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BEFORE THE STATE OF WASHINGTON
ENERGY FACILITY SITE EVALUATION COUNCIL

IN RE APPLICATION NO. 2002-01

EXHIBIT 30R.0 (DD-RT)

BP WEST COAST PRODUCTS, LLC.

BP CHERRY POINT COGENERATION
PROJECT

APPLICANT'S PREFILED REBUTTAL TESTIMONY

DONALD DAVIES, Ph.D.

Q. Please state your name and business address.

A. My name is Donald Davies. I am a Vice-President and Principal of CANTOX ENVIRONMENTAL INC., based in Calgary, Alberta, CANADA.

Q. Can you briefly describe your background and experience?

A. I am a Toxicologist by training, and have over 25 years of working experience in the areas of product safety, health risk assessment, risk communication, and regulatory compliance. I have worked as a researcher, as a regulator, as a corporate toxicologist,

1 and as a consultant in the areas of health and the environment. I have been with
2 CANTOX ENVIRONMENTAL since 1991. My work involves identifying and
3 understanding the health effects of chemicals on living systems, as well as the
4 potential health impacts that can result from chemical exposures. Much of my work
5 has focused on the potential health effects of air-borne chemicals in both
6 occupational and public settings. I am familiar with the health effects, and have
7 examined the potential health risks of a number of different air pollutants, including
8 particulate matter (“PM”), in relation to oil and gas facilities, power plants, cement
9 kilns, petrochemical complexes, forest products industries, mining operations, steel
10 mills, and other industrial activities.
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22 I hold a Ph.D. in Nutrition/Toxicology from the University of Guelph (Guelph,
23 Ontario). I currently serve as an Adjunct Professor in the Department of Community
24 Health Studies, Faculty of Medicine at the University of Alberta (Edmonton,
25 Alberta). I have been a Diplomate of the American Board of Toxicology since 1985.
26 I have attached a copy of my *Curriculum vitae* hereto for the Council’s further
27 review.
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36 **Q. What testimony will you be addressing in this rebuttal testimony?**

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38 A. I will be responding to portions of the testimony of Dr. Jane Koenig, which was filed
39 on behalf of Whatcom County.
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44 **Q. In general, what is your reaction to Dr. Koenig’s testimony?**
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1 A. Dr. Koenig argues that the particulate matter (PM) emissions from the proposed BP
2 Cherry Point Cogeneration Facility (the “Project”) could potentially affect public
3 health, especially the health of children with asthma. Her testimony focuses almost
4 exclusively on fine particulate matter (PM_{2.5}). Her argument refers specifically to the
5 projected ‘cumulative’ impacts of the facility, namely the impacts that could result
6 from the combination of existing background levels of PM with the predicted added
7 contributions of PM from the Project. The basis of her argument is that the combined
8 amounts of PM could exceed the ‘benchmark’ level of 25 micrograms per cubic
9 meter of air (“ug/m³”) for PM_{2.5} recommended by the Puget Sound Clean Air
10 Agency *Ad Hoc* Particulate Matter Health Committee (the “Health Committee”) as a
11 goal for the protection of public health.¹ In support of her argument, she proffers
12 several exhibits consisting of a selection of scientific papers that she has authored,
13 principally describing associations between PM-related air pollution and hospital
14 admissions or emergency department visits for asthma.
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31 Although I can fully respect Dr. Koenig’s interest in exploring the potential public
32 health implications of the PM emissions from the Project, especially in relation to
33 ‘sensitive’ members of the population such as children with asthma, my overall
34 reaction to her testimony is that her argument is counter-intuitive and unnecessarily
35 alarmist, and her conclusions are based on hypothetical ‘constructs’ that have little,
36 if any, practical relevance. In this regard, I would point out the following:
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45 ¹ The ‘benchmark’ level refers to the 24-hour average “goal” for PM_{2.5} developed by the
46 Health Committee, and presented to and formally acknowledged by the Puget Sound Clean Air
47 Agency Board in 1996.

