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POLLUTION CONTROL HEARINGS BOARD
STATE OF WASHINGTON

MICROSOFT-YES TOXIC AIR
POLLUTION-NO,

Appellant,

v.

WASHINGTON STATE DEPARTMENT OF
ECOLOGY, MICROSOFT CORPORATION
COLUMBIA DATA CENTER,

Respondent.

PCHB No. 10-162

FINDINGS OF FACT,
CONCLUSIONS OF LAW, AND
ORDER

Appellant Microsoft-Yes Toxic Air Pollution-No (MYTAPN) challenged the Notice of Construction Approval Order 10AQ-E374 (2010 Approval Order) issued by the Washington State Department of Ecology (Ecology) authorizing Microsoft Corporation Columbia Data Center (Microsoft) to install and operate thirteen additional diesel generators at its data center in Quincy, Washington. The Board issued an Order on Summary Judgment on September 11, 2011, addressing 28 legal issues raised in the case. The Board granted summary judgment on all but two issues, which were reserved for hearing. The Board restated the issues remaining for hearing as follows: (1) whether the emissions estimates Microsoft used to support the health risk analysis, and its analysis of compliance with emissions standards, are so flawed as to warrant invalidating the 2010 Approval Order; and (2) whether Ecology's decision to reject diesel oxidation catalyts

1 and diesel particulate filters in favor of operational limits and engine specifications
2 satisfies the BACT requirements of WAC 173-400-113 and WAC 173-460-060.

3 The Board held a hearing on the two remaining issues on February 7-8, 2012. The
4 board hearing the case was comprised of William H. Lynch, Kathleen D. Mix, and
5 Thomas McDonald. Administrative Appeals Judge Kay M. Brown presided for the
6 Board. Pro Se Litigant Patricia A. Martin represented appellant MYTAPN. Attorney Eric
7 Laschever and Attorney Matthew Cohen represented respondent Microsoft. Assistant
8 Attorney General Katharine G. Shirey represented Ecology. The proceedings were
9 recorded by Randi Hamilton of Olympia Court Reporters of Olympia, Washington. At
10 hearing, the Board heard testimony from MYTAPN's expert witness, three expert
11 witnesses on behalf of Ecology and two expert witnesses and one fact witness on behalf of
12 Microsoft. The Board also admitted and considered 42 exhibits offered by the parties. All
13 three parties filed pre-hearing briefs and written closing arguments. Based upon the
14 evidence presented the Board makes the following:

15 **FINDINGS OF FACT**

16 1.

17 Microsoft operates the Columbia Data Center (Data Center) on seventy acres of
18 industrial land in the city of Quincy. *Order on Summary Judgment at 3.* The Data Center
19 originally consisted of two buildings (CO1 and CO2). A new source approval order
20 initially issued in 2007 (No. 07AQ-E230) and amended in 2009 (No. 09AQ-E308)
21 (hereinafter "2007 Approval Order" and "2009 Approval Order") authorized Microsoft to
22 install twenty-four (24) 2.5 megawatt diesel generator engines to provide back up power
23 for these facilities. The 2009 Approval Order authorized the engines to run up to 285
24 hours per year apiece, and consume up to a total of 890,021 gallons of fuel per year. *Ex.*
25 *R-3, p.2.*

1 2.

2 The primary power supply for the Data Center is hydro-electric power purchased
3 from the Grant County Public Utility District (PUD). In addition, data centers require a
4 back-up power supply because any interruption of electric service impairs access to the
5 internet for users relying on the data housed at the data center and threatens the loss or
6 corruption of this data. *Amundson Testimony*. The Data Center requires sufficient reserve
7 generating capacity to replace 100 percent of the power supplied by the PUD. This
8 backup power is supplied by the backup diesel generator engines at the facility. These
9 engines are authorized to operate for readiness testing and maintenance, as well as during
10 power outages. *Ex. R-3, p. 2*.

11 3.

12 When operating, diesel generator engines emit federally-listed criteria air
13 pollutants and precursors, including sulfur dioxide (SO₂), nitrogen oxides (NO_x), carbon
14 monoxide (CO), and particulate matter (PM). The particulate matter generated by these
15 engines is also known as diesel engine exhaust particulate (DEEP) or diesel particulate
16 matter (DPM). DEEP is listed by the state as a toxic air pollutant (TAP), but is not a
17 federally-designated hazardous air pollutant (HAP).¹ *Order on Summary Judgment at 3;*
18 *Ex. R-1*.

19 4.

20 On May 14, 2010, Microsoft submitted a Notice of Construction (NOC)
21 application to Ecology seeking approval to install thirteen additional diesel backup
22

23 ¹ Ecology added DEEP to the state list of TAPs in 2009. It was not regulated as a TAP prior to that time.
24 For this reason, the 2007 Approval Order did not require Microsoft to analyze DEEP or ensure that DEEP
25 emissions met the requirements for toxic air pollutants. The 2009 Approval Order also did not regulate
DEEP associated with the first 24 generators, as it authorized only an extension of time for installation and
neither added a new emission source nor modified an existing emission source. *Order on Summary
Judgment at 3-4*.

1 generator engines as part of an expansion of the Data Center. The expansion consists of
2 three more buildings to house additional server equipment (collectively “CO3”). The new
3 generator engines are the same make and model as the twenty-four generator engines
4 approved for CO1 and CO2; however, the new CO3 engines are independent from the
5 twenty-four engines that provide backup power to CO1 and CO2. *Order on Summary*
6 *Judgment at 3-4; Ex. R-1.*

7 5.

8 In its Notice of Construction application, Microsoft proposed to operate the CO3
9 generator engines a total of 105 hours per year per engine using the following three
10 operating scenarios: (a) 12 hours per year per engine at 10 percent load for readiness
11 testing of the engines, (b) 44 hours per year per engine at 40 percent load for electrical
12 bypass mode for maintenance work, and (c) 48 hours per year per engine at 85 percent
13 load for full power outage. These proposed operational limitations became part of the
14 basis for further modeling assumptions, upon which Ecology and Microsoft conducted a
15 health risk assessment and determined appropriate emission limitations for the project.
16 *Ogulei Testimony, p. 16; Ex. R-1, pp. 3-2, 3-3; Ex. R-1, Appendix E at 5.*

17 6.

18 All of the diesel generator engines to be installed at the Data Center as part of the
19 CO3 expansion project are 2010 model year Caterpillar Model 3516C engines. The
20 United States Environmental Protection Agency (EPA) has promulgated emission
21 standards known as New Source Performance Standards (NSPS) for new diesel engines.
22 *Ex. R-3, pp. 5-6, Ex. R-2, p. 5-2.*

23 7.

24 An applicant seeking a new source approval order for a project in Washington
25 State must demonstrate that emissions from the project will not cause or contribute to an

1 exceedance of EPA’s National Ambient Air Quality Standards (NAAQS). To make this
2 demonstration Ecology requires applicants to estimate anticipated emissions from the
3 project, plus background emissions from other sources in the vicinity of the project. *R-1,*
4 *p. 6-2.* The applicant must then model the dispersion of those emissions in the ambient
5 air. For the CO3 project, Microsoft estimated that emission rates for most pollutants
6 would be equal to the Tier 2 emission limits established by EPA for model year 2010
7 engines of the size and type to be installed for the project. Microsoft then modeled these
8 emission rates, assuming as the worst case that each engine would run for the maximum
9 time allowed by the permit for each operating scenario described above. The results of
10 the modeling—at the various loads for the anticipated periods of time—indicated that the
11 CO3 project together with all background emissions would not cause an exceedance of
12 any of the NAAQS. *Ex. R-1, p. 6-3.*

13 8.

