William J. Cahill, Jr.

April 5, 1977

Director of Nuclear Reactor Regulation
Attn: Mr. George W. Knighton, Chief
Environmental Projects Branch No. 1
Division of Reactor Licensing
United States Nuclear Regulatory Commission
Washington, D. C. 20555

RE: Docket Nos. 50-3, 50-247
and 50-286

Dear Mr. Knighton:

In response to your letter dated January 24, 1977, and the accompanying list of questions to which you requested answers, we have attached hereto a response to question #6.

Sincerely,

William J. Cahill, Jr.

jbw/klg

cc: Stephen Lewis, Esq. *
Richard King, Esq. *
Sarah Chasis, Esq. *
Paul Shemin, Esq. *

(NRC PUBLIC DOCUMENT ROOM)

* With Response and Tables; without model listing and computer cards

Question 6

To continue analysis of the LMS one-dimensional, tidal-averaged model for the Hudson River, we need LMS estimates for 1974 and 1975 for each parameter in the model that has a value different from that in 1973. Examples are values for fractional egg production by week and river segment, values for freshwater flow and dispersion coefficient by flow period and river segment, and values for migration preference for each of the three juvenile life stages.

Response:

Attached are three sets of tables showing the 1973, 1974 and 1975 mass transport parameters, fractional distribution of egg production, migration preferences and fertility factors that served as input to the LMS tidal-averaged Transport model.

Also included is the most up-to-date listing of the Transport model with changes enclosed as punched computer cards, and three computer sets of 1973, 1974 and 1975 data files identified as R1B732 for 1973, DAT74 for 1974 and DAT75 for 1975 year simulations.

HUDSON RIVER FRESHWATER FLOW RATES*

(Input to the Transport Model) - 1975

RIVER SEGMENTS (mi)	28 APR-4 MAY	5 MAY-11 MAY	12 MAY-18 MAY	19 MAY-25 MAY	26 MAY-1 JUN	2 JUN-8 JUN	9 JUN-22 JUN	23 JUN-6 JUL	7 JUL-20 JUL	21 JUL-27 JUL	28 JUL-3 AUG	4 AUG-10 AUG	11 AUG-24 AUG	25 AUG-31 AUG
14-23	18.608	24.469	16.876	15.409	13.941	12.621	10.682	6.164	5.356	7.573	5.459	9.934	6.457	7.660
24-33	18.608	24.469	16.876	15.409	13.941	12.621	10.682	6.164	5.356	7.573	5.459	9.934	6.457	7.660
34-38	18.608	24.469	16.876	15.409	13.941	12.621	10.682	6.164	5.356	7.573	5.459	9.934	6.457	7.660
39-46	18.608	24.469	16.876	15.409	13.941	12.621	10.682	6.164	5.356	7.573	5.459	9.934	6.457	7.660
47-55	18.608	24.469	16.876	15.409	13.941	12.621	10.682	6.164	5.356	7.573	5.459	9.934	6.457	7.660
56-61	18.608	24.469	16.876	15.409	13.941	12.621	10.682	6.164	5.356	7.573	5.459	9.934	6.457	7.660
62-76	18.256	24.067	16.436	14.969	13.090	12.327	10.537	6.164	5.298	7.279	5.283	9.686	6.193	7.631
77-85	17.904	23.480	15.849	14.088	12.327	11.740	10.155	5.929	5.195	7.044	5.107	9.392	6.017	7.572
86-93	17.610	22.776	15.262	13.501	11.270	11.447	9.979	5.723	4.990	6.985	4.755	9.099	5.870	7.455
94-106	17.023	21.719	14.499	12.327	9.979	10.625	9.392	5.312	4.960	6.457	4.696	8.805	5.430	7.161
107-124	16.436	20.545	13.208	10.566	8.218	9.979	8.805	4.872	4.461	6.164	4.109	8.159	4.901	7.044
125-140	15.849	19.371	12.327	9.392	6.751	9.099	8.218	4.667	4.138	5.870	4.050	7.572	4.432	6.985

*10^{-3} cubic miles per day

HUDSON RIVER DISPERSION COEFFICIENTS[a]

