EXHIBIT
MDU-5
PU-19-306; PU-19-307; PU-19-317

MONTANA-DAKOTA UTILITIES CO.

Before the Public Service Commission of North Dakota

Case Nos. PU-19-306 and PU-19-307

Joseph E. Geiger

Adopted Direct Testimony
of
Alan L. Welte

Q. Please state your name and business address.

A. My name is Joseph E. Geiger and my business address is 400 North Fourth Street, Bismarck, North Dakota 58501.

Q. By whom are you employed and in what capacity?

A. I am the Director of Generation in the power production department of Montana-Dakota Utilities Co. (Montana-Dakota).

Q. Please describe your duties and responsibilities with Montana-Dakota.

A. I have overall responsibility for the day-to-day operation of Montana-Dakota's electric generation facilities, represent Montana-Dakota's interests in jointly owned generation facilities operated by other companies, and I am also responsible for new generation development.

Q. Please outline your educational and professional background.

A. I hold a Bachelor's Degree in Electrical Engineering from the University of North Dakota. My work experience includes four years as a plant engineer, ten years in various supervisory/managerial roles in coal fired and natural gas fired generating facilities, and I have recently

transitioned into my current position which includes the oversite of generation development and operational responsibilities for coal fired, natural gas fired, and renewable generation facilities.

Q. What is the purpose of this testimony you are now filing in this proceeding?

A. I am adopting the testimony originally filed by Alan L. Welte on August 28, 2019 in this proceeding regarding the Heskett 4 combustion turbine project (Project) identified as part of the Montana-Dakota's 2019 least cost generation expansion plan, including the benefits of locating Heskett 4 on the existing Heskett 3 site, of selecting similar major equipment to those used in Heskett Unit 3, and to build Heskett 4 in conjunction with the retirement of the existing Heskett 1 and 2 coal-fired units. I am also sponsoring the exhibit previously marked as Exhibit No. __(ALW-1) which is now marked as Exhibit No.___(JEG-1) and attached to this testimony.

Q. Is your testimony and exhibit identical to the testimony and exhibit submitted by Mr. Welte on August 28, 2019?

A. Yes, it is.

Q. Please describe Montana-Dakota's Heskett Unit 4 Project?

A. The Project includes a simple cycle combustion turbine (SCCT) and generator interconnected to Montana-Dakota's existing electric transmission and natural gas systems. The Project will be located near Mandan, North Dakota on Montana-Dakota's R.M. Heskett Station

property and on the existing Heskett 3 site. The timeline for construction and commercial operation will be coordinated with the retirement of the Heskett 1 and 2 coal-fired units to utilize the existing MISO transmission system interconnection rights and to use the emissions reductions in the air permitting for Heskett 4. Heskett 4 will be operated and maintained with existing trained and experienced employees.

Q. What is a SCCT electric generating facility?

A. The purpose of a SCCT electric generating facility is to start up quickly to serve peak capacity needs under higher electric market price conditions or when there are transmission system reliability concerns. In the SCCT, air is drawn in and is compressed using rows of rotating blades. The compressed air is then sent to a combustion chamber where it is mixed with fuel and the mixture is ignited. The hot combustion gas is then expanded through rotating turbine blades delivering power through a shaft connected to the generator where electricity is produced.

Q. Please describe the major equipment that will comprise Montana-Dakota's Project?

A. The Project will include a nominal rated 88 MW heavy-duty frame type combustion turbine and a totally enclosed water to air cooled generator similar to those used in Heskett Unit 3. The SCCT will be natural gas-fired, have a dry low NOx combustion system, and include evaporative inlet air cooling for power augmentation. The generator will connect to Montana-Dakota's 115kV transmission system through a

13.8kV to 115kV generator step up transformer. Station power will be provided by a 13.8 kV to 4160 kV unit auxiliary transformer. Natural gas equipment will include a pressure regulation station, a natural gas-fired fuel gas heater and a final filtration skid. A closed cooling water system will be included for cooling the turbine and generator lubricating oil, the generator windings, and other smaller turbine support systems. A continuous emissions monitoring system will be installed to measure NOx, CO and O_2.

Q. What Heskett Unit 3 design considerations, facilities and equipment are anticipated to be utilized for the Heskett Unit 4 Project?