14 In the Board’s Order on Summary Judgment, we stated, “the Board seeks further
15 explanation at hearing of why Respondents derived its emissions estimates based on
16 EPA’s tier II process, rather than obtaining actual emissions data from the identical CO1
17 and CO2 engines that are currently operating...” *Order on Summary Judgment at 31, 32;*
18 *Ex. R-1.* Accordingly, in 2011, after the 2010 Approval Order had been issued, Microsoft
19 hired Horizon Engineering to conduct emission tests on two CO3 engines, which were
20 considered representative of the engines on site. *Amundson Testimony; Bouwman*
21 *Testimony; Exs. R-68 and 69.* On September 27-29, 2011, Horizon Engineering
22 conducted emission tests on a Caterpillar Model 3516C engine owned by Microsoft,
23 located in Tukwila, Washington, and scheduled to be installed at the CO3 project. For the
24 purposes of this testing, Microsoft purchased a diesel oxidation catalyst (DOC) and
25 installed it on the engine being tested. Horizon Engineering sampled and analyzed

1 emissions at the DOC inlet and the DOC outlet. *Ex. R-68.* On November 30-December 2,
2 2011, Horizon Engineering conducted emission tests on one of Microsoft's backup
3 generator engines located at the Data Center in Quincy (Quincy test). *Ex. R-69.* For the
4 tests in Quincy, Microsoft did not install a DOC.

5 9.

6 For each pollutant tested at Tukwila and Quincy (CO, PM, NO_x and NO₂),
7 Horizon conducted three test runs at each of the three engine loads at which Microsoft will
8 be operating the engines (85 percent, 40 percent and 10 percent). Horizon then averaged
9 the results of the three test runs at each load, as required by the EPA test protocols used.
10 *Ogulei Testimony, pp. 32, 33.*

11 10.

12 In analyzing the data from the Quincy tests, Microsoft and Ecology excluded the
13 results from Run 2 at 85 percent load for PM. *Ex. R-71A, n.2.* Run 2 was excluded
14 because the "back half" PM emission rate from Run 2 was 17 times the average emission
15 rates from Runs 1 and 3, and the "back half" condensate appeared to be diesel fuel, not
16 DEEP. *Ex. R-69, pp. 8, 9.* Horizon team leader Jason Bouwman and his colleagues
17 concluded the run was unrepresentative because of its color and smell. *Bouwman*
18 *Testimony pp. 13-15.* Microsoft expert Jim Wilder modeled the data including the outlier
19 and testified that DEEP emissions from the CO3 project would not cause an unacceptable
20 cancer risk even if Run 2 was included. *Wilder Testimony, pp. 83-85.* Ecology agreed
21 that Run 2 was not representative and Ecology's analysis excluded the Run 2 information.
22 *Ogulei Testimony, pp. 25, 26, 68, 69.* The Board finds that the weight of the evidence
23 supports the respondents' decision that Run 2 does not accurately reflect the emission rate
24 from the engine, and that exclusion of the results from Run 2 was appropriate.

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11.

MYTAPN expert Dr. Ranajit Sahu testified that the run-to-run variability in the test results for PM from the Tukwila engine was significant. *Sahu Testimony at 62*. He also testified that PM emissions from engines can vary dramatically. *Sahu Testimony at 10-15*. Dr. Ogulei testified that the variability in PM for the Tukwila test at 10 percent load was minimal; the variability at 85 percent load, though a bit greater, was reasonable, while the greater variability at 40 percent load was a little bit uncomfortable. Dr. Ogulei also testified that a certain amount of variability is normal for PM testing, and for that reason, the EPA test method requires doing more than one run and averaging the results. *Ogulei Testimony, pp. 28, 32, 33*.

12.

The source tests measured the emission rates from the engines of nitrogen oxides (NOx) and nitrogen dioxide (NO₂). NOx is a composite of many oxides of nitrogen, including NO and NO₂. The source tests revealed that the proportion of NO₂ to NO in the flue gas stream was lower than Microsoft assumed at the time of modeling NAAQS compliance in the notice of construction application. The NO emitted from the Microsoft engines reacts in air to form what is called secondary NO₂. *Bowman Testimony, pp. 12, 13*. Using the Tukwila emission data for NOx and NO₂, Ecology conducted dispersion modeling to determine the secondary NO₂ formed from the expansion project. *Ex. R-17*. This modeling indicated that the NOx emissions measured by the Tukwila tests produce a lower amount of secondary NO₂ formation than do the NOx emissions calculated using the EPA Tier 2 emission rate for NO₂. This modeling exercise confirmed that the Tier 2 emission rate that Microsoft modeled was conservative, that is, it overestimated emissions. *Ogulei Testimony, pp. 29-33; Ex. R-17, p. 1*. The lower measured

1 concentration of NO₂ in the flue gases translated into a lower modeled concentration of
2 the NAAQS pollutant NO₂ in the ambient air.

3 13.

4 The test results showed that emissions of NO_x in a power outage (85% load)
5 scenario and at 40% load would be slightly higher than the emission rates that Microsoft
6 modeled in the notice of construction application. At 10 percent load, the measured NO_x
7 emission rate was lower than the rate Microsoft modeled. *Exs. R-17 and R-71A*. In all
8 scenarios, however, the modeled concentration of the criteria pollutant NO₂ emitted at the
9 rates measured in the source tests were well below the NO₂ NAAQS. The high margin of
10 compliance was due in part to the fact that the NO₂ concentration in the emissions from
11 the engines was lower than Microsoft assumed in the application modeling exercise.

12 *Wilder Testimony, pp. 71-85.*

13 14.

14 The CO emission rates measured by the tests were significantly lower than the
15 emission rates Microsoft modeled in its notice of construction application. *Ex. R-17,*
16 *Table 1.*

17 15.

18 The measured rates for PM (DEEP) emissions were lower than the rates Microsoft
19 modeled at 85 percent load, but considerably higher than originally estimated at 40
20 percent load and 10 percent load. *Ex. R-17, Table 1.* At all load levels, however, the
21 modeled concentrations of PM in the ambient air were far below the applicable PM
22 ambient air quality standards. *Exs. R-17 and R-71A.*

23 16.

24 Some of the stack parameters (temperature, diameter) measured during the
25 Tukwila and Quincy tests differed slightly from the Caterpillar engine performance

1 specifications used in the original modeling. Ecology modeled NO₂ concentrations using
2 both the measured stack parameters and the originally modeled stack parameters, and
3 found that the differences between the modeled and measured stack temperatures do not
4 affect the modeling results. *Bowman Testimony, pp. 16, 17; Ex. R-17(graph AERSCREEN*
5 *Model of NO2 Emissions).*

6 17.

7 Based on the evidence presented above, Ecology concluded that, even with the
8 higher PM emissions measured at the 40 percent and 10 percent load levels, the test data
9 confirm that CO₃ project emissions is not expected to cause an exceedance of any of the
10 NAAQS. *Ogulei Testimony, p. 37; Ex. R-17.*

11 18.

