DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

REPLY TO
ATTENTION OF

February 24, 1998

Engineering/Planning Division
Evaluation Branch

Ms. Pamela D. Harvey, Acting Deputy Director
Division of Wetlands and Waterways
Department of Environmental Protection
One Winter Street
Boston, Massachusetts 02108

Dear Ms. Harvey:

The purpose of this letter is to provide you with information for the Town Brook Local Protection Project located in Quincy, Massachusetts. Your office issued a Water Quality Certificate (WQC) for this project on March 24, 1989.

Condition 14 of the WQC requires continuous monitoring of dissolved oxygen in tunnel water. Monthly reports, including appropriate maintenance and calibration records, must be provided to your Division. Condition 15 requires grab sampling of ten water quality parameters of storm waters discharged from the tunnel. The attached report provides the results of continuous monitoring and grab sampling. This information will be provided to you by the Metropolitan District Commission when we officially turn over project operations. During the project transition, the Corps of Engineers will conduct the monitoring and provide the results to you.

If you have any questions about this information, please contact Mr. Larry Oliver at (781) 647-8347 or Mr. Townsend Barker at (781) 647-8621.

Sincerely,

Richard D. Reardon, P.E.
Chief, Engineering/Planning Division

Attachment

Copy Furnished:

Ms. Judy Perry
Division of Wetlands and Waterways
Department of Environmental Protection
One Winter Street
Boston, Massachusetts 02108

CENAE-EP-GW

9 February 1998
Mr. Barker/cm/78621

MEMORANDUM FOR Chief, Evaluation Branch

SUBJECT: Town Brook Tunnel Water Quality Data

1. Attached is water quality data from the first grab sampling, and the automatic monitor at the tunnel inlet, for transmittal to the state. These data show the aeration system is working very well.

2. The initial grab samples from the tunnel outlet and Town River were collected on 20 January 1998, when the tunnel was discharging and the tide was low enough to collect good samples. Three samples were collected from the tunnel outlet and composited for nitrogen, phosphorus, and oil and grease analyses. Samples for fecal coliform bacteria analyses were not composited. One sample was collected from Town Brook immediately upstream from the confluence with the tunnel outlet discharge.

3. Dissolved oxygen (DO) is the most important water quality parameter in the tunnel, and results from the automatic monitor and grab samples show good to excellent results. The DO was 4.87 ppm when the monitor began collecting data on 24 August 1997 (Julian day 236), but within an hour it was above 5.0 ppm and within 13 hours it was above 6.0 ppm. Since then the DO level has fluctuated a lot, but it has usually been above 6.0, only rarely below 5.0, and never below 4.6 ppm.

4. Sharp drops in conductivity indicate storms, as freshwater flows in and displaces the saltwater in the bottom of the tunnel. Monitor data shows storms on 7 October (Julian day 280), 2 November (Julian day 306), 10 November (Julian day 314), 17 November (Julian day 321), and 20 January. Each of these events has been accompanied by a rise in DO. Since the 2 November storm, the DO has been so high as to indicate the aeration system may not be necessary in the winter.

5. Grab sample data shows the tunnel discharge water quality as being as good as or better than that in the upstream Town Brook. Phosphorus, and oil and grease were less than the detection limits for both. There were no significant differences in pH or combined nitrate plus Kjeldahl nitrogen. Average DO in the tunnel was slightly higher than in Town Brook, and total suspended solids (TSS)

were lower. Salinity was higher in the tunnel discharge because saltwater enters the tunnel outlet during every high tide, and some of that saltwater is discharged with the freshwater inflow. The biggest difference between the tunnel and the brook was in fecal coliform bacteria, which were much lower in the tunnel. Samples collected on 20 January show the tunnel outlet easily meeting water quality standards for coliform bacteria, but Town Brook exceeding them.

6. The second set of grab samples will be collected following a "major storm," as defined in the Water Quality Certification, that occurs during a tide cycle that allows proper samples to be collected.

7. Very little useful water quality data have been collected from the automatic monitor at the tunnel outlet because of mechanical difficulties. However, as both the inlet and outlet monitors measure water drawn from the center of the tunnel, results should be the same. We expect to have the monitor at the outlet working properly by the end of February.