A. Heskett 4 will benefit from Heskett 3 design considerations relating to natural gas pipeline capacity and site layout. The existing natural gas pipeline has enough capacity and will not require any additional pipeline equipment to serve Heskett 4. The existing site, including the natural gas yard and the construction parking and lay down area, were laid out to accommodate the new Heskett 4 equipment. Additionally, Heskett 4 will share the existing Heskett 3 fire protection loop, the storm water and waste water systems, the oily drains tank, and the turbine water wash system. Portions of the Heskett 3 service building, the underground electric conduit, the control system, and spare parts will also be utilized for Heskett 4. Exhibit No. __(JEG-1) depicts a conceptual arrangement of Heskett 4 on the existing site.

Q. What potential savings and benefits can be realized by building the Project at the Heskett site over a greenfield location?

A. The full savings to be realized from site design considerations and shared equipment are not available at this point in the preliminary design. Three substantial cost savings that are anticipated relate to MISO transmission system network upgrades, the electric transmission interconnection, and the natural gas interconnection. If a greenfield location required 15 miles of additional electric transmission and five miles of additional natural gas pipeline, the added cost would be around $14.5 million and $7.4 million respectively. Assuming an average cost of approximately $113 per kW required for MISO transmission system network upgrades for new generator interconnections in MISO's West region, the savings realized by utilizing the existing Heskett 1 and 2 transmission interconnection rights through the MISO Generator Replacement process would be $11.0 million. Additionally, there are also benefits to be achieved by netting the emission reductions from Heskett 1 and 2 against the Heskett 4 emissions in the air permitting process.

Q. Please provide the estimated Project capital cost.

A. The Heskett 4 Project capital cost is estimated to be $73.0 million. North Dakota's allocated share is approximately $52 million.

Q. Please describe Montana-Dakota's Project contracting approach.

A. Montana-Dakota intends to hire an engineering consultant to perform the detailed design, assist with the procurement process from bid

phase through administration of contracts after award, and manage on-site construction, commissioning, and startup activities for Heskett 4. This contracting approach is commonly referred to as an Engineer, procurement support, and Construction Management (EpCM) contracting approach, and is very similar to the multiple contracts approach used for Heskett 3. Montana-Dakota expects that there will be at least seven major equipment contracts, one or more major construction contracts, and several smaller contracts for specialized equipment, construction, and services for Heskett 4. Major contracts for equipment, construction, and services will be directly between Montana-Dakota and the associated vendor.

Q. Please describe the Project activities undertaken at the time of the Advance Determination of Prudence filing?

A. Project activities include preliminary design and cost estimate development, review of proposals for the air permit consultant, and filing of the MISO Generator Replacement Process application.

Q. What is the schedule for ceasing operation of Heskett Units 1 and 2?

A. It is anticipated Heskett 1 and 2 operation will cease around March 31, 2022, following the end of the term of the existing coal supply agreement and the cold winter months.

