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Technical Memo

To: Matthew Zerafa, Shell International Exploration and Production, Inc.

From: M. John Thompson and David Snyder, Continental Shelf Associates, Inc.

Date: 5 March 2004

Subject: SEAMAP fish egg data received after the completion of Appendix D of the Gulf Landing Environmental Review

The following SEAMAP data concerning fish eggs collected during SEAMAP surveys in the Gulf of Mexico was provided to us by Dr. Joanne Lyczkowski-Shultz of the NOAA/NMFS Southeast Fisheries Science Center, 3209 Frederic Street, Pascagoula, Mississippi. These data come from a personal database she maintains at the Southeast Fisheries Science Center. Her explanation regarding why these data are not part of the generally available SEAMAP data set is as follows:

"Fish eggs have always been removed from SEAMAP plankton samples but when the SEAMAP data files for ichthyoplankton were developed there was no field designated to contain egg counts. I don't know why this happened but it did. In the new file structures which are being developed for SEAMAP there is a place to hold the egg data but for now egg data is in a separate file which I have only recently put together."

Unfortunately these data reached us too late to be included with the 11 December 2003 version of Appendix D.

If these data are inserted into the quantitative entrainment estimates presented in Table 1 of Appendix D, the potential for fish egg entrainment is slightly less than that presented on our original version of Appendix D.

Table 1 Revised. Comparison of potential entrainment estimates for fish larvae and fish eggs based on a seawater intake of 127 million gallons per day.

Locations	Data Set			Shaw et al. 2002 Fish Larvae Per Day
	SEAMAP		NOAA 11 July 2003 Fish Eggs Per Day	
	On-line Data Base Fish Larvae Per Day	Lyczkowski-Shultz Fish Eggs Per Day		
West Cameron 213 (Preferred Alternative)	536,457	1,381,041	1,471,549	796,800
West Cameron 183	491,271	996,003		
Entire 30-nmi ² SEAMAP Sampling Grid	551,433	1,220,488		

Using the Joanne Lyczkowski-Shultz database, the potential for fish egg entrainment is slightly less than that predicted using the blanket NOAA estimate from their 11 July Memorandum. As explained in Appendix D, there is such a large spatial and temporal variation in plankton samples that we do not consider this slight variation to be significant. The following tables (**Tables 2, 3, and 4**) summarize the fish eggs data collected within the SEAMAP 30 nmi by 30 nmi sampling grid containing the two Gulf Landing terminal alternatives in the same format as the ichthyoplankton tables present in Appendix D.

Table 2. Summary of fish eggs collected within 21 nmi of West Cameron Block 213 (June 1982 through September 1999).

SEAMAP Station	P_Station	Latitude	Longitude	Date	Eggs Numbers/m ³
B207	20004	29°30.50'N	93°01.90'W	6/17/1982	19.034
B207	41080	29°30.00'N	93°00.00'W	6/18/1984	0.370
B207	41374	29°30.00'N	93°00.30'W	8/12/1984	17.541
B211	26	29°30.02'N	93°29.93'W	9/17/1986	0.088
B207	25	29°29.95'N	93°00.02'W	9/17/1986	0.165
B211	46254	29°30.02'N	93°30.01'W	9/22/1987	0.516
B211	48959	29°29.10'N	93°29.40'W	11/4/1988	0.306
B211	50646	29°29.70'N	93°30.10'W	11/5/1989	0.086
B210	36494	29°40.00'N	93°20.00'W	11/17/1989	0.099
B211	51939	29°30.10'N	93°30.00'W	9/23/1990	0.816
B210	36756	29°40.00'N	93°22.00'W	7/10/1991	0.042
B207	53534	29°30.10'N	93°00.00'W	11/2/1991	0.327
B210	36794	29°40.00'N	93°22.00'W	11/5/1991	2.246
B211	54138	29°24.60'N	93°28.80'W	6/29/1992	0.098
B207	54185	29°29.80'N	93°00.10'W	7/6/1992	5.946
B210	41	29°28.00'N	93°30.00'W	9/11/1992	4.040
B211	28081	29°30.18'N	93°30.22'W	9/17/1993	1.303
B207	28088	29°30.20'N	93°00.27'W	9/18/1993	0.525
B211	183	29°29.46'N	93°29.67'W	7/9/1994	0.050
B207	186	29°30.11'N	93°00.13'W	7/9/1994	15.208
B211	28028	29°30.00'N	93°30.00'W	9/16/1994	18.519
B207	28035	29°30.00'N	93°00.40'W	9/17/1994	0.028
B211	154	29°26.24'N	93°29.26'W	10/31/1994	0.102
B207	4150	29°29.96'N	93°00.03'W	7/10/1995	0.460
B211	28045	29°29.90'N	93°30.06'W	9/13/1995	0.219
B207	28046	29°30.03'N	93°00.11'W	9/13/1995	0.295
B211	152	29°30.03'N	93°29.97'W	7/7/1996	0.051
B211	28031	29°29.65'N	93°29.79'W	9/10/1996	0.258
B207	28032	29°30.06'N	93°00.01'W	9/10/1996	0.851
B211	145	29°30.11'N	93°28.96'W	7/5/1997	0.420
B207	189	29°29.90'N	93°00.08'W	7/9/1997	0.986
B207	28032	29°30.02'N	93°00.02'W	9/12/1997	2.750
B211	28031	29°29.98'N	93°29.95'W	9/12/1997	3.417
B211	63032	29°33.40'N	93°29.67'W	9/9/1999	3.092
B207	63040	29°30.01'N	93°00.03'W	9/10/1999	0.309