8. Questions should be directed to Mr. Barker on x78621.

H. Farrell McMillan

Attch

H. FARRELL MCMILLAN, P.E.
Chief, Geotechnical & Water Management Branch

CF:
Mr. Barker - 115N
Mr. Buteau - 112S
Mr. MacPherson - 109S
Mr. Fedele - 109S
Engr/Plan Div Files - 112S (disk-GWMB98-wqdata)

TOWN BROOK TUNNEL
GRAB SAMPLE DATA
20 January 1998

| Station Location | Time | Conductivity (uS/cm) | Temperature Celcius | pH | DO (mg/l) | Fecal Coliforms (per 100 ml) |
|---|---|---|---|---|---|---|
| Tunnel outlet | 1030 | 6700 | 6.3 | 6.2 | 12.4 | 15 |
| Tunnel outlet | 1125 | 6050 | 6.3 | 6.5 | 13.5 | 5 |
| Tunnel outlet | 1220 | 5090 | 6.4 | 6.6 | 12.9 | 3 |
| Town Brook | 1225 | 2100 | 3.9 | 6.7 | 12.6 | 1000 |

| Parameter | Tunnel Outlet (Composite Sample) | Town Brook (Single Sample) |
|---|---|---|
| Nitrate - N (ppm) | 1.2 | 0.85 |
| Total Kjeldahl - N (ppm) | 0.36 | 0.50 |
| Nitrate + Kjeldahl - N | 1.56 | 1.35 |
| Phosphorus (ppm) | <0.01 | <0.01 |
| Oil & Grease (ppm) | <0.50 | <0.62 |
| TSS (ppm) | <5 | 11 |
| Salinity (ppt) | 5 | <2 |

TOWN BROOK LOCAL FLOOD PROTECTION PROJECT, TOWN BROOK TUNNEL
QUINCY, MASSACHUSETTS.

WATER QUALITY DATA 2/5/98

The following table is water quality data collected from Town Brook Tunnel using the automatic water quality monitoring system located in the pumphouse at the Intake Site. The monitoring system has been maintained by the Contractor. The water sampling device checks its calibration after each measurement cycle.

| YEAR | DAY (Julian) | TIME (Military) | TEMP. (F) | CONDUCTIVITY (mS) | DISSOL. OXYGEN (mg/L) | BARO. PRES (mmHg) | BATT. VOLTS (volts) |
|---|---|---|---|---|---|---|---|
| 1997 | 236 | 22 | 61.6 | 21.3 | 4.87 | 757 | 13.32 |
| 1997 | 236 | 112 | 61.6 | 21.7 | 5.33 | 757 | 13.3 |
| 1997 | 236 | 212 | 61.7 | 22.1 | 5.14 | 756 | 13.28 |
| 1997 | 236 | 312 | 61.5 | 22 | 5.03 | 756 | 13.26 |
| 1997 | 236 | 412 | 61.4 | 22 | 4.99 | 756 | 13.26 |
| 1997 | 236 | 512 | 61.7 | 22.5 | 5.3 | 756 | 13.25 |
| 1997 | 236 | 612 | 61.4 | 22.3 | 5.01 | 756 | 13.24 |
| 1997 | 236 | 712 | 61.6 | 22.7 | 5.65 | 756 | 13.24 |
| 1997 | 236 | 812 | 61.4 | 22.9 | 5.44 | 756 | 13.24 |
| 1997 | 236 | 912 | 61 | 24.1 | 4.95 | 757 | 13.24 |
| 1997 | 236 | 1012 | 61.1 | 24.2 | 5.09 | 756 | 13.24 |
| 1997 | 236 | 1112 | 61.2 | 24.3 | 5.34 | 756 | 13.24 |
| 1997 | 236 | 1212 | 61.2 | 24.5 | 5.45 | 756 | 13.24 |
| 1997 | 236 | 1312 | 61.7 | 24.5 | 6.05 | 756 | 13.24 |
| 1997 | 236 | 1412 | 61.3 | 25 | 5.83 | 756 | 13.25 |
| 1997 | 236 | 1512 | 62.6 | 25.7 | 8.28 | 756 | 13.26 |
| 1997 | 237 | 22 | 61.7 | 23.9 | 7.57 | 758 | 13.27 |
| 1997 | 238 | 22 | 62.7 | 22.2 | 9.03 | 762 | 13.24 |
| 1997 | 239 | 22 | 62.3 | 22.3 | 8.38 | 765 | 13.24 |
| 1997 | 240 | 22 | 62 | 22.5 | 8.19 | 764 | 13.24 |
| 1997 | 241 | 22 | 61.5 | 22.5 | 7.72 | 756 | 13.21 |
| 1997 | 242 | 22 | 63.8 | 20.1 | 7.45 | 757 | 13.28 |
| 1997 | 243 | 22 | 63.1 | 20.5 | 6.79 | 760 | 13.24 |
| 1997 | 244 | 22 | 62.8 | 20.9 | 6.76 | 763 | 13.24 |
| 1997 | 245 | 22 | 63.1 | 20.2 | 6.4 | 765 | 13.24 |
| 1997 | 245 | 112 | 63.4 | 20.3 | 6.39 | 765 | 13.23 |
| 1997 | 245 | 212 | 63.6 | 19.5 | 6.54 | 765 | 13.23 |
| 1997 | 246 | 22 | 64 | 18.8 | 5.9 | 758 | 13.2 |
| 1997 | 246 | 112 | 64.1 | 19 | 6.33 | 757 | 13.2 |
| 1997 | 246 | 212 | 64.1 | 19.1 | 6.57 | 757 | 13.2 |
| 1997 | 247 | 22 | 64.2 | 18.6 | 6.03 | 759 | 13.3 |
| 1997 | 247 | 112 | 64.4 | 18 | 6.19 | 759 | 13.29 |
| 1997 | 247 | 212 | 64.4 | 18.6 | 6.48 | 759 | 13.28 |
| 1997 | 247 | 312 | 64.5 | 18.6 | 6.54 | 758 | 13.29 |
| 1997 | 248 | 22 | 63.7 | 18.4 | 6.48 | 759 | 13.37 |
| 1997 | 248 | 112 | 63.9 | 18 | 6.45 | 759 | 13.36 |
| 1997 | 248 | 212 | 64 | 18.2 | 6.7 | 759 | 13.36 |
| 1997 | 248 | 1230 | 63.5 | 18.2 | 6.66 | 759 | 13.38 |

