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Division of Air
Resources Management

KA 124-90-01

March 5, 1992

Mr. John Notar
U.S. National Parks Service-Air
12795 W. Alameda Parkway
Lakewood, CO 80228

Subject: IMC Fertilizer, Inc.
Polk County, Florida
Permit AC53-192221, PSD-FL-170
Impact of Proposed Project
on Chassahowitzka National Wildlife Refuge

Dear Mr. Notar:

On August 1, 1991, the Florida Department of Environmental Regulation (FDER) issued the subject permits to IMC Fertilizer, Inc. (IMC). The permits allowed IMC to increase the production rates of their Nos. 1, 2 and 3 sulfuric acid plants from 2700 tons per day to 2900 tons per day and to increase the production rates of their Nos. 4 and 5 sulfuric acid plants from 2750 tons per day 2900 tons per day of 100 percent sulfuric acid. Sulfur dioxide emissions from each of the five plants are limited by federal New Source Performance Standards to four pounds per ton of 100 percent sulfuric acid produced. Thus, the increases in production rates will result in increases in the sulfur dioxide emission rates; a matter addressed in the permit application submitted by IMC to FDER and a matter approved by the subject permits.

Based upon an air quality review conducted by the U.S. Fish and Wildlife Service (FWS), there was reason to suspect that the 24-hour Class I PSD increment for sulfur dioxide may be exceeded in the Chassahowitzka Wilderness Area; an area approximately 104 kilometers northwest of IMC. The air quality review further indicated that sulfur dioxide emissions from the proposed IMC project might contribute significantly to the exceedance. Based upon this review, and discussions with FDER, the FWS filed a petition for an administrative hearing, challenging the permits issued to IMC. The petition was dated September 3, 1991.

On November 26, 1991, you and other representatives of the FWS met with representatives of IMC at the IMC fertilizer complex in Polk County, Florida. At this meeting, the potential impact of the IMC project on the Chassahowitzka area was discussed, as were possible procedures for resolving the matter. During the meeting, it was pointed out that there were certain errors in the emission inventory used in the air quality review. These errors were subsequently discussed with FDER and corrected.

Regarding the resolution of the matter involving the potential impact of IMC on Chassahowitzka, it was agreed, subsequent to the meeting on November 26, 1991, that the MESOPUFF 2.0 long-range transport model would be the most appropriate tool to use in evaluating the impact of the IMC project on the Chassahowitzka area.

We received a copy of the MESOPUFF 2.0 model from your office in mid-December, 1991, and, following several telephone conversations with you and Mr. John Vimont, we were able to compile the model and duplicate the results of the test data that you provided with the model. We then used the model to assess the impact of the sulfur dioxide emission increase resulting from the sulfuric acid production increase at IMC.

The modeling addressed the impact of the PSD-consuming sources in west central Florida, including minor sulfur dioxide increment-consuming sources located within 50 kilometers of Chassahowitzka, as agreed during our meeting of November 26, 1991. The basic emission inventory is the one that was part of the FWS air quality review in 1991, corrected as discussed in the previous paragraph and supplemented by the addition of the minor facilities.

The meteorological data used with the model were for calendar year 1986. Surface data from Tampa, Orlando and Gainesville, Florida were used, along with upper air data from Tampa and West Palm Beach, Florida. Initially, it was intended to use upper air data from Waycross, Georgia; however, it was discovered that considerable data were missing from this record. Furthermore, Waycross was at such a distance from our computational and receptor grids that it had very little effect. Because of the inordinate amount of missing data in the Waycross record and the distance from our grids to this station, this data set was deleted from the final model runs.

Two increment-consuming sources not included in the emission inventory are the proposed Florida Power Corporation Intercession City project and the sulfuric acid production rate increase proposed by the Agrico Chemical Company. These sources have not been included as neither had been permitted at the time the permits were issued for IMC. Regarding the model setup, most can be determined from the model runs included with this letter. The meteorological grid was 300 kilometers by 300 kilometers, consisting of 15 by 15 grid units. The computation grid was 140 kilometers (7 units) in the east-west direction and 160 kilometers (8 units) in the north-south direction. Land use categories within this grid were determined from maps prepared by Water Management Districts in the

state of Florida. Ten discrete receptors were used to define the boundaries of the Chassahowitzka Wilderness Area.

As discussed with Mr. John Vimont with your agency, the MESOPUFF model has technical options to account for dry deposition of a pollutant, the chemical transformation of a pollutant, and the removal of a pollutant from the atmosphere through wet deposition and rainfall scavenging. Additionally, the model can be run with either two vertical layers or three vertical layers. With the two-layer model, dry deposition is assumed to deplete the pollutant throughout the mixing layer, while with the three-layer model, the dry deposition is assumed to deplete the pollutant in a 10-meter surface layer. The three-layer model further assumes a transfer of a pollutant from the mixing layer (the middle layer of the three-layer model) into the surface layer.

