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King County
Department of
Natural Resources and Parks
Director's Office
King Street Center
201 South Jackson Street, Suite 700
Seattle, WA 98104-3855

Department of Ecology
Water Quality Program
DEC 17 2004

December 17, 2004

Linda Hoffman, Director
Washington State Department of Ecology
Post Office Box 47600
Olympia, WA *98504*

Dear Ms Hoffman:

I am writing to you directly with regard to significant concerns that the King County Department of Natural Resources and Parks (DNRP) has with the revised Draft of Washington State's 2002-
2004 Water Quality Assessment.

Inasmuch as this statewide assessment is a major activity of the Department of Ecology (Ecology), and will drive a substantial number of federal, state, and local regulatory and planning activities, I want to make sure that you fully understand our concerns, and to offer DNRP staff time to you in order to make changes that we think will improve the document and meet our needs.

DNRP staff already submitted comments on the initial Draft Assessment released by Ecology in January of 2004. Ecology has made many of our suggested changes. However, this second draft does not address some our earlier comments, and Ecology's interpretation of the newest data seems to have created additional concerns. For those reasons, we request you revisit the draft text.

A detailed set of our comments is enclosed. The two main issues I would like to highlight, and that are of most concern to us are (1) the process used by Ecology to interpret Dissolved Oxygen (DO) data in Puget Sound, and (2) the use of Ammonia data in some fresh and salt water areas. In the case of DO, Ecology's revised draft does not seem to recognize periodic seasonal low DO conditions in Puget Sound as natural occurrences due to bathymetric configuration and estuarine circulation. With regard to ammonia, it appears that the ammonia standard for unionized ammonia was applied to total ammonia data

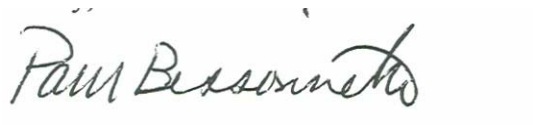
without appropriate conversion of that data to its unionized fraction. Each of these situations creates the potential for listings of waterbodies as impaired when the actual water quality conditions support designated uses. Any such designations of impairment could inappropriately result in new limits being applied to NPDES permits for existing facilities when the discharges are not causing harm, requiring costly

modification to facilities that may not be warranted and diverting scarce Ecology and local funding to unneeded TMDL assessment, strategy development, and implementation.

The enclosed comments provide information that should help Ecology substantiate the appropriate natural condition determinations for DO in Puget Sound and assist in interpreting King County's total Ammonia data. If you have any questions about this, please have your staff contact Betsy Cooper, NPDES Administrator in the Wastewater Treatment Division of the Department of Natural Resources and Parks, at 206-263-3728.

We look forward to continuing to work closely with Ecology to provide accurate and complete assessments of the health of our aquatic environment.

Sincerely,



Pam Bissonnette
Director

Enclosure

cc: Dave Peeler, Manager, Water Program, Department of Ecology (DOE)
Susan Braley, Project Lead, Water Quality Assessment, DOE
Ken Koch, Water Quality Manager, DOE
Ed Thorpe, Coalition for Clean Water
Betsy Cooper, NPDES Administrator, Wastewater Treatment Division

King County Comments on Ecology's Revised Draft Water Quality Assessment 2002-04

Category 5 [303(d)] Listings

King County believes the following listings are incorrect and should be removed from the 303(d) list based upon the reasons described below.

<u>Dissolved Oxygen</u>

- **Listings # 42478, 42479, 42480, 42481, 42482, 42483, 42484, 42486 based upon dissolved oxygen**.

The above listings are for data collected monthly at King County subtidal stations throughout the Central Basin. We do not believe it is appropriate to list these waters as impaired based solely upon recent dissolved oxygen concentration data provided to Ecology by KCDNRP. All of the stations listed above have naturally occurring seasonal declines in dissolved oxygen, generally between August and October when oceanic waters enters inland Puget Sound.