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- First, her argument never considers the fact that the Project is expected to reduce the overall levels of particulate matter in the airshed by reducing emissions from the neighbouring BP refinery. By providing steam to the refinery, the Project will allow BP to reduce the existing refinery emissions by shutting down boilers and heaters currently used in the refining process. The net result will be an overall reduction in the amount of PM emitted into the airshed. This item is addressed in detail in the testimony of Mr. Brian Phillips (Exhibit No. 22R). The expected overall reduction in PM emissions effectively negates Dr. Koenig’s argument. Clearly, it is only reasonable to conclude that any such reduction would act to lower, not increase, the threat of adverse health impacts.
 - Second, her argument is based exclusively on ‘worst-case’ scenarios involving the hypothetical combination of *maximum* background PM levels with the *maximum* predicted PM contributions from the Project. This approach represents nothing more than a simple screening-level exercise that cannot be relied upon as a valid indicator of possible public health implications without careful consideration of the conservatism embraced by these maximum numbers, both on a project-specific and cumulative basis. I refer specifically to the very low likelihood of occurrence of conditions that correspond to the maximum PM levels, regardless of source (*i.e.*, background or project), *and* to the even lower likelihood that these conditions would occur simultaneously such that the maximum PM levels from each source would ‘collide’ at one location at one time. Based on my experience, these

1 conditions correspond to very rare events, and represent nothing more than
2 hypothetical constructs. In my opinion, to argue that public health may be
3 adversely affected by the PM emissions from the Project strictly on the basis
4 of consideration of absolute ‘worst-case’ conditions, as Dr. Koenig does, is
5 not meaningful from a scientific perspective, nor helpful for decision-
6 making. Proper interpretation of the significance of the findings from such an
7 exercise requires thoughtful analysis of the conservatism incorporated in the
8 ‘worst-case’ estimates of cumulative impacts. There is no evidence to
9 indicate that Dr. Koenig completed such an analysis in reaching her
10 conclusions.
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- 22 • Third, as indicated above, Dr. Koenig relies on the use of the air quality
23 ‘guideline’ for PM_{2.5} of 25 ug/m³, averaged over 24 hours, recommended by
24 the *ad hoc* Health Committee to support her argument that the PM emissions
25 from the proposed facility might adversely affect public health. I view this
26 approach with skepticism since:
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34 ➤ The Guideline developed by the Health Committee represents a
35 “goal” for the protection of public health.² It does *not* represent a
36 ‘bright line’, above which adverse health effects are inevitable. By
37 convention, air quality guidelines that are established for the
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46 ² Final Report of the Puget Sound Clean Air Agency PM_{2.5} Stakeholder Group. October 15,
47 1999.

1 protection of human health incorporate safety factors, such that
2 modest excursions do not signal an imminent threat to health.
3
4 Because of these safety factors, minor exceedances of a guideline,
5 particularly if infrequent, are generally regarded to be of little, if any,
6 consequence from a public health perspective. The exceedances
7 described by Dr. Koenig fit this category, particularly since they
8 represent isolated, rare events.
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17 ➤ Regrettably, documentation surrounding the development of the
18 Guideline is limited.³ The *ad hoc* Health Committee did not issue a
19 formal report outlining the exact scientific basis of the Guideline,
20 including a description of the studies examined, the principal findings
21 of interest, and the limitations and uncertainties surrounding the data.
22 Accordingly, it is difficult, if not impossible, to critique the Health
23 Committee's recommendation, or to confirm or refute the scientific
24 validity of the Guideline. This inability to independently assess the
25 adequacy of the scientific data supporting the Guideline seriously
26 detracts from its usefulness.
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45 ³ Personal communication from Ms. Naydene Maykut, Senior Air Quality Scientist, Puget
46 Sound Clean Air Agency, November 18, 2003.
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➤ The Health Committee’s guideline is considerably more stringent than the corresponding PM ‘standards’ that have recently been developed by federal authorities in the U.S.A. and Canada. I refer specifically to the National Ambient Air Quality Standards (“NAAQS”) for PM_{2.5} established by the U.S. EPA, and the Canada Wide Standard (“CWS”) for PM_{2.5} established by the Canadian Council of Ministers of the Environment (“CCME”). These federal standards are shown in the chart below. Each of the standards was developed with full respect for the need to protect public health. Unlike the Health Committee’s guidelines, the federal standards have been subject to rigorous peer review by the broad scientific community as well as the public-at-large, and are fully supported by documentation that is readily available.

