requiring cleaner products and production processes have resulted in a reduction in the number of operable U.S. petroleum refineries from 301 in 1982 to 142 at the beginning of 2014. Those refineries that remain, however, are more efficient, with slightly more refining capacity available today than in 1982.

Over the decade prior to the 2001–03 recession, the increased demands of a growing population and economy and an increasing array of “boutique” fuels required by federal and state regulations strained capacities, with price effects felt throughout the country. The 2001–03 recession provided a respite, but capacity constraints returned at mid-decade as the economy recovered. The situation was exacerbated by hurricane damage to refineries along the Gulf Coast. During 2008–09, high crude oil prices followed by financial crisis induced demand reductions severely squeezed refinery margins. More recently, margins rebounded as increased crude oil production in the U.S. lowered refinery costs, while global product prices remained high.

The constrained supply-demand relationship combines with the West Coast's isolation to produce an economy in Washington that is unusually dependent on its in-state refining capacity. It is this industry and its relationship with the larger Washington state economy that are described in the sections that follow.

4. Industry Impact Analysis

To quantify the impact of Washington State's refineries on its economy, we use the WRC-REMI model to simulate a permanent increase in refin-

ery employment of roughly 8 percent and measure the resulting changes in total state employment, personal income, and gross product. Dividing these resulting changes by the change in refinery employment gives “multipliers” that are then applied to the industry’s total employment to calculate total economic impact. For example, in 2013 the five refineries had 2,024 employees. With a multiplier of 12.88 the total impact of the refineries was 26,060 jobs. Similarly, the refinery activities resulted in \$880,142 of state personal income for every direct job, or a total statewide \$1.78 billion in personal income.

The economic impacts of petroleum refining in Washington, however, are broader than those of most other sectors of the economy. If petroleum prices go up, the effects are felt in the price of food and other essential consumer goods, the costs of commuting, and the cost of moving goods to market for businesses throughout the economy. And, unlike products from other sectors, alternative petroleum supplies or sub-

stitute products are not readily available in the case of an emergency. In order to fully appreciate the economic value of the petroleum refining industry in Washington, the dire economic consequences possible in a catastrophic scenario must be acknowledged. Foreign product would have to be imported, increased dock and terminal capability would be required, product prices would increase in response to diminished supply availability and stability, and these increases would be felt throughout the economy.

In the sections that follow, Washington’s petroleum refining industry is described under equilibrium conditions by summarizing consumption (Section 5), production (Section 6), and the direct purchases of the five major industry refiners (Section 7). Based on these data, the WRC-REMI model calculates the effect of the five refineries on jobs, income, retail sales and use, and B&O taxes statewide (Section 9).

Section 8 presents a comparison of taxes paid by hypothetical 160,000 barrels-per-day refineries located in Washington and California.

Finally, in Section 10 we provide employment, wage, and tax contribution information on the portions of the transportation, wholesaling, and retailing sectors that operate downstream of the refining process. These petroleum-related activities combine to assure that petroleum products get to their markets in Washington state and beyond. Although they would exist regardless of the presence of in-state refining, their inclusion here helps to give a complete picture of the petroleum industry in Washington state.

Figure 5.1: Washington State Petroleum Product Consumption (millions of barrels)

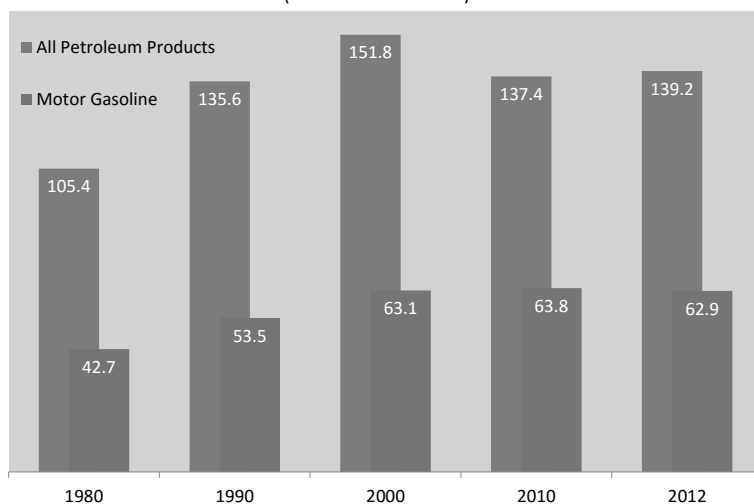
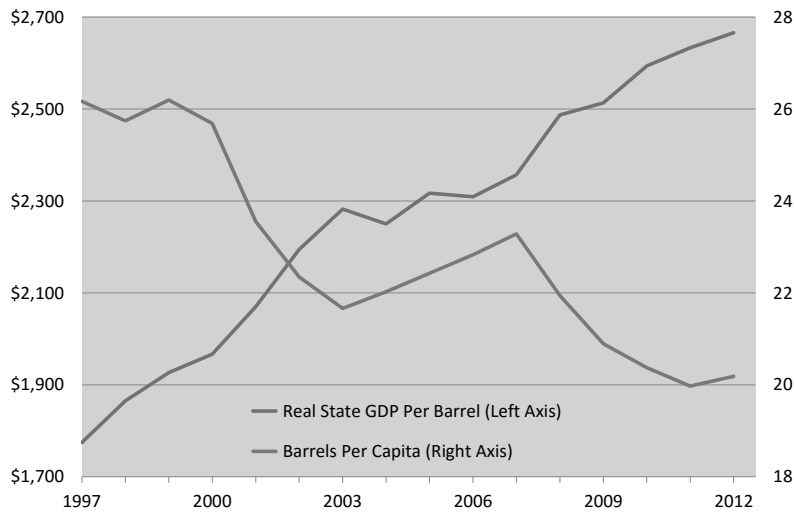
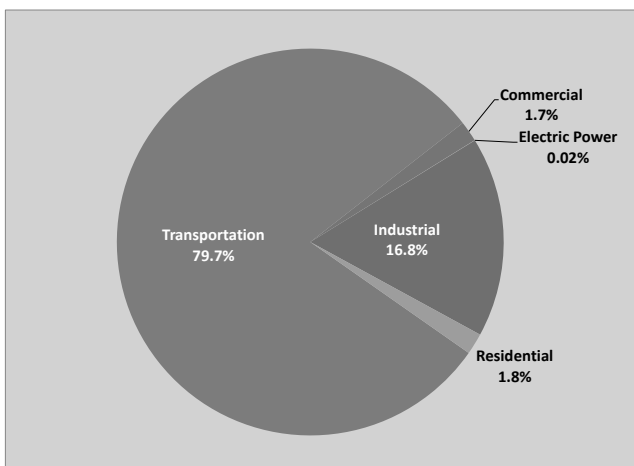