12 In addition to emitting criteria pollutants, diesel engines that emit TAPS are
13 regulated by Washington’s toxic air pollutant standards, chapter 173-460 WAC. TAPs
14 emitted by diesel engines include DEEP and nitrogen dioxide (NO₂). The rules require
15 first that a project must employ “best available control technology” for the TAPs (t-
16 BACT) emitted by the project. After employing t-BACT, a source impact analysis must be
17 conducted for each TAP. This analysis is satisfied by conducting a dispersion modeling
18 of the emissions of each TAP against screening levels known as Ambient Source Impact
19 Levels (ASILs). This is known as “first tier” review. WAC 173-460-080. If the screening
20 indicates that the project does not exceed the ASIL for a pollutant at the point of
21 maximum impact, the applicant has satisfied the requirements of the rule for that TAP.
22 *Ex. R-3, pp. 6, 7.*

23 19.

24 As part of the first tier review of Microsoft’s expansion project, Microsoft
25 modeled the emissions of TAPs that would result from the thirteen new engines. The first

1 tier dispersion modeling showed that potential emissions of TAPs from the proposed
2 engines would cause an exceedance of the ASIL for DEEP, but not for any other pollutant.
3 When a proposed project exceeds an ASIL for any toxic air pollutant, a “second tier”
4 (health impact assessment), and in some cases a “third tier” (risk management) review, of
5 that pollutant is required before Ecology may approve the project. Thus, given the
6 exceedance of the ASIL for DEEP, the project proceeded to a second tier, health impact
7 assessment of the DEEP emissions from the thirteen new engines. *Ex. R-1, p. 6-4; Ex. R-*
8 *3, pp.6-9.*

9 20.

10 A second tier review includes a site-specific health impact analysis (“HIA”),
11 designed to evaluate the acute and long term health impacts of emissions of any TAP from
12 the project that exceeds the ASIL. In evaluating the second tier petition, background
13 concentrations of the applicable pollutants from other regional sources must be
14 considered. *Ex. R-2; Ex. R-3, pp. 6-9.*

15 21.

16 Based on the HIA, the excess cancer risk from DEEP associated with Microsoft’s
17 expansion project is 2.4 per million. However, the cumulative risk for the maximally
18 exposed residence near the Columbia Data Center exceeds one in one hundred thousand
19 (10 per million). *Ex. R-3, p. 24.*

20 22.

21 With respect to non-cancer health effects, the second tier review looked at other
22 sources of information. According to EPA and the California Office of Environmental
23 Health Hazard Assessment (OEHHA), continuous exposure to DEEP at concentrations
24 below 5 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) will not likely lead to adverse non-cancer
25 health effects. Concentrations of DEEP attributable to the CO3 expansion project at the

1 maximally impacted receptors range from 0.007 $\mu\text{g}/\text{m}^3$ to 0.016 $\mu\text{g}/\text{m}^3$. When background
2 emissions are added, the concentrations range from 0.061 $\mu\text{g}/\text{m}^3$ to 0.174 $\mu\text{g}/\text{m}^3$. These
3 concentrations result in hazard quotients, with background, of 0.012 to 0.035. The hazard
4 quotients indicate adverse non-cancer effects are not likely to result from chronic
5 exposure to DEEP emitted from Microsoft’s backup generators and other current sources
6 of DEEP in Quincy. *Palcisko Testimony, pp. 10, 11; Ex. R-3, pp. 20-22.*

7 23.

8 Ecology required Microsoft to prepare a third tier review of DEEP in the Quincy
9 area under WAC 173-460-100 because the cancer risks from the new source, added to the
10 existing “background” sources of DEEP in Quincy, exceeded the 10 per million level. *Ex.*
11 *R-3 p. 6, 7, 24, 29.* The third tier review took a community-wide approach for permitting
12 data centers in the Quincy Urban Growth Area (UGA) by considering the cumulative
13 impact of DEEP from all DEEP sources in Quincy, including the existing Yahoo!,
14 Microsoft, and Intuit data centers, the Microsoft expansion project, and DEEP emissions
15 from the highways and railroad in Quincy. *Ex. R-3, p. 17.* For the purpose of the third
16 tier petition, Ecology established a cumulative risk management goal of 100 excess cancer
17 cases in one million people exposed.² *Ex. R-3, p. 24.* Above this level, any new source of
18 DEEP wishing to locate in Quincy would be required to use offsets or other mitigation to
19 reduce the cancer risk. *Id.* The third tier, community-wide assessment of cancer risk from
20 the existing data centers and the rail and truck traffic in Quincy found that the maximum
21 excess cancer risk in Quincy for someone potentially exposed to Microsoft’s DEEP

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² The Board previously granted summary judgment to Respondents on MYTAPN’s challenge to the establishment of this “goal” for measuring excess cancer risk in the Quincy community. The Board did so based on the undisputed factual evidence demonstrating that there was a reasoned basis for the goal, and that it was significantly more protective than EPA regulations and other states require. The Board concluded that it provided an “ample margin of safety with respect to the upper limit on excess cancers that an individual facility may cause.” *Order on Summary Judgment, p. 30, 31.*

1 emissions was 30 per million – well below the 100-in-a-million threshold. *Id.* Of that
2 modeled risk, 2.4 excess cancers were attributed to the CO3 project, and the balance to
3 background sources. *Palcisko Testimony; Exs. R-3, p. 24.*

4 24.

5 The 100-in-a-million excess cancer limit was imposed in addition to all the other
6 requirements of WAC 173-460. As such, the cumulative limit adds a cap for excess
7 cancer caused by DEEP emissions from all sources to the limit that exists for individual
8 facilities for emissions of DEEP. *Ogulei Testimony, pp. 60-68.*

9 25.

10 The HIA for the Microsoft expansion project includes a number of areas of
11 uncertainty. These include uncertainty about exposure levels, uncertainty about what the
12 emissions from the engines will actually be, uncertainty about the air dispersion modeling,
13 and uncertainty concerning the actual toxicity of the toxic chemical. These uncertainties
14 could result in over- or under- estimating risks. *Ex. R-3, pp. 25-27.*

15 26.

16 In this case, the uncertainties about emissions were addressed in part by the
17 emission tests performed on Microsoft engines at Quincy and Tukwila. The DEEP
18 concentrations measured in the emission tests performed at Quincy and Tukwila (0.25
19 tons per year and 0.65 tons per year, respectively) result in excess cancer rates of 1.3 and
20 3.5, respectively, again confirming that the cancer risks related to DEEP emissions from
21 the CO3 project itself (not including background levels) meet the 10-in-a-million
22 standard. These test results also confirm that the non-cancer health risks related to DEEP
23 emissions from the CO3 project meet applicable standards. *Palcisko Testimony, pp. 12-*
24 *14; Ex. R-17.*

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27.

The modeling performed by Ecology using the Tukwila test results for NO₂ (described in Finding of Fact 12 above) confirms that the CO3 project meets the NO₂ ASIL. *Palcisko Testimony, pp. 12-13; Ex. R-17.*

28.

As part of the NOC permitting process, Microsoft proposed, and Ecology determined, the Best Available Control Technology (BACT) and the Best Available Control Technology for toxics (tBACT) for the pollutants emitted by the backup diesel generator engines. *Exs. R-1, R-2, R-5.*

29.

A BACT determination by Ecology is a project-specific totality-of-the-circumstances analysis in which Ecology balances many factors, such as available control technology, energy considerations, environmental considerations, economic impacts, to reach a conclusion of what constitutes BACT in a given situation. Ecology's BACT analysis uses a well-accepted "top-down" BACT process. *Wilder Testimony, pp. 7-8; Ex. R-5, p. 5.* The cost-effectiveness portion of a BACT determination is based on the amount of a given pollutant that a facility is authorized to emit. *Ogulei Testimony, pp. 74, 75.* When evaluating the cost effectiveness of a given pollution control technology, Ecology looks at both the total cost per ton to reduce all pollutants affected by that technology, and the cost per ton to reduce each individual pollutant. *Ex. R-5 p. 8, § 4.2.2.*

30.