Comparison of Ambient Air Quality ‘Benchmarks’ for PM_{2.5}

Authority	Designation	Averaging Period	Value (ug/m ³)	Basis
Ad hoc Health Committee	‘Goal’	24-hour	25	Not to be exceeded. Averaged over one year.
		Annual	15	
U.S. EPA	NAAQS	24-hour (deferred)	65	Based on 98 th percentile of data collected and averaged over three years. Averaged over three years.
		Annual (deferred)	15	
CCME	CWS	24-hour	30	Based on 98 th percentile of data collected and averaged over 3 years.
		Annual	None	

1 It is obvious from the chart that, irrespective of averaging period, the
2 'goal' recommended by the *ad hoc* Health Committee goes far beyond
3 the federal standards. With respect to the 24-hour guideline cited by
4 Dr. Koenig, it is not only more stringent numerically than each of the
5 corresponding federal standards, but it also is considerably more strict
6 in terms of the manner in which it is to be applied. Specifically,
7 whereas the Health Committee's guideline is 'not to be exceeded', and
8 therefore refers to the 100th percentile of measurements (*i.e.*, absolute
9 maximum levels), compliance with each of the 24-hour federal
10 standards is based on the 98th percentile of measurements of PM_{2.5} (*i.e.*,
11 near maximum levels only). This distinction is important since, unlike
12 the Health Committee's 'goal', the NAAQS and CWS do not subscribe
13 to the use of absolute 'worst-case' measurements as the basis for
14 compliance. It is noteworthy that the PM_{2.5} emissions from the Project
15 will be fully compliant with the federal standards, whether assessed on
16 a project-specific or cumulative basis.
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34 My overall reaction to Dr. Koenig's argument concerning the potential public health
35 impacts of the Project is that it is not especially convincing, nor does it consider the
36 PM emissions from the Project in the proper context. Her argument relies only on the
37 use of hypothetical 'worst-case' conditions contributing to maximum cumulative
38 PM_{2.5} levels, and comparison of these maximum levels against a very stringent air
39 quality 'goal', for which supporting documentation is not readily available. In my
40 opinion, this argument is not especially useful for decision-making since it is too
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1 narrowly focused. It refers only to very rare, isolated hypothetical events, for which
2 the probability of occurrence is remote, if not impossible. Her argument also ignores
3 the margins of safety that are typically incorporated into air quality guidelines, which
4 allow for modest, infrequent excursions without threat of adverse health outcomes. I
5 also find Dr. Koenig's use of the air quality 'goal' recommended by the *ad hoc*
6 Health Committee to be questionable in the present context given that the scientific
7 basis of the 'goal' cannot be openly debated, nor can its adequacy be confirmed or
8 refuted in the absence of supporting documentation. Finally, Dr. Koenig's argument
9 completely ignores the fact that the Project is expected to contribute to a net
10 reduction in PM emissions from the cogeneration facility-refinery complex. On this
11 basis alone, it is difficult to fathom Dr. Koenig's concern that the Project *per se*
12 could contribute to adverse effects on public health. At the very least, it would be
13 expected to reduce the threat of adverse health impacts.
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28 **Q. Dr. Koenig recommends the use of a 25 ug/m³ guideline for PM_{2.5} to protect**
29 **public health. Do you agree that 25 ug/m³ is the appropriate guideline?**
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31 **A.** I seriously question the appropriateness of the specific guideline cited by Dr. Koenig