Figure 5.2: Washington Petroleum Consumption Trends



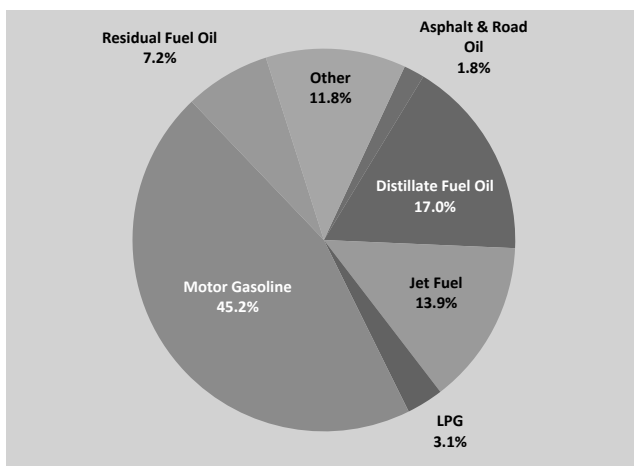
Source: EIA

Figure 5.3: 2012 Consumption By Sector



Source: EIA

Figure 5.4: 2012 Consumption By Product (Volume in Barrels)



Source: EIA

5. Petroleum Product Consumption in Washington

Washington households and businesses consumed a bit more than 139 million barrels of finished petroleum products in 2012, up 32 percent from 1980, according to the Energy Information Administration (EIA). (See Figure 5.1.) Washington's 2012 consumption was 2.1 percent of the U.S. total and about 15 percent of EIA's western Petroleum Administration for Defense (PAD) District V, which encompasses Washington, Oregon, California, Nevada, Alaska, and Hawaii. PAD District V represented 14 percent of total U.S. consumption in 2012 (EIA 2014b).

As a result of increasing fuel efficiency, petroleum product consumption in Washington declined by 6 percent from 1997 to 2012. Over the period the state's population grew by 22 percent and the output of the state economy (as measured by real gross state product) grew by 41 percent. As a result, per-capita consumption declined by 23 percent, while gross state product per barrel of petroleum increased by 50 percent. (See Figure 5.2)

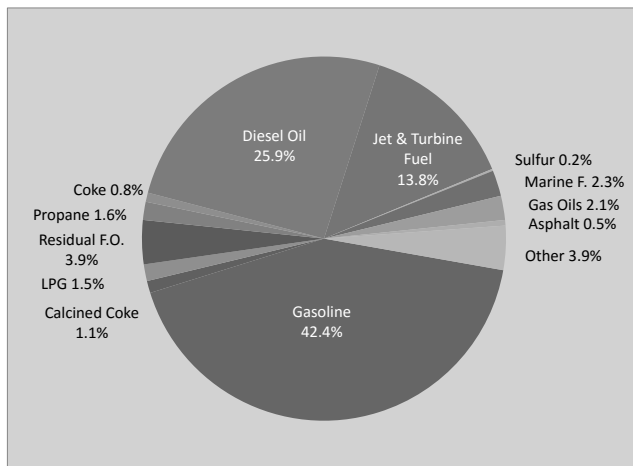
The several broad classes of customers who purchase petroleum products help to explain the state's consumption patterns. Demand for petroleum products from transportation, industrial and residential customers decreased over the fifteen-year period by 3 percent, 17 percent and 41 percent, respectively. Commercial customer demand increased by 33 percent over the period (EIA 2014b).

As shown in Figure 5.3, commercial customers accounted for less than 2 percent of Washington's total petro-

leum product consumption; transportation and industrial customers together accounted for more than 96 percent.

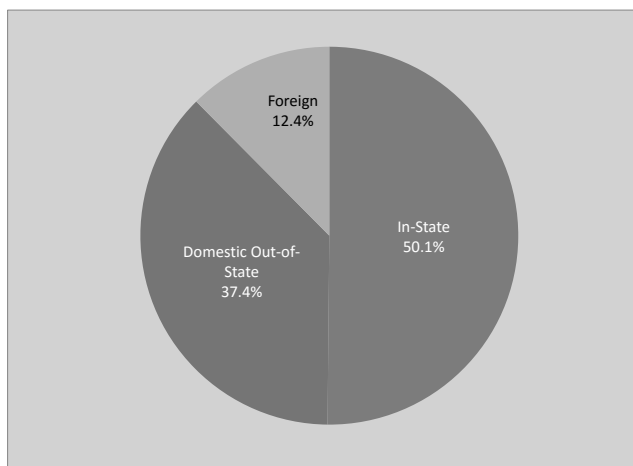
By far, motor gasoline was the largest category of product consumed, at 46.2 percent of the total. (See Figure 5.4)

Figure 6.1: 2013 Washington Production By Product (Volume in Barrels)



Source: 2014 Refiners Survey

Figure 6.2: 2013 Washington Production By Destination (Volume in Barrels)



Source: 2014 Refiners Survey

6. Refinery Production in Washington

The data that follow in Sections 6, 7, and 8, unless otherwise indicated, are the aggregated results of our survey of Washington's five major refiners (Appendix A).

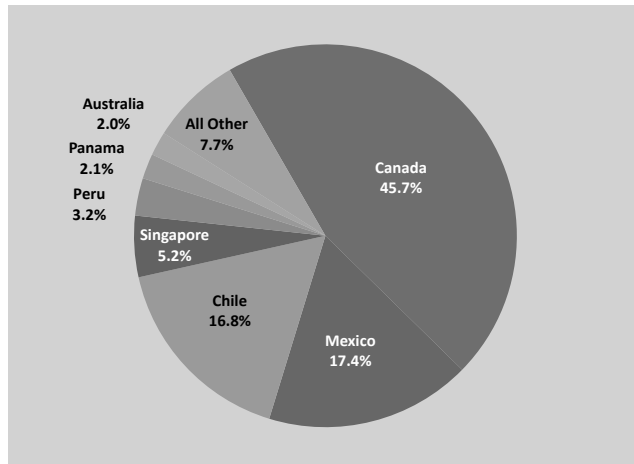
Finished products. Washington's refineries produced 606,200 barrels per day and more than a dozen different products in 2013. Gasoline, 257,100 barrels per day in 2013, is by far the largest product category, accounting for 42.4 percent of the total. Diesel oil and jet fuel are the next largest at 25.9 percent and 13.8 percent, respectively. (See Figure 6.1.)