Microsoft initially screened out the use of diesel oxidation catalysts (DOCs) for DEEP as not technically useful, but at Ecology's request, Microsoft examined the feasibility of DOCs to remove DEEP/PM, CO and VOCs. *Wilder Testimony, pp. 16, 17.*

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31.

The BACT analysis for particulate matter and DEEP looked at two potential add-on emission control technologies: diesel particulate filters (DPFs) and diesel oxidation catalysts (DOCs). Microsoft evaluated the cost of DPFs using two methods: the cost per cancer case avoided and cost per ton of particulate removed. Based on the cost per cancer case avoided, Microsoft calculated a \$3.74 billion cost per cancer case. *Wilder Testimony, pp. 15-17, 30; Ex. R-2, pp. 5-1 and 5-2.*

32.

Microsoft's original application identified the cost per ton of particulate matter removed using DPFs as \$971,638. *Ex. R-70B; Wilder Testimony, pp. 17-22.*

33.

Ten years ago, Ecology surveyed environmental agencies in other states for figures on the cost effectiveness for BACT for particulate matter and found the upper range to be about \$23,000 per ton of PM removed. *Ogulei Testimony, p. 75.* Microsoft's annualized cost effectiveness figures for DPFs varied, but were many, many times in excess of the figures Ecology offered as indicative of cost effectiveness. Because the cost effectiveness of DPF greatly exceeds Ecology's upper range, Ecology rejected DPFs as BACT. *Ogulei Testimony, pp. 45-48.*

34.

Microsoft and Ecology reviewed the original cost figures for DPFs based on the results from the Tukwila and Quincy emission tests and other updated information. Microsoft expert Jim Wilder testified that the cost per ton of DEEP removed by DPF is \$1,287,225 when the cost and emissions data are updated. *Wilder Testimony, pp. 22-23; Ex. R-70B.* After reviewing the Tukwila and Quincy emission test information, Ecology

1 did not change its original conclusion that DPFs are not BACT for the Microsoft
2 expansion project. *Ogulei Testimony, pp. 46-47.*

3 35.

4 Dr. Sahu, MYTAPN's expert, disputed certain line items in Microsoft's revised
5 calculation of BACT, such as the discount rate, but did not testify that DPF would be cost
6 effective if Ecology used some other discount rate. *Sahu Testimony at 33-39; Ex. R-70-B.*

7 36.

8 The cost-effectiveness evaluation for DOCs originally found DOCs would cost
9 \$83,000 per ton of DEEP removed. *Ex. R-14, p. 7, § 4.2.2.* That analysis was based on
10 annualized costs of \$34,960 for DOCs and a 30 percent removal rate for DEEP. *Ex. R-1,*
11 *after the end of Appendix E, p. 2, 3; Ex. R-14, p. 7.* This original cost analysis was also
12 based on an estimate that the CO3 expansion project would emit 1.4 tons of DEEP per
13 year. *Ex. R-14, p. 2.* The original cost analysis for DOCs found that the cost per ton for
14 removing CO would be about \$5,000 per ton, while the cost of removing volatile organic
15 compounds (VOCs) would be about \$116,500 per ton, with a cost for removing all
16 pollutants of about \$4,500 per ton. *Ex. R-14, p. 7.* Based on these numbers, Ecology
17 originally determined that DOCs would be required as BACT for CO, PM, and VOCs.
18 *Ogulei Testimony, p. 52; Ex R-14, p. 7.* However, applying Microsoft's annualized costs
19 for DOCs to the corrected estimate of DEEP emissions yields a much higher cost per ton
20 of DEEP removed. Once that correction was made, Ecology determined that the costs per
21 ton of DEEP removed were too high to justify requiring DOCs as BACT. *Ogulei*
22 *Testimony, p. 46; Wilder Testimony, pp. 38-44; Ex. R-5, pp. 8-9.*

23 37.

24 As part of the review process with Ecology, Microsoft offered to reduce the limit
25 on the number of hours the existing engines supporting the CO1 and CO2 facilities could

1 run, from 285 hours per year to 121 hours per year. This would result in a significant
2 reduction in the limits on the facility wide fuel consumption. *Ex. R-4, p. 6.* Ecology
3 concluded that achieving these voluntary, enforceable reductions in emission limits for the
4 existing engines, where Ecology could not otherwise require such reductions under
5 existing regulations, would provide an environmental benefit. *Ex, R-4, p. 29; Order on*
6 *Summary Judgment at 8, lines 12-15* (“Ecology did not rely on the reductions in
7 previously permitted emissions for CO1 and CO2 engines as ‘offsets’ under either the first
8 or second tier review requirements.”) Ecology ultimately accepted those reductions as part
9 of the Third Tier Review. *Order on Summary Judgment at 8.*

10 38.

11 Results from the emission tests on the Tukwila engine indicate that the DOC on
12 that engine removed about 65 percent of the DEEP from the engine emissions, rather than
13 the 30 percent originally assumed. *Ex. R-70-A.* This resulted in an improved cost per ton
14 of removal of DEEP, although it is still well in excess of Ecology’s range for cost
15 effectiveness.

16 39.

17 The test results on the Tukwila engine also indicate that the DOC increased the
18 emissions of NO₂ at all loads to above the Tier 2 standard of 0.612 g/kWm-hr. *See Ex. R-*
19 *17, Table 1.* At 85 percent load, the DOC tripled the emissions of NO₂, increasing them
20 from 0.39 g/kWm-hr at the DOC inlet to 1.2 g/kWm-hr at the DOC outlet. *Compare Ex.*
21 *R-68 at 15 to Ex. R-68 at 17.* This increase in NO₂ occurred because DOCs are designed
22 to add oxygen to convert CO to CO₂ and the same process converts NO to NO₂. *Wilder*
23 *Testimony, pp. 58-62.* EPA’s guidance on how to determine BACT encourages agencies
24 to reject control options as BACT that cause collateral environmental impacts, such as
25 increased emissions of other air pollutants. *Wilder Testimony, p. 14.* Ecology views the

1 increase in NO₂ from the DOC at the Tukwila test as a collateral environmental impact
2 that raises a “red flag”. *Ogulei Testimony, p. 47.*

3 40.

4 The test results from the Tukwila and Quincy engines indicate that the amount of
5 CO emitted by those engines was actually about 1.3 tons per year, rather than the 8 tons
6 per year originally estimated. *See Ex. R-17, Table 1.* Thus, although the rate of removal
7 of CO by the DOC was 99.5 percent, the amount of CO actually removed by the DOC was
8 significantly less than originally estimated. As a result, the dollars per ton removed
9 increased significantly. *Wilder Testimony, pp. 42-43; Ex. R-70-A.*

10 41.

11 The cost per ton of pollutant removed by DOC is higher than estimated in
12 Microsoft’s application because the CO3 engines emit less CO than was assumed, and
13 therefore the DOC removes fewer tons of CO per year than was originally assumed. In
14 addition, Microsoft presented evidence that the actual cost of installing DOCs at a new
15 state facility, the Olympia Data Center, was significantly higher than estimated in the CO3
16 application, and that the original application omitted costs such as insurance and taxes that
17 should be considered, per the EPA Cost Control Manual. *Wilder Testimony, pp. 41-44;*
18 *Ex. R-70-A.*

19 42.