32 as the basis for any decision-making. As already indicated, the guideline refers to an
33 ambient air quality 'goal' recommended by the *ad hoc* Health Committee, and
34 accepted and endorsed by the Puget Sound Clean Air Agency in 1996. My reluctance
35 to accept this guideline stems not so much from the numerical value itself, but rather
36 from the fact that the 'goal' is without adequate supporting documentation. There is
37 no formal report describing the manner in which the guideline was derived, and the
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1 limitations and uncertainties surrounding its use. I am reluctant to endorse *any*
2 guideline for which supporting documentation is lacking.
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7 In terms of what might be considered an appropriate guideline for PM_{2.5}, I would
8 point out that many of the more recently developed standards (see above chart) are
9 now undergoing review in light of the discovery of certain inadequacies in the
10 standards.⁴ Specifically, certain aspects of the S-plus statistical software that was
11 commonly used in analyzing the data have been found to be ‘at fault’. Since these
12 statistical analyses were critical to the interpretation of the data and influenced the
13 setting of the air quality ‘standards’, the responsible authorities have concluded that
14 the ‘raw’ data must be re-analyzed using improved statistical methods. This work is
15 now on-going. Preliminary analyses have shown that the relative risks per PM
16 increment may have been overstated by as much as 100% in the original analyses,
17 presenting the possibility that the standards may embrace an even higher margin of
18 safety for the protection of health than originally planned. The need for review of the
19 standards has been recognized by the U.S. EPA. Accordingly, the NAAQS for PM_{2.5}
20 has been ‘deferred’ until the re-analysis is complete.⁵
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37 **Q. Dr. Davies, how would your approach toward assessing the potential health**
38 **risks from the Project’s PM2.5 emissions differ from that used by Dr. Koenig?**
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45 ⁴ Letter report from the Health Effects Institute. May 30, 2002.
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1 A. I would not confine my comparisons to a single air quality guideline, but instead
2 would base my opinion on comparisons against several different guidelines that I
3 judged to be reliable indicators of the health hazard presented by PM_{2.5} for different
4 averaging periods. Certainly, I would rely, in part, on comparisons against the
5 federal ‘standards’ since they are current, have been carefully scrutinized by the
6 responsible authorities, and have been subject to rigorous and extensive peer review
7 through an open, transparent process. I also would take into consideration the
8 margins of safety incorporated into the guidelines as part of my assessment of
9 potential public health risks. This would involve looking beyond the standards *per*
10 *se*, and examining the health effects data to determine the actual levels of PM for
11 which associations with adverse health outcomes actually been demonstrated. In
12 addition, I would not limit my comparisons to the location of the maximum point of
13 impact of the Project’s emissions, but rather would examine nearby community
14 locations where people actually live and work. Finally, I would interpret the
15 significance of any findings with full consideration of the conservatism embraced by
16 the work, including the conservatism incorporated into the estimates of PM levels,
17 both on a project-specific and cumulative basis.