Gasoline accounted for 45.0 percent of the refineries' total \$25.1 billion in output value in 2013. Again, diesel oil and jet fuel are next, accounting for 28.6 percent and 15.1 percent, respectively.

Markets. In 2013, 50.1 percent of Washington refined product was sold within the state; 37.4 percent of total product was sold domestically outside Washington; and the remaining 12.4 percent was delivered to foreign buyers. (See Figure 6.2.)

The World Institute for Strategic Economic Research (WISER) provides data on the destination of foreign exports of petroleum products from Washington. In 2013, the \$4.8 billion of petroleum products exported from the state amounted to 5.8 percent of Washington's foreign exports. Almost 46 percent of the dollar value of petroleum product exports went to Canada. Mexico was the second most important export market, followed by Chile, Singapore, Peru, Panama and Australia. (See Figure 6.3; Appendix B provides com-

Figure 6.3: Top Export Markets in 2013



Source: WISER

plete listings of export destinations for 2012 and 2013.)

Product transport. Finally, 47.8 percent of all products refined in Washington was shipped by pipeline in 2013, primarily to Seattle and Tacoma markets and on to Portland. Of the remaining product, 39.1 percent was shipped by water, to Portland and other destinations along the Columbia River as well as to foreign customers; 10.2 percent went by truck; and 2.9 percent went by rail.

7. Washington Refiners: Inputs

Washington refiners spent \$23.5 billion on feedstocks and other inputs in 2013. This section describes their main areas of expenditure.

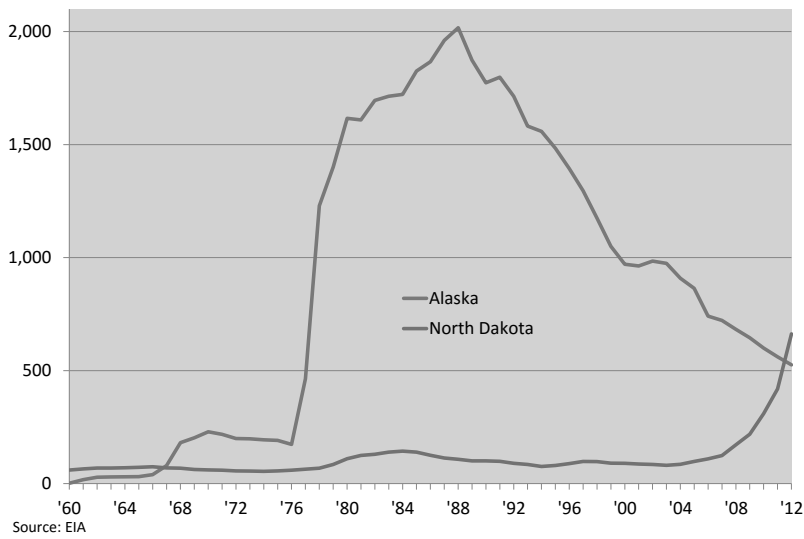
Feedstock. Washington's petroleum refineries received 591,300 barrels per day of crude oil and other feedstock inputs (e.g., butane, isobutene, and cat feed) in 2013. The total volume of feedstock in 2013 was 8.9 percent greater than 2012. The value of 2013 feedstocks was \$22.5 billion, up 8.8 percent from 2012. (See Table 7.1.)

In 2013, 60.5 percent of crude oil came into the refineries by water, 27.2 percent came by pipeline; and 12.3 percent came by rail. Of the

Table 7.1: Quantity and Value of Feedstock Inputs

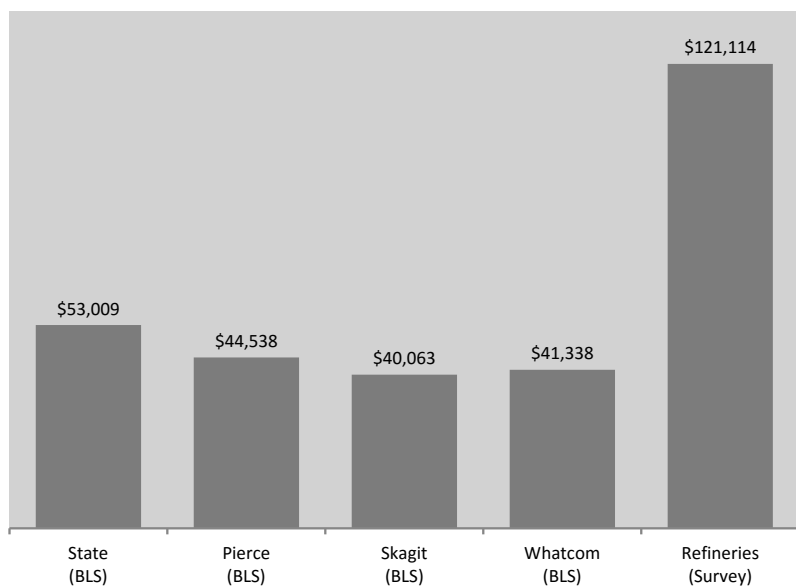
	2012	2013
Total Feedstock Inputs (thousands of barrels/day)	542.9	591.3
Crude Oil	528.4	572.3
Other	14.5	19.0
Total Value of Feedstock Inputs (millions of dollars)	20,673.0	22,494.4
Crude Oil	20,296.5	22,012.1
Other	376.5	482.3

Figure 7.1: Crude Oil Production, Alaska and North Dakota, (1,000 BBL/D)



crude oil, 46.2 percent was Alaskan, 18.4 percent was Canadian from conventional sources, 8.7 percent was Canadian from oil sands and 13.9 percent was from North Dakota. The remaining 12.8 percent came from a number of other places.

Figure 7.2: Average Annual wages



This represents a noteworthy change from 2003 when 90.4 percent of crude came by water from Alaska and no crude came to Washington by rail from North Dakota. Driving this change was the precipitous decline of crude oil production in Alaska and growth of production in North Dakota, as shown in Figure 7.1.

