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BEFORE THE STATE OF WASHINGTON
ENERGY FACILITY SITE EVALUATION COUNCIL

IN RE APPLICATION NO. 99-1

EXHIBIT ____ (BC-T)

SUMAS ENERGY 2 GENERATION
FACILITY

APPLICANT'S PREFILED DIRECT TESTIMONY

BURT CLOTHIER

Q. Please reintroduce yourself to the Council.

A. My name is Burt Clothier. My business address is Robinson & Noble, Inc. 5320 Orchard Street West, Tacoma, Washington, 98467.

Q. What is the subject of your testimony?

A. My testimony will address two topics: First, my background and experience. Second, the proposal in the Second Revised Application to address private water supply concerns.

Background

Q. Please remind the Council of your background.

EXHIBIT ____ (BC-T)
BURT CLOTHIER'S
PREFILED TESTIMONY - 1

[31742-0001/Clothier]

PERKINS COIE LLP
1201 Third Avenue, Suite 4800
Seattle, Washington 98101-
3099
(206) 583-8888

1 A. I am a Principal Hydrogeologist at Robinson & Noble, where I've worked for eleven
2 years. I am a Licensed Hydrogeologist in the State of Washington and a Registered
3 Professional Geologist in the State of Oregon. A copy of my resume was previously
4 provided as Exhibit 23.1.
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10 **Q. What is the basis for your opinions regarding water supply issues in and around**
11 **Sumas, Washington?**
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14 A. In addition to my general knowledge and experience about hydrogeology and geology,
15 I have devoted considerable time and attention to water supply issues in the Sumas
16 area since the early 1990s. National Energy Systems Company (NESCO) retained
17 Robinson & Noble in connection with the development of the Sumas Energy 1 (SE1)
18 Co-generation Facility. We were the project hydrogeologists for the evaluation,
19 drilling and development of the City of Sumas' May Road Well Field. I was involved
20 in the drilling of May Road Well 1 in 1992. Since then, I have worked on the drilling
21 and testing of May Road Well 3, the 7-day test of the May Road Wellfield, and the
22 drilling and testing of Replacement Well 4 for the City of Sumas' municipal wellfield.
23 Additionally, I conducted or directed short pump testing events at May Road
24 Observation Well OB-2 last year and Sumas Wells 2 and 3 this year.
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39 Beginning in 1998, I have performed regional hydrogeologic studies, water rights
40 analyses, well testing, and wellfield evaluations in connection with the SE2 project.
41 In doing so, I have reviewed the available published and unpublished geologic reports
42 and studies for northern Whatcom County and the Fraser River Valley in British
43 Columbia. During that same time, I also worked on two hydrogeologic projects in the
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1 central-northern portion of Whatcom County that were unrelated to SE2, but were in
2 similar hydrogeologic settings.
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6 **Water Supply Mitigation**
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9 **Q. Are you familiar with the proposal in the Second Revised Application to address
10 private water supply concerns?**
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12 A. Yes. I participated in developing the proposal to address water supply concerns raised
13 during the prior hearings.
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18 **Q. Can you summarize the proposal?**
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20 A. SE2 has essentially proposed to do four things:
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22 1. Identify and survey wells within the potential zone of influence. Prior to
23 operation, SE2 proposes to identify and survey as many wells as possible within the
24 one-mile potential zone of influence identified in EFSEC's Final Environmental
25 Impact Statement (FEIS). This effort will include quarterly measurements of water
26 levels in those wells for which access is granted. This will define water level changes
27 over time that occur prior to the S2GF operation. In addition, SE2 will install
28 monitoring wells and perform a controlled test of the two City of Sumas wellfields
29 that will supply water for the SE2 project.
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32 2. Confirm the potential zone of influence. The above surveys, monitoring and tests
33 will allow us to confirm that the potential zone of influence of the intended
34 groundwater withdrawals identified in the FEIS does in fact define the reasonable
35 outerbounds of potential impacts. If additional areas of potential influence are
36 identified, wells within those areas will also be identified and surveyed.
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1 3. Monitor wells for first year of operation, identify any mitigation required, and
2 submit report. After S2GF begins operation, all wells included in the pre-operation
3 survey will be monitored monthly for the first year of plant operation. At the end of
4 the first year, SE2 will prepare a report of the monitoring results and propose a
5 mitigation plan for any wells that are identified as being adversely impacted by the
6 water withdrawals for SE2.

7 4. Continued monitoring and annual summaries after the first year of operation.

8 After the first year of operation, monitoring will continue semi-annually for four years
9 with annual summaries provided to EFSEC. Any areas of concern after the first year
10 of operation will be monitored at least monthly, depending upon the circumstances
11 and data requirements to address the identified concern.

