July 23, 2004

Mr. Glenn Haas, Director
Division of Watershed Management
Department of Environmental Protection
1 Winter Street
Boston, MA 02108

Ms. Linda Murphy, Director
Office of Ecosystem Protection
U.S. Environmental Protection Agency
Water Technical Unit "SEW"
P.O. Box 8127
Boston, MA 02114

Re: Massachusetts Water Resources Authority, Permit Number MA0103284
Notification Pursuant to Part I.8. Contingency Plan

Dear Mr. Haas and Ms. Murphy:

In its outfall ambient monitoring program, MWRA monitors levels of three types of nuisance algae (*Alexandrium, Pseudo-nitzschia,* and *Phaeocystis*) in the nearfield of the Massachusetts Bay outfall. Reporting on per-sample abundances of *Alexandrium* and seasonal abundances of *Pseudo-nitzschia* and *Phaeocystis* is part of the Contingency Plan.[1] MWRA has received results of the nuisance algae from testing carried out through May 14, 2004. For one of the algae, *Phaeocystis pouchetii*, the average abundance for the winter/spring season (January 1-April 30) and the summer season (May 1- August 31) exceeded the Caution Level threshold triggering a notification requirement under the Contingency Plan. This letter constitutes the notification for both exceedances.

Impacts. There were no indications of adverse impacts from this bloom. There was no aesthetic nuisance, which potentially can be caused by large *Phaeocystis* blooms if the gelatinous colonies wash up on shore. Zooplankton communities were within the normal range, and water column dissolved oxygen levels were normal. Right whales were present in Cape Cod Bay during the spring in relatively abundant numbers, and levels of the zooplankton *Calanus*, the locally preferred prey of right whales, were normal to abundant (Center for Coastal Studies[2]). Other nuisance algal species were well within baseline and threshold values (Table 1). There is no obvious association with MWRA's outfall.

Threshold calculations. In 2004, MWRA implemented a new outfall sampling design.[3] The changes included dropping one survey in the winter-spring and two surveys in the summer. Therefore, for purposes of threshold testing with the new sampling design, the baseline means and the thresholds (the 95th percentile of the baseline

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1 *Massachusetts Water Resources Authority Contingency Plan Revision 1*. 2001. Report ENQUAD ms-071, on the web at http://www.mwra.state.ma.us/harbor/enquad/trlist.htm

2 http://www.coastalstudies.org/research/field04a.htm

3 *Massachusetts Water Resources Authority Effluent Outfall Ambient Monitoring Plan Revision 1*. March 2004. Report ENQUAD ms-092, on the web at http://www.mwra.state.ma.us/harbor/enquad/trlist.htm

mean) were recalculated mathematically deleting baseline data corresponding to the dropped surveys. The recalculated summer threshold is slightly higher for *Phaeocystis*, but the winter-spring threshold is the same. The winter-spring threshold for *Pseudo-nitzschia* also remains the same.

Table 1. Contingency Plan threshold results for nuisance algae for winter-spring and summer, 2004.

Parameter	Specific Parameter	Baseline	Caution Level Threshold	Warning Level Threshold	2004 Results
Phaeocystis pouchetii	**Winter/spring**	**470,000 cells/l**	**2,020,000 cells/l**	None	**Caution Level Exceedance 2,870,000 cells/l**
	Summer*	**79 cells/l**	**357 cells/l**		**Caution Level Exceedance 164,000 cells/l**
Pseudo-nitzschia	Winter/spring	6,200 cells/l	21,000 cells/l		11 cells/l
Alexandrium tamarense	Any nearfield sample	Baseline maximum = 163 cells/l	100 cells/l		No *Alexandrium* detected through May 14, 2004

* Because of the changed survey schedule, the summer baseline and threshold for *Phaeocystis* are now slightly higher. The previous baseline mean was 72 cells/liter, and the previous threshold was 334 cells/l. The 2004 summer results, also yielding a Caution Level exceedance for summer *Phaeocystis* are based on results from the first summer survey, assuming that results for the rest of the summer are zero.

