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BEFORE THE STATE OF WASHINGTON  
ENERGY FACILITY SITE EVALUATION COUNCIL

IN RE APPLICATION NO. 99-1

EXHIBIT \_\_\_\_\_(SQ-RT)

SUMAS ENERGY 2 GENERATION  
FACILITY

**APPLICANT'S PREFILED REBUTTAL TESTIMONY**

**WITNESS : SHARON J. QUIRING**

**Q. Please introduce yourself to the Council.**

A. My name is Sharon Quiring. I am a human health risk assessor with URS Corporation and have been conducting human health risk assessments, occupational health studies, and toxicological reviews for thirteen years. URS is a consulting firm offering expert assistance for engineering, architectural, construction, and environmental projects. As a Senior Human Health Risk Analyst and Senior Certified Industrial Hygienist (CIH), I manage risk assessment and occupational health projects. My experience and education are further described in my resume, which is provided as Exhibit \_\_ (SQ-1).

**Q. Which testimony are you responding to with this rebuttal?**

A. I have been asked to respond to testimony concerning the potential for human health effects to occur from exposure to constituents and agents that may be released into the air from the proposed Sumas Energy 2, Inc. (SE2) power generation facility. In particular, I have been asked to respond to portions of the testimony from Dr. Jane Koenig, Peter Sagert, and Constance Hoag.

EXHIBIT \_\_\_\_\_ (SQ-RT) –  
SHARON QUIRING  
REBUTTAL TESTIMONY - 1

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**Q. What air emissions information about the SE2 project have you reviewed?**

A. I have reviewed Sections 2.11, 3.2 and 6.1 of the Application, Section 3.1 of the Draft Environmental Impact Statement, and air quality data prepared by Eric Hansen.

**Q. Has anyone assisted the preparation of this testimony?**

A. Yes. I consulted with Betty J. Locey, Ph.D., DABT at the URS Corporation's office in Farmington Hills, Michigan. Dr. Locey is Board Certified in Toxicology and is the URS Human Health Risk Assessment Practice Leader. Dr. Locey has conducted hazard assessments for numerous chemicals, generated health-based, media-specific exposure criteria, developed toxicity values from the published literature and conducted and reviewed numerous human health risk assessments. She worked as a Toxicologist for the State of Michigan's Air Quality Division (AQD) for three years and her primary responsibility during this period was supporting the states Operating Permit Program. Since leaving the state, she has served on several state AQD advisory committees and been retained by another consulting firm as a specialist in air toxics. Her experience and education are more fully described in her resume, which is provided as Exhibit \_\_ (SQ-2).

**Q. Dr. Koenig testifies that her research has lead her to conclude that fine particulate air pollution poses a human health hazard. Do you agree with this conclusion?**

A. I agree with Dr. Koenig that fine particulate air pollution can pose a human health hazard. All chemicals and agents may pose a human health hazard if the level of exposure is sufficiently great. The critical issue is what level of exposure is likely to cause harm (how much for how long). That is why USEPA regulates particulate emissions, as well as many other chemicals and agents, emitted into the ambient air and other environmental media. Research has not established definitively what levels of exposure are associated with health effects. USEPA takes this uncertainty into account when they establish air quality standards and takes a conservative, health-protective approach to setting the standards.

Particulate exposure is a very active area of on-going investigation and USEPA is devoting tremendous resources into evaluating the ambient air quality criteria and ensuring that they are and remain health protective. Federal regulations require that the National Ambient Air Quality Standards be evaluated periodically to ensure they