| YEAR | DAY (Julian) | TIME (Military) | TEMP. (F) | CONDUC-TIVITY (mS) | DISSOL. OXYGEN (mg/L) | BARO. PRES (mmHg) | BATT. VOLTS (volts) |
|---|---|---|---|---|---|---|---|
| 1997 | 249 | 22 | 63.4 | 17.7 | 6.64 | 761 | 13.3 |
| 1997 | 250 | 22 | 63.3 | 18.5 | 6.42 | 760 | 13.24 |
| 1997 | 250 | 112 | 63.2 | 18.3 | 6.27 | 759 | 13.25 |
| 1997 | 250 | 212 | 63.2 | 18.4 | 6.32 | 759 | 13.25 |
| 1997 | 250 | 312 | 63.4 | 18.2 | 6.52 | 759 | 13.24 |
| 1997 | 251 | 22 | 63.5 | 18.3 | 6.49 | 758 | 13.22 |
| 1997 | 251 | 112 | 63.5 | 18.4 | 6.56 | 758 | 13.22 |
| 1997 | 252 | 22 | 63.2 | 18.3 | 6.34 | 761 | 13.32 |
| 1997 | 252 | 112 | 63.3 | 18.3 | 6.47 | 761 | 13.32 |
| 1997 | 252 | 212 | 63.3 | 18.3 | 6.53 | 761 | 13.3 |
| 1997 | 253 | 22 | 63 | 18.2 | 6.37 | 763 | 13.31 |
| 1997 | 253 | 112 | 63 | 18.2 | 6.43 | 763 | 13.32 |
| 1997 | 253 | 212 | 63 | 18.2 | 6.52 | 763 | 13.31 |
| 1997 | 254 | 22 | 62.6 | 18.2 | 6.15 | 764 | 13.34 |
| 1997 | 254 | 112 | 62.8 | 18.2 | 6.22 | 764 | 13.33 |
| 1997 | 254 | 212 | 62.8 | 18 | 6.32 | 764 | 13.33 |
| 1997 | 254 | 312 | 62.9 | 18 | 6.52 | 763 | 13.33 |
| 1997 | 255 | 22 | 62.5 | 18 | 5.68 | 761 | 13.33 |
| 1997 | 255 | 112 | 62.7 | 18 | 6.12 | 761 | 13.31 |
| 1997 | 255 | 212 | 62.7 | 17.3 | 5.92 | 761 | 13.3 |
| 1997 | 255 | 312 | 62.7 | 18.7 | 6.31 | 761 | 13.29 |
| 1997 | 255 | 412 | 62.7 | 17.6 | 6.14 | 761 | 13.29 |
| 1997 | 255 | 512 | 62.8 | 17.3 | 6.34 | 761 | 13.29 |
| 1997 | 255 | 612 | 62.9 | 17.4 | 6.4 | 761 | 13.29 |
| 1997 | 255 | 712 | 62.8 | 17 | 5.98 | 761 | 13.28 |
| 1997 | 255 | 812 | 63.2 | 17.3 | 6.69 | 761 | 13.28 |
| 1997 | 256 | 22 | 63.8 | 16.5 | 6.56 | 761 | 13.22 |
| 1997 | 257 | 22 | 64.1 | 17.8 | 6.61 | 760 | 13.22 |
| 1997 | 258 | 22 | 63.5 | 18.2 | 6.41 | 760 | 13.24 |
| 1997 | 258 | 112 | 64.3 | 18.4 | 6.61 | 760 | 13.24 |
| 1997 | 259 | 22 | 64 | 18.9 | 6.16 | 758 | 13.21 |
| 1997 | 259 | 112 | 64.3 | 19.1 | 6.49 | 758 | 13.21 |
| 1997 | 259 | 212 | 64.7 | 19.5 | 6.63 | 758 | 13.21 |
| 1997 | 260 | 22 | 64.3 | 19.3 | 6.34 | 761 | 13.24 |
| 1997 | 260 | 112 | 64.2 | 19.5 | 6.29 | 761 | 13.24 |
| 1997 | 260 | 212 | 64.2 | 19.9 | 6.29 | 761 | 13.24 |
| 1997 | 260 | 312 | 64.6 | 20.2 | 6.59 | 761 | 13.25 |
| 1997 | 261 | 22 | 64 | 19.7 | 6.2 | 759 | 13.27 |
| 1997 | 261 | 112 | 64.2 | 19.7 | 6.37 | 759 | 13.27 |
| 1997 | 261 | 212 | 64.1 | 19.9 | 6.32 | 759 | 13.26 |
| 1997 | 261 | 312 | 64.2 | 20.4 | 6.36 | 759 | 13.26 |
| 1997 | 261 | 412 | 64.5 | 20.4 | 6.64 | 758 | 13.26 |
| 1997 | 262 | 22 | 64.3 | 20.2 | 6.4 | 761 | 13.22 |
| 1997 | 262 | 112 | 64.4 | 20.1 | 6.48 | 761 | 13.22 |
| 1997 | 262 | 212 | 64.4 | 20.1 | 6.48 | 761 | 13.22 |
| 1997 | 262 | 312 | 64.2 | 20.3 | 6.45 | 761 | 13.22 |
| 1997 | 262 | 412 | 64.2 | 20.6 | 6.56 | 761 | 13.22 |
| 1997 | 263 | 22 | 64.4 | 20.5 | 6.72 | 757 | 13.22 |
| 1997 | 264 | 22 | 65.9 | 20.2 | 6.54 | 757 | 13.27 |

