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BEFORE THE STATE OF WASHINGTON
ENERGY FACILITY SITE EVALUATION COUNCIL

IN RE APPLICATION NO. 99-1

EXHIBIT ____ (HC-T)

SUMAS ENERGY 2 GENERATION
FACILITY

APPLICANT'S PREFILED DIRECT TESTIMONY

HSUEH-JU CHANG

Q. Please introduce yourself to the Council.

A. My name is Hsueh-Ju (Sherrie) Chang. I am a Water Resources Engineer with URS Corporation. My business address is 1501 4th Avenue, Suite 1400, Seattle, WA 98101-1616.

Q. What is the subject of your testimony?

A. My testimony will address two topics: First, my background and experience. Second, the unsteady flood modeling proposed in the Second Revised Application.

Background

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3 **Q. What is your title and occupation?**
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6 A. My title at URS is Water Resources Engineer. I am a flood modeler. This
7
8 means that I use various hydrologic and hydraulic programs to simulate the
9
10 behavior of surface water during certain storm conditions.
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15 **Q. Please describe your education and experience.**
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17 A. I have 15 years of experience performing hydrologic and hydraulic modeling
18
19 for watershed planning, alternative analysis, and permit review. The majority
20
21 of my work involves using continuous hydrologic simulation coupled with
22
23 unsteady flow routing. My training regarding unsteady flood models was
24
25 primarily with Delbert Franz, the flood modeler who created the existing
26
27 Whatcom County region unsteady flood model. Subsequently, I worked with
28
29 Paula Cooper, who is now the Special Projects Manager for Whatcom County,
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31 managing the County's River and Flood Section. My experience and education
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33 are further described in my resume, which is provided as Exhibit ____ (HC-1).
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38 **Q. What is your role in the SE2 project?**
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41 A. As a Water Resources Engineer with experience in running and interpreting the
42
43 results of various flood models, I was tasked with reviewing Whatcom
44
45 County's existing unsteady state flood model to determine whether it could be
46
47 used for assessing flood impacts from filling the SE2 site, and how the model

1 might need to be adapted. I am in the process of adapting the model for use for
2
3 the SE2 site, and I will be responsible for running the unsteady model to
4
5 determine potential impacts from filling the SE2 site.
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10 **Q. Has anyone assisted your work on the SE2 project?**

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12 A. No one has assisted me to this point. However, my work on the SE2 flood
13
14 analysis has included conversations with Paula Cooper, as well as with the
15
16 creator of the existing unsteady flood model and Whatcom County's flood
17
18 consultant, Delbert Franz. When running the model, I may seek further
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20 assistance from Delbert Franz to generate overflow hydrographs for model runs
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22 at the upstream end of the models.
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26 **Flood Analysis Proposal**

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28 **Q. In the Second Revised Application, how has SE2 proposed to address**
29
30 **concerns regarding potential flood impacts from the SE2 project?**

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32 A. SE2 proposes to perform unsteady flood modeling of the SE2 site for the
33
34 standard 100-year flood event as well as for smaller events such as 10, 25 and
35
36 50 year floods in consultation with the Whatcom County Public Works
37
38 Department and the City of Sumas. SE2 would then submit a report of the
39
40 unsteady modeling results, including recommendations for reasonable
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42 mitigation of adverse off-site impacts, to the Council for approval at least six
43
44 months prior to construction.
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1 **Q. Does an unsteady flood model for the Sumas area currently exist?**