(Input to the Transport Model) - 1975

RIVER SEGMENTS (mi)	28 APR-4 MAY	5 MAY-11 MAY	12 MAY-18 MAY	19 MAY-25 MAY	26 MAY-1 JUN	2 JUN-8 JUN	9 JUN-22 JUN	23 JUN-6 JUL	7 JUL-20 JUL	21 JUL-27 JUL	28 JUL-3 AUG	4 AUG-10 AUG	11 AUG-24 AUG	25 AUG-31 AUG
14-23	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2
24-33	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
34-38	2.1	2.4	5.5	6.0	6.2	7.2	7.3	7.6	7.8	7.5	7.5	7.3	7.5	7.[illegible]
39-46	1.0	1.0	1.0	1.0	1.0	3.8	6.3	7.4	7.4	6.6	7.4	6.8	7.4	6.[illegible]
47-55	1.0	1.0	1.0	1.0	1.0	1.0	1.2	5.9	6.2	4.4	6.4	1.8	5.6	4.6
56-61	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.9	2.2	1.5	2.2	1.5	1.5	1.3
62-76	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.3	1.5	1.1	1.5	1.0	1.0	1.0
77-85	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
86-93	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
94-106	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
107-124	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
125-140	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

[a] mi^2/day

FRACTIONAL DISTRIBUTION OF EGG PRODUCTION - 1975

TIME DISTRIBUTION OF TOTAL ESTUARY EGG PRODUCTION

WEEK NO.	EGG PRODUCTION
1	0.0460
2	0.5521
3	0.3533
4	0.0379
5	0.0006
6	0.0040
7	0.0061

FRACTIONAL DISTRIBUTION OF EGG PRODUCTION - 1975

WEEKLY SPATIAL DISTRIBUTION (BY RIVER SEGMENT)

SEGMENT (MILE POINTS)	WEEK NO. 1	2	3	4	5	6	7	8
125-154	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
107-124	0.0000	0.0026	0.0012	0.0337	0.0000	0.0000	0.0000	
94-106	0.0671	0.0405	0.1094	0.0000	0.0000	0.0000	0.0000	
86-93	0.6864	0.3681	0.3235	0.1843	0.0000	0.0000	0.0000	
77-85	0.2465	0.4265	0.3191	0.4048	0.9409	0.2645	0.8248	
62-76	0.0000	0.0592	0.1356	0.2876	0.0591	0.0046	0.0844	
56-61	0.0000	0.0554	0.0501	0.1585	0.0000	0.1907	0.0147	
47-55	0.0000	0.0258	0.0243	0.0738	0.0000	0.0000	0.0760	
39-46	0.0000	0.0066	0.0032	0.0000	0.0000	0.0000	0.0000	
34-38	0.0000	0.0091	0.0116	0.0000	0.0000	0.1651	0.0000	
24-33	0.0000	0.0047	0.0220	0.0000	0.0000	0.3751	0.0000	
14-23	0.0000	0.0015	0.0000	0.0000	0.0000	0.0000	0.0000	

FRACTIONAL DISTRIBUTION OF JUVENILE STRIPED BASS
IN THE LOWER HUDSON RIVER - 1975

M.P.	JUVENILE I[a]	JUVENILE II[b]	JUVENILE III[c]
14-23	0.052	0.043	0.043
24-33	0.233	0.242	0.242
34-38	0.267	0.576	0.576
39-46	0.216	0.081	0.081
47-55	0.039	0.010	0.010
56-61	0.159	0.026	0.026
62-76	0.006	0.005	0.005
77-85	0.001	0.003	0.003
86-93	0.006	0.001	0.001
94-106	0.003	0.006	0.006
107-124	0.019	0.008	0.008
125-154	0.001	0.002	0.002

[a]Based on 1975 beach seine data from T.I.
[b]Entrainable juveniles (25 to 50 mm in length)
[c]Impingeable juveniles (50 mm in length)

SELECTED FERTILITY PARAMETERS

AGE GROUPS	FEMALE FRACTION	FEMALE MATURITY	FECUNDITY
1	0.50	0.00	0.0
2	0.52	0.00	0.0
3	0.54	0.00	0.0
4	0.56	0.06	4.086×10^5
5	0.58	0.23	7.454×10^5
6	0.60	0.71	6.551×10^5
7	0.62	0.95	8.922×10^5
8	0.64	1.00	1.353×10^6
9	0.66	1.00	1.512×10^6
10	0.68	1.00	1.799×10^6
11	0.70	1.00	1.972×10^6
12	0.70	1.00	2.201×10^6
13	0.70	1.00	1.956×10^6
14	0.70	1.00	2.189×10^6