20 After reviewing the Tukwila and Quincy test information, Ecology did not change
21 its original conclusion that DOCs are not BACT for the Microsoft expansion project.
22 *Ogulei Testimony, pp. 46-47.*

23 43.

24 Dr. Sahu took issue with the discount rate and other costs that Microsoft included
25 in its BACT analysis but did not present any alternative calculation of the cost of DOCs or

1 contend Ecology should have selected DOCs as BACT for the Data Center. *Sahu*
2 *Testimony*, pp. 38-39; *Sahu Rebuttal Testimony*, p. 14.

3 44.

4 MYTAPN claims the BACT cost-effectiveness analyses for DOCs and DPFs are
5 based on only 48 hours of power outage rather than the emissions from the total 104 hours
6 of operation authorized for the Microsoft engines, and, therefore significantly
7 overestimate the costs for BACT. *MYTAPN's Closing Argument*, pp. 8, 9. However, the
8 evidence indicates that the cost analyses are based on the total authorized emissions from
9 the Microsoft expansion project of 8 tons per year of CO, 0.45 tons per year of DEEP, and
10 0.6 tons per year of VOCs. *See Ex. R-4*, p. 3 (giving the potential to emit for pollutants
11 from the expansion project); *Ex. R-70-A, -B* (showing the old and new cost analyses for
12 DOCs and DPFs).

13 45.

14 MYTAPN asserts that the DOC used in the Tukwila test was oversized and that
15 using this engine inflates the cost of the control in calculating BACT. *MYTAPN's Closing*
16 *Argument*, p. 8. Microsoft witness Jim Wilder testified that the DOC cost estimate in *Ex.*
17 *R-71-A* is not based on the DOC used at Tukwila, but on the actual costs of the DOC used
18 on a similar engine at the Olympia Data Center. *Wilder Testimony*, pp. 41, 42.

19 46.

20 The Olympia Data Center in Olympia uses DOCs as BACT for particulate
21 emissions. It is located next to a freeway (I-5), causing the background cancer risk there
22 to be from 200-400 excess cancers per million, which is considerably higher than the
23 background cancer risk in Quincy (approximately 30 per million). *Palcisko Testimony*, p.
24 *16*; *Wilder Testimony*, p. 51; *Ex. R-9*, p. 23, § 5.4.2.2; *Ex. R-3*, p. 24, Table 10.

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47.

The Olympia Data Center is closer to downwind neighbors than is the Microsoft facility. The Microsoft facility is located on a 70-acre parcel, which is considerably larger than the 9-acre Olympia Data Center site. *Ex. R-3, p. 2; Ex. R-9, p. 3; Palcisko Testimony, pp. 14, 15.* The larger Microsoft property provides more space for pollutants to disperse and dissipate before they reach off-property receptors. The weather in Quincy is more favorable for dispersion than the weather in Olympia. *Wilder Testimony, p. 51.*

48.

The ambient concentration of DEEP from the Olympia Data Center project, with DOCs, at the maximally impacted residence in Olympia is the same as the ambient concentration of DEEP from the Microsoft project, without DOCs, at the maximally impacted residence in Quincy. *Palcisko Testimony, pp. 15-19; Ex. R-9, p. 23, Table 8* (ambient concentration at the maximally impacted residence in Olympia is $0.0078 \mu\text{g}/\text{m}^3$); *Ex. R-3, p. 24, Table 10* (ambient concentration at the maximally impacted residence in Quincy is $0.008 \mu\text{g}/\text{m}^3$). The excess cancer risk attributable to the Olympia Data Center project at the maximally impacted residence in Olympia (with DOCs) is about the same as that in Quincy attributable to the Microsoft project (without DOCs). *Ex. R-9 at 23, Table 8* (excess cancer risk in Olympia is 2.3 in a million); *Ex. R-3 at 24, Table 10* (excess cancer risk in Quincy is 2.4 in a million).

49.

The Titan Data Center in Moses Lake is equipped with three-way catalysts. During the application process, the Titan facility was having problems demonstrating compliance with the NO₂ NAAQS and Titan requested approval to install three-way catalysts, to reduce the facility's NO₂ emissions to comply with the NAAQS. *Ogulei Testimony, pp. 50, 51; Wilder Testimony, pp. 45-46.*

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50.

Any Conclusion of Law deemed to be properly considered a Finding of Fact is hereby adopted as such.

Based upon the foregoing Findings of Fact, the Board enters the following:

CONCLUSIONS OF LAW

1.

The Board has jurisdiction over the parties and the subject matter of this case under RCW 43.21B.110(1)(c) and WAC 371-08-315(2)(c). The Board reviews the issues raised *de novo* and MYTAPN, as the appealing party, has the burden of proof. WAC 371-08-485(3); *Sierra Club v. SWCAA*, PCHB No. 09-108, p. 7 (Order Granting Summary Judgment, April 19, 2010).

2.

The legal issues identified for resolution in the Pre-Hearing Order are:

1. Whether the emissions estimates Microsoft used to support the health risk analysis, and its analysis of compliance with emissions standards, is so flawed as to warrant invalidating the 2010 Approval Order; and

2. Whether Ecology's decision to reject diesel oxidation catalysts and diesel particulate filters in favor of operational limits and engine specifications satisfies the BACT requirements of WAC 173-400-113 and WAC 173-460-060.

Issues pertaining to compliance with permit conditions are not before the Board. *See e.g.* Order on Motions in Limine, PCHB No. 10-162, p. 4.

A. Emissions Limitations and the Health Risk Assessment (Issue 1)

3.

The new source review process is a preconstruction permitting exercise in which Ecology establishes limits to ensure that a project proposed for construction incorporates

1 BACT, protects the NAAQS, and meets the new source air toxics requirements found in
2 chapter 173-460 WAC.

3 4.

4 There are three potential levels of review when processing a Notice of
5 Construction application for a new or modified emissions unit emitting TAPS in excess of
6 the *de minimis* levels: (1) first tier (toxic screening), (2) second tier (health impact
7 assessment) and (3) third tier (risk management decision).

8 5.

9 WAC 173-460-080 sets out the requirements for first tier review. An applicant
10 must submit an acceptable source impact analysis for each TAP emitted by the new or
11 modified emissions unit with an emission increase greater than the *de minimis* level. If the
12 modeled impact of the increase in emissions of a TAP exceeds the ASIL for that TAP, a
13 second tier review is required.

14 6.

15 The requirements for a second tier review are set out in WAC 173-460-090. As
16 part of the second tier review, the Applicant submits a site-specific Health Impact
17 Analysis (HIA). The objective of a HIA is to quantify the increase in lifetime cancer risk
18 for persons exposed to the increased concentration of any carcinogen, and to quantify the
19 increased health hazard from any non-carcinogen that would result from the proposed
20 projects. Once quantified, the cancer risk is compared to the maximum risk allowed for a
21 second tier petition, which is set out in WAC 173-460-090. WAC 173-460-090(7)
22 provides:

23 Ecology may recommend approval of a project that is likely to
24 cause an exceedance of acceptable source impact levels for one
25 or more TAPs only if it determines that the emission controls for
the new and modified emission units represent tBACT and the
applicant demonstrates that the increase in emissions of TAPs is
not likely to result in an increased cancer risk of more than one

1 in one hundred thousand and ecology determines that the
2 noncancer hazard is found to be acceptable

3 7.

