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BEFORE THE STATE OF WASHINGTON
ENERGY FACILITY SITE EVALUATION COUNCIL

IN RE APPLICATION NO. 99-1

EXHIBIT _____ (DE-T)

SUMAS ENERGY 2 GENERATION
FACILITY

APPLICANT'S PREFILED DIRECT TESTIMONY

WITNESS # 2: DAVID EADEN

REVISED 6/21/00

Q. Please introduce yourself to the Council.

A. My name is David Eaden. I am the Vice President of Engineering for Sumas Energy 2, Inc. (SE2) and for National Energy Systems Company (NESCO).

Q. What is the subject of your testimony?

A. My testimony will address three issues:

First, I will describe my background and experience.

Second, I will describe the proposed project from a design and engineering standpoint.

Third, I will discuss construction aspects of the proposed project.

EXHIBIT _____ (DE-T) – REVISED 6/21/00

DAVID EADEN'S
PREFILED TESTIMONY - 1

[31742-0001/Eaden Revised.doc SL003721.452]

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Background

Q. Please describe your background and experience.

A. My background is in mechanical engineering and I have almost 43 years of experience designing, building and commissioning steam plant facilities. From approximately 1957 to 1989, I was the vice-president and eventually the president of Cole Industrial, Inc., a company that built steam boiler plants for a wide variety of industrial and institutional facilities in Washington State. In March 1989, I joined NESCO to manage the development of a coal-fired power plant facility in Tok~~ok~~Golkana, Alaska. I have been with NESCO ever since, managing the development of several projects.

Q. What is your role in connection with the SE2 project?

A. As Vice President of Engineering, I serve as the overall manager for the SE2 project. We have specialists working on all aspects of the project, and in a sense, it is my job to oversee and manage the whole range of specialists working to develop the project. I oversee the design, engineering, permitting, and pre-purchasing of equipment for the facility. I supervise the team of engineering and environmental consultants working on the project, and administer their consulting contracts. I have met with federal, state and local government agencies in connection with permitting matters. I will be negotiating engineering, procurement and construction contracts regarding the project. If permitted, I will also be overseeing the construction of the facility as one of the company's representatives.

Description of Proposed Project

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2
3 **Q. Please describe the proposed project.**

4
5 A. The SE2 Generation Facility is a 660 megawatt, natural gas-fired, combined cycle,
6
7 electric generating facility with distillate oil alternative fuel capacity for "cold snap"
8
9 days. The proposed project includes the power plant facility itself, as well as an
10
11 associated electrical transmission line and natural gas pipeline. The project is
12
13 described in considerable detail in the Revised Application for Site Certification
14
15 Agreement (Jan. 2000), and in Section 2.3 of the Application in particular.
16
17

18
19 **Q. Could you describe the power plant facility in more detail?**

20
21 A. Yes. The power plant is a 660 MW combined cycle plant. It consists of two separate
22
23 but identical Westinghouse 501F combustion turbine generators and one steam turbine
24
25 driven generator. The combustion turbines will burn natural gas, and the exhaust heat
26
27 from the combustion turbines will flow to heat recovery steam generators (HRSG) to
28
29 produce steam. The steam will then power the steam turbine. A gas-fired duct burner
30
31 will provide additional steam generation by increasing the exhaust gas temperature.
32
33 Exhaust steam will be condensed and returned to the HRSG. This combined cycle
34
35 system will generate electricity at a much higher thermal efficiency than a conventional
36
37 power cycle.
38
39

40
41 The power plant will be built on a 37-acre site in an industrial area of the City of
42
43 Sumas. The site is located north of State Highway 9 and south of the U.S.-Canada
44
45 border. The IKO asphalt shingle plant is located next door, and the SOCCO lumber
46
47 facility and Sumas Cogeneration Facility (SE1) are located across the street. Exhibit

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____ (DE-1) is a artistic rendition of the proposed facility, viewed from the side.

Exhibit ____ (DE-2) is a Plan View of the facility. As shown in the diagram, the power plant facility occupies approximately 20 acres on the eastern half of the 37-acre site. As Katy Chaney will discuss in her testimony, much of the western half of the site has been dedicated to a wetland mitigation and preservation area.

The site diagram shows the combustion turbines and HRSGs that I described located roughly in the middle of the power plant facility. South of the turbines and generators are the large air cooled condenser and the smaller water cooling tower. The facility will utilize a "wet-dry" cooling system. The air condenser will be used to cool exhaust steam at all times during operation. When ambient temperatures exceed 25 degrees F, some of the exhaust steam will also be routed to the wet cooling system.