HUDSON RIVER VOLUMES FOR EACH SEGMENT AND CROSS-SECTIONAL AREAS AT THE DOWNSTREAM BOUNDARY OF THE i^{th} SEGMENT

RIVER MILE	VOLUME (m^3)	CROSS-SECTIONAL AREA, (10^3 ft^2)
14-23	229,500,000	156.0
24-33	321,600,000	201.5
34-38	147,700,000	202.0
39-46	208,300,000	168.0
47-55	207,400,000	158.0
56-61	139,800,000	160.0
62-76	298,200,000	144.0
77-85	161,500,000	119.0
86-93	141,500,000	116.0
94-106	242,100,000	82.3
107-124	160,700,000	53.3
125-154	71,100,000	21.9

HUDSON RIVER FRESHWATER FLOW RATES*
(Input to the Transport Model) - 1974

RIVER SEGMENTS (mi)	28 APR-11 MAY	5 MAY-18 MAY	12 MAY-25 MAY	26 MAY-8 JUN	9 JUN-15 JUN	16 JUN-29 JUN	30 JUN-6 JUL	7 JUL-13 JUL	14 JUL-27 JUL	28 JUL-10 AUG
14-23	15.556	31.463	16.906	8.013	5.107	6.662	17.140	8.101	4.461	5.459
24-33	15.556	31.463	16.906	8.013	5.107	6.662	17.140	8.101	4.461	5.459
34-38	15.556	31.463	16.906	8.013	5.107	6.662	17.140	8.101	4.461	5.459
39-46	15.556	31.463	16.906	8.013	5.107	6.662	17.140	8.101	4.461	5.459
47-55	15.556	31.463	16.906	8.013	5.107	6.662	17.140	8.101	4.461	5.459
56-61	15.556	31.463	16.906	8.013	5.107	6.662	17.140	8.101	4.461	5.459
62-76	15.556	31.463	16.906	8.013	5.107	6.662	17.140	8.101	4.461	5.459
77-85	15.060	30.780	16.647	8.024	4.910	6.557	17.010	8.024	4.431	5.389
86-93	14.661	29.802	16.103	7.871	4.807	6.339	16.704	7.811	4.326	5.288
94-106	14.069	28.682	15.491	7.685	4.780	6.171	16.338	7.746	4.236	5.204
107-124	13.161	26.555	14.506	7.135	4.563	5.878	15.207	7.253	3.978	4.913
125-140	12.679	25.476	13.853	7.044	4.461	5.811	14.910	7.044	3.874	4.696

*10^{-3} cubic miles per day

HUDSON RIVER DISPERSION COEFFICIENTS*
(Input to the Transport Model) - 1974

RIVER SEGMENTS (mi)	28 APR-11 MAY	5 MAY-18 MAY	12 MAY-25 MAY	26 MAY-8 JUN	9 JUN-15 JUN	16 JUN-29 JUN	30 JUN-6 JUL	7 JUL-13 JUL	14 JUL-27 JUL	28 JUL-10 AUG
14-23	15.8	11.0	15.0	20.0	21.0	21.0	14.9	19.9	22.0	21.5
24-33	10.0	7.0	9.7	14.0	15.7	14.8	9.6	13.9	16.4	15.5
34-38	5.1	3.4	4.8	11.0	13.7	12.4	4.7	10.9	14.7	13.2
39-46	3.2	1.3	3.0	8.3	11.5	9.8	2.9	8.2	12.0	10.8
47-55	1.7	1.0	1.7	5.4	8.1	6.6	1.6	5.4	8.9	7.6
56-61	1.5	1.0	1.2	3.1	5.5	4.2	1.2	3.1	6.2	5.2
62-76	1.2	1.0	1.1	1.8	3.2	2.4	1.1	1.7	4.1	2.9
77-85	1.0	1.0	1.0	1.5	1.6	1.2	1.0	1.3	2.1	1.5
86-93	1.0	1.0	1.0	1.0	1.4	1.1	1.0	1.0	1.5	1.2
94-106	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.2	1.0
107-124	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
125-140	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

*mi^2/day and based on 1974 Hudson River Freshwater Flow.