4 When a project exceeds the second tier review threshold it may proceed on to a
5 third tier risk management decision pursuant to WAC 173-460-100. Pursuant to WAC
6 173-460-100(3), Ecology's director must find that the following conditions are met before
7 approving a third tier petition:

8 (a) Proposed emission controls represent at least tBACT; and

9 (b) An HIA has been completed as described in WAC 173-460-090(3); and

10 (c) Approval of the project will result in a greater environmental benefit to the
11 state of Washington.

12 8.

13 Here, the 2010 Approval Order proceeded through all three levels of review.
14 Because the potential DEEP emissions from the proposed expansion identified in the First
15 Tier analysis exceeded the ASIL, a second tier analysis was required. Based on the HIA
16 provided in the second tier analysis and evaluation of background DEEP concentrations in
17 the Quincy area, Ecology determined that Microsoft's second tier analysis for the
18 expansion project could not be approved without a third tier risk management decision in
19 accordance with WAC 173-460-100. The Board concludes that the third tier review
20 properly assessed the potential effect of increased emission of DEEP in the Quincy area,
21 and properly concluded that the controls contained in the Microsoft proposal represented
22 tBACT. The emission estimates relied upon in the review, and the analysis of emission
23 standards, support the Approval Order, with one minor modification, discussed below.

24 9.

25 In analyzing the results of the emission testing on two of Microsoft's CO3 engines,
it was appropriate to average the results of three test runs at each load level because the

1 test methods recommend averaging to dampen the variability from run to run. *Ogulei*
2 *Testimony*, p. 28, 32-33. The data from the two tests confirm that emissions from the CO3
3 project will not cause violations of the NO₂ ASIL, the human health and safety criteria in
4 chapter 173-460 WAC, or the NAAQS.

5 10.

6 MYTAPN argues that the stack temperatures measured during the testing of the
7 Tukwila and Quincy engines do not reflect Caterpillar data or the temperatures used by
8 modeling. *MYTAPN's Closing Argument*, p. 12. Ecology modeled the test data using
9 both the measured stack parameters and the originally modeled (Caterpillar) stack
10 parameters, and found that the differences between the modeled and measured stack
11 temperatures, and other stack parameters, do not affect the modeling results. *Bowman*
12 *Testimony*, pp. 16-18; *Ex. R-17*.

13 11.

14 MYTAPN argues that the engine in the Quincy test used fuel that was not ultra
15 low sulfur diesel, but provided no evidence to support this assertion.

16 12.

17 MYTAPN claims the modeling did not account for the conversion of NO_x to NO₂.
18 *MYTAPN's Closing Argument*, p. 10. The record demonstrates that modeling did account
19 for conversion of NO_x to NO₂, using the Plume Volume Molar Reaction Model
20 (PVMRM) module, which models NO_x conversion to NO₂. *Ex. R-1 at 6-1*; *Ex. A-13, p.*
21 *68234-68235*.

22 13.

23 As we referenced in Finding of Fact 5, Microsoft proposed to operate the CO3
24 engines under three different operating scenarios, which became the basis of the modeling
25 in subsequent review of the project. The 2010 Approval Order, Condition 3—Operating

1 Limits—does not clearly reflect these assumptions, and should be modified to more
2 clearly match the modeling assumptions that were made when calculating emissions
3 limitations. These changes are intended to make clear that the maximum number of hours
4 Microsoft can run its 13 diesel engines at 85% of the standby rating for power outage
5 emergencies is a total of 48 hours per calendar year. This maximum applies, regardless of
6 how many of the 104 total hours per year per engine have been utilized for maintenance
7 and testing and electrical bypass (Condition 3.5 and 3.6) and regardless of whether there is
8 fuel consumption capacity (Condition 3.3) during the calendar year in which the power
9 outage emergencies occur.

10 14.

11 Since 2010, additional data centers have been planned and permitted in the Quincy
12 area. In addition, Microsoft conducted the tests of potential DEEP emissions described in
13 Finding of Fact 8. The third tier review recognized that many factors of the HIA are
14 prone to uncertainty; and, that many of the assumptions used to estimate the human health
15 impacts of DEEP emissions from generators and background sources of DEEP may tend
16 to over- or under- estimate the health risks. First, there is uncertainty and change inherent
17 in the data and assumptions used to estimate mass emissions from the proposed project,
18 and used to support the models of air quality and health risk impacts. Second, the
19 variability of results from the engine testing, engine use, and the addition of additional
20 data centers and related diesel engine operation protocols, may result in changes to the
21 background level of DEEP in the community over time, and a changing analysis of cost
22 effectiveness and cost of cancer risk avoided. Additional areas of uncertainty stem from
23 exposure uncertainty, air dispersion model uncertainty, and toxicity uncertainty. These
24 multiple factors give the Board pause as to the appropriate levels of emission control on
25 this, and future expansion projects. However, the Board is mindful that once a new source

1 or modification is approved, Ecology and the Board are limited in their authority under
2 chapters 70.94 RCW and 173-400, 460 WAC to require further health risk assessments or
3 re-evaluation of BACT after a project has been constructed and becomes operational.
4 Microsoft cannot be held accountable through this Order of Approval for future air quality
5 problems attributable to background emissions or emissions from new data centers where
6 the results of the modeled risk assessment show the increased cancer risk is well below the
7 threshold Ecology established as an acceptable risk.

8 15.

9 To meet the third tier requirements in WAC 173-460-100(3), the approval of the
10 project must result in a greater environmental benefit to the State of Washington. Ecology
11 concluded that there was a greater environmental benefit based on Microsoft's agreement
12 to reduce the facility-wide maximum fuel consumption by more than fifty percent (50%),
13 and to limit total engine operation time. This will significantly lower the amount of
14 allowable DEEP emissions for the existing Data Center's 24 diesel-powered generators.
15 At the completion of hearing and during preparation of Findings and Conclusions,
16 Microsoft has suggested a further step in addition to those discussed above, to address
17 DEEP emissions in the Quincy community. Microsoft offers to submit a protocol for a
18 health risk assessment that analyzes the public health risk to Quincy residents from DEEP
19 emissions in the Quincy area, including emissions from data center engines, highways,
20 locomotives and other source categories, by July 2017. Microsoft then states that it would
21 complete the health risk assessment within 90 days of Ecology's approval of the risk
22 assessment protocol. The Board concludes that Microsoft's suggestion buttresses the
23 conclusion of the third tier review that the project will result in greater environmental
24 benefit to the state. We therefore include it in the Board's modifications to the 2010
25 Approval Order.

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16.

The Board concludes that the Petitioner has failed to meet its burden of proof and that the evidence in the record supports Ecology’s conclusion that the emissions estimates that Microsoft used to support the health risk analysis were appropriate, and the analysis of compliance with emission standards was correct.

B. BACT –Use of DOCs and DPFs and/or Operational Limits (Issue 2)

17.

RCW 76.94.030(6)³ defines BACT as:

"Best available control technology" (BACT) means an emission limitation based on the maximum degree of reduction for each air pollutant subject to regulation under this chapter emitted from or that results from any new or modified stationary source, that the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such a source or modification through application of production processes and available methods, systems, and techniques, including fuel cleaning, clean fuels, or treatment or innovative fuel combustion techniques for control of each such a pollutant. . . .

18.

WAC 173-400-113(2) requires that prior to approval of a new source or modification, Ecology must conclude that:

The proposed new source or modification will employ BACT for all pollutants not previously emitted or whose emissions would increase as a result of the new source or modification.