Summary Statistics	Total/m ³
Mean	2.873
Standard Deviation	5.548
Standard Error	0.938
95% Confidence Interval	1.906
99% Confidence Interval	2.559
Minimum	0.028
Maximum	19.034

Table 3. Summary of fish eggs collected within 25 nmi of West Cameron Block 183 (June 1984 through September 1999).

SEAMAP Station	P_Station	Latitude	Longitude	Date	Eggs Numbers/m ³
B208	41079	29°00.00'N	93°00.00'W	6/18/1984	0.730
B210	41108	29°00.01'N	93°31.53'W	6/22/1984	7.579
B208	41376	29°00.00'N	93°00.00'W	8/12/1984	0.667
B208	41375	29°15.10'N	93°00.00'W	8/12/1984	1.533
B208	41387	29°15.00'N	93°30.00'W	8/13/1984	0.351
B210	27	29°00.80'N	93°30.02'W	9/17/1986	0.013
B210	46253	29°00.98'N	93°30.02'W	9/22/1987	4.127
B210	48530	29°00.00'N	93°28.90'W	9/21/1988	0.423
B208	48975	29°06.10'N	93°04.00'W	11/5/1988	0.911
B210	50655	29°00.09'N	93°29.70'W	11/6/1989	0.143
B208	51929	29°00.00'N	93°00.00'W	9/23/1990	1.182
B208	54182	29°04.77'N	93°00.27'W	7/6/1992	1.900
B210	42	29°00.00'N	93°30.10'W	9/11/1992	3.560
B208	43	29°00.00'N	93°00.00'W	9/11/1992	0.378
B208	54530	29°00.03'N	93°00.04'W	11/6/1992	3.620
B210	28082	29°00.45'N	93°31.47'W	9/17/1993	6.215
B210	28029	29°00.20'N	93°30.00'W	9/16/1994	0.241
B210	151	29°00.27'N	93°30.05'W	10/30/1994	3.970
B210	28051	29°00.05'N	93°29.93'W	9/14/1995	0.063
B210	145	29°00.13'N	93°29.38'W	7/6/1996	0.524
B210	187	29°00.62'N	93°30.60'W	7/9/1997	0.012
B210	28030	29°02.00'N	93°29.23'W	9/11/1997	0.337
B208	28033	29°00.32'N	93°00.15'W	9/12/1997	0.133
B210	183	29°00.51'N	93°30.43'W	7/11/1999	9.615
B210	63033	29°00.13'N	93°31.85'W	9/9/1999	3.577

Summary Statistics	Total/m ³
Mean	2.072
Standard Deviation	2.603
Standard Error	0.521
95% Confidence Interval	1.075
99% Confidence Interval	1.456
Minimum	0.012
Maximum	9.615

Table 4. Summary of fish eggs collected near West Cameron Blocks 183 and 213 (June 1982 through September 1999).