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4 A. An unsteady model for the study of the Nooksack-Fraser Overflow Corridor
5 does exist and it includes the Sumas area. However, the model was developed
6 by Whatcom County as part of the Lower Nooksack River Comprehensive
7 Flood Management Plan. As such, the model was created on a watershed basis,
8 and is too broad in scale to assess flood hazards specific to the SE2 site. In
9 addition, the model currently only simulates impacts caused by floods with a
10 higher magnitude, larger storm events like the 100-year flood, and was not
11 designed to assess smaller events, like 10-, 25- and 50-year floods.
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22 Basically, the existing model was not intended to be used for analyzing flood
23 impacts at a specific localized area within the larger region of its analysis. In
24 the SE2 case, the proposed site is within the edge of the Johnson Creek
25 Floodplain and is located between the transition of two cross sections used in
26 the model. In order to perform a more definitive flood impact analysis for the
27 proposed filling at just the SE2 site, additional modeling work is needed to
28 represent the detail of the existing site. This will require construction of both a
29 new base model to assess impacts at the SE2 site without the SE2 project fill,
30 and a new "with-project" model reflecting the fill for the SE2 site.
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1 **Q. Can the existing unsteady model be adapted to analyze flood impacts from**
2 **the SE2 site?**
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5 A. Yes. It was not immediately obvious whether it could be adapted, but after
6 working on it for a few weeks and conferring with Delbert Franz, I believe it
7 can. However, adapting the model will not be a simple process. As I
8 mentioned, a base model will need to be developed that incorporates existing
9 site-specific features, such as the small stream tributary that leads to Sumas
10 Creek, the existing 42-inch culverts, the existing on-site wetlands, and other
11 key drainage features of the site. In addition, a "with-project" model must be
12 constructed to simulate project impacts. This second model will replace
13 existing site-specific features with the new features of the proposed project.
14 For example, the with-project model will include the Second Revised
15 Application's proposed stormwater detention ponds and proposed wetland
16 creation or enhancement areas, some of which include open water. Existing
17 and proposed site condition information will need to be compiled to create
18 these models. The models must have a similar degree of detail for a fair
19 comparison. Once the models are debugged and run under unsteady
20 conditions, discharge, velocity, flood heights and flood volume will be
21 compared at various locations throughout the model to evaluate the impact of
22 the fill for the proposed project.
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1 **Q. Once adapted, how long will it take to run the unsteady model for the SE2**
2 **site?**
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5 A. Once the model is adapted to specify results for the SE2 site, I estimate that the
6 computer run time alone for the model will be approximately six weeks at a
7 minimum. I would like to caution, however, that this is a very complex model,
8 and it is not at all uncommon to encounter errors or difficulties in the process
9 that require the model to be further adapted and re-run. It could, therefore, take
10 longer.
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20 **Q. Once the model has been adapted for the SE2 site, can you run the model**
21 **for 10, 25 and 50 year flood events as well as a 100-year event?**
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25 A. At this time, no, not precisely. The requisite parameters for 10-, 25- and 50-
26 year flood events of Nooksack-Fraser Overflow Corridor have not yet been
27 established. It would take approximately 3 to 4 months to research and develop
28 this information to the point that it could be used in the model. However, there
29 are other ways of analyzing potential smaller (less than 100-year) flood events,
30 including the use of increments of the 100-year flood or selected historical
31 storms.
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42 SE2 proposes to use select historical storms to analyze impacts of smaller flood
43 events in lieu of actual 10-, 25- and 50-year floods. The select historical storms
44 are real storms that cover different intensities and durations. Various factors
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1 (or multipliers) are then applied to the selected storms to cover ranges of flow
2 conditions.
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8 **Q. Have you discussed the status of the existing unsteady flood model and the**
9 **lack of 10, 25 and 50 year flood event data with Whatcom County?**
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12 A. Other members of URS and I have had discussions with Paula Cooper. She
13 agrees with the status of the existing unsteady model and the time required to
14 adapt and run the model for the SE2 site. In one of our early conversations,
15 Ms. Cooper suggested using select historical storms to analyze smaller flood
16 events. However, we have not discussed the details of that approach (in
17 particular, which storm events should be used for such an analysis). I will have
18 further conversations with Ms. Cooper as well as the appropriate staff from
19 Jones & Stokes about the unsteady modeling prior to making any decisions
20 regarding running the model.
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31 **END OF TESTIMONY**
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