1 remain health protective. Standards are then changed if appropriate based on the new  
2 data. The new standard may be lower or more refined once the process is complete.  
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5 The current federal and state PM<sub>10</sub> standards are 50 micrograms of particulate per  
6 cubic meter of air (ug/m<sup>3</sup>) (annual) and 150 ug/m<sup>3</sup> (24-hour). These standards were  
7 established in 1987 and reviewed and retained by USEPA (except for reporting &  
8 statistical formats) in 1996/1997. USEPA's most recent review for particulates  
9 (USEPA 1999<sup>i</sup>), has reached a preliminary conclusion that the most recent health  
10 information confirms the findings from their previous exhaustive review in 1996  
11 (USEPA, 1996<sup>i</sup>). The 1996 review, which upheld the 1987 PM<sub>10</sub> standards,  
12 recommended establishment of an additional standard for PM<sub>2.5</sub>. There are indications  
13 that a PM<sub>2.5</sub> standard should and will continue to be recommended; however, the new  
14 recommended levels are not yet available and it is not known whether they will be  
15 different from those proposed by EPA in 1997 of 15 ug/m<sup>3</sup> (annual) and 65 ug/m<sup>3</sup> (24-  
16 hour).  
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23 Q. Both Dr. Koenig and Ms. Hoag appear to question the federal EPA standards  
24 established for particulate matter. How are EPA's ambient air quality standards for  
25 particulate matter established?  
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28 A. In general, USEPA's process for developing health-based ambient air standards is  
29 rigorous, conservative and accounts for uncertainty in the process. USEPA's existing  
30 and proposed PM Standards were developed based on a rigorous review of the  
31 existing scientific studies (USEPA, 1996<sup>ii</sup>) and were developed using generally  
32 accepted state of the practice methods and approaches. In addition, an independent  
33 committee of non-USEPA experts peer reviewed USEPA's work and provided the  
34 USEPA Administrator with advice and recommendations regarding the scientific  
35 adequacy of USEPA's evaluation. Studies that were reviewed and summarized by the  
36 agency include animal and human studies, short-term and chronic exposure studies and  
37 epidemiological studies (USEPA, 1996<sup>ii</sup>). Studies were conducted under a broad  
38 range of conditions, some based on controlled exposure to known particles (*e.g.*,  
39 homogeneous particulate, heterogeneous particulate, particulate of known  
40 composition) or studies where particulate was not characterized well. Generally  
41 human data collected during high particulate episodes are of this latter type where  
42 there may be uncertainties in both the data collection process and the extent to which  
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1 ambient air data from a centrally located monitor reflects individual exposure. An  
2 effect is observed, and there is a statistical correlation between the effect and  
3 particulate exposure, however the true cause of the effect can not be identified with  
4 certainty. Therefore, USEPA evaluates the entire body of available data and evaluates  
5 the data for "coherence." Determination of coherence involves:  
6

- 7 □ examining all the epidemiological studies, including those which did not  
8 find an association between a pollutant and an adverse health outcome;
- 9 □ assessing supporting medical and toxicological data for consistency across  
10 a variety of health outcomes; and
- 11 □ evaluating whether health outcomes are observed at varying levels of  
12 ambient PM in different populations with different circumstances and at  
13 different locations.

14 The USEPA also evaluates how background concentrations, measurement methods,  
15 and analytical techniques could affect study results. The end result of this process is a  
16 recommendation of a standard. USEPA's mandate is to protect public health with an  
17 adequate margin of safety when they establish NAAQS.  
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23 **Q. Ms. Hoag testifies that epidemiological studies, including the Six Cities Study,**  
24 **the American Cancer Society study, the 90 Cities Study, and "the study done in**  
25 **Seattle on emergency room admissions" indicate a correlation between increases**  
26 **in particulate matter levels and increased hospital admissions and mortality**  
27 **rates, and that this exemplifies that regulatory standards do not protect health.**  
28 **Do you agree with this testimony?**