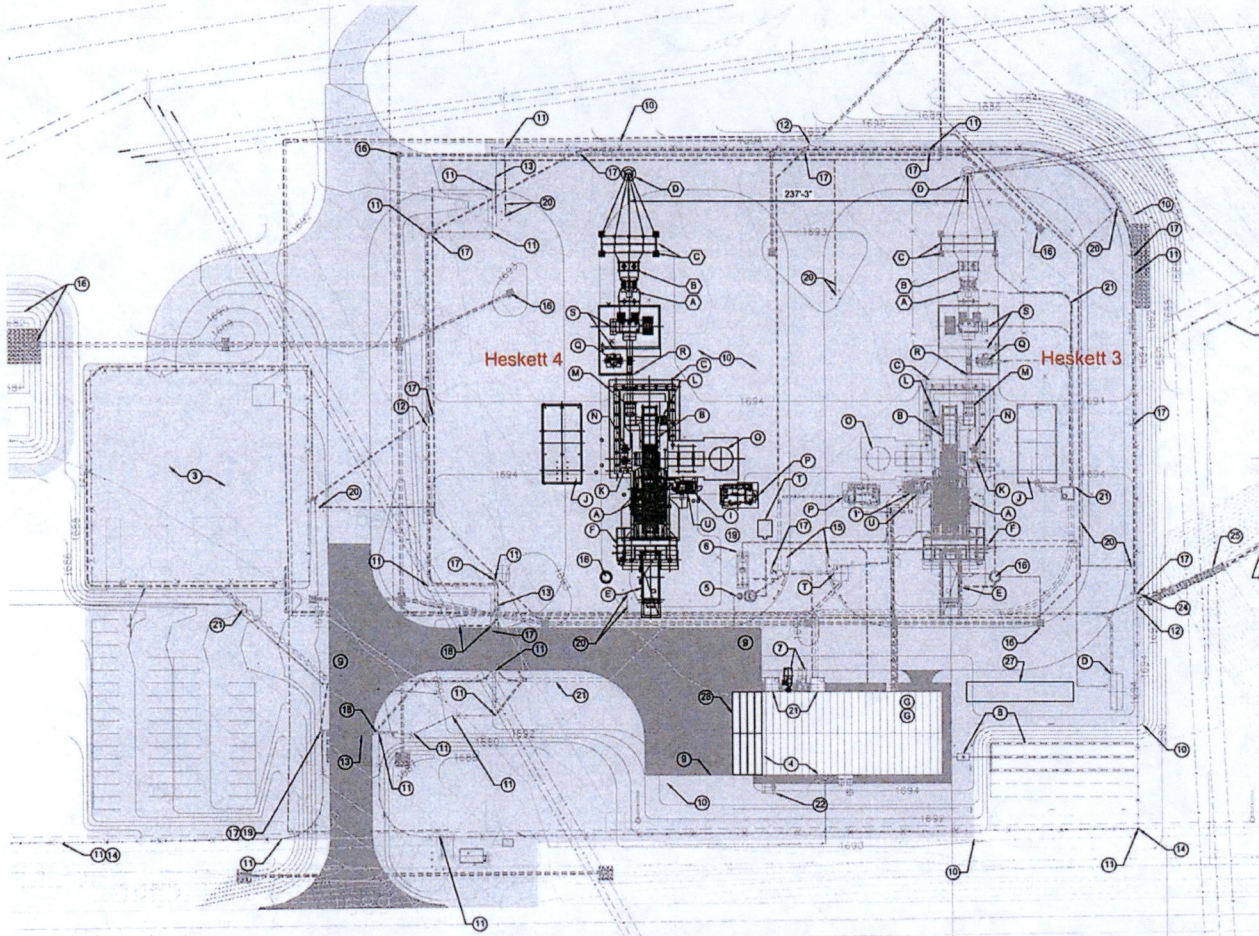
Q. What is the anticipated schedule for commercial operation of the SCCT?

A. Project permit work began in 2019. Detailed engineering work is anticipated to begin in January of 2021 and construction in March of 2022. The unit is projected to be available for commercial operation in February of 2023.

Q. Does this conclude your direct testimony?

A. Yes, it does.

Exhibit No.__(JEG-1)



SITE PLAN
SCALE: 1" = 40'

LEGEND:
- CONCRETE PAVEMENT
- CRUSHED ROCK PAVEMENT

KEYNOTES:

1. CT (COMBUSTION TURBINE) GROUP
   - A. CT
   - B. GENERATOR
   - C. GENERATOR ROTOR REMOVAL
   - D. WATER WASH SKID
   - E. PEECC (PACKAGED ELECTRICAL AND ELECTRONIC CONTROL COMPARTMENT)
   - F. INLET AIR FILTER AND EVAPORATIVE COOLING MODULE
   - G. WMFP (WATER MIST FIRE PROTECTION) SKID (INSIDE SERVICE BUILDING)
   - H. NOT USED
   - I. CT FUEL GAS VALVE MODULE
   - J. CLOSED COOLING WATER MODULE
   - K. CT EXHAUST FRAME BLOWERS
   - L. GNAC (GENERATOR NEUTRAL ACCESSORY COMPARTMENT)
   - M. GCBC (GENERATOR CIRCUIT BREAKER COMPARTMENT)
   - N. ACOUSTIC BARRIER WALL
   - O. EXHAUST SYSTEM AND ACOUSTIC PACKAGE-(CONTRACT 140089)
   - P. CEMS (CONTINUES EMISSION MONITORING SYSTEM) BUILDING-(CONTRACT 140093)
   - Q. UAT (UNIT AUX. TRANSFORMER)-(CONTRACT 140068)
   - R. NON-SEG BUS & BUS SUPPORT STANDS-(CONTRACT 140092)
   - S. GSU (GENERATOR STEP-UP) TRANSFORMER AND FIREWALL-(CONTRACT 140087)
   - T. FINAL GAS COALESCING FILTER SKID-(CONTRACT 140090)
   - U. OIL MIST ELIMINATOR
2. SWITCHYARD KEYNOTES
   - A. 115-KV CIRCUIT BREAKER
   - B. 115-KV DISCONNECT SWITCH
   - C. A-FRAME AND 115-KV METERING EQUIPMENT
   - D. TRANSMISSION POLE
3. FUEL GAS YARD FOUNDATION, GROUNDING, FENCE, GATE, ROCK, AND EQUIPMENT.
4. SERVICE BUILDING FOUNDATIONS AND METAL BUILDING. REF. SERVICE BUILDING DRAWINGS.
5. WASTEWATER LIFT STATION AND FORCE MAIN.
6. UNDERGROUND EMERGENCY OILY DRAIN TANK.
7. STATION SERVICE TRANSFORMER (CONTRACT 140092).
8. ONSITE WASTEWATER TREATMENT SYSTEM.
9. CONCRETE PAVEMENT, REF. PAVEMENT PLAN AND DETAILS. INSTALLED AS PART OF CN140096.
10. CRUSHED ROCK SURFACING, 5' MINIMUM OUTSIDE PAVEMENT. REF. PAVEMENT PLAN AND DETAILS.
11. SITE SECURITY FENCE, REF. FENCE DETAILS. EXTEND FENCE WEST ALONG 38TH STREET TO PROPERTY CORNER.
12. SITE SECURITY MAN GATE, 3 PLACES, REF. FENCE DETAILS.
13. SITE SECURITY CANTILEVER SLIDE GATE, 3 PLACES, REF. SITE DETAILS. INSTALLED AS PART OF CN140096.
14. FENCE ISOLATION REFERENCE FENCE DETAILS.
15. GUARDRAIL BARRIER, 6 PLACES, REF. SITE DETAILS.
16. STORMWATER MANAGEMENT SYSTEM.
17. SITE LIGHTING (12 PLACES), REFERENCE LIGHTING DETAILS.
18. GATE OPERATOR, AND GATE ACTUATOR. INSTALLED AS PART OF CN140096.
19. CLOSED CIRCUIT CAMERA, REF. SPECIFICATIONS (BY OTHERS).
20. SITE FIRE PROTECTION SYSTEM, REFERENCE MECHANICAL PLANS AND DETAILS.
21. ELECTRICAL MANHOLES AND DUCTBANK, REFERENCE ELECTRICAL PLANS AND DETAILS.
22. CONSTRUCTION POWER SUPPLY (SERVICE BUILDING ALTERNATE SUPPLY) TRANSFORMER. CONCRETE PAD FOR OWNER SUPPLIED AND INSTALLED ALTERNATE SUPPLY PAD MOUNT TRANSFORMER.
23. MANHOLES FOR MECHANICAL PIPING SERVICES, REFERENCE UNDERGROUND DRAWINGS.
24. KEY CARD READER.
25. STAIRCASE
26. SIDEWALK
27. EMERGENCY GENERATOR
28. 20' BUILDING EXTENSION

0 20 40 80 120 FEET
1" = 40'

PRELIMINARY,
NOT FOR CONSTRUCTION,
RECORDING PURPOSES,
OR IMPLEMENTATION

SEALING ENGINEER

PROJECT LOCATION
2025 38TH ST
MANDAN, MORTON CO., NORTH DAKOTA 58554

INTER-DISCIPLINE REVIEW

DISC	ARCH	CIVIL	ELECT	I&C	MECH	STRUCT
DATE	*	*	*	*	*	*
INIT	*	*	*	*	*	*

REV	REVISIONS	DATE	DRN	DSGN	CKD	APPD
C	ISSUED WITH SCCT STUDY	08/12/19	NLI	BHR	SMT	CMD
B	ISSUED WITH SCCT STUDY	07/19/19	NLI	BHR	SMT	CMD
A	ISSUED WITH SCCT STUDY	06/17/19	BLW	BHR	SMT	CMD

DSGN	BHR	06/17/19
DRN	BRG	06/17/19
CKD	SMT	06/17/19

SCALE: 1" = 40'
FOR 22x34 DWG ONLY

MONTANA-DAKOTA UTILITIES CO.
A Division of MDU Resources Group, Inc.

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CERTIFICATE OF REGISTRATION NO. X-0000

MONTANA-DAKOTA UTILITIES CO.
MONTANA-DAKOTA UTILITIES CO.
HESKETT UNIT 4
OVERALL SITE PLAN

JOB NUMBER 157610
REV C
DRAWING NUMBER EXH-C1-1A

EXH-C1-1A.DWG