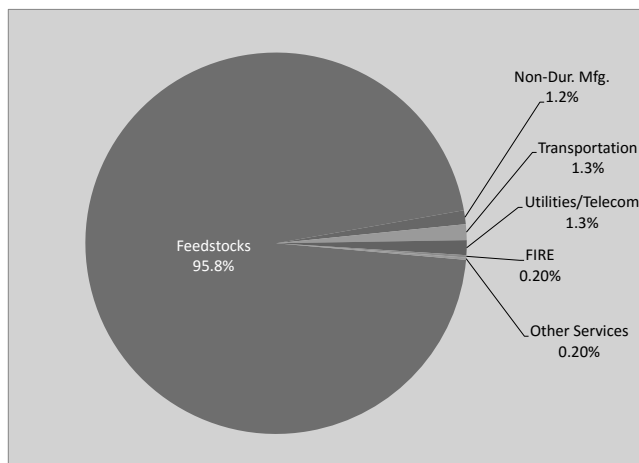
Labor. Washington's five oil refiners employed 2,024 workers in 2013 and paid them extraordinarily well. The refiner survey puts the 2013 average annual refinery wage at \$121,114. According to the U.S. Bureau of Labor Statistics (BLS), the overall statewide average wage was \$53,009 in 2013, less than half of the refinery average wage. (See Figure 7.2.)

This contrast is even more pronounced when comparing refining wages with average annual wages in Whatcom and Skagit counties where the four largest refineries are located. The average annual wage in Whatcom County in 2013 was \$41,338 while in Skagit County it was \$40,063 (BLS 2014).

Refinery payrolls totaled nearly a quarter of a billion dollars in 2013. Worker benefits totaled more than \$90 million, and average total compensation per employee was \$165,870.

Contract labor. Washington's petroleum refiners regularly rely on contract workers to clean and service various parts of their plant facilities and equipment, as well as to conduct scheduled major repairs and upgrades. The number of workers varies from year to year—2,843 in 2012 and 2,727 in 2013—and represents a significant part of the employment base, especially in Whatcom and Skagit counties.

Figure 7.3: 2013 Non-Labor Operating Expenses



Source: 2014 Refiners Survey

In 2013 refiners paid \$412.9 million for contract workers, an average of \$151,417 per worker.

Forty-one percent of contract workers in 2013 (1,128 workers) were engaged in capital repair and replacement, at a cost of \$91.7 million. In addition to this contract labor, the refiners made \$100.5 million in construction and other capital expenditures. Purposes included safety and environmental compliance, efficiency

improvements and capacity expansion.

Non-labor operating expenditures. Non-labor operating expenditures are mostly for feedstocks—crude oil—and intermediate processed crude (which will be refined further into higher grade products) and chemicals and catalysts to be applied to the crude to produce various final products. These purchases show up in two categories: feedstocks and nondurable manufactured goods (primarily intermediate petroleum products and chemicals). Combined, these two categories account for more than 97 percent of all non-labor operating expenditures.

Significant amounts are also spent on utilities and transportation, which together accounted for \$609.1 million in 2013. Utilities expenditures, including electricity, gas and communications, totaled \$294.6 million in 2013, and transportation totaled \$314.5 million. Transportation expenditures were primarily for waterborne transport of inbound and outbound product (Appendix A, Table A.7).

Taxes. The five refiners contributed \$268.6 million in state and local taxes in 2013 (See Table 7.2).

Table 7.2: Taxes Paid by Refiners in 2013

	(Millions)	% of Total
Retail sales and use tax	\$5.9	2.2%
Business and occupation tax	\$110.0	41.0%
Property tax	\$24.3	9.0%
Unemployment compensation tax (state only)	\$1.1	0.4%
Hazardous substance tax	\$116.7	43.5%
Oil spill tax	\$8.3	3.1%
Petroleum Products Tax	-	-
Motor vehicle fuel tax	\$0.5	0.2%
Other	\$1.7	0.6%
Total	\$268.6	

Source: 2014 Refiners Survey

Table 7.3: Regulatory Fees Paid by Refiners in 2012 (dollars)

Air operating registration and permit fees	2,061,000	16.4%
Waste disposal fees	1,330,000	10.6%
Wastewater discharge fees	820,600	6.5%
Building Inspection Fees	8,344,913	66.3%
Building permit fees	35,000	0.3%
Other	109,000	0.9%
Total	12,700,513	

Source: 2014 Refiners Survey

The state hazardous substance tax—\$116.7 million—comprised the largest share of total taxes paid, 43.5 percent of the total. The rate on this tax is 0.7 percent of wholesale value. Petroleum products constitute a large portion of the products subject to the tax.

Ranking a close second was the business and occupation tax, \$110.0 million, 41.0 percent of the total. Refineries are subject to this tax under either the manufacturing or wholesaling categories, at the rate of 0.484 percent.

Next in line was the property tax, \$24.3 million and 9.0 percent of the total tax bill.

The fourth most costly tax in 2013, \$8.3 million, was the oil spill tax. It is a tax of 5 cents per barrel on crude oil or petroleum products that are transported by ship or barge in Washington waters and offloaded at an in-state marine terminal. Of the proceeds, 4 cents are paid into the oil spill administration account and 1 cent into the oil spill response account. When (as is currently the case) the oil spill response account is fully funded, the 1 cent tax is suspended; when the account is short of funds, the tax is resumed. The 1 cent response tax was last collected during the 3-month period from January 1

to March 31, 2013. Through a credit, the tax is effectively eliminated for crude oil or petroleum products exported from the state.

The petroleum products tax is another tax unique to the petroleum industries. Revenues from this tax are dedicated to the pollution liability insurance program, which assists owners of underground storage tanks in obtaining insurance for upgrading and replacing tanks and preventing leaks. This tax is suspended when the pollution liability insurance program account balance exceeds a trigger value. The trust fund balance reached the trigger in the first quarter of 2010. The tax was suspended on April 1 of that year and remains suspended today.

The refineries reported paying \$5.9 million in sales and use taxes in 2013. Currently the sales and use tax rate paid by the two Skagit County refineries and the two Whatcom County refineries is 8.5 percent, while the rate paid by the Tacoma refinery is 9.5 percent.

Fees. In addition, the refiners paid \$12.7 million in regulatory fees in 2013. These included their air operating registration and permit fees (\$2.1 million, 16.4 percent), waste disposal fees \$1.3 million, 10.6 percent), and building inspection fees

(\$8.3 million, 66.3 percent). (See Table 7.3.)

8. Comparison with Taxation of a California Refinery

Table 8.1 compares the taxation of hypothetical refineries that processed 160,000 barrels of crude oil per-day in Washington and California in 2013.