FRACTIONAL DISTRIBUTION OF EGG PRODUCTION - 1974

TIME DISTRIBUTION OF TOTAL ESTUARY EGG PRODUCTION

WEEK* NO.	WEEKLY EGG PRODUCTION
1	0.0030
2	0.1375
3	0.4526
4	0.3504
5	0.0476
6	0.0037
7	0.0031
8	0.0020

*Referenced to 28 April 1974.

FRACTIONAL DISTRIBUTION OF EGG PRODUCTION, 1974

WEEKLY SPATIAL DISTRIBUTION (BY RIVER SEGMENT)

SEGMENT (MILE POINTS)	WEEK NO. 1	2	3	4	5	6	7	8
14-23	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
24-33	0.0000	0.0000	0.0002	0.0021	0.0011	0.0000	0.0000	0.0000
34-38	0.0000	0.0007	0.0468	0.4502	0.0629	0.0000	0.0000	0.0000
39-46	0.0000	0.0839	0.3628	0.1821	0.0043	0.0000	0.0000	0.0000
47-55	0.8397	0.9146	0.4967	0.0163	0.0734	0.4746	0.3854	0.0463
56-61	0.1603	0.0000	0.0270	0.0200	0.0819	0.2586	0.0135	0.9112
62-76	0.0000	0.0000	0.0538	0.0195	0.2240	0.0784	0.0232	0.0000
77-85	0.0000	0.0000	0.0070	0.0554	0.3638	0.0000	0.0000	0.0000
86-93	0.0000	0.0000	0.0056	0.1570	0.0207	0.0000	0.0000	0.0000
94-106	0.0000	0.0008	0.0000	0.0379	0.1108	0.0000	0.0000	0.0425
107-124	0.0000	0.0000	0.0000	0.0595	0.0572	0.1884	0.0000	0.0000
125-154	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.5779	0.0000

FRACTIONAL DISTRIBUTION[a] OF JUVENILES STRIPED BASS IN THE LOWER HUDSON RIVER - 1974

RIVER MILE POINT RANGE	MIGRATION PREFERENCES		
	JUVENILE I[b]	JUVENILE II[c]	JUVENILE III
14-23	0.0080	0.0400	0.0400
24-33	0.0140	0.0510	0.0510
34-38	0.0800	0.3560	0.3560
39-46	0.3150	0.3170	0.3170
47-55	0.2120	0.1340	0.1340
56-61	0.0790	0.0023	0.0023
62-76	0.0380	0.0040	0.0040
77-85	0.0370	0.0040	0.0040
86-93	0.0430	0.0090	0.0090
94-106	0.0260	0.0070	0.0070
107-124	0.0650	0.0140	0.0140
125-154	0.0830	0.0410	0.0410

[a] Based on 1974 beach seine data from T.I.
[b] Entrainable juveniles (25 to 50 mm in length)
[c] Impingeable juveniles (50 mm in length)

SELECTED FERTILITY PARAMETERS

AGE GROUPS	FEMALE FRACTION	FEMALE MATURITY	FECUNDITY
1	0.50	0.00	0.0
2	0.52	0.00	0.0
3	0.54	0.00	0.0
4	0.56	0.06	4.086×10^5
5	0.58	0.23	7.454×10^5
6	0.60	0.71	6.551×10^5
7	0.62	0.95	8.922×10^5
8	0.64	1.00	1.353×10^6
9	0.66	1.00	1.512×10^6
10	0.68	1.00	1.799×10^6
11	0.70	1.00	1.972×10^6
12	0.70	1.00	2.201×10^6
13	0.70	1.00	1.956×10^6
14	0.70	1.00	2.189×10^6