For example, listing 42479 is for station KSBPO1 located in the middle of the Central Basin off Point Jefferson. Of the 1000 data points collected between 1993 and 2003, 38% (382) are below 7.0 mg/L and only 3 measurements were below 5.0 mg/L (4.5 to 4.8 mg/L). Almost all the values below 7.0 mg/L occurred during times when upwelled waters enter the Sound. The same situation occurred with the other listings where approximately 38 to 48% of the values collected between 1993 and 2003 were below 7.0 mg/L but are by no means impaired due to low dissolved oxygen. In fact, 22 of the almost 3,640 samples collected over a 10 year period were below 5.0 mg/L and ranged from 4.5 to 4.9 mg/L. For several sites, even at deep depths of near 200 meters which can be prone to lower dissolved oxygen concentrations, dissolved oxygen is rarely below 5.0 mg/L, but do dip below the standard of 7 mg/L for extraordinary quality waters due to the presence of this naturally low DO water.

Even the Elliott Bay Station LTEDO4, listing # 42484, does not have observed dissolved oxygen concentrations warranting a listing, although it is also listed due to Ecology's data at station ELBOI5. King County's data shows that only 13 of the 522 samples collected between 1997 and 2003 had values below 5.0 mg/L (ranged from 4.5 to 4.9 mg/L) all occurring between August and November and that values observed were similar to other stations sampled within a period of two days.

Listings # 42490, 38765, 38769, and 42485, which are based on others data also seem to be listed without consideration of these natural conditions.

If any area within inland Puget Sound is sampled monthly for at least one year under typical conditions, dissolved oxygen concentrations less than 7.0 mg/L will occur due to naturally occurring conditions. Oceanic waters enter the Sound through Admiralty Inlet

and Deception Pass. At Ecology's Admiralty Inlet station (ADMOO 1), approximately 40% of all values collected between 19% and 2002 were below 7.0 mg/L and 72% of these values occurred between August and October.

Low dissolved oxygen concentrations in the central basin of Puget Sound are not a new occurrence. The quantitative record of oxygen conditions extends back to at least 1933 through the data set collected by E. Collias of the University of Washington (Collias, et al, 1974)'. Figure 1 summarizes the frequency of occurrence of low DO (<7>mg/l) in the data between 1933 and 1975 for station PSB3O5 (Pt Jefferson) at depths below 300 ft. This graph clearly shows that low dissolved oxygen values are to be expected between July and November. Table 1 gives some additional statistics about DO values sampled from depths greater than 300 ft at station P5B305 (Pt Jefferson).

Oceanographic studies on the central basin have shown it to have a relatively short residence time of 1-3 months. Denser water from the Strait of Juan de Fuca has been shown to intrude over the sills in Admiralty inlet and replace the bottom waters in the central basin (Cannon, 19832, King County, 2002[3]). Thus we expect to see similar water in the central basin a month or so after it is in the Strait of Juan de Fuca outside of Admiralty Inlet. Dissolved Oxygen measurements at Ecology's stations ADMOO2, SJF000, SJFOOI, SJFOO2, all show low (<5 mg/l) DO during the autumn months, indicating that the low DO measurements in the Central Basin are a result of flushing with water from the Strait of Juan de Fuca.

Listing sites based upon naturally occurring conditions using the 7.0 mg/L criterion is not appropriate and could divert important Ecology resources away from other important impaired areas.

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[1]Collias, E.E., McGary, N, Barnes, C.A., 1974, *Atlas of Physical and Chemical properties of Pages Sound and its Approaches,* Washington Sea Grant
[2]King County, 2002. Final Report Puget Sound Physical Oceanography
[3]Cannon, G.A., 1983, *NOAA Technical Memorandum ERL PMEL-48 "An Overview of Circulation in the Puget Sound Estuarine System"*