Electric power will be generated by three 18,000-volt generators (two generators driven by the combustion turbines and one driven by the steam turbine). The electricity will flow from these generators to the transformers located in the north end of the site, where it will be stepped up to 230,000 Volts for transmission to BCHydro's Clayburn Station located north of Abbotsford, B.C. The site diagram shows the transformers and the switchyard on the northeast portion of the site.

Finally, in the southeast portion of the site, there will be a 2.5 million gallon storage tank for No. 2 distillate fuel oil, surrounded by a lined containment area. Michael Woltersdorf will address the safety features associated with this tank in his testimony.

1 **Q. Has the project changed since SE2 filed its original Application in January**
2
3 **1999?**

4 A. Yes. After we filed the original application, we met with various federal, state and
5
6 local officials, and we held some public meetings. Through that process, we identified
7
8 some legitimate concerns and made some significant adjustments to the project to
9
10 address those concerns. The following are the primary changes we made:
11

12 (1) The power plant has been downsized from 720 MW to 660 MW.
13

14 (2) In order to reduce water consumption, the original wet cooling system has been
15
16 replaced with a wet-dry cooling system. As a result, the water usage has been reduced
17
18 75% and the wastewater output has been reduced by 25%. The water for the facility
19
20 will now be supplied entirely by the City of Sumas, rather than from the City of
21
22 Abbotsford.
23

24 (3) Nitrous oxide (NOx) emissions have been reduced from 4.5 ppm to 3.0 ppm.
25

26 (4) Gas turbine dual fuel combustion and backup fuel oil storage has been
27
28 incorporated in the facility design.
29

30 (5) Additional sound attenuation features have been incorporated into the plant
31
32 design.
33

34 (6) The gas line design was enhanced beyond code requirements.
35

36 (7) Removed hydrogen cooling from the electric generators to remove hydrogen
37
38 storage from this site.
39
40

41
42 **Q. Have there been any additional changes to the project since you filed your pre-**
43 **filed testimony in April?**
44
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47

1 A. Yes. We have continued to meet with federal, state and local jurisdictions and we
2 have attempted to respond to concerns and, in some cases, negotiate stipulations. In
3 the course of these on-going efforts, SE2 has agreed to the following additional
4 measures:

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9 (1) SE2 will install a reverse osmosis (RO) water treatment system at the facility to
10 further reduce waste water discharge. The unit will be similar to the one used at the
11 nearby Sumas Cogeneration Company facility, commonly referred to as "SE1." The
12 unit is small (approximately 72 inches high, 139 inches wide and 40 inches deep), and
13 its deployment will not require any additional fill or paving at the site. Using the RO
14 system, the monthly average waste water flow will range from 17-27 gpm (24,480 -
15 38,880 gallons per day). The use of the RO system will also reduce the amount of
16 water makeup needed to replenish water lost from the system through wet cooling
17 blowdown. With the RO system operating, average water usage will be reduced to
18 635 gpm or approximately 1025 acre feet per year.

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28 (2) SE2 is willing to install an SCR emissions control system capable of limiting NOx
29 emissions to 2 ppm during gas firing and 6 ppm during low sulfur distillate oil firing.

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33 (3) Although SE2 continues to request the ability to operate using low sulfur (0.05%)
34 distillate oil for a maximum of 15 days per year, SE2 has agreed not to use distillate oil
35 more than an average of 10 days per year over a 10 year period.

36
37
38
39 (4) SE2 has committed to design the single-wall 2.5 million gallon distillate oil storage
40 tank with a double steel bottom and an interstitial leak detection system. The tank will
41 be placed in a containment area that is capable of holding at least 125% of the tank
42 volume, and will have a liner made of 60 mil HDPE or an equivalent quality material.
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1 **Q. How will SE2 obtain the water needed to operate the facility?**

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3 A. During operation of the RO system, Aan annual average of ~~653~~ 635 gallons of water
4 per minute, or ~~1053~~ 1025 acre-feet per year ~~is~~ will be needed to operate the facility.
5
6 SE2 will purchase this water from the City of Sumas, which has already issued a
7
8 Certificate of Water Availability to SE2. A copy is provided as Exhibit ____ (BC-3) to
9
10 Burt Clothier's testimony. Water supply issues are addressed in greater detail in the
11
12 testimony of Burt Clothier. From an engineering standpoint, the water will be supplied
13
14 from the City of Sumas water system via a new connection constructed by the City of
15
16 Sumas to the facility site. That water supply line is not a part of the SE2 project
17
18 presented to EFSEC for approval.
19
20

21
22 **Q. How will the power be transmitted from the power plant?**

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24 A. The electricity produced by the SE2 facility will be transmitted via a 230 kV
25
26 transmission line from the facility to BCHydro's Clayton Station located north of
27
28 Abbotsford, B.C. A map showing the transmission route is provided as Exhibit ____
29
30 (DE-3). The route is approximately 5.9 miles long, and goes through industrial and
31
32 rural areas of the City of Sumas, across the U.S-Canadian border, and through
33
34 industrial and commercial areas of Abbotsford.
35
36

37
38
39 Only approximately a half mile of the transmission line is located in the United States.
40
41 That portion of the line will parallel Bob Mitchell Avenue and an existing abandoned
42
43 railroad corridor in the City of Sumas that runs to the Canadian Border, and will
44
45 require 11 new transmission poles, which will be 80-100 feet tall. Diagrams of the
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47 sorts of poles to be used are provided in Section 2.4 of the Application.