| YEAR | DAY (Julian) | TIME (Military) | TEMP. (F) | CONDUC-TIVITY (mS) | DISSOL. OXYGEN (mg/L) | BARO. PRES (mmHg) | BATT. VOLTS (volts) |
|---|---|---|---|---|---|---|---|
| 1997 | 265 | 22 | 63.9 | 20.5 | 4.95 | 767 | 13.39 |
| 1997 | 265 | 112 | 63.9 | 20.4 | 5.06 | 767 | 13.39 |
| 1997 | 265 | 212 | 64 | 20.3 | 4.99 | 767 | 13.39 |
| 1997 | 265 | 312 | 64 | 20.2 | 5.08 | 767 | 13.4 |
| 1997 | 265 | 412 | 64 | 20.3 | 5.18 | 767 | 13.39 |
| 1997 | 265 | 512 | 64.2 | 20.4 | 5.38 | 767 | 13.41 |
| 1997 | 265 | 612 | 63.7 | 19.9 | 4.62 | 767 | 13.41 |
| 1997 | 265 | 712 | 63.8 | 19.3 | 4.87 | 768 | 13.41 |
| 1997 | 265 | 812 | 63.9 | 20.1 | 5.35 | 768 | 13.41 |
| 1997 | 265 | 912 | 63.9 | 20.3 | 5.48 | 768 | 13.42 |
| 1997 | 265 | 1012 | 63.9 | 20.7 | 5.58 | 768 | 13.41 |
| 1997 | 265 | 1112 | 64 | 20.5 | 5.86 | 767 | 13.4 |
| 1997 | 265 | 1212 | 64.1 | 20.4 | 5.98 | 767 | 13.39 |
| 1997 | 265 | 1312 | 64.1 | 20.6 | 6.06 | 766 | 13.37 |
| 1997 | 265 | 1412 | 64.1 | 20.5 | 6.03 | 765 | 13.37 |
| 1997 | 265 | 1512 | 64.1 | 20.3 | 6.06 | 764 | 13.34 |
| 1997 | 265 | 1612 | 64.1 | 19.9 | 5.86 | 764 | 13.34 |
| 1997 | 265 | 1712 | 64.1 | 20.6 | 6.12 | 764 | 13.31 |
| 1997 | 265 | 1812 | 64 | 19.7 | 6.16 | 764 | 13.31 |
| 1997 | 265 | 1912 | 63.9 | 19.4 | 6.45 | 763 | 13.31 |
| 1997 | 265 | 2012 | 63.8 | 19.3 | 6.52 | 764 | 13.32 |
| 1997 | 266 | 22 | 63.5 | 19.4 | 7.08 | 762 | 13.37 |
| 1997 | 267 | 22 | 62.5 | 17.5 | 7.31 | 759 | 13.41 |
| 1997 | 268 | 22 | 62 | 18.8 | 7 | 760 | 13.45 |
| 1997 | 269 | 22 | 61.4 | 19 | 7.09 | 751 | 13.39 |
| 1997 | 270 | 22 | 61.3 | 19.7 | 6.42 | 761 | 13.39 |
| 1997 | 270 | 112 | 61.2 | 19.6 | 6.81 | 761 | 13.38 |
| 1997 | 271 | 22 | 61 | 19.5 | 6.23 | 765 | 13.41 |
| 1997 | 271 | 112 | 61 | 19.9 | 6.32 | 765 | 13.41 |
| 1997 | 271 | 212 | 61 | 19.8 | 6.78 | 765 | 13.41 |
| 1997 | 272 | 22 | 60.8 | 19.5 | 6.26 | 755 | 13.41 |
| 1997 | 272 | 112 | 60.8 | 19.6 | 6.37 | 753 | 13.4 |
| 1997 | 272 | 212 | 60.7 | 19.6 | 6.58 | 752 | 13.4 |
| 1997 | 273 | 22 | 61.1 | 19.4 | 6.25 | 745 | 13.39 |
| 1997 | 273 | 112 | 61.1 | 19.5 | 6.35 | 745 | 13.37 |
| 1997 | 273 | 212 | 61.1 | 19.7 | 6.41 | 744 | 13.38 |
| 1997 | 273 | 312 | 61 | 19.7 | 6.76 | 744 | 13.37 |
| 1997 | 274 | 22 | 60.9 | 19 | 6.68 | 746 | 13.37 |
| 1997 | 275 | 22 | 60.4 | 20.2 | 6.44 | 759 | 13.47 |
| 1997 | 275 | 112 | 60.4 | 20.1 | 6.64 | 759 | 13.47 |
| 1997 | 276 | 22 | 59.9 | 20.3 | 6 | 762 | 13.49 |
| 1997 | 276 | 112 | 59.9 | 20.3 | 6.12 | 762 | 13.48 |
| 1997 | 276 | 212 | 60 | 20.3 | 6.26 | 762 | 13.48 |
| 1997 | 276 | 312 | 59.9 | 20.3 | 6.51 | 761 | 13.48 |
| 1997 | 277 | 22 | 59.6 | 20.7 | 6.57 | 763 | 13.49 |
| 1997 | 278 | 22 | 59.6 | 20.9 | 6.3 | 763 | 13.43 |
| 1997 | 278 | 112 | 59.6 | 20.8 | 6.16 | 763 | 13.43 |
| 1997 | 278 | 212 | 59.6 | 20.8 | 6.19 | 763 | 13.41 |
| 1997 | 278 | 312 | 59.5 | 20.7 | 6.59 | 763 | 13.41 |