19.

A BACT determination is a totality-of-the-circumstances, project specific analysis in which Ecology balances many factors, including the removal efficiency of different

³ This definition is essentially repeated in WAC 173-400-030(12).

1 control options, the cost efficiency of each option, collateral environmental impacts
2 associated with a control option, and energy considerations.

3 20.

4 Ecology's regulations governing emissions of toxic air pollutants require sources of
5 such pollutants to use BACT for toxics, referred to as tBACT. WAC 173-460-060
6 provides that:

7 (1) Except as provided for in WAC 173-460-040, a person shall not
8 establish, operate, or cause to be established or operated any new or
9 modified toxic air pollutant source which is likely to increase TAP
emissions without installing and operating tBACT.

10 (2) A notice of construction application for a new or modified toxic air
11 pollutant source must demonstrate that the new or modified emission
12 units will employ tBACT for all TAPs for which the increase in
emissions will exceed de minimis emission values as found in WAC
173-460-150....

13 The regulations define tBACT to be the same as BACT. WAC 173-460-020(3).
14 These regulations preclude Ecology from imposing emission controls which reflect the
15 use of EPA's standard for emissions of federally listed hazardous air pollutants, maximum
16 achievable control technology (MACT), rather than BACT. WAC 173-460-020, 060.

17 21.

18 The Board has made findings of fact regarding the cost effectiveness analysis
19 based on the evidence provided by Microsoft and Ecology. The Board has some concerns
20 and questions regarding the validity of this cost analysis. For example, the Board is not
21 convinced that Microsoft used the correct discount rate when calculating the capital
22 recovery factor. However, MYTAPN did not present factual evidence to support a
23 conclusion that another discount rate would be more appropriate. Further, the Board
24 questions whether Ecology's range of cost effectiveness values are current, given that the
25 testimony established that they were based on data that was 10 years old. Ecology's cost

1 ranges appear to be remarkably low, given the potential capital costs associated with
2 expansion of a large industrial facility. Here again, however, MYTAPN did not present
3 any evidence as to what would be a more appropriate range based on more current
4 information. Therefore, based on the evidence presented at the hearing, the Board
5 concludes that the cost-per-ton to install DPFs and DOCs greatly exceeds the usual cost-
6 per-ton accepted for BACT by Ecology.

7 22.

8 MYTAPN argues that Ecology should have used costs comparable to EPA's
9 MACT standard for hazardous air pollutants. EPA applies the MACT standard under
10 federal Clean Air Act §112 in setting emission standards for source categories (not
11 individual sources) that emit federally listed hazardous air pollutants (HAPs). DEEP is
12 not an HAP. *Ogulei Testimony, p. 49*. Section 112 specifies criteria that EPA follows in
13 setting MACT standards. Those criteria, found at 42 U.S.C. 7412(d)(3), do not resemble
14 the criteria that Ecology must follow in setting BACT, pursuant to Washington's
15 definition of BACT (RCW 76.94.030(6) and WAC 173-400-030(12)). Thus there is no
16 legal basis to conclude that cost calculations used by EPA in setting MACT for any source
17 category have any relevance to the determination of BACT or tBACT for the CO3
18 engines.

19 23.

20 MYTAPN argues that an industry's ability to afford controls should be considered
21 "when it is known that the industry can afford them." *MYTAPN's Closing Argument, pp.*
22 *6-7*. The Board has consistently rejected this argument. "The economic piece of the
23 BACT analysis should focus on quantifying the cost of control and not on the economic
24 situation of the individual source." *See Order on Motions in Limine, PCHB No. 10-162 at*
25 *5:5-7, citing Bernardo's Aroma Rosteria v. Puget Sound Clean Air Agency, PCHB No.*

1 04-041 (citing EPA’s Draft New Source Review Workshop Manual, aka “the Puzzle
2 Book”).

3 24.

4 MYTAPN argues that engine emission rates are not BACT and that Ecology and
5 Microsoft impermissibly rely on 40 C.F.R. Part 60, subpart IIII, for the BACT emission
6 rates. *MYTAPN’s Closing Argument*, p. 4. The Board concludes that as determined by its
7 definition, BACT is an emission rate. RCW 70.94.030(6) (BACT “means an emission
8 limitation based on the maximum degree of reduction for each air pollutant subject to
9 regulation”).

10 25.

11 MYTAPN argues, based on *Dow Chemical Co. v. U.S. EPA*, 635 F.2d 559 (6th
12 Cir. 1980), *cert denied*, 452 U.S. 939(1981),⁴ that the 2010 Approval Order’s limit of
13 some testing to daylight hours constitutes impermissible intermittent controls.
14 Impermissible intermittent controls are those that authorize a source to vary emissions in
15 response to weather conditions. 42 U.S.C. § 7423(b). *See also Kamp v. Hernandez*, 752
16 F.2d 1444, 1451–52 (9th Cir. 1985). Permit conditions that limit certain operations to
17 daylight hours do not authorize varying operations in response to predicted weather
18 conditions. Therefore, such conditions do not constitute impermissible intermittent
19 controls or impermissible dispersion techniques. EPA guidance documents confirm that
20 permits may limit operations to daylight hours. *Ogulei Testimony*, pp. 38-39; *Ex. A-13*, p.
21 68, 241 n.5 to Table 8-1; *Ex. A-39* at 9.

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25 ⁴ The practice that the Court found improper in *Dow Chemical* was Dow Chemical’s use of low-sulfur oil
when satellite weather observations indicated that Dow Chemical’s normal emissions of SO₂ would cause an
exceedance of the SO₂ NAAQS. *Dow Chemical*, 635 F.2d at 560.

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26.

MYTAPN argues that no controls will be required as BACT for Quincy data centers until the excess cancer risk reaches 100 per million. *MYTAPN's Closing Argument, p. 13*. The Board finds that Ecology determined BACT and incorporated it into the 2010 Approval Order; the cumulative community cancer risk goal applies in addition to, not instead of, BACT. *Ogulei Testimony, p. 66-68*.

27.

The Board concludes that MYTAPN failed to meet its burden of proving that Ecology improperly rejected DOCs, and DPFs in favor of operational limits and engine specifications as satisfying the BACT requirements of WAC 173-400-113 and WAC 173-460-060. Based on the evidence, the Board concludes that there was a proper balancing of many factors, including cost, as required by RCW 70.94.030, and proper reliance on a top-down assessment of BACT. The Board concludes that requiring DOCs in this particular situation, when test results raise questions about potential increased emissions of NO₂, would be inconsistent with EPA's Guidance encouraging agencies to consider a technology's collateral negative impact. The Board further concludes that the different circumstances presented by the Olympia Data Center and Titan Data Center justify the fact that different emission control technologies are required at those facilities than are required for Microsoft.

28.

The Board further concludes that because BACT has been determined to be satisfied based on the condition of the operational limits and engine specifications, the continued testing and maintenance of the engines to verify continuing compliance of the new backup diesel generator engines with EPA Tier II emissions standards is necessarily an important element of BACT. In Condition 4 of the 2010 Approval Order (General

1 Testing and Maintenance Requirements) Ecology imposed various conditions on
2 Microsoft to pursue options at the conclusion of the warranty term for the diesel engines
3 (at 60 months or 3,000 hours of operation). These options include further emission testing
4 of each engine, or re-evaluation of BACT and tBACT and health risks of the facility's
5 operations, or extension of the manufacturer's maintenance requirements, or any
6 combination of these items. The Board concludes that as mere alternative options, there is
7 no certainty that the operational limits and engine specifications will continue over time to
8 be as protective as intended by the 2010 Approval Order or as anticipated in the third tier
9 analysis.