We focus on six major taxes. One of these taxes—the corporate income tax—is levied in California but not in Washington. Two of these taxes—the business and occupation tax and the hazardous substance tax—are levied in Washington but not in California. The remaining three taxes—the sales and use tax, the property tax and the oil spill tax—are levied in both states.

The overall 2013 tax burden in Washington, \$75.8 million, is almost three times the burden in California, \$26.3 million. This is largely due to the fact that the Washington refinery pays considerably more in B&O and hazardous substance taxes than the California refinery pays in corporate income tax.

Corporate income tax. California’s primary business tax is a corporate income tax. To avoid the complications inherent in state-level income taxation of multi-state businesses, we assume that the corporation

owning the refinery does business only in California. California’s corporate income tax rate is 8.84 percent. Based on financial information from Tesoro Corporation’s 2013 Form 10-K filed with the U.S. Securities and Exchange Commission, we estimate the taxable income for a 160,000 barrels-per-day refinery to be \$161.7 million and the corporate income tax due to be \$14.3 million.

B&O tax. The B&O tax is Washington’s primary business tax. It is a tax on a business’s gross receipts. Our 160,000 barrel per day refinery has refined product sales of \$6.78 billion. This results in a B&O tax obligation of \$32.8 million at the manufacturing/wholesaling rate of 0.484 percent. This is more than twice the corresponding obligation under the California income tax.

The B&O tax is a tax on gross income, without any deductions for the costs of making the goods or services sold, while the corporate income tax is a tax on net income, after deduction of these costs. The B&O tax tends to be more burdensome than a corporate income tax for low margin businesses such as refining.

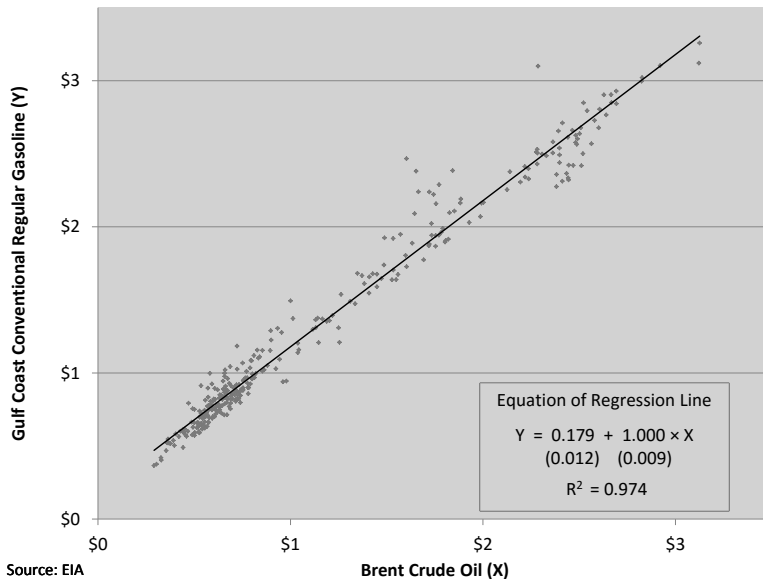
Refinery margins are particularly low when crude oil prices are high. In the

Table 8.1: Taxes on a 160,000 Barrels per Day Refinery, 2013
(millions of dollars)

	Washington	California
Corporate Profits Tax		\$ 14.3
Business & Occupation Tax	\$ 32.8	
Hazardous Substance Tax	\$ 34.8	
Property Tax	\$ 5.4	\$ 6.6
Sales & Use Tax	\$ 1.6	\$ 1.6
Oil Spill Tax	\$ 1.2	\$ 3.8
	<u>\$ 75.8</u>	<u>\$ 26.3</u>

Source: WRC calculations

Figure 8.1: Monthly Average Spot Prices May 1987 – August 2014
Gulf Coast Conventional Regular Gasoline vs. Brent Crude Oil
2009 Dollars Per Gallon



long run, the prices refiners pay for crude oil passes directly through to the prices they receive for products, as Figure 8.1 illustrates. On the figure we have plotted the monthly average U.S. Gulf Coast spot price of conventional regular gasoline against the monthly average spot price of the benchmark European Brent crude oil from May 1987 to August 2014. The slope of the regression line through the data points is almost exactly equal to one.

Hazardous substance tax. Returning to the taxes listed in Table 8.1, the hazardous substance tax is a second gross receipts tax levied by Washington state. Applying an effective rate of 0.513 percent to gross receipts of \$6.78 billion gives a \$34.8 million hazardous substance tax obligation for the 160,000 barrel per day Washington refinery. (Based on our survey, we use the 0.513 percent effective rate rather than the statutory 0.7 percent rate to account for various deductions and credits including

the credit for product shipped out-of-state in vehicle fuel tanks.)

Property tax. We assume that the Washington refinery is located in the city of Anacortes and that the California refinery is in the city of Martinez. (Shell and Tesoro have refineries in both of these cities.) Based on the taxes paid by the Shell and Tesoro refineries in Anacortes, we estimate that the taxes that would be paid by a 160,000 bbl./day refinery in Anacortes to be \$5.4 million. Based on the difference in property tax rates between Anacortes and Martinez, we estimate that such a refinery in Martinez would pay \$6.6 million in property taxes.

Sales and use tax. In 2013, the combined state and local sales tax rates was 8.5 percent in both Anacortes and Martinez. Based on the survey of Washington refineries, we estimate transactions subject to the sales and use tax to be \$18.8 million and the amount paid to be \$1.6 million.

Oil spill tax. Both states impose an oil spill tax. The rate in Washington is 5 cents per barrel. As we noted above, in Washington, 1 cent of the 5 cents is sometimes suspended, and the full 5 cents was only collected in the first three months of 2013. We assume an effective rate of 2.125 percent to account for the credit for product exported from the state. The oil spill tax rate in California is 6.5 cents per barrel, with no credit for exported product. We assume that for both refineries, 58.4 million barrels crude oil are subject to the tax. The oil spill tax burden is \$1.2 million in Washington and \$3.8 million in California.