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37 Using this approach, together with the relevant information documented in the
38 Application and as part of the Direct Testimony and Rebuttal Testimony of Mr.
39 Brian Phillips (Exhibit Nos. 22 and 22R), I can state confidently that the Project,
40 either alone or in combination with background sources of PM, will *not* result in
41 either the NAAQS or the CWS for PM_{2.5} being exceeded, *even* at the location of the
42 maximum predicted impact of the Project emissions. These findings signify that the
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1 PM emissions from the Project will not present any significant health risks to the
2 public, even under 'worst-case' conditions. At the nearby communities of Birch Bay
3 and Lyndon, the lack of any significant adverse health impacts from the Project
4 emissions is even more evident.
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10 Comparison against the 25 ug/m³ 'goal' that Dr. Koenig recommends reveals that
11 under 'worst-case' conditions, the cumulative PM levels could exceed the numerical
12 limit. However, in my opinion, the modest excursions are of very questionable, if
13 any, significance from a public health perspective given:
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20 • The appreciable margin of safety that presumably was incorporated into this
21 'goal' in order to afford protection to even vulnerable individuals. In this
22 regard, the 'goal' goes well beyond the corresponding federal standards, each
23 of which was developed with full respect for the need to protect public
24 health. With a large margin of safety, modest excursions of the 'goal' can
25 easily be accommodated without threat of adverse health effects.
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29 • The possibility that the goal may afford an even higher level of protection
30 because it was likely developed on the basis of estimates of relative risk
31 calculated using the S-plus statistical software package.
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35 • The low frequency at which the excursions are forecast to occur. The
36 excursions result from the hypothetical combination of the *maximum* PM
37 levels contributed by the Project with the *maximum* PM levels contributed by
38 background sources. This combination represents a very rare event, and, in
39 fact, is unlikely to ever be realized. As Brian Phillips explains in his
40 testimony, the Cogeneration Project is expected to result in a net reduction in
41 PM levels in the airshed since the contributions from the Project will be
42 offset by the reductions in PM emissions from the neighbouring refinery.
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1 Clearly, my opinion differs from that of Dr. Koenig. Although we both subscribe to
2 the need to examine the potential health implications of the PM emissions from the
3 Project, we differ in our approach and the manner in which the findings are
4 interpreted. These differences are outlined below:
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- 10 • Whereas Dr. Koenig relies on a single air quality ‘goal’ developed by an *ad*
11 *hoc* committee that is without supporting documentation to reach her
12 conclusion, my opinion is based on consideration of the air quality
13 ‘standards’ developed by federal regulatory authorities following extensive
14 peer review using current information for which the supporting
15 documentation is readily available.
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- 18 • Whereas, Dr. Koenig appears to view the air quality ‘goal’ for PM_{2.5}
19 recommended by the *ad hoc* Health Committee as a ‘bright line’ not to be
20 exceeded, and above which adverse health effects are imminent, my opinion
21 respects the fact that the various air quality standards possess adequate
22 margins of safety to allow for modest excursions, without the threat of
23 adverse health impacts. In addition, my opinion acknowledges the fact that
24 the standards may be even more conservative than originally intended owing
25 to upward bias introduced through the use of the S-plus statistical software.
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- 28 • Whereas, Dr. Koenig bases her argument entirely on absolute ‘worst-case’
29 scenarios involving the hypothetical combination of the maximum PM levels
30 contributed by the Project with the maximum PM levels contributed by
31 background sources at the location of the maximum impact of the Project
32 emissions without consideration of the frequency of occurrence of such
33 scenarios, my opinion recognizes that such conditions represent very rare,
34 isolated events that are of little practical relevance in terms of assessing the
35 public health implications of the Project emissions. In addition, my opinion
36 includes consideration of the PM levels that might be encountered not only at
37 the maximum point of impact of the emissions, but also within the actual
38 communities surrounding the facility.
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- 41 • Whereas, Dr. Koenig considers the PM emissions from the Project in
42 isolation, my opinion acknowledges the overall net reduction in the amount
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1 of PM emitted into the airshed that is likely to be realized by the emission
2 offsets from the neighbouring BP refinery.
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6 **Q. Is the guideline of 25 ug/m³ recommended by Dr. Koenig consistent with the**