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25 **Q. What is meant by the term “potential zone of influence”?**

26 A. In order to address the assertion that increased water use by the City might cause
27 impacts to water levels in neighboring wells, an analysis was performed of the
28 potential water level changes that might result from maximum production at the
29 City’s two wellfields. The analysis was based on hydrogeologic theory, using the
30 information that has been generated for the wellfields during construction, testing and
31 operation. This analysis identified a distance around each wellfield at which a one
32 foot drawdown of water level would be predicted based on averaged values of aquifer
33 transmissivity and storativity. The analysis was performed for the steady-state
34 condition, which means that the ultimate result was considered regardless of the time
35 required for that result to develop. The results of this calculation defined a radius of
36 approximately one mile around the City’s main wellfield. A considerably smaller
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1 radius was predicted for the May Road wellfield, but as this fell entirely within the
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3 radius defined for the City's main wellfield, it could safely be regarded as redundant
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5 for the purpose of examining potential impacts to neighboring wells. (More detail of
6
7 the calculation is included in the Application and FEIS.)
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10 The difficulty that arises in using a theoretical approach such as this, is that it is a very
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12 conservative measure of responses that would occur only if all of the assumptions
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14 necessary to the application of the theory are true. While the theoretical prediction is
15
16 useful in helping to define a maximum condition of potential effects, it is generally
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18 found that actual data show this calculation to be an over-prediction of real-world
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20 effects. This is true of the City's wellfields, as neither of the wellfields show water
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22 level data records indicating measurable water level influence from the production at
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24 the other wellfield.
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28 Even though the predicted level of influence at distance from the producing wellfield
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30 is an over-statement of likely water level changes, the radius of potential effects can
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32 be used to define a plan to monitor the water resource response and the potential
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34 impact to other water users. Thus, the one-mile radius is a conservative guide for the
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36 identification of the potential to impact neighboring wells that would be appropriate
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38 to the monitoring plan.
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43 **Q. Please explain more particularly how SE2 proposes to confirm the zone of**
44
45 **potential influence for water withdrawals.**
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1 A. Based on our existing knowledge of the wellfields and the hydrogeologic conditions
2 controlling each site, we will define the placement of monitoring wells to guide the
3 completion of wellfield testing. Currently, we expect a minimum of three monitoring
4 wells: two at the City's main wellfield (Neuman Road) and one at the May Road
5 wellfield (several monitor wells already exist at this wellfield). With dedicated
6 monitoring wells in place, and prior to plant operations, we will conduct longer,
7 controlled-rate testing of each wellfield. This will involve pumping the wellfield at a
8 known, constant production rate for 24 to 72 hours, while regularly measuring water
9 level changes in each well in the wellfield and all monitor wells. (Test length will be
10 dependent on the operational constraints of the wellfield and the level of previous
11 testing.)
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24 The data collected from the monitoring network during the tests will be used to define
25 the water level changes in the wellfields and the aquifer system in response to the
26 production of water at the intended pumping rates. (Monitoring of water level changes
27 during the 24 or 72-hour constant-rate testing should provide sufficient data to allow
28 predictions of the effects of pumping. This includes both water level changes over
29 time and changes occurring at different distances from the wellfields.) From this, we
30 will confirm and/or refine the previously predicted zone of influence and identify any
31 need to supplement the monitoring network to provide the necessary long-term data.
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42 **Q. How will SE2 identify wells within the zone of potential influence?**

43 A. With the assistance of the City of Sumas, an initial effort to locate wells on the U.S.
44 side of the border has already been accomplished. We will review Washington State
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1 water well records and contact local residents and City employees to create as
2 comprehensive a list as possible of well owners in the identified area of interest. We
3 will then canvass the area door-to-door to confirm our findings and initiate contact
4 with well owners who wish to have their wells included in the monitoring program.
5 We will collect well construction and geologic information when available for
6 individual wells. Then, with the consent of the well owners, the water level in each
7 well surveyed will be measured to identify a background condition.
8 SE2 will conduct the same general process on the Canadian side of the border using
9 records from the Ministry of the Environment and the services of a hydrogeologic
10 consulting company in Vancouver. We have preliminarily identified four wells on the
11 Canadian side that fall within the theoretical potential zone of influence as identified
12 in the FEIS. These wells are (or were) part of the Fraser Valley Groundwater
13 Monitoring Plan. As such, these wells are anticipated to have good water quality
14 records (at the very least) associated with them.
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31 **Q. Please explain how the pre- and post-operation monitoring will be conducted.**