1973 HUDSON RIVER FRESH WATER FLOW RATES USED IN THE MODEL*
(CUBIC MILES/DAY)

	Seg. No. / Mile Point / Week	1 120-130	2 110-120	3 100-110	4 90-100	5 80-90	6 70-80	7 60-70	8 50-60	9 40-50	10 30-40	11 20-30	12 10-20
1.	4/29-5/12	.0110	.0114	.0117	.0123	.0127	.0130	.0130	.0130	.0130	.0130	.0130	.0130
2.	5/13-5/26	.0252	.0257	.0274	.0282	.0292	.0303	.0303	.0303	.0303	.0303	.0303	.0303
3.	5/27-6/2	.0167	.0173	0.0178	.0185	.0191	.0197	.0197	.0197	.0197	.0197	.0197	.0197
4.	6/3-6/9	.0100	.0102	.0105	.0107	.0110	.0112	.0112	.0112	.0112	.0112	.0112	.0112
5.	6/10-6/16	.0076	.0078	.0082	.0083	.0086	.0087	.0087	.0087	.0087	.0087	.0087	.0087
6.	6/17-6/23	.0058	.0058	.0060	.0061	.0063	.0064	.0064	.0064	.0064	.0064	.0064	.0064
7.	6/24-6/30	.0083	.0086	.0090	.0093	.0096	.0099	.0099	.0099	.0099	.0099	.0099	.0099
8.	7/1-7/7	.0146	.0148	.0152	.0154	.0159	.0162	.0162	.0162	.0162	.0162	.0162	.0162
9.	7/8-7/14	.0052	.0053	.0053	.0054	.0055	.0057	.0057	.0057	.0057	.0057	.0057	.0057
10.	7/15-8/4	.0038	.0039	.0039	.0040	.0041	.0043	.0043	.0043	.0043	.0043	.0043	.0043

*Based on USGS gaging station readings at Green Island, N.Y. (5) and QL&M's analysis of long-term hydrological data for the lower Hudson River.

1973 DISPERSION COEFFICIENTS USED IN THE MODEL*
[(MILE)^2/DAY]

	Seg. No. / Mile Point / Week	1 120-130	2 110-120	3 100-110	4 90-100	5 80-90	6 70-80	7 60-70	8 50-60	9 40-50	10 30-40	11 20-30	12 10-20
1.	4/29-5/12	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.20	2.30	4.20	9.00	13.30
2.	5/13-5/26	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.15	2.40	3.80	8.50
3.	5/27-6/2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.50	3.00	6.20	10.50
4.	6/3 -6/9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.50	3.00	4.40	9.30	14.00
5.	6/10-6/16	1.0	1.0	1.0	1.0	1.0	1.1	1.30	1.80	3.50	5.50	10.40	16.00
6.	6/17-6/23	1.0	1.0	1.0	1.0	1.10	1.30	1.80	3.60	5.70	8.50	12.30	18.20
7.	6/24-6/30	1.0	1.0	1.0	1.0	1.0	1.0	1.20	1.60	3.10	4.70	9.60	14.90
8.	7/1- 7/7	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.20	1.90	4.00	8.00	12.00
9.	7/8- 7/14	1.0	1.0	1.0	1.0	1.0	1.2	2.20	4.10	6.70	9.60	13.00	18.90
10.	7/15-8/4	1.0	1.0	1.0	1.1	1.3	1.80	3.60	5.90	8.90	11.63	14.40	20.37

FRACTIONAL DISTRIBUTION OF EGG PRODUCTION
(Texas Instruments 1973 Data)

TIME DISTRIBUTION OF TOTAL ESTUARY EGG PRODUCTION

Week Number	Calendar Time	Egg Production, Fe*	Starting Time, ts (Days)	Ending Time, te (Days)
1	April 30 - May 6	.0016	0	7
2	May 7 - May 13	.1826	7	14
3	May 14 - May 20	.5108	14	21
4	May 21 - May 27	.0594	21	28
5	May 28 - June 3	.2148	28	35
6	June 4 - June 10	.0191	35	42
7	June 11 - June 17	.0117	42	49
	Total	1.0000		

FRACTIONAL DISTRIBUTION OF EGG PRODUCTION
(Texas Instruments 1973 Data, Reference 4)

WEEKLY SPATIAL DISTRIBUTION (BY RIVER SEGMENT)