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Q. Are the Canadian transmission lines part of the project SE2 is asking EFSEC to certify?

A. Yes and no. The half-mile of transmission line located in the United States is part of the project presented to EFSEC. The border crossing requires a Presidential Permit. SE2 has applied for that permit. The Canadian portion of the line is subject to the regulatory authority of the National Energy Board (NEB) in Canada. The Canadian Ministry of the Environment is conduct its own environmental review process, which is similar to the SEPA process in Washington State and the federal NEPA process in the U.S. SE2 is currently working with the NEB, the British Columbia Ministry of Environment, and local authorities in Abbotsford in an attempt to resolves concerns about the Canadian portion of the line.

Q. The Draft Environmental Impact Statement mentions the possibility of much longer transmission lines through Whatcom County. Are those lines part of the project?

A. No. SE2 has no intention of building lines across Whatcom County, and Whatcom County transmission lines are not a part of the project that we are asking EFSEC to approve. We are not aware of any entity that is currently planning to construct lines from our facility through Whatcom County. If someone proposed to do so, they would presumably have to obtain approval from the authorities in Whatcom County.

Q. Could you describe the pipeline that will deliver natural gas to the facility?

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A. Natural gas is delivered to the U.S.-Canadian border by a Westcoast Energy pipeline. SE2 will construct a 16-inch pipeline approximately 4.5 miles long from the border to the SE2 facility. The pipeline will follow the same corridor used by the pipeline that currently supplies natural gas to the SE1 cogeneration facility. It will cross the border east of the City of Sumas, then run south and west, and eventually north through the SE1 site, under State Highway 9 and onto the SE2 facility site. A map of the route is provided as Exhibit ____ (TP-3) to Ted Potter's testimony. The pipeline route and design are described in greater detail in the Application and in Ted Potter's testimony.

Q. Has SE2 already obtained easements from the property owners along the pipeline route?

A. Yes. When the SE1 pipeline was built, easements were obtained for a 30-foot right of way, with the understanding that a second pipeline might be installed at a later date. SE2 has met with each of the 14 property owners along the route, and agreed to pay them additional compensation in connection with installing a second line.

Q. Has SE2 already obtained whatever permits or authorizations are necessary for the pipeline to cross the U.S.-Canadian border?

A. Yes. The Federal Energy Regulatory Commission (FERC) regulates the construction and operation of natural gas pipeline border crossing facilities. SE2 has applied for and obtained a Presidential Permit authorizing the construction and operation of the border crossing facility. A copy of the Presidential Permit is provided as Exhibit ____ (DE-4).

Design & Construction

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3 **Q. Can you provide a general description of the construction process for the**
4 **proposed project?**
5

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7 A. Yes. Facility construction is addressed in detail in Sections 2.12, 2.13 and 2.14 of the
8 Application. In general, construction would involve several stages. First, engineering
9 and design studies would be completed. Then, site preparation activities would occur.
10
11 Next, the underground utilities, the cooling tower basin and the foundations would be
12
13 installed, followed by the mechanical installation of equipment. The installation of
14
15 pipe racks and piping, electrical work and the installation of buildings will be
16
17 coordinated with the equipment installation. Instrumentation, controls and major
18
19 utility connections will be installed last. Following construction, equipment and
20
21 system functioning and performance will be tested during plant commissioning. The
22
23 plant will go into commercial operation upon completion of commissioning.
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29 **Q. What is the construction time-table?**
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31 A. We anticipate that the power plant will be fully operational approximately 2½ years
32 after a Site Certification Agreement is signed by the Governor. Detailed time tables
33 are provided in Section 2.12 of the Application. Assuming that construction could
34
35 begin in mid-2000, the construction schedule would lead to commissioning in late
36
37 2002 and commercial operation in the first quarter of 2003. SE2 has already entered
38
39 into contracts to ensure that the Westinghouse turbines and other equipment will be
40
41 available to allow construction in that time frame.
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END OF TESTIMONY

I declare under penalty of perjury that the foregoing testimony is true and correct to the best of my knowledge.

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