32 A. Water levels in each of the wells identified within the potential zone of influence,
33 where the well owner grants access, will be measured quarterly prior to operation of
34 the SE2 facility. (Measurement of water levels can be as simple as lowering a
35 graduated electronic probe wire or steel tape measure into the well until contact with
36 the water is made. This process poses no threat to either the security or integrity of
37 the well.) At the time of measurement, we will discuss with the well owner the
38 purpose of the monitoring, explain the method of water level measurement in case
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1 they wish to make additional measurements of their own, and provide appropriate
2 contact information should they notice any changes in the performance of their well.
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6 The water level data collected before plant operations begin, plus the information
7 collected during the establishment of the monitoring network, will define the water
8 level changes over time that are occurring at these sites due to seasonal fluctuations
9 and existing water use patters. After SE2 facility commences operation, monitoring
10 of all wells within the potential zone of influence whose owners consented to pre-
11 operation monitoring will be performed monthly for the first year of plant operation.
12 The collection of water level data both before and after the commencement of plant
13 operations will allow the generation of hydrographs for each monitoring point. The
14 hydrographs will graphically display the water level changes over time and allow for
15 identification of patterns of impacts, use or seasonality. At the end of the SE2
16 facility's first operational year, SE2 will submit a report to EFSEC, providing the
17 monitoring results.
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33 **Q. Why are monitoring results presented in a report one year after SE2 begins**
34 **operation and not sooner?**
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37 A. The purpose of the monitoring is to identify impacts over time resulting from plant
38 operation as compared to pre-operation conditions. In order to differentiate localized
39 or temporary impacts from long-term changes caused by increased pumping to meet
40 plant demands, at least one full annual cycle of monitoring after plant start-up is
41 appropriate. That way, any noted changes can be compared to the seasonal conditions
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1 from the same time period during the pervious year to identify that portion of the
2 water level fluctuation that reflects background conditions.
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6 **Q. What if there were a severe impact to a well within the first few months after the**
7 **SE2 facility began operations?**
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10 **A.** Part of the process of establishing the monitoring network involves a simple
11 education process for well owners who agree to participate in the monitoring plan.
12 By providing the basic information on how and why the monitoring is being
13 conducted, well owners would be made more aware of the conditions of their well
14 under normal use. When the plant begins operation, any sudden changes in the well's
15 performance would be noticeable to the well owner as a contrast to the pre-operation
16 condition. If such a condition were to occur, the well owner would have information
17 about who to contact. SE2 would investigate the well's condition by collecting
18 supplemental information as appropriate to the change in well performance noted by
19 the well owner. (The investigation could include, but would not necessarily be
20 limited to: water level measurements, short pumping tests of one to two hours
21 duration, and water sampling for sand production or turbidity.) If an initial diagnosis
22 were unclear, more frequent water level monitoring could be conducted as warranted.
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38 With that said, I should also mention that I believe it is extremely unlikely that this
39 sort of dramatic impact would occur. As I mentioned before, the data that currently
40 exists suggests that the predicted radius of potential impacts is over-estimated. From
41 my experience with this aquifer, it is clear that if there were a potential for the aquifer
42 to respond as would be necessary for this hypothetical extreme impact to occur,
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1 previous pumping conditions would have already caused an observable response
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3 noticeable to individual well owners in the area.
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7 **Q. What is the purpose of continuing monitoring semi-annually for four years after**
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9 **the facility's first year of operation?**

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11 A. The semi-annual monitoring for four years after the initial year of operation will
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13 expand the comparison between the pre- and post-operation conditions made in the
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15 first year of operation. The final four years of monitoring will allow for confirmation
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17 of the conclusions noted in the monitoring report and identification of any problems
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19 resultant from the long-term production of water to serve the SE2 facility. This will
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21 ensure that long-term trends can be identified and addressed where appropriate and in
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23 a timely fashion. It will also provide data to use as a check on the aquifer responses
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25 predicted at the end of the first year of plant operations.
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29 **Q. If any wells are determined to be adversely impacted by water withdrawal for**
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31 **SE2, how will these adverse impacts be addressed?**

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33 A. If a well is identified as being adversely impacted by the increased water withdrawal
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35 to serve the SE2 facility, SE2 will submit for EFSEC's approval a mitigation plan to
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37 replace lost well production capacity and prevent further loss. Such mitigation plan
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39 may include: lowering of the pump in the well, providing additional water reserve
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41 (such as a larger capacity pressure tank), well redevelopment to improve efficiency of
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43 production (removal of encrustation or scale from the well or well screen), drilling a
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45 new well, or paying for a hook-up to public water, as warranted and appropriate.
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1 **Q. In your professional opinion, do you believe the monitoring and mitigation**
2 **proposal contained in the Second Revised Application addresses concerns**
3 **regarding potential impacts to private water supplies?**
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7 A. Yes. The Revised Application’s proposal assures sufficient definition and
8 understanding of the hydrogeologic conditions in order to design an appropriate
9 monitoring network and reliable monitoring protocols. The monitoring process will
10 assure timely identification of potentially impaired wells and the planned mitigation
11 responses will avoid impacts to the community.
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18 This high level of commitment to protection of water resources is extremely rare, in
19 fact, unique in my experience. Typically, water users are under no obligation to
20 provide assurances to neighboring water users except through the existing water rights
21 process or in response to actions requesting intervention by Ecology or the Pollution
22 Control Hearings Board on behalf of a senior water user. Thus, this “good neighbor
23 policy” is providing an unprecedented level of resource protection and assurance of
24 responsiveness on the part of the water user, despite the fact that the user in this case
25 has no legal control over the water in question. (The City of Sumas, not SE2, holds
26 the water rights being exercised for this project.)
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39 In my professional opinion, the proposed plan more than adequately addresses the
40 potential for impacts within the aquifer system. This is particularly true because all of
41 the research done to date demonstrates that the withdrawals for SE2 constitute only a
42 tiny fraction of the water available in the aquifer, and pump tests have shown that the
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1 withdrawals are not likely to have any water level impacts beyond the limited
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3 responses predicted by the application of well hydraulics theory.
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7 **END OF TESTIMONY**
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