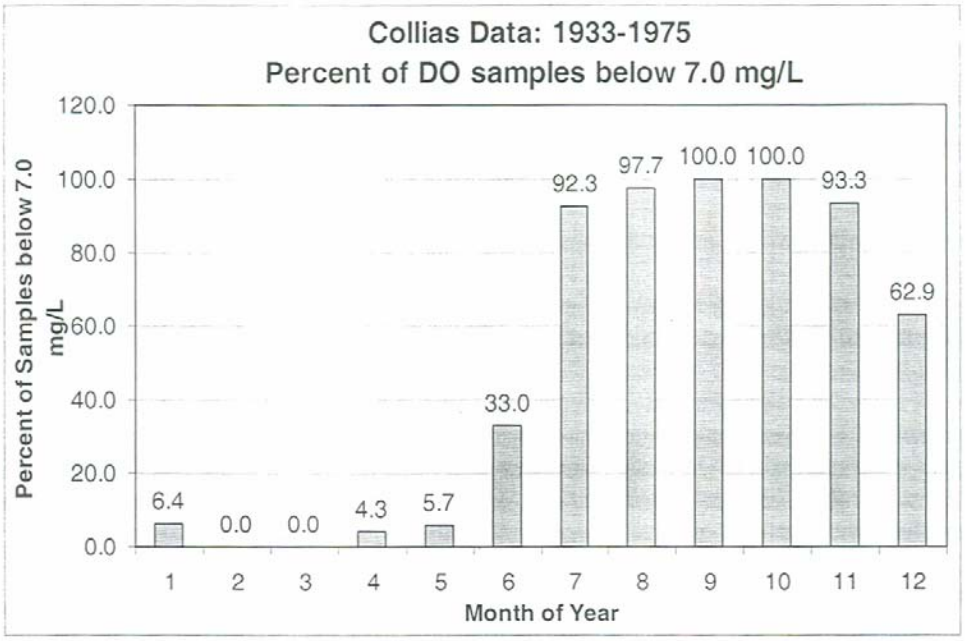

Figure 1. Percent of samples taken at station PSB305 and at depths below 300 ft between 1933 and 1975 that had dissolved oxygen values below 7.0 mg/l.

Table 1. Dissolved Oxygen (mg/l) Summary Statistics for Station PSB305 for samples collected below 300 ft.

MONTH	1	2	3	4	5	6	7	8	9	10	11	12
MEAN	7.56	7.99	8.16	7.97	7.73	7.11	6.46	5.99	5.75	5.70	6.22	6.90
STD	0.58	0.38	0.45	0.45	0.42	0.36	0.33	0.49	0.29	0.28	0.47	0.39
MIN	3.07	7.14	7.04	6.21	6.75	6.21	5.62	4.34	5.06	5.14	5.3	6.16
MAX	8.43	9.22	10.05	8.7	8.78	7.94	7.36	7.36	6.5	6.51	7.73	7.74
TOTAL # SAMPLES	109	107	117	117	122	112	78	87	78	97	120	97
SAMPLES BELOW 7.0 MG/L	7	0	0	5	7	37	72	85	78	97	112	61
PERCENT	6.4	0.0	0.0	4.3	5.7	33.0	92.3	97.7	100.0	100.0	93.3	62.9

Ammonia

- **Listing #42475 based upon ammonia.**

This listing is based upon two values of 0.39 and 0.013 mg/L on sampling on 10/28 and 11/20 2002. King County analyzes for total ionized ammonia and the state standard is based upon un-ionized ammonia. The WAC 173-201A-240, footnote hh for ammonia states that " …Criteria concentrations based on total ammonia for marine waters can be

found in USEPA Ambient Water Quality Criteria for Ammonia—1989,EPA 440/5-88-004." The EPA table to obtain the chronic criterion (the lowest) based on total ammonia that is equivalent to un-ionized ammonia, results in a chronic criterion of 1.6 mg/L using a salinity of 30 pss, temperature of 15 degree Celsius, and a pH of 8.0. These values most often represent conditions when samples were collected. The two values which the listing was based are well below the chronic ammonia criterion.

- **Other King County listings based on Ammonia.**

Fourteen King County freshwater sites (see attached table) were proposed for Category 5 listing in the initial and second Draft Assessment due to ammonia excedances. Of the fourteen sites, perhaps one, Lake Union (L1957) should remain on the list. It appears that the initial ammonia analysis done by Ecology may have used the wrong data set. Based on KCDNRP ammonia, pH, and temperature data and WDOE NH3FRES2.WKI this site exceeded the chronic criteria for unionized ammonia for a period of about three months (09/04/2002 through 12/03/2002) at 14m depth. This excursion was associated with the development of a salt wedge in the bottom of the lake and was associated with low DO and high conductivity. The chronic criterion was exceeded only at the deepest sampling (14 m) and did not exceed the chronic criteria at 12 m during the same sampling period. These chronic ammonia conditions at 14 m disappeared in January 2003 with lake mixing. This situation will re-occur with the development of salt wedges in the future. None of the other sites in the draft 303(d) list had unionized ammonia concentrations anywhere near chronic levels, and no site ever exhibited acute levels. These sites should not be included in the final Category 5 list.