| YEAR | DAY (Julian) | TIME (Military) | TEMP. (F) | CONDUC-TIVITY (mS) | DISSOL. OXYGEN (mg/L) | BARO. PRES (mmHg) | BATT. VOLTS (volts) |
|---|---|---|---|---|---|---|---|
| 1997 | 279 | 22 | 59.9 | 20.8 | 6.67 | 761 | 13.38 |
| 1997 | 280 | 22 | 59.8 | 0.712 | 9.11 | 761 | 13.3 |
| 1997 | 281 | 22 | 59.9 | 0.783 | 9.26 | 766 | 13.32 |
| 1997 | 282 | 22 | 59.5 | 20.7 | 5.99 | 769 | 13.41 |
| 1997 | 282 | 112 | 59.5 | 20.6 | 6.23 | 769 | 13.41 |
| 1997 | 282 | 212 | 59.5 | 20.7 | 6.42 | 769 | 13.4 |
| 1997 | 282 | 312 | 59.5 | 20.7 | 6.52 | 769 | 13.4 |
| 1997 | 283 | 22 | 59.3 | 20.8 | 6.59 | 765 | 13.38 |
| 1997 | 284 | 22 | 59.6 | 21.1 | 7.32 | 765 | 13.31 |
| 1997 | 285 | 22 | 59.5 | 21.7 | 6.78 | 768 | 13.38 |
| 1997 | 286 | 22 | 59.3 | 22.1 | 6.89 | 768 | 13.43 |
| 1997 | 287 | 22 | 59.1 | 21.7 | 7.44 | 766 | 13.39 |
| 1997 | 288 | 22 | 59 | 22.6 | 7.12 | 765 | 13.39 |
| 1997 | 290 | 22 | 59.1 | 23.4 | 7.3 | 765 | 13.47 |
| 1997 | 290 | 1105 | 58.9 | 23 | 7.42 | 765 | 13.5 |
| 1997 | 291 | 22 | 58.8 | 23.4 | 7.32 | 764 | 13.49 |
| 1997 | 292 | 22 | 58.4 | 23.8 | 7.44 | 764 | 13.51 |
| 1997 | 293 | 22 | 58.1 | 24.2 | 7.45 | 755 | 13.56 |
| 1997 | 294 | 22 | 57.9 | 24.3 | 7.49 | 756 | 13.55 |
| 1997 | 295 | 22 | 57.8 | 24.4 | 7.37 | 758 | 13.58 |
| 1997 | 296 | 22 | 57.4 | 24 | 6.69 | 760 | 13.6 |
| 1997 | 297 | 22 | 57.2 | 24.2 | 6.78 | 760 | 13.66 |
| 1997 | 298 | 22 | 57.1 | 23.8 | 6.67 | 762 | 13.61 |
| 1997 | 299 | 22 | 56.2 | 23.6 | 6.49 | 761 | 13.64 |
| 1997 | 300 | 22 | 56.4 | 23.9 | 5.97 | 761 | 13.65 |
| 1997 | 300 | 112 | 56.4 | 23.4 | 6.17 | 760 | 13.64 |
| 1997 | 300 | 212 | 56.4 | 23.4 | 6.52 | 759 | 13.63 |
| 1997 | 301 | 22 | 56.2 | 23.3 | 5.77 | 748 | 13.61 |
| 1997 | 301 | 112 | 56.1 | 23.3 | 5.92 | 748 | 13.59 |
| 1997 | 301 | 212 | 56 | 23.4 | 6.26 | 748 | 13.59 |
| 1997 | 301 | 312 | 55.7 | 23.5 | 6.72 | 749 | 13.59 |
| 1997 | 302 | 22 | 56.1 | 23.1 | 6.13 | 759 | 13.66 |
| 1997 | 302 | 112 | 56.1 | 23.1 | 5.97 | 759 | 13.65 |
| 1997 | 302 | 212 | 55.7 | 22.5 | 6.36 | 759 | 13.64 |
| 1997 | 302 | 312 | 55.7 | 22.8 | 6.34 | 760 | 13.64 |
| 1997 | 302 | 412 | 55.6 | 22.7 | 6.57 | 760 | 13.63 |
| 1997 | 303 | 22 | 55.9 | 22.5 | 6.19 | 761 | 13.63 |
| 1997 | 303 | 112 | 55.7 | 22.6 | 6.2 | 761 | 13.61 |
| 1997 | 303 | 212 | 54.7 | 20.8 | 6.98 | 761 | 13.6 |
| 1997 | 304 | 22 | 55 | 21.8 | 6.31 | 766 | 13.59 |
| 1997 | 305 | 22 | 54.6 | 21.8 | 6.6 | 765 | 13.55 |
| 1997 | 306 | 22 | 56.3 | 0.207 | 11.54 | 747 | 13.52 |
| 1997 | 307 | 22 | 56.6 | 7.5 | 9.65 | 752 | 13.46 |
| 1997 | 308 | 22 | 56.2 | 12.66 | 8.27 | 762 | 13.51 |
| 1997 | 309 | 22 | 56 | 14.43 | 7.93 | 763 | 13.53 |
| 1997 | 310 | 22 | 55.9 | 15.3 | 7.94 | 771 | 13.57 |
| 1997 | 311 | 22 | 55.6 | 16.4 | 8.14 | 768 | 13.61 |
| 1997 | 312 | 22 | 55.5 | 16.7 | 7.62 | 760 | 13.62 |
| 1997 | 313 | 22 | 52.8 | 9.83 | 9.36 | 752 | 13.64 |