SEAMAP Station	P_Station	Latitude	Longitude	Date	Eggs Numbers/m ³
B207	20004	29°30.50'N	93°01.90'W	6/17/82	19.034
B208	41079	29°00.00'N	93°00.00'W	6/18/84	0.730
B207	41080	29°30.00'N	93°00.00'W	6/18/84	0.370
B210	41108	29°00.01'N	93°31.53'W	6/22/84	7.579
B208	41376	29°00.00'N	93°00.00'W	8/12/84	0.667
B208	41375	29°15.10'N	93°00.00'W	8/12/84	1.533
B207	41374	29°30.00'N	93°00.30'W	8/12/84	17.541
B208	41387	29°15.00'N	93°30.00'W	8/13/84	0.351
B210	27	29°00.80'N	93°30.02'W	9/17/86	0.013
B207	25	29°29.95'N	93°00.02'W	9/17/86	0.165
B211	26	29°30.02'N	93°29.93'W	9/17/86	0.088
B210	46253	29°00.98'N	93°30.02'W	9/22/87	4.127
B211	46254	29°30.02'N	93°30.01'W	9/22/87	0.516
B210	48530	29°00.00'N	93°28.90'W	9/21/88	0.423
B211	48959	29°29.10'N	93°29.40'W	11/4/88	0.306
B208	48975	29°06.10'N	93°04.00'W	11/5/88	0.911
B211	50646	29°29.70'N	93°30.10'W	11/5/89	0.086
B210	50655	29°00.09'N	93°29.70'W	11/6/89	0.143
B210	36494	29°40.00'N	93°20.00'W	11/17/89	0.099
B208	51929	29°00.00'N	93°00.00'W	9/23/90	1.182
B211	51939	29°30.10'N	93°30.00'W	9/23/90	0.816
B210	36756	29°40.00'N	93°22.00'W	7/10/91	0.042
B207	53534	29°30.10'N	93°00.00'W	11/2/91	0.327
B210	36794	29°40.00'N	93°22.00'W	11/5/91	2.246
B211	54138	29°24.60'N	93°28.80'W	6/29/92	0.098
B208	54182	29°04.77'N	93°00.27'W	7/6/92	1.900
B207	54185	29°29.80'N	93°00.10'W	7/6/92	5.946
B210	42	29°00.00'N	93°30.10'W	9/11/92	3.560
B208	43	29°00.00'N	93°00.00'W	9/11/92	0.378
B210	41	29°28.00'N	93°30.00'W	9/11/92	4.040
B208	54530	29°00.03'N	93°00.04'W	11/6/92	3.620
B210	28082	29°00.45'N	93°31.47'W	9/17/93	6.215
B211	28081	29°30.18'N	93°30.22'W	9/17/93	1.303
B207	28088	29°30.20'N	93°00.27'W	9/18/93	0.525
B211	183	29°29.46'N	93°29.67'W	7/9/94	0.050
B207	186	29°30.11'N	93°00.13'W	7/9/94	15.208
B210	28029	29°00.20'N	93°30.00'W	9/16/94	0.241
B211	28028	29°30.00'N	93°30.00'W	9/16/94	18.519
B207	28035	29°30.00'N	93°00.40'W	9/17/94	0.028
B210	151	29°00.27'N	93°30.05'W	10/30/94	3.970
B211	154	29°26.24'N	93°29.26'W	10/31/94	0.102
B207	4150	29°29.96'N	93°00.03'W	7/10/95	0.460

Table 4. (Continued).

SEAMAP Station	P_Station	Latitude	Longitude	Date	Eggs Numbers/m ³
B211	28045	29°29.90'N	93°30.06'W	9/13/95	0.219
B207	28046	29°30.03'N	93°00.11'W	9/13/95	0.295
B210	28051	29°00.05'N	93°29.93'W	9/14/95	0.063
B210	145	29°00.13'N	93°29.38'W	7/6/96	0.524
B211	152	29°30.03'N	93°29.97'W	7/7/96	0.051
B211	28031	29°29.65'N	93°29.79'W	9/10/96	0.258
B207	28032	29°30.06'N	93°00.01'W	9/10/96	0.851
B211	145	29°30.11'N	93°28.96'W	7/5/97	0.420
B210	187	29°00.62'N	93°30.60'W	7/9/97	0.012
B207	189	29°29.90'N	93°00.08'W	7/9/97	0.986
B210	28030	29°02.00'N	93°29.23'W	9/11/97	0.337
B208	28033	29°00.32'N	93°00.15'W	9/12/97	0.133
B211	28031	29°29.98'N	93°29.95'W	9/12/97	3.417
B207	28032	29°30.02'N	93°00.02'W	9/12/97	2.750
B210	183	29°00.51'N	93°30.43'W	7/11/99	9.615
B210	63033	29°00.13'N	93°31.85'W	9/9/99	3.577
B211	63032	29°33.40'N	93°29.67'W	9/9/99	3.092
B207	63040	29°30.01'N	93°00.03'W	9/10/99	0.309

Summary Statistics	Total/m ³
Mean	2.539
Standard Deviation	4.545
Standard Error	0.587
95% Confidence Interval	1.174
99% Confidence Interval	1.562
Minimum	0.012
Maximum	19.034