9. Petroleum Refining Industry Direct, Indirect and Induced Economic Impacts

The economic impact of refineries on the state's economy can be divided into three primary categories: direct, indirect, and induced effects:

- The **direct** effects are those in the industry itself—the refinery jobs and payroll, and the taxes paid by the refiners.
- The **indirect** economic effects include the jobs, wages, and taxes of upstream suppliers of the refineries—not only the suppliers of crude oil, but also the construction companies and contract workers used for plant maintenance and repair and the office product and equipment suppliers, for example. These figures were captured in the survey completed by the five refiners. The indirect economic effects also include the jobs, wages, and taxes of suppliers' suppliers; of the suppliers' suppliers' suppliers; and so on up the supply chain.
- Finally, the **induced** effects are the jobs, income, and taxes contributed by firms in industries that supply daily consumables and services—e.g., food, dry cleaning, banking—to workers holding the direct and indirect jobs.

The relationship between the direct jobs, income, and tax effects in an industry and their indirect and induced effects are captured by multipliers, which are calculated using the WRC-REMI model of the Washington state economy.

The employment multiplier for the petroleum refining industry is 12.88. Applying this multiplier to the 2,024 direct refinery jobs in 2013 gives a total state employment impact of 24,036 jobs.

This is an unusually large employment multiplier. In comparison, the 2007 Washington state Input-Output Study (2014) calculates that the employment multiplier for manufacturing/construction overall is 2.65. Much of this difference arises because the WRC-REMI model incorporates a number of significant behavioral responses to changes in prices and costs that are not picked up by a simple input-output model: The wage rate depends on the supply and demand for labor, migration and labor force participation rates respond to changes in wage rates, and consumer purchases of specific goods and services respond to changes in relative prices and personal income. In addition, producers substitute among production factors in response to changes in relative factor costs, market shares respond to changes in regional production

Table 9.1: Impact of a 160,000 Barrel Per Day Refinery

565 Direct Jobs	+6,915 Additional Jobs Elsewhere in the State Economy
\$92.2 Million Direct Compensation	+\$399.5 Million Additional Personal Income Elsewhere in the Economy
\$73.7 Million Direct Taxes	+\$4.3 Million Additional Sales, Use and B&O Taxes Elsewhere in the Economy

Source: WRC

costs, and investment rises in response to increases in output. When we run the WRC-REMI model with these channels turned off so as to approximate an input-output model, the employment multiplier for petroleum refining is reduced to 4.84. When we run such a WRC-REMI simulation for the larger petroleum and coal products manufacturing sector (the “three-digit” sub-sector of manufacturing that contains the petroleum refining industry) the employment multiplier is 4.05. This is actually less than the 6.80 multiplier that the Washington Input-Output Model gives for petroleum and coal products manufacturing. (This 6.80 is the highest employment multiplier found by the 2007 Input-Output Study.)

Several additional factors contribute to the petroleum refining industry's large multiplier. First, petroleum refiners pay high wages. As a result, the employment induced by refinery employee spending is relatively great. Second, the petroleum industry ranks high in the ratio of in-state supplied intermediate inputs (including contract labor) to employee income. For this reason, indirect employment is relatively high. And some of these indirect jobs (contract labor, in particular) pay unusually high wages.

The WRC-REMI model calculates that each refining job results in an additional \$880,142 of state personal income. At 2013 employment levels, the industry adds \$1.8 billion to state personal income.

In 2013 state and local sales and use taxes averaged \$0.0270 for each dollar of state personal income. With the income multiplier of \$880,142, each petroleum refining job results in

\$26,324 in state and local sales taxes or a total of \$53.4 million.

The refiners directly paid \$105.1 million in B&O taxes in 2013. In 2009 state B&O taxes averaged \$0.00106 for each dollar of personal income. Multiplying this rate into \$1,452.9 million—the increase in state personal income we ascribe to the 1,986 refinery jobs net of the wages and benefits of the refinery workers—gives \$15.4 million additional induced and indirect B&O tax revenue, for a total of \$120.5 million, or \$60,691 per direct job.

These impacts can be expressed in terms of the hypothetical Washington refinery producing 160,000 barrels of product a day that was analyzed in Section 8. In 2013, this refinery would have provided 565 jobs, and these workers would have received \$68.4 million in wages and salaries and \$25.3 million in benefits. In addition to the direct jobs and income, the refinery would generate 6,915 jobs and \$399.5 million in personal income elsewhere in the state's economy. The refinery itself would pay \$73.7 million in state and local taxes. In addition to these direct taxes, the indirect and induced activities generated by the refinery would provide \$4.3 million in sales, use and B&O tax revenue. (See Table 9.1.)

10. Washington Petroleum Industry: Downstream Activities

Washington's petroleum refiners rely on a number of industries to distribute their product to consumers.

These include transportation (pipelines, barges, trucks, and rail) and transportation support facilities (terminals, stockyards, and bulk stations), wholesalers, and retailers

Table 10.1: Employment and Wages by Industry, 2013

Industry (NAICS Code)	Firms	Total Wages Paid	Average Employment	Average Annual Wage
Petroleum Bulk Stations and Terminals (424710)	38	\$45,169,000	716	\$63,092
Other Petroleum Merchant Wholesalers (424720)	94	\$63,632,000	1,085	\$58,661
Gasoline Stations With Convenience Store (447110)	1,730	\$230,081,000	12,109	\$19,001
Other Gasoline Stations (447190)	112	\$24,395,000	958	\$25,455
Fuel Dealers (45431)	120	\$49,627,000	1,038	\$47,799
Refined petroleum product pipelines (48691)	7	\$14,979,000	138	\$108,346
Crude Oil Pipelines (48611)	D	D	D	D

Source: BLS

D: Value not disclosed

(gasoline stations and fuel oil dealers).

These downstream industries exist as a result of petroleum product consumption in our economy, not as a result of petroleum refining. Presumably, if the refineries were gone or if they had never existed in Washington, finished petroleum products would be imported to terminal and stockyard facilities, transported to retail destinations within the state, and sold to consumers through systems much like those that currently exist, together with similar job, wage, and tax effects. Even so, their direct economic contribution is substantial and their role in the larger petroleum industry is crucial. This section describes the employment, wages, and taxes associated with these industries.

Of the total finished products produced by Washington's refineries, 48 percent leaves through pipeline to markets in Seattle and Tacoma and beyond. Another 39 percent goes by water to Seattle, Portland, or elsewhere with the remaining 13 percent of product shipped by rail or truck. About 50 percent of product is delivered to retailers for consumer sales within the state of Washington (Appendix A).

Jobs and wages. According to detailed data reported to the BLS for 2013, the most recent year for which such data are available, there were about 2,100 employers in these downstream industries. Together, they paid \$428 million in wages to 16,044 workers. These are all workers covered by unemployment insurance in these industries, so the number includes both full-time and part-time workers. Table 10.1 shows these data for each industrial classification with its corresponding North American Industrial Classification System (NAICS) code.