| YEAR | DAY (Julian) | TIME (Military) | TEMP. (F) | CONDUC-TIVITY (mS) | DISSOL. OXYGEN (mg/L) | BARO. PRES (mmHg) | BATT. VOLTS (volts) |
|---|---|---|---|---|---|---|---|
| 1997 | 314 | 22 | 52.4 | 0.418 | 11.46 | 747 | 13.63 |
| 1997 | 315 | 22 | 52.8 | 5.48 | 10.25 | 754 | 13.64 |
| 1997 | 316 | 22 | 52.7 | 8.45 | 9.76 | 758 | 13.68 |
| 1997 | 317 | 22 | 52.1 | 10.36 | 9.61 | 760 | 13.76 |
| 1997 | 318 | 22 | 51.2 | 11.47 | 9.76 | 762 | 13.77 |
| 1997 | 319 | 22 | 42.1 | 1.395 | 13.38 | 748 | 13.81 |
| 1997 | 320 | 22 | 45.1 | 5.77 | 11.89 | 754 | 13.82 |
| 1997 | 321 | 22 | 46.4 | 8.11 | 11.1 | 758 | 13.84 |
| 1997 | 322 | 22 | 46.8 | 9.06 | 10.76 | 765 | 13.84 |
| 1997 | 323 | 22 | 47.2 | 9.89 | 10.44 | 765 | 13.81 |
| 1997 | 324 | 22 | 47.2 | 10.61 | 10.64 | 758 | 13.8 |
| 1997 | 325 | 22 | 47.2 | 11.13 | 10.68 | 764 | 13.8 |
| 1997 | 326 | 22 | 47.7 | 11.53 | 10.29 | 760 | 13.71 |
| 1997 | 327 | 22 | 46.4 | 1.78 | 11.87 | 762 | 13.76 |
| 1997 | 328 | 22 | 46.2 | 6.1 | 11.4 | 757 | 13.82 |
| 1997 | 329 | 22 | 46.4 | 7.64 | 11.08 | 763 | 13.85 |
| 1997 | 330 | 22 | 46.2 | 8.26 | 11.31 | 755 | 13.85 |
| 1997 | 331 | 22 | 47.2 | 9.56 | 9.7 | 743 | 13.71 |
| 1997 | 332 | 22 | 46.7 | 10.04 | 10.36 | 763 | 13.81 |
| 1997 | 333 | 22 | 46.9 | 11.05 | 9.34 | 755 | 13.82 |
| 1997 | 334 | 22 | 46.4 | 11.68 | 10.42 | 758 | 13.79 |
| 1997 | 335 | 22 | 45.6 | 12.34 | 10.75 | 744 | 13.78 |
| 1997 | 336 | 22 | 44.5 | 5.49 | 11.34 | 746 | 13.85 |
| 1997 | 337 | 22 | 44 | 8.49 | 11.33 | 756 | 13.85 |
| 1997 | 338 | 22 | 44.1 | 8.72 | 11.27 | 756 | 13.78 |
| 1997 | 339 | 22 | 44.7 | 8.96 | 11.1 | 748 | 13.73 |
| 1997 | 340 | 22 | 44.6 | 9.87 | 11.32 | 745 | 13.76 |
| 1997 | 341 | 22 | 44.7 | 10.68 | 11.08 | 747 | 13.81 |
| 1997 | 342 | 22 | 44.9 | 11.45 | 10.81 | 752 | 13.82 |
| 1997 | 343 | 22 | 44.9 | 11.98 | 10.48 | 761 | 13.8 |
| 1997 | 344 | 22 | 44.7 | 12.53 | 10.4 | 758 | 13.82 |
| 1997 | 345 | 22 | 44.7 | 12.85 | 10.61 | 754 | 13.8 |
| 1997 | 346 | 22 | 44.5 | 13.34 | 10.88 | 763 | 13.87 |
| 1997 | 347 | 22 | 44.5 | 14 | 10.82 | 756 | 13.84 |
| 1997 | 348 | 22 | 44.5 | 14.45 | 10.79 | 753 | 13.81 |
| 1997 | 349 | 22 | 44.3 | 14.9 | 10.8 | 759 | 13.89 |
| 1997 | 350 | 22 | 44.3 | 15.3 | 10.24 | 760 | 12.53 |
| 1997 | 351 | 22 | 43.9 | 16.1 | 10.77 | 756 | 12.55 |
| 1997 | 352 | 22 | 44 | 16.6 | 10.78 | 758 | 12.57 |
| 1997 | 353 | 22 | 44.3 | 16.8 | 10.82 | 759 | 12.55 |
| 1997 | 354 | 22 | 44.9 | 17.1 | 10.05 | 757 | 12.55 |
| 1997 | 355 | 22 | 45 | 17.5 | 10.34 | 761 | 12.52 |
| 1997 | 356 | 22 | 45.1 | 17.6 | 10.01 | 768 | 12.47 |
| 1997 | 357 | 22 | 45.2 | 17.6 | 10.16 | 765 | 12.45 |
| 1997 | 358 | 22 | 45.4 | 17.8 | 9.9 | 759 | 12.43 |
| 1997 | 359 | 22 | 45.8 | 18.1 | 9.51 | 764 | 12.44 |
| 1997 | 360 | 22 | 45.9 | 17.9 | 9.38 | 752 | 12.43 |
| 1997 | 361 | 22 | 46.2 | 18 | 9.22 | 757 | 12.42 |
| 1997 | 362 | 22 | 46.1 | 18.2 | 9.35 | 749 | 12.38 |