10 29.

11 The Board concludes that the ultimate purpose of the air quality laws is to protect
12 the environment and the public health as specifically provided in the statute and its
13 implementing regulations. RCW 70.94.011.030(6). If BACT is satisfied by the
14 manufacturer's "built-in controls" of the Tier 2 engines, the reliability of these controls
15 over the useful life of the engines is paramount, especially with the uncertainties described
16 above. The protective requirements of the law may not be met by having an option to
17 merely maintain a manufacturer's warranty and conduct recommended diagnostic testing
18 and maintenance procedures. In requiring the testing and maintenance schedule in
19 Condition 4 of the 2010 Approval Order, Ecology properly recognized the need for
20 additional testing of the engines and some form of re-evaluation. The Board concludes
21 that these two conditions are in fact elements in meeting the applicable requirements for
22 this 2010 Approval Order, and are reasonable requirements in regard to the uncertainties.
23 Therefore, to meet the Clean Air Act's objectives, the Board concludes that Condition 4
24 must require both engine testing and a one-time reevaluation of community health risks.

30.

Any Finding of Fact deemed to be properly considered a Conclusion of Law is hereby adopted as such. Based on the foregoing Findings of Fact and Conclusions of Law, the Board enters the following:

ORDER

1. Judgment is granted to respondents Ecology and Microsoft on Legal Issues No. 1. The emissions estimates Microsoft used to support the health risk analysis, and the analysis of compliance with emission standards, were validly derived and support Ecology's permit decision.
2. Judgment is granted to respondents Ecology and Microsoft on Legal Issues No. 2. Ecology's decision to reject diesel oxidation catalysis and diesel particulate filters in favor of operational limits and engine specifications satisfies the BACT requirements of WAC 173-400-113 and WAC 173-460-060.
3. The Board revises the 2010 Approval Order as follows:
 - a. Condition 3.3.9 is added which states: Operation of the 13 CO3 generators for power outage emergencies shall be limited to a maximum of 48 hours per engine per calendar year at a maximum average electrical load of 85%.
 - b. Conditions 4.2, 4.3, 4.4 and 4.5 are replaced with the following:

4.2 On or before June 30, 2013 Microsoft shall source test one CO1 or CO2 engine installed prior to 2008 to show continuing compliance with the applicable 40 CFR Part 89 Tier II emission standards for particulate matter, NOx, CO, and non-methane hydro-carbons (NMHC). On or before December 1, 2016⁵ Microsoft shall source test two CO1 or CO2 engines and one CO3 engine to show continuing compliance with the applicable 40 CFR Part 89 Tier II emission standards for particulate matter, NOx, CO, and non-methane hydro-carbons (NMHC). The tests required by December 1, 2016 shall be repeated periodically at 60 month intervals from December 1, 2016. Each test shall be performed on different engines from those tested previously, until each Caterpillar 3516C engine at the data center has been tested. Microsoft shall notify Ecology at least 20 days prior to any test of the

⁵ December 1, 2016 is five years after the Quincy source test.

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engine(s) selected for testing, and consider any guidance provided by Ecology on this decision. In the event that any source test shows non-compliance with any Tier II emission standard, Microsoft shall repair or replace the engine and repeat the test on the same engine plus two additional engines from the same phase of the Columbia Data Center. Test reports shall be submitted to Ecology as provided in Condition 10 of this Approval Order.

4.3 The following procedure shall be used for each test required by Condition 4.2 unless an alternate method is proposed by Microsoft and approved in writing by Ecology prior to the test:

4.3.1 Periodic emissions testing should be combined with pre-scheduled maintenance testing and annual load bank testing. Additional operation of the engines for the purpose of emissions testing beyond the operating hour and fuel consumption limits authorized by this Order may be allowed by Ecology upon request.

4.3.2 Testing shall be performed at each of the five load levels described in Table 2 of Appendix B to Subpart E of Part 89, and data shall be reduced to a single weighted average value using the weighting factors specified in Table 2. Microsoft may replace the dynamometer requirement in Subpart E of 40 CFR Part 89 with corresponding measurement of gen-set electrical output and mechanical horsepower output.

4.3.3 Testing shall employ the following EPA reference methods from 40 CFR Part 60, Appendix A. For NO_x, use Method 7E. For CO, use Method 10. For NMHC use Methods 25A and 18. For particulate matter use Method 5. The F-factor method described in Method 19 shall be used to calculate exhaust flow rate through the exhaust stack, except that EPA Method 2 shall be used to calculate the flow rate for purposes of particulate testing. The fuel meter data, as measured according to Condition 4.4, shall be included in the test report, along with the emissions calculations.

4.3.4 Three test runs shall be conducted for each engine. Each run must last at least 60 minutes. Analyzer data shall be recorded at least once every minute during the test. Engine run time and engine mechanical horsepower output and fuel usage shall be recorded during each test run for each load and shall be included in the test report. In lieu of these requirements, Microsoft may propose a test protocol to Ecology for approval.

4.3.5 For the gaseous pollutants (NO_x, CO and NMHC) Microsoft may propose using a portable emissions instrument analyzer for subsequent rounds of periodic source testing if all three engines tested by December 1, 2016 show compliance with each of the Tier II emission standards referenced in Condition 4.2. The use of an analyzer and the

1 analyzer model shall be approved in writing by Ecology prior to
2 testing. The analyzer shall be calibrated using EPA Protocol 1 gases
3 according to the procedures for drift and bias limits outlined in EPA
4 Methods 7E and Method 10. Alternate calibration procedures may be
5 approved in advance by Ecology.

6 4.4 Each engine shall be equipped with a properly installed and maintained
7 non-resettable meter that records total operating hours.⁶

8 4.5 Each engine shall be connected to a properly installed and maintained fuel
9 flow monitoring system that records the amount of fuel consumed by that engine
10 during each operation.

11 c. Condition 4.6 is added as follows:

12 4.6 On or before July 1, 2017 Microsoft shall submit to Ecology a protocol for
13 a health risk assessment that analyzes the public health risk to Quincy residents
14 from DEEP emissions in the Quincy area, including emissions from data center
15 engines, highways, locomotives and other source categories. Microsoft shall
16 submit the completed health risk assessment to Ecology within 90 days of
17 Ecology's approval of the risk assessment protocol. Ecology may extend this
18 deadline for good cause. The study shall model the locations in the community
19 that experience the highest exposure to DEEP emissions, estimate the health risks
20 associated with that exposure, and apportion the health risks among contributing
21 source categories. In preparing the study Microsoft may collaborate with other
22 owners of diesel engines in or near Quincy. Ecology shall review the assessment
23 and take appropriate action based on the results.

24 4. Accordingly, the Board affirms Ecology's 2010 Approval Order with the
25 conditions established by the Board in this Order.

⁶ New conditions 4.4 and 4.5 renumber 4.3 and 4.4 from the current Approval Order. Condition 4.5, which states that periodic emission testing is not required, is deleted from the Approval Order.

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SO ORDERED this 25th day of July, 2012.

POLLUTION CONTROL HEARINGS BOARD

KATHLEEN D. MIX, Chair

WILLIAM H. LYNCH, Member

TOM MCDONALD, Member

Kay M. Brown
Administrative Appeals Judge, Presiding