7 **current scientific evidence surrounding the association between PM2.5 levels**
8 **and adverse health outcomes?**
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12 A. A considerable volume of literature exists regarding the health effects of PM, with
13 literally hundreds of publications devoted to examining this topic, many of which
14 have only recently emerged. A brief synopsis of the evidence may be of some
15 benefit, especially in the context of understanding the potential health implications
16 of the PM emissions from the Project. From the Project perspective, the following
17 points are significant:
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- 23 • The cumulative PM level (*i.e.*, 11 ug/m³) resulting from the combination of
24 the maximum PM level contributed by the Project (*i.e.*, 4.3 ug/m³) with the
25 background PM level corresponding to the 50th percentile of values (*i.e.*, 7
26 ug/m³) is below the corresponding range of average daily PM levels for
27 which for which statistically significant associations with adverse health
28 outcomes have been reported to first appear (*i.e.*, 13 to 21 ug/m³).
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- 30 • Additionally, the cumulative PM level (*i.e.*, 25 ug/m³) resulting from the
31 combination of the maximum PM level contributed by the Project (*i.e.*, 4.3
32 ug/m³) with the background PM level corresponding to the 98th percentile of
33 values (*i.e.*, 21 ug/m³) is well below the corresponding percentile range of
34 PM levels (*i.e.*, 98th percentile) for which the associations first appear (*i.e.*, 30
35 to 55 ug/m³).
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43 On the basis of the above, there is no reasonable ground to argue, as Dr. Koenig
44 does, that the PM emissions from the Project could adversely affect public health.
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1 Regardless of the distribution ‘metric’ chosen (*i.e.*, average vs. 98th percentile), the
2 cumulative PM levels consistently fall below the levels associated with adverse
3 health effects. Added assurance of the lack of any adverse health outcomes is
4 provided not only by the fact that each of the above combinations is based on the
5 absolute *maximum* PM level contributed by the Project, and therefore, is biased
6 upward, but also by the fact that this maximum level refers only to the location of the
7 maximum point of impact of the Project emissions. The PM levels contributed by the
8 Project at the nearby communities of Birch Bay and Lyndon will be much lower than
9 this maximum level. It also must be emphasized that the above comparisons refer to
10 PM levels at which associations with adverse health outcomes only begin to achieve
11 statistical significance. At these PM levels, considerable uncertainty surrounds the
12 veracity of the associations. Finally, it must again be pointed out that the cumulative
13 levels listed above are unlikely to ever occur since the Project is expected to result in
14 an overall net reduction in the amounts of PM emitted into the airshed.
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31 **Q. Dr. Koenig has attached several articles to her testimony to support her**
32 **contention that the PM emissions from the Project have the potential to**
33 **adversely affect public health, especially the health of children with asthma. Do**
34 **these articles support her position?**
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38 A. The articles consist of a number of scientific papers co-authored by Dr. Koenig that
39 describe the findings from a series of community-based studies that were designed to
40 explore the relationship between PM-related air pollution and respiratory health,
41 especially among children with asthma. Different indices of respiratory health were
42 examined, notably pulmonary function, hospital admissions and emergency
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1 department visits. All of the studies were based in Seattle, Washington. It appears
2 that the studies were prompted by concerns over the PM pollution caused by home
3 heating using wood-burning stoves.
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8 The findings from the studies are not especially revealing. It is generally accepted
9 that children with asthma are more responsive to air pollution compared to their
10 normal counterparts or adults. A number of studies have previously shown
11 associations between PM-related air pollution and aggravation of asthma. Perhaps
12 more importantly, the findings from Dr. Koenig's studies are of little, if any,
13 relevance from a clinical perspective in relation to the PM emissions from the
14 Project. The relative risks that she reports are of no significance in terms of the
15 actual case loads that might be expected, and refer to PM increments that will not
16 occur from the Project, even under 'worst-case' conditions.
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28 Perhaps it is first worth noting that virtually all of the studies cited by Dr. Koenig
29 suffer from one or more deficiencies that are common to many investigations of this
30 type that attempt to explore health indices on a community basis in relation to air
31 pollution. Collectively, these deficiencies can seriously erode confidence in the study
32 findings and conclusions. Many of these deficiencies are acknowledged by Dr.
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39 Koenig. They include:

- 40 • Small sample size
- 41 • Exposure misclassification
- 42 • Missing exposure data
- 43 • Lack of personal exposure data
- 44 • Failure to adequately control for confounding variables, including other
45 asthma inducers.
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1 Other notable deficiencies include:

- 2 • Reliance on use of S-plus statistical software
- 3 • Reliance on self-reported diagnosis of asthma
- 4 • Reliance on indirect measurement of PM_{2.5} levels

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6 Interpretation of the significance of the findings from Dr. Koenig's studies must
7 necessarily weigh the influence of these deficiencies on the study outcomes before
8 any conclusions can be properly drawn from the work. Certainly, the deficiencies
9 detract from the usefulness of the studies.
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16 In my opinion, the overall findings and conclusions from the studies are not relevant
17 to the present case, for two principal reasons.
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22 • First, the associations that Dr. Koenig and her colleagues report appear to be
23 related largely to the air pollution associated with the use of wood- burning
24 stoves during winter months. The 'character' of wood smoke differs
25 significantly from the emissions that will result from the burning of the
26 natural gas that will fuel the Project. In the first instance, the cleaner 'burn'
27 achieved with natural gas compared to wood results in a much different
28 emission profile. Wood smoke contains higher relative amounts of
29 aldehydes, ketones, acids, polycyclic aromatic hydrocarbons (PAH) and
30 other irritants that can trigger or aggravate asthmatic attacks. Even the PM
31 *itself* will differ in chemical composition. In the second instance, the Project
32 will be equipped with BACT to reduce the amounts of pollutants emitted to
33 the lowest levels possible, whereas residential wood stoves typically are
34 exhausted directly to atmosphere, with no pollution control. Under the
35 circumstances, it is not surprising that Dr. Koenig discovered associations
36 between PM levels and increased asthma episodes. However, the
37 circumstances are not relevant to the Project.
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42 • Second, the associations discovered in the studies are generally reported in
43 terms of relative risks that correspond to an incremental increase in PM
44 levels. Depending on the study and the health outcome examined (*i.e.*,
45 hospital admissions for asthma *vs.* hospital emergency department visits for
46 asthma), the relative risks ranged from 1.04 to 1.15 (*i.e.*, a 4 to 15% increase
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1 in admissions above background rates), and the corresponding PM
2 increments ranged from 11 to 30 ug/m³. Although on first glance the relative
3 risks may appear to be appreciable, they become essentially meaningless
4 from a clinical perspective when examined in the context of the PM
5 emissions from the Project. Consider the following:
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10 ➤ According to the Application and the testimony of Mr. Phillips, the
11 Project is expected to result in an overall reduction in the amount of
12 PM emitted into the airshed. Thus, the incremental change in PM
13 levels will be downward, and not upward. On this basis, one would
14 expect to witness a reduction in admissions once the Project is
15 approved and operating.
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18 ➤ Even if one considers the Project in isolation, as Dr. Koenig does, the
19 PM increment added at the location of the *maximum* point of impact
20 of the Project emissions under 'worst-case' conditions will range
21 from 1.7 to 4.3 ug/m³. At the neighbouring communities of Birch Bay
22 and Lyndon, the increment will be 1.7 and 0.35 ug/m³, respectively.
23 These increments correspond to relative risks that are much lower
24 than those reported in Dr. Koenig's papers. It is these relative risks
25 that must be considered when assessing the potential impacts of the
26 Project emissions on the health of children with asthma. The relative
27 risks become reduced from the 1.04 to 1.15 reported by Dr. Koenig to
28 a relative risk as low as 1.001, and no higher than 1.06 (*i.e.*,
29 equivalent to a 0.1 to 6 % increase in admissions beyond
30 background). Since the background hospital admission and
31 emergency department visit rates for asthma were reported to average
32 2 to 3 cases per day, the relative risks become insignificant from both
33 a clinical and case load perspective. The number of extra cases, if
34 any, that might result would be indiscernible from background.
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40 ➤ The papers refer to use of the S-plus statistical software as part of the
41 analysis of the findings. Accordingly, it is likely that the risk
42 estimates are over-stated, thereby detracting even further from their
43 clinical relevance.
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1 Based on the above, Dr. Koenig's argument concerning the potential for the PM
2 emissions from the Project to adversely affect public health, including the health of
3 children with asthma is *not* supported by the papers. Evidently, she fails to recognize
4 that the Project is expected to contribute to a net reduction in the amount of PM
5 emitted into the airshed, and as such, should lessen any threat of adverse health
6 outcomes, including hospital admissions and/or emergency department visits for
7 asthma. Even if the Project is viewed in isolation, once the findings from the papers
8 are adjusted for the PM increments and corresponding relative risks involved, they
9 provide no evidence to support Dr. Koenig's argument.
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21 **Q. In your professional opinion, Dr. Davies, do the Cogeneration Project's PM_{2.5}**
22 **emissions present a risk to public health?**
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24 A. After examining and weighing the evidence made available to me, it is my opinion
25 that the PM emissions from the Project will not present a significant risk to public
26 health, including the health of vulnerable individuals such as children with asthma.
27 Since the Project is expected to result in a net reduction in the amount of PM emitted
28 into the airshed, any risk to public health should, in fact, be reduced by the Project's
29 approval. However, even if the Project is considered in isolation, the modest PM
30 increments contributed by the Project's emissions cannot be considered significant
31 from either a clinical or public health perspective. Even under 'worst-case'
32 conditions, the PM increment that might be added by the Project is well below the
33 levels that have been reported to be associated with adverse health outcomes. In
34 addition, comparison of the PM levels involved, either on a project-specific or
35 cumulative basis, against the NAAQS and CWS shows that the concentrations fall
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1 well below the ‘standards’, even under ‘worst-case’ conditions, thereby signifying a
2 lack of any significant health risks. Taken collectively, the evidence provides no
3 indication that the PM increments expected to be added by the Project, even ignoring
4 the emission reductions at the neighboring refinery, will adversely affect public
5 health.
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12 **END OF TESTIMONY**
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