Characteristics of the 2004 *Phaeocystis* spring bloom. Figure 1 shows the spring and summer seasonal nearfield means for 2004 compared to previous years.

Figure 2 shows the average *Phaeocystis* counts for each survey for all years where MWRA detected *Phaeocystis* since 1992. The winter-spring bloom of 2004 had high levels of *Phaeocystis* compared to previous blooms within MWRA's monitoring period, with a peak cell count of 15.5 million cells/liter at the farfield site (F24) northeast of Boston Harbor. Figure 2 shows that the temporal pattern of the bloom was typical, with the bloom first detected in mid-March, counts peaking in mid-April, and dropping to lower numbers in mid-May.

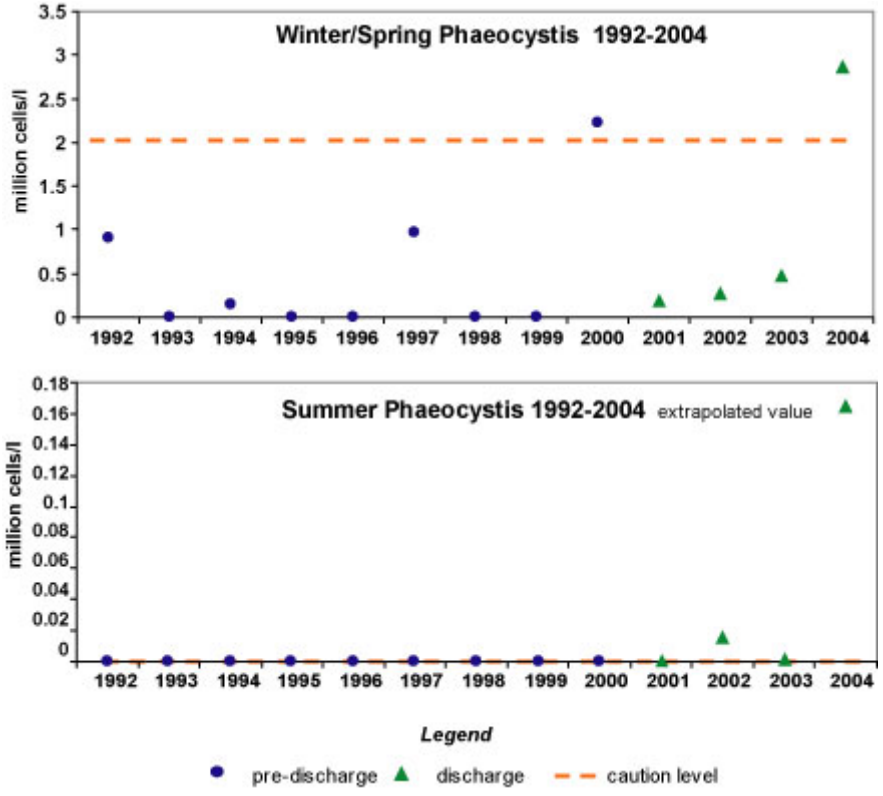

Figure 1. Nearfield seasonal mean *Phaeocystis* counts 1992-2004.

Because a remnant of the bloom still remained in mid-May, the very low summer contingency plan threshold was also exceeded.