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31 **A.** Ms. Hoag's testimony and assumptions in this regard do not demonstrate an  
32 understanding of the standard setting process. She appears to be contending that,  
33 because certain studies reflect a correlation between increased pollutants and hospital  
34 admission and mortality rates, regulatory standards must not be protective of human  
35 health. A correlation does not demonstrate cause and effect, and the finding of a  
36 significant correlation is not directly or automatically connected to an air standard.  
37 The USEPA included the findings of the Six Cities Study and the American Cancer  
38 Society study in their review of the particulate standard in 1996 and the information  
39 from those studies was taken into account with their 1996 recommendations and the  
40 proposed 1997 standards. As discussed below, the proposed standards are very  
41 unlikely to be exceeded by the SE2 project.  
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1 **Q. Ms. Hoag testifies that in 1997 EPA revised its standards for particulate matter**  
2 **and ozone because EPA found that public health was not adequately protected,**  
3 **but "[t]hose revisions are held up in court at this time," so the SE2 project will**  
4 **be reviewed under the current standards. Dr. Koenig indicates in her testimony**  
5 **that the EPA has recommended a 24-hour average PM<sub>2.5</sub> concentration of 65**  
6 **ug/m<sup>3</sup> and an annual standard of 15 ug/m<sup>3</sup>, but that this standard has not yet**  
7 **been adopted. Are EPA's current and proposed standards likely to be exceeded**  
8 **by the SE2 facility?**

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11 A. No. The applicable current ozone standard is 0.12 parts of ozone per million parts of  
12 air (ppm) (1-hour). The USEPA proposed a similar standard of 0.08 ppm (8-hours) in  
13 1997. Environment Canada evaluated the SE2 plant's emissions with respect to ozone  
14 and concluded that SE2 operations would result in only small local peak increases in  
15 ground-level ozone of 0.0007 ppm to 0.004 ppm and no effect on ozone duration (di  
16 Cenzo and Pottier, 2000<sup>iii</sup>). These increases are well below current and proposed US.  
17 health standards and are very unlikely to increase background ozone concentrations  
18 above USEPA's existing or proposed standards.  
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23 The current federal and state PM<sub>10</sub> standards, which apply to the project, are 50 ug/m<sup>3</sup>  
24 (annual) and 150 ug/m<sup>3</sup> (24-hour). The proposed PM<sub>2.5</sub> standard of 15 ug/m<sup>3</sup> (annual)  
25 and 65 ug/m<sup>3</sup> (24-hour) is in addition to the PM<sub>10</sub> standard and has not been adopted.  
26 Predicted ambient air impacts were estimated based on modeling and are provided in  
27 the PSD permit (see PSD permit application Sections 3.2 and 6.1). Table 3.2-5 in  
28 Section 3.2 of the PSD permit summarizes estimated maximum impacts from the  
29 facility. The predicted maximum ambient air emissions for PM<sub>10</sub> based on 24-hour and  
30 annual averaging times are 10 ug/m<sup>3</sup> and 0.48 ug/m<sup>3</sup>, respectively. Although PM<sub>2.5</sub>  
31 emissions were not modeled, a conservative estimate based on 80 percent of the PM<sub>10</sub>  
32 values would be 8 ug/m<sup>3</sup> and 0.38 ug/m<sub>3</sub>. These concentrations are significantly below  
33 the ambient air emission standards and applicable permit standards. Based on this  
34 data, maximum predicted ambient impacts from the SE2 emissions do not exceed the  
35 current particulate standards and are very unlikely to exceed the proposed standards.  
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41 **Q. In conclusion, Dr. Koenig testifies that the SE2 project raises public health**  
42 **concerns because, "since levels in the range of 44-67 ug/m<sup>3</sup> PM<sub>10</sub> have been**  
43 **measured at the Abbotsford station (and PM<sub>2.5</sub> is 50 to 80% of PM<sub>10</sub>), there is**  
44 **very little margin left for the addition of new sources of PM if we plan to protect**  
45 **public health." Do you agree with this conclusion?**  
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1 A. No. Initially, I do not agree with Dr. Koenig's conclusion as it uses the predicted  
2 maximum impacts estimated for the facility as if they were ambient air data. In  
3 addition, even if they were ambient data, there appears to be sufficient margin when  
4 compared to USEPA existing and proposed standards.  
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8 It is important to distinguish between USEPA ambient air standards, ambient air data  
9 collected at a monitoring station, and potential ambient air impacts estimated for a  
10 facility for permitting purposes. Predicted ambient impacts are estimated using  
11 modeling (i.e., ISCST and CALPUFF [Section 6.1 of the Sumas PSD permit]). In  
12 order to estimate emissions from the facility, modeling takes into consideration  
13 meteorological conditions, dispersion, and identifies the location where the maximum  
14 concentration is likely to occur. Through the process, choices in input parameters are  
15 intentionally conservative to ensure impacts are under limits in the permit. The  
16 maximum predicted concentration based on this process is then added to background  
17 and compared to the ambient air standards.  
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22 Background, as estimated by the Abbotsford data, is significantly greater than  
23 predicted impacts from the facility. The highest 24-hour PM<sub>10</sub> concentrations  
24 observed at Abbotsford between 1996 and 1998 ranged from 44 ug/m<sup>3</sup> to 66 ug/m<sup>3</sup>  
25 (see PSD Permit Application Table 6.1-9). When PM<sub>10</sub> concentrations in Abbotsford  
26 exceed 50 ug/m<sup>3</sup> (the Canadian 24-hour guideline), the episodes have been associated  
27 with high wind events and windblown dust from agricultural areas and exposed soils in  
28 the eastern portion of the Lower Fraser Valley (see PSD Permit Application and  
29 summary of air quality data sent by Eric Hansen to British Columbia's Ministry of  
30 Environment, Land, and Parks dated February 23, 2000). These exceedances are on-  
31 going and totally unrelated to any additional emissions from the SE2 facility. The  
32 conditions producing these particulate concentrations are different than the  
33 meteorological conditions associated with the highest predicted ambient air impacts  
34 from the facility (see PSD Permit Application) and are not expected to occur at the  
35 same time.  
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42 Dr. Koenig notes that there is very little margin left for the addition of new sources  
43 compared to the proposed PM<sub>2.5</sub> 24-hour level of 65 ug/m<sup>3</sup>; however, the maximum  
44 24-hour PM<sub>10</sub> predictions from the plant reaching Canada are very low, only 7 ug/m<sup>3</sup>.  
45 To assess PM<sub>2.5</sub> emissions, Dr. Koenig indicates that PM<sub>2.5</sub> is 50% to 80% of PM<sub>10</sub>.  
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1 This is not the range presented in USEPA's 1999 Criteria Document and to my  
2 knowledge actual particulate fractions other than PM<sub>10</sub> have not been characterized.  
3 The USEPA lists a range for PM<sub>2.5</sub>'s percentage of PM<sub>10</sub> concentrations of 20% to  
4 80% and the lower end is noted to be typical of western dry areas, while the upper end  
5 is more typical of eastern areas. However, even if 80% of the SE2 emissions are  
6 PM<sub>2.5</sub>, adding them to 80% of the maximum PM<sub>10</sub> concentration from Abbotsford in  
7 three years of monitoring results in a total concentration below the proposed PM<sub>2.5</sub>  
8 standard. Because the maximum plant emissions and maximum Abbotsford  
9 concentration would likely not occur on the same day, there is sufficient margin for the  
10 SE2 emission. Air quality concerns in this region would be more appropriately  
11 focused on emissions contributing to the existing PM background levels than the very  
12 low emissions from the SE2 facility.  
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18 **Q. Ms. Hoag also seems to testify generally that regulatory air quality standards do**  
19 **not adequately protect public health. Is this an accurate statement?**