| YEAR | DAY (Julian) | TIME (Military) | TEMP. (F) | CONDUC-TIVITY (mS) | DISSOL. OXYGEN (mg/L) | BARO. PRES (mmHg) | BATT. VOLTS (volts) |
|---|---|---|---|---|---|---|---|
| 1997 | 363 | 22 | 45.3 | 19.1 | 9.82 | 762 | 12.34 |
| 1997 | 364 | 22 | 45.6 | 19.1 | 9.26 | 738 | 12.33 |
| 1997 | 365 | 22 | 43.3 | 11.66 | 11.34 | 742 | 12.32 |
| 1998 | 1 | 22 | 43.8 | 15.3 | 10.33 | 764 | 12.26 |
| 1998 | 2 | 22 | 30.4 | 10.71 | 12.9 | 762 | 12.21 |
| 1998 | 3 | 22 | 44.5 | 17.1 | 10.14 | 765 | 12.24 |
| 1998 | 4 | 22 | 44.9 | 17.8 | 9.69 | 762 | 12.26 |
| 1998 | 5 | 22 | 45 | 18.3 | 9.8 | 773 | 12.24 |
| 1998 | 6 | 22 | 45.2 | 18.5 | 10.02 | 766 | 12.22 |
| 1998 | 7 | 22 | 45.6 | 18.8 | 9.45 | 764 | 12.2 |
| 1998 | 8 | 22 | 45.9 | 18.5 | 8.81 | 760 | 12.16 |
| 1998 | 9 | 22 | 44.6 | 18.7 | 9.75 | 752 | 12.13 |
| 1998 | 10 | 22 | 44.9 | 16.3 | 9.29 | 755 | 12.1 |
| 1998 | 11 | 22 | 45.5 | 14.85 | 9.78 | 761 | 12.08 |
| 1998 | 12 | 22 | 45.8 | 16.6 | 8.58 | 764 | 12.05 |
| 1998 | 13 | 22 | 45.7 | 17 | 8.9 | 767 | 12.01 |
| 1998 | 14 | 22 | 45.6 | 17.1 | 9.56 | 761 | 11.99 |
| 1998 | 15 | 22 | 45.4 | 17.5 | 9.54 | 771 | 11.95 |
| 1998 | 16 | 22 | 45.4 | 17.5 | 9.62 | 760 | 11.92 |
| 1998 | 17 | 22 | 41.9 | 16.7 | 9.78 | 753 | 11.9 |
| 1998 | 18 | 22 | 43 | 15 | 10.51 | 759 | 11.86 |
| 1998 | 19 | 22 | 43.3 | 15.8 | 10.03 | 761 | 11.84 |
| 1998 | 20 | 22 | 46.1 | 1.92 | 11.99 | 758 | 11.82 |