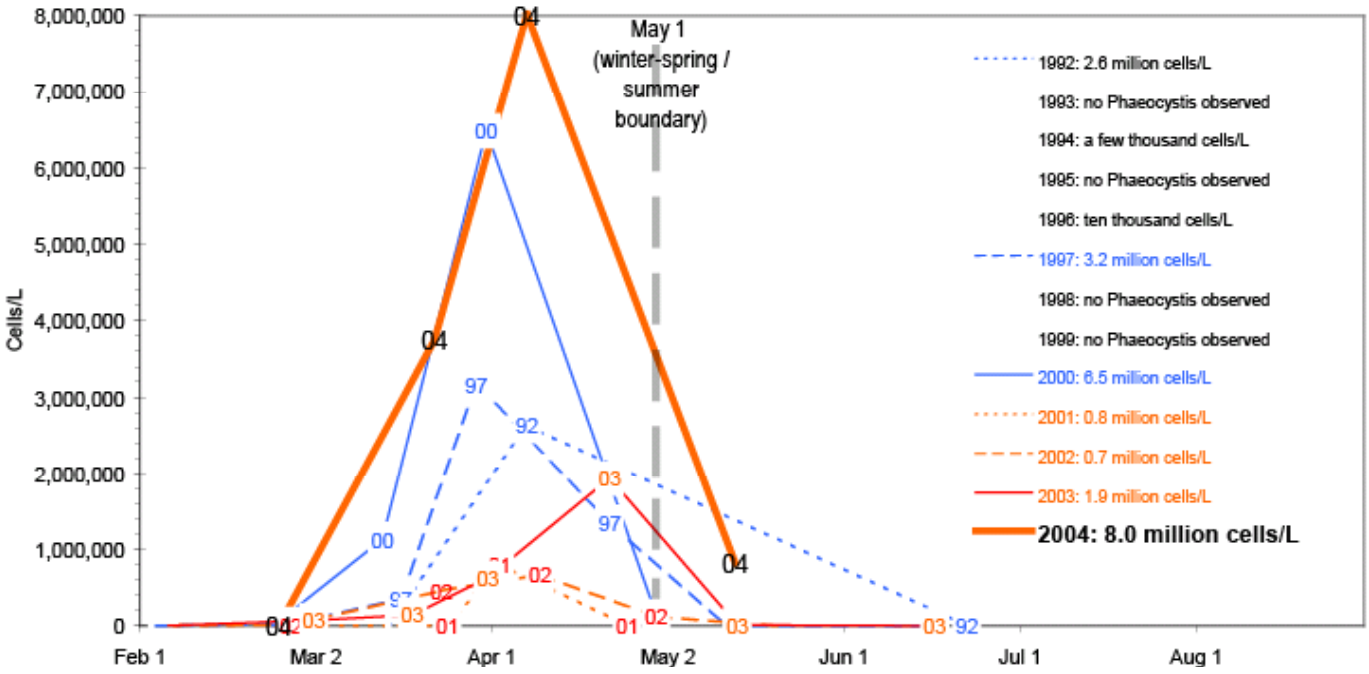

Figure 2. Annual patterns of nearfield mean *Phaeocystis* abundances, 1992-2004.

Figure 3 shows the spatial pattern of *Phaeocystis* in mid-April, for years when it was relatively abundant in MWRA's monitoring. There is no obvious, consistent spatial pattern of abundance, with high counts further offshore in some years and closer in shore in other years. In 2004, the area with the highest counts was Boston Harbor and the nearby coastal stations to the north and south. There is no obvious spatial association with the MWRA's outfall—*Phaeocystis* was abundant far north and south of the outfall.

Why *Phaeocystis* occurs in relatively high abundances in some years and not in others is not understood. Algal growth and abundance are influenced by environmental factors including the availability of light, nutrients, water temperature, water movement, competition from other algal species for nutrients and light, and by grazing. It is possible that this large *Phaeocystis* bloom was related to the extremely cold winter and spring and/or the precipitation pattern of little rain in February and March, followed by a wet April.