20 A. Ms. Hoag's statement is very broad and does not specifically relate her concerns to the  
21 siting of the proposed facility. She appears to question all health-based regulatory  
22 standards developed to protect ambient air and does not differentiate between  
23 governing bodies (*e.g.*, state, federal, international), laws or regulations, or  
24 constituents. To understand her statement and for it to have meaning within the  
25 context of siting this facility, she must define "adequately protective" and discuss how  
26 that differs from how acceptable risk is defined under the applicable Washington state  
27 and federal requirements and support why what she proposes is more appropriate.  
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32 As I discussed previously, USEPA's process for establishing national ambient air  
33 quality standards (NAAQS) is exhaustive and thorough. Their mandate is to protect  
34 human health with an adequate margin of safety. Federal regulations require all six of  
35 the ambient air quality standards be periodically evaluated to ensure they remain health  
36 protective. Each of these evaluations goes through an exhaustive process of  
37 examining the available health data and assessing whether the existing air  
38 concentration standard is adequately health-protective. The emissions from the  
39 proposed facility are well below USEPA's current and proposed ambient air quality  
40 standards.  
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1 **Q. In her testimony, Ms. Hoag denies that cars contribute significantly to**  
2 **particulate matter pollution, stating: "Some like to blame cars, and they do play**  
3 **a part, but if you take a careful look at the violations, particulate matter is not a**  
4 **pollutant that cars put out in much quantity." Is this accurate?**