Among the downstream industries there are three broad tiers of employment and pay:

- Refined petroleum product pipelines employ a few highly paid workers—138 workers made \$108,346 (plus benefits) on average in 2013.
- Bulk stations and terminals, wholesalers, and fuel oil dealers employ about 2,839 workers who earned on average \$55,804 in 2013.
- Gasoline stations generate a large wage bill with a lot of lower-wage and part-time jobs. In 2013, this industry's 1,842 employers paid

total wages of \$254.6 million to 13,067 workers.

Taxes. The state Department of Revenue (DOR) reports excise tax data on these same industries (DOR 2014a, 2014b).

As shown in Table 10.2, total excise taxes due from the downstream industries equaled \$236.2 million in 2013. Gasoline stations paid \$156.7 million in excise taxes. Wholesalers paid \$59.9 million; fuel dealers, \$19.6 million.

Table 10.2: Taxable Income and Taxes Due by Industry, 2013 (millions of dollars)

Industry (NAICS Code)	Gross	Taxable	B&O Tax	Other Excise	Total
Petroleum Products Wholesaling (4247)	7,667.4	6,079.4	29.9	30.0	59.9
Gasoline Stations (4471)	12,015.1	9,907.2	47.9	108.8	156.7
Fuel Dealers (45431)	540.5	510.3	2.5	17.1	19.6
Refined petroleum product pipelines (48691)	D	D	D	D	D
Crude Oil Pipelines (48611)	D	D	D	D	D

Source: DOR

D: Value not disclosed by DOR

Appendix A

A.1: Quantity and Value of Feedstock Inputs	2012	2013
Feedstock Quantity (KBLS/Day)		
Crude Oil	528.4	572.3
Other	14.5	19.0
Total	542.9	591.3
Feedstock Value (\$K)		
Crude Oil	20,296,503	22,012,122
Other	376,451	482,324
Total	20,672,954	22,494,447
A.2: Quantity and Value of Output	2012	2013
Output Quantity (KBLS/Day)		
Gasoline	244.0	257.1
Diesel Oil	123.0	156.8
Jet and Turbine Fuel	77.6	83.7
Calcined Coke	5.0	6.5
LPG	6.2	9.0
Residual Fuel Oil	25.6	23.7
Propane	8.7	9.8
Coke	5.5	4.9
Sulfur	0.9	1.1
Marine Fuels	18.7	13.9
Gas Oils	17.0	13.0
Emulsified and Road Asphalt	3.0	3.0
Other	19.6	23.8
Total	554.8	606.2
Output Value (\$K)		
Gasoline	11,131,333	11,283,582
Diesel Oil	5,925,518	7,180,577
Jet and Turbine Fuel	3,607,739	3,776,891
Calcined Coke	240,571	274,427
LPG	147,581	186,164
Residual Fuel Oil	954,440	761,980
Propane	110,292	143,743
Coke	46,945	46,263
Sulfur	10,802	7,245
Marine Fuels	732,733	486,125
Gas Oils	492,609	369,691
Emulsified and Road Asphalt	108,848	88,554
Other	404,719	460,997
Total	23,914,129	25,066,238

A.3: Origin of Inputs 2013 (KBBL/Day)	Crude Oil	Other
Alaska	264.4	2.9
Canada (Conventional)	105.4	-
Canada (Oil Sands)	49.6	-
Bakken	79.3	-
All Other Origins	73.7	16.1

A.4: Destination of Output 2013 (KBBL/Day)	Washington	Other U.S.	Foreign	Total
Gasoline	118.7	116.6	21.8	257.1
Diesel Oil	77.2	57.8	21.8	156.8
Jet and Turbine Fuel	47.6	15.4	20.8	83.7
Calcined Coke	-	-	6.5	6.5
LPG	8.6	0.3	-	9.0
Residual Fuel Oil	12.9	3.2	7.6	23.7
Propane	8.3	1.5	-	9.8
Coke	3.0	2.0	-	4.9
Sulfur	1.0	0.0	-	1.1
Marine Fuels	12.1	1.8	-	13.9
Gas Oils	2.0	11.0	-	13.0
Emulsified and Road Asphalt	2.0	1.0	-	3.0
Other	3.8	20.0	-	23.8

A.5: Mode of Transport 2013	Pipeline	Water	Truck	Rail
Feedstocks (KBBL/Day)				
Crude Oil	155.7	346.1	0.1	70.4
Other	1.8	8.0	0.2	9.1
Outputs (KBBL/Day)				
Gasoline	159.2	77.6	20.3	-
Diesel Oil	77.4	63.7	15.6	0.1
Jet and Turbine Fuel	37.6	33.0	13.2	-
Calcined Coke	-	-	0.2	6.3
LPG	5.7	-	-	3.3
Residual Fuel Oil	-	23.7	-	-
Propane	0.1	-	7.2	2.4
Coke	-	2.0	-	3.0
Sulfur	-	-	1.1	-
Marine Fuels	-	13.9	-	-
Gas Oils	-	13.0	-	-
Emulsified and Road Asphalt	-	-	2.0	1.0
Other	-	16.7	-	7.1

A.6: Employment and Contract Labor	2012	2013
On-Site Employment		
Number of FTE Employees	1,996	2,024
Total Payroll (\$K)	248,408	245,134
Total Employee Benefits (\$K)	91,579	90,586
Contract Labor		
Expenditure (\$K)		
Service and Maintenance	517,015	321,197
Capital Repair and Replacement	80,889	91,709
Total	597,903	412,906
Number of Contract Workers (FTE)		
Service and Maintenance	1,790	1,599
Capital Repair and Replacement	1,053	1,128
Total	2,843	2,727
% of Contract Labor from Outside WA State		
Service and Maintenance	19%	10%
Capital Repair and Replacement	25%	50%

A.7: Operating Expenditures Other than Labor or Feedstock (\$K)	2012	2013
Non-Durable Manufactured Goods		
Petroleum Products	240,056	234,633
Other Non-Durable Goods	42,544	40,235
Total	282,600	274,868
Durable Manufacturing	-	-
Construction	178,368	75,900
Transportation		
Rail	27,188	61,653
Trucking	8,557	4,956
Automobiles	9,479	5,360
Waterborne	216,837	223,115
Air	-	-
Other	17,123	19,419
Total Transportation	279,185	314,503
Utilities and Communications		
Electricity	48,745	64,952
Gas	140,716	211,872
Other	14,450	17,824
Total U&C	203,911	294,647
Finance, Insurance and Real Estate	8,029	45,858
Business Services	6,213	6,109
Other Services	37,067	40,076