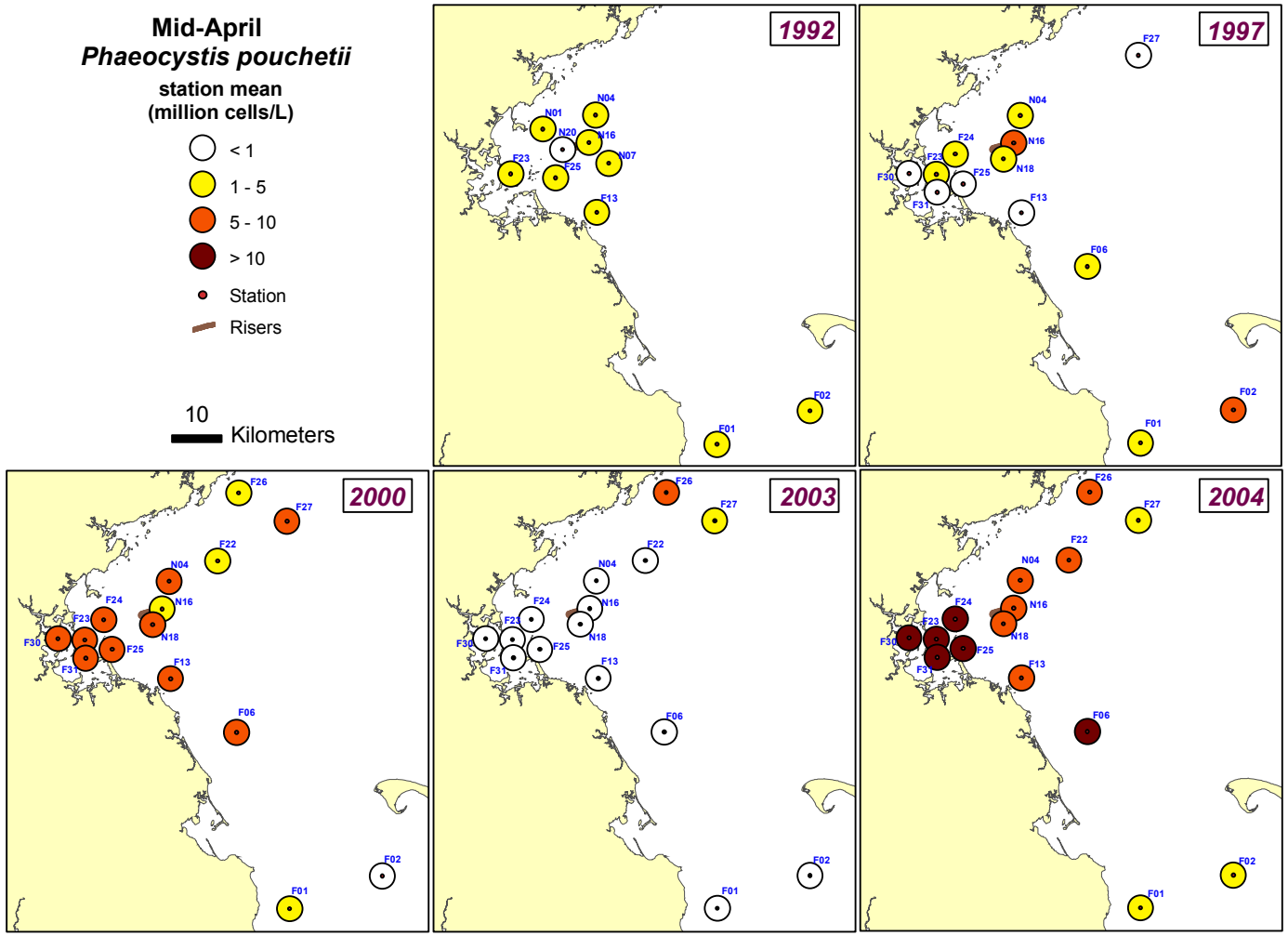

Figure 3 Spatial extent of the five largest April blooms of the nuisance alga *Phaeocystis pouchetii*. MWRA's outfall went on-line in September, 2000. Each point represents a station where plankton were sampled. There were fewer stations in 1992 and in 1997.

A more complete analysis of the 2004 *Phaeocystis* bloom, including more detailed spatial and temporal patterns and relationship to other water quality parameters, will be part of MWRA's annual water column monitoring synthesis report for 2004, which will be discussed at a future Outfall Monitoring Science Advisory Panel meeting.

Please let me know if any of MWRA's staff can give you additional assistance regarding this notification.

Sincerely,

Michael J. Hornbrook
Chief Operating Officer

Cc:

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