Fraction (fsi) of Each Week's Production Assigned to Each 10-Mile River Segment

Week Number	Segment: Mile Pt.:	1 120-130	2 110-120	3 100-110	4 90-100	5 80-90	6 70-80	7 60-70	8 50-60	9 40-50	10 30-40	11 20-30	12 10-20	Tot
1		.000	.000	.101	.000	.899	.000	.000	.000	.000	.000	.000	.000	1.0
2		.003	.001	.000	.000	.099	.000	.116	.772	.009	.000	.000	.000	1.0
3		.000	.001	.005	.006	.222	.015	.085	.146	.286	.213	.021	.000	1.0
4		.000	.000	.000	.000	.024	.000	.000	.652	.214	.000	.000	.000	1.0
5		.005	.001	.001	.002	.177	.077	.041	.680	.011	.005	.000	.000	1.0
6		.005	.026	.114	.021	.215	.038	.194	.174	.213	.000	.000	.000	1.0
7		.005	.000	.000	.000	.000	.026	.000	.018	.744	.207	.000	.000	1.0

$$\text{Daily Egg Production Rate Introduced to Transport Model Segment } i = 2.8 \times 10^9 \times \left(\frac{F_{E^*}}{t_e - t_s}\right) \times fsi,$$

MIGRATION PREFERENCES

(1973 Texas Instruments Beach Seine Data, Reference 4)

Segment Number	River Mile Point Range	Migration Preferences J I	J II	J III
1	120-130	.0028	.0030	.0030
2	110-120	.0026	.0025	.0025
3	100-110	.0012	.0003	.0003
4	90-100	.0066	.0008	.0008
5	80-90	.0064	.0024	.0024
6	70-80	.0069	.0011	.0011
7	60-70	.0253	.0047	.0047
8	50-60	.1382	.0331	.0331
9	40-50	.0698	.0486	.0486
10	30-40	.4000	.7034	.7034
11	20-30	.2386	.1755	.1755
12	10-20	.1016	.0246	.0246

SELECTED FERTILITY FACTORS

Age Group	Female Fraction*	Female Maturity	Fecundity (Eggs/Fertile Female)
1	.50	0	0
2	.52	0	0
3	.54	0	0
4	.56	0	0
5	.58	0	0
6	.60	.67	451,000
7	.62	1.0	780,000
8	.64	1.0	1,543,000
9	.66	1.0	1,563,000
10	.68	1.0	1,841,000
11	.70	1.0	2,095,000**
12	.70	1.0	2,350,000
13	.70	1.0	2,269,000**
14	.70	1.0	2,189,000

*Values between age group 1 and 11 were linearly interpolated from estimates of age group 1 and 11 female fractions.

**Computed by interpolation using data for years 10, 12 and 14.

HUDSON RIVER VOLUMES OF 10-MILE SEGMENT,
UPPER, BOTTOM (BOTTOM 4 ft.) LAYERS AND SHALLOWS

SEGMENT NO.	MILE POINT RANGE	AVERAGE CROSS-SECTION AREA (10^5 FT^2)	SEGMENT VOLUME (10^4 TCM)	UPPER LAYER VOLUME (10^4 TCM)	LOWER LAYER VOLUME (10^4 TCM)	VOLUMES OF SHALLOWS (10^4 TCM)
1	120-130	0.2983	5.2438	3.9629	1.2809	0.716
2	110-120	0.4461	7.6925	5.8337	1.8588	0.985
3	100-110	0.8336	11.0743	8.7171	2.3572	0.440
4	90-100	1.0900	15.7354	13.1588	2.5766	0.954
5	80-90	1.1151	17.6251	15.6315	1.9936	0.597
6	70-80	1.2350	19.3707	17.9255	1.4452	0.297
7	60-70	1.5389	21.3640	18.8522	2.5118	0.985
8	50-60	1.7257	22.4262	20.1138	2.3124	1.044
9	40-50	1.4943	23.9786	22.2766	1.7020	2.152
10	30-40	1.9459	30.0881	23.4796	6.6085	10.794
11	20-30	2.0463	29.1856	24.1970	4.9886	5.082
12	10-20	1.3744	20.8653	18.0084	2.8569	1.345

TCM = thousand cubic meters

*Volume of lower layer represents the volume of the bottom 4 feet. It was computed by multiplying 4 ft. by the average width of a 5-mile segment and summing two 5-mile segment volumes to obtain the 10-mile segment volume.