A.8.: Non-Labor Capital Expenditures	2012	2013
Equipment (\$K)	95,261	139,241
Materials and Supplies (\$K)	53,451	121,808
Total	148,712	261,050
A.9: Taxes and Fees		
Taxes (\$K)		
Retail Sales and Use tax	3,182	5,919
Business and Occupation Tax	101,517	110,028
Property Tax	23,371	24,270
Unemployment Compensation Tax	934	1,067
Hazardous Substance Tax	109,339	116,746
Oil Spill Tax	7,943	8,343
Petroleum Products Tax	-	-
Motor Vehicle Fuel Tax	530	514
Special Fuel Tax	52	33
Other	1,586	1,662
Regulatory Fees (\$K)		
Air Operating Registration and Permit Fees	1,957	2,061
Waste Disposal Fees	2,126	1,330
Wastewater Discharge Fees	794	821
Building Inspection Fees	3,879	8,345
Building Permit Fees	30	35
Other	40	109
Industrial Insurance Premium (\$K)	9,210	6,966
A.10: Estimated Services and Retail Trade		
Food Services (\$K)		
Associated with Contract Labor	372	415
Associated with Business Visitors	505	579
Total	877	994
Hotel and Motels (\$K)		
Associated with Contract Labor	634	653
Associated with Business Visitors	695	665
Total	1,329	1,318
Other Trade and Services (\$K)		
Associated with Contract Labor	25	25
Associated with Business Visitors	61	70
Total	86	95
A.11: Contributions (\$K)		
Corporate	755	807
Firm-Sponsored Employee Giving	860	908
A.12.: Other (\$K)		
Estimated Business visitors from outside Washington	3,050	2,450

Appendix B

Petroleum Product Exports from Washington State

	2013		2012	
Canada	\$2,177,833,636	1	\$1,781,345,720	1
Mexico	\$829,871,226	2	\$1,082,484,856	2
Chile	\$799,600,716	3	\$321,653,747	3
Singapore	\$246,697,826	4	\$244,062,973	4
Peru	\$151,040,493	5	\$439,895	19
Panama	\$101,230,413	6	\$497,533	18
Australia	\$96,604,700	7	\$138,680,487	5
Guatemala	\$95,946,791	8	\$38,177,596	9
China	\$71,483,403	9	\$67,575,139	6
Brazil	\$64,440,635	10	\$64,750,640	7
New Zealand	\$40,964,163	11	\$52,736,383	8
Thailand	\$17,846,188	12	\$233,353	21
United Arab Emirates	\$14,671,853	13	\$7,409,777	13
Ecuador	\$9,773,181	14	\$34,457,684	10
Colombia	\$9,348,212	15	\$213,812	22
Indonesia	\$8,461,078	16	\$8,180,664	12
India	\$8,244,201	17	\$2,023,767	16
Belgium	\$8,000,000	18	\$16,142	32
Japan	\$7,325,684	19	\$5,377,778	14
Taiwan	\$3,650,060	20	\$3,471,180	15
Russia	\$3,484,204	21	\$621,938	17
Malaysia	\$549,305	22	\$10,705,014	11
Philippines	\$394,911	23	\$364,487	20
Dominican Republic	\$167,947	24	\$172,401	23
Costa Rica	\$137,888	25	\$125,102	24
Germany	\$110,370	26	\$49,032	27
Nicaragua	\$96,226	27	\$19,487	31
Kazakhstan	\$94,789	28	\$14,120	34
Vietnam	\$40,451	29	\$116,818	25
Guadeloupe	\$31,109	30	\$0	-
Saudi Arabia	\$25,242	31	\$0	-
Uruguay	\$21,101	32	\$0	-
Trinidad And Tobago	\$17,531	33	\$11,195	37
French Polynesia	\$16,802	34	\$8,401	39
Fiji	\$9,444	35	\$0	-
Barbados	\$8,483	36	\$4,448	42
United Kingdom	\$5,535	37	\$26,097	28
Czech Republic	\$5,440	38	\$7,400	40
New Caledonia	\$5,260	39	\$0	-
Korea, Republic Of	\$4,607	40	\$26,033	29
Switzerland	\$3,996	41	\$0	-
Hong Kong	\$3,561	42	\$88,040	26
Netherlands	\$3,480	43	\$0	-
Norway	\$2,886	44	\$0	-
Spain	\$2,613	45	\$5,280	41
Haiti	\$2,580	46	\$13,960	35
Jamaica	\$0	-	\$23,234	30
Maldiv Islands	\$0	-	\$15,196	33
Denmark	\$0	-	\$12,000	36
Austria	\$0	-	\$8,799	38
France	\$0	-	\$2,559	43
Total All Countries	\$4,768,280,220		\$3,866,230,167	

Source: WISERTrade

Appendix C

The Washington Research Council uses a model of the Washington state economy constructed especially for WRC by Regional Economic Models, Inc. Because it allows supply and demand to respond to changes in prices and wages, and permits substitution among factors of production, the WRC-REMI model is more elaborate than the standard input-output models commonly employed to estimate regional economic impacts (Treyz 1993).

The standard input-output model fails to model the numerous capacity constraints within the economy, the processes that set prices for goods and services and the responses of consumers and producers to changes in these prices. In the input-output model, industry and labor supply are perfectly elastic—so prices and wage rates do not matter.

Prices and wages do matter in the WRC-REMI model. The model divides the state into two sub-regions: The Seattle Metropolitan District (King and Snohomish Counties) and the balance of the state. There are 66 private industrial sectors within each sub-region, as well as four governmental sectors. Within each sub-region the model tracks inter-industry transactions, much as an input-output model would.

Unlike an input-output model, however, the WRC-REMI model incorporates a number of significant behavioral responses to changes in prices and costs: The wage rate depends on the supply and demand for labor, migration and labor force participation rates respond to changes in wage rates, and consumer purchases of specific goods and services respond to changes in relative prices and personal income. In addition, producers substitute among production factors in response to changes in relative factor costs, market shares respond to changes in regional production costs, and investment rises in response to increases in output.

This report uses version PI+ 1.5.2 of the WRC-REMI model.

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