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6 A. No. It commonly known that motor vehicle exhaust is a major contributor to airborne  
7 particulate (USEPA 1999<sup>iv</sup>). The EPA recently reviewed approximately ten studies  
8 that estimated the percent contribution of various sources to PM<sub>10</sub> (particulate matter  
9 with an aerodynamic diameter of 10 microns or less) and PM<sub>2.5</sub> (particulate matter  
10 with an aerodynamic diameter of 2.5 microns or less) and found that motor vehicle  
11 exhaust accounted for up to 40 percent of average PM<sub>10</sub> at many of the monitoring  
12 sites and their percent contribution to PM<sub>2.5</sub> may be even higher (USEPA, 1999<sup>i</sup>).  
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16 **Q. Mr. Sagert suggests that air emissions of particulate matter and smog (ozone)**  
17 **from the SE2 project could cause health impacts in Canada. Do you have a**  
18 **response to his testimony?**

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20 A. "Smog" is defined as photochemical air pollution resulting primarily from the  
21 combination of atmospheric reaction products of automobile exhaust and sunlight  
22 during an inversion layer. Automobile exhaust is not an issue related to SE2.  
23 However, ozone is a component of smog and likely one of smog's primary toxicants.  
24 The SE2 facility does emit precursors of ozone. The ozone levels from plant  
25 emissions are very small, from 0.0007 ppm to 0.004 ppm, and according to  
26 Environment Canada's estimation they will not contribute significantly to current  
27 ozone levels in British Columbia's Lower Mainland area. The ozone levels predicted  
28 in Canada from SE2 emissions are certainly not a health concern.  
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34 The Abbotsford air quality data for particulates (also a smog component, the majority  
35 of which comes from automobile exhaust) indicate that the Greater Vancouver  
36 Regional District's (GVRD) PM<sub>10</sub> guideline of 50 ug/m<sup>3</sup> (24-hours) is currently  
37 exceeded approximately four days per year. The GVRD notes that the exceedances  
38 have been associated with high-wind events and windblown dust from agricultural  
39 areas in the Lower Fraser Valley. The meteorological conditions creating such  
40 exceedances are different than the conditions producing the maximum PM<sub>10</sub> emissions  
41 from SE2; therefore, the chances of those two things occurring on the same day are  
42 remote. Unless those things occur on the same day, SE2's PM<sub>10</sub> contributions will not  
43 increase Abbotsford ambient levels above the GVRD guideline. The GVRD guideline  
44 is one-third of the current US standard.  
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**END OF REBUTTAL 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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<sup>i</sup> USEPA. 1996. *Review of the National Ambient Air Quality Standards for Particulate Matter: Policy Assessment of Scientific and Technical Information*. OAQPS Staff Paper. Office of Air Quality Planning and Standards. EPA-452/R-96-013. July.

<sup>ii</sup> USEPA, 1996. *Air Quality criteria for particulate matter*. Research Triangle Park, NC. EPA/600/P-95/001aF-cF. 3v.

<sup>iii</sup> di Cenzo, Colin and Joanne Pottier. 2000. A numerical simulation of impacts on ground-level ozone concentrations from the proposed Sumas Energy 2, Inc. power generation facility. Atmospheric Sciences Section, Environment Canada, Vancouver, British Columbia. Report 2000-001, January 31. Unpublished Manuscript

<sup>iv</sup> USEPA. 1999. *Air Quality Criteria for Particulate Matter, Volumes I – III, External Review Draft*. Office of Research and Development, Washington, D.C. EPA 600/P-99/002a. October.