To: Pamela Harvey@Legal,Glenn Gilmore@MA,Philip DiPietro@brp ww@DEP NERO,Brad Chase@DMF@FWE Gloucester,Leigh Bridges@DMF@FWE,Steven Lipman@Commissioner
From: Judith Perry
Cc:
Bcc:
Subject: Town Brook storm water tunnel releases (Quincy)
Attachment:
Date: 2/27/98 10:05 AM

The Corps or Engineers has provided the first water quality data from the new storm water tunnel at Town Brook, in response to conditions in a 1989 Water Quality Certification. (The WQC designated Glenn Gilmore to receive this info, but the Corps was requested to send it to Pam Harvey. Maybe future reports from the Corps and later from MDC should go to Phil DiPietro as Boston-South basin chief?)

Anyway, the data looks very good as far as D.O. is concerned. I will send you all copies of the data and cover letter. (Please let me know if anyone else should receive this also)

As background, we were concerned that the tunnel 4000 ft long x 12 ft diameter deep underground for flood storage (and periodic discharge) would contain high BOD and very low DO after long storage. An aeration system was proposed and the WQC required it. I spoke to one of the Corps staff involved with the tunnel operation recently (Townsend Barker) and he explained the aeration system. THe system is not quite like the one proposed, but it appears to be very effective. Basically, a pump automatically withdraws a sample of water once a day from the deep tunnel, sampling from near the floor and the roof of the tunnel and brings it up to the surface for automatic analysis. If the DO is below 6 mg/l, the pump keeps withdrawing water and releasing so it cascades back to the bottom. The data shows that the sampling (and pumping) was more frequent on some days than on others and that the data generally shows DO above 6 mg/l. There is also a backup system that provides air injection, if the cascade should fail. Computer control for all this is at the Corps offices. You could call up and ask them to sample the tunnel water on the spot! Also there is a redundant sampling system. The one housed at the tunnel outlet does not work, but the one at the tunnel inlet provided data. Both systems sample from the same part of the center of the tunnel.

The WQC also required grab samples of the tunnel discharge during a storm event in the first month of operation. Data was provided and it looks good, but a discharge was not sampled until a storm January 20, 1998. Tunnel sampling and presumably operation started August 24, 1997. The Corps plans to sample a major storm discharge from the tunnel as per WQC shortly.

Because of the fish run in Town Brook, the WQC (condition 16) required that no tunnel discharge occur between march 15 and May 15 unless DEP had

received at least two months of DO monitoring data showing that the tunnel aeration system works. The data just received provides about five months of good data, I believe.

The WQC requires (condition 14) that DWPC/DEP receive continuous monitoring data monthly. We might consider waiting until after MDC takes over the tunnel operation and then issuing a sunset clause or reduced frequency of reporting to DEP on this, assuming DO of tunnel water is taken care of by the aeration systems in place.

I think we need to respond to the data with a letter to the Corps saying that (per condition 16) the tunnel discharge may occur during March 15 to May 15 based on the good DO data received.

Please direct comments to me or Pam Harvey.