King County monitored major lakes listed on the WDOE 2003 Draft 303(d) water quality limited list for ammonia (1995-2002).

		draft 303(d) list		KCDNR data		
	data range	number of samples	number of reported excursions	number of samples	number of calculated excursions *	comments
Lake Union A522 west shore south end listing ID# 11957	1998-2002	53	40	58	4	**Agree with listing**. Based on KCDNR data and WDOE NH3FRES2.WK1 this site exceeded the chronic criteria for unionized ammonia for a period of about three months (09/04/2002 through 12/03/2002) at 14m depth. This excursion was associated with the development of a salt wedge in the bottom of the lake and associated low DO and high conductivity. These conditions disappeared in January 2003. This situation will re-occur with the development of salt wedges in the future.
Lake Union 0512 Ship Canal above locks listing ID# 11955	1998-2002	51	22	57	0	**Should not be listed**. There were no excursions for ammonia during the reporting period based on KCDNR data and WDOE NH3FRES2.WK1.
Lake Union 0527 S of Gasworks near buoy C13-RR listing ID# 11957	1988-2002	9	9	12	0	**Should not be listed**. There were no excursions for ammonia during the reporting period based on KCDNR data and WDOE NH3FRES2.WK1.
Lake Union 0536 Ship Canal at I-5 Bridge listing ID# 11957	1998-2002	53	17	58	0	**Should not be listed**. There were no excursions for ammonia during the reporting period based on KCDNR data and WDOE NH3FRES2.WK1.
Lake Union 0540 Montlake Bridge listing ID# 11957	1988-2002	54	16	52	0	**Should not be listed**. There were no excursions for ammonia during the reporting period based on KCDNR data and WDOE NH3FRES2.WK1.
Lake Sammamish 0611 North mid lake listing ID# 11948	1988-2002	52	19	52	0	**Should not be listed**. There were no excursions for ammonia during the reporting period based on KCDNR data and WDOE NH3FRES2.WK1.
Lake Sammamish 0614 near mouth Issaquah Ck listing ID# 11950	1998-2002	59	11	59	0	**Should not be listed**. There were no excursions for ammonia during the reporting period based on KCDNR data and WDOE NH3FRES2.WK1.
Lake Sammamish 0617 near mouth Lewis Ck listing ID# 11951	1998-2002	49	8	59	0	**Should not be listed**. There were no excursions for ammonia during the reporting period based on KCDNR data and WDOE NH3FRES2.WK1.
Lake Sammamish 0622 near mouth Eden Ck listing ID# 11952	1998-2002	49	5	59	0	**Should not be listed**. There were no excursions for ammonia during the reporting period based on KCDNR data and WDOE NH3FRES2.WK1.
Lake Washington 0804 Kenmore mid-lake listing ID# 11962	1998-2002	50	11	57	0	**Should not be listed**. There were no excursions for ammonia during the reporting period based on KCDNR data and WDOE NH3FRES2.WK1.
Lake Washington 0817 near mouth Thornton Ck listing ID# 11965	1988-2002	49	4	53	0	**Should not be listed**. There were no excursions for ammonia during the reporting period based on KCDNR data and WDOE NH3FRES2.WK1.
Lake Washington 0829 South, near Boeing ranp listing ID# 11967	1998-2002	46	4	57	0	**Should not be listed**. There were no excursions for ammonia during the reporting period based on KCDNR data and WDOE NH3FRES2.WK1.
Lake Washington 0832 near mouth Coal Ck listing ID# 11969	1998-2002	52	3	57	0	**Should not be listed**. There were no excursions for ammonia during the reporting period based on KCDNR data and WDOE NH3FRES2.WK1.
Lake Washington 0840 E Mercer Channel listing ID# 11971	1998-2002	51	6	54	0	**Should not be listed**. There were no excursions for ammonia during the reporting period based on KCDNR data and WDOE NH3FRES2.WK1.
Lake Washington 4903 near Henderson CSO listing ID# 11974	1998-2002	48	6	57	0	**Should not be listed**. There were no excursions for ammonia during the reporting period based on KCDNR data and WDOE NH3FRES2.WK1.

Comparison of numbers of excursions estimated by the Department of Ecology and King County.

*Worksheet NH3FRES2.WK1 used to determine whether NH3 levels exceeded criteria.

exceeds acute and chronic ammonia criteria

meets chronic but exceeds acute ammonia standard

meets chronic and acute ammonia standard