Another option of the model is a choice of vertical pollutant distribution algorithms. One algorithm uses the classical Gaussian dispersion algorithm which, through reflection at the ground surface and the top of the mixing layer, approaches a uniform vertical pollutant distribution at some distance from the source. The second vertical dispersion option assumes a uniform vertical distribution of a pollutant at all distances from a source.

From telephone conversations with Mr. Vimont, it is my understanding that he feels there is justification for using the various technical options in the MESOPUFF model. Mr. Vimont has expressed a concern that the technical options associated with the MESOPUFF model have not been tested or validated through extensive use of the model, but, nevertheless, he recognizes that there are sulfur dioxide depletion mechanisms in the real atmosphere. As a result of our conversations, MESOPUFF model runs were made using six combinations of the technical options available in the model. These combinations, as summarized in the attached table, vary from the use of no options to the use of dry deposition plus chemical transformation plus wet removal plus the three-layer model. An additional model run was conducted using all of the technical options plus the uniform vertical mixing algorithm.

The MESOPUFF model run with <u>no</u> technical options showed an impact in the Chassahowitzka area greater than 5.0 micrograms per cubic meter for one 24-hour period (Julian day 329) in the 365-day record of meteorological data. Under this set of meteorological conditions, a maximum 24-hour sulfur dioxide impact at the Chassahowitzka boundary of 5.47 micrograms per cubic meter was predicted. Also under this set of meteorological conditions, the impact of the IMC project permitted by FDER was 0.028 micrograms per cubic meter; well below the 0.07 micrograms per cubic meter significant impact guideline established by your agency. When the model was run with various combinations of the technical options, there were no predicted exceedances of the 5.0 microgram per cubic meter PSD increment in the Chassahowitzka area. Results of the six model runs are summarized in the attached table and full copies of all model runs are included with this letter.

In my opinion, the modeling reported herein demonstrates that the sulfur dioxide emission increase associated with the sulfuric acid production rate increase proposed by IMC and permitted by FDER under Permits AC53-192221 and PSD-FL-170 will not result in a significant impact in the Chassahowitzka area.

If you have any questions regarding the modeling, please do not hesitate to contact me.

Very truly yours,

KOOGLER & ASSOCIATES

John B. Koogler, Ph.D., P.E.

JBK:mab

cc: Ms. Sandra Silva, Fish and Wildlife Service
Mr. John Bunyak, U.S. National Parks Service
Mr. John Vimont, U.S. National Parks Service
Mr. Clair Fancy, FDER, Tallahassee
Mr. Tom Rogers, FDER, Tallahassee
Mr. Joe Baretincic, IMC Fertilizer, Inc.
Mr. Tom Patka, Holland & Knight

SUMMARY OF MESOPUFF AIR QUALITY MODELING ANALYSES

IMC, POLK COUNTY, FLORIDA

Option(1)	Impact of All Increment Consuming Sources(2)			Impact of Emissions from Proposed IMC Project	
	24-Hr Periods with Impact >5 μg/m3 (Julian Day, 1986)	Max 24-hour Impact (μg/m3)	Number of Class I Receptors with impact >5 μg/m3	24-hour Period (Julian Day, 1986)	Max 24-hour Impact at any Class I Receptor on Julian Day (μg/m3)
Gaussian Vertical Dispersion Algorithm					
1	329	5.47	5	329	0.028
2	None (329)(3)	4.18	0	329	0.016
3	None (329)(3)	4.13	0	329	0.013
4	None (329)(3)	4.13	0	329	0.013
5	None (329)(3)	4.12	0	329	0.013
Uniform Vertical Mixing Algorithm					
6	None (317)(3)	2.08	0	317	0.001

(1) Gaussian Dispersion Algorithm used for Vertical Dispersion

Option	Technical Model Options Employed
1	No Options
2	Dry Deposition
3	Dry Deposition + Chemical Transformation
4	Dry Deposition + Chem Trans + Wet Removal
5	Dry Deposition + Chem Trans + Wet Removal + Three-Level Model

Uniform Mixing Algorithm used for Vertical Dispersion

Option	Technical Model Options Employed
6	Dry Deposition + Chem Trans + Wet Removal + Three-Level Model

(2) 24-Hour SO_2 Impact of all PSD increment consuming sources on Chassahowitzka Class I Area.

(3) No impact greater than 5 $\mu g/m^3$; meteorology resulting in greatest impact shown in parenthesis.

MESOPUFF 2.0

SULFUR DIOXIDE EMISSION INVENTORY

WEST-CENTRAL FLORIDA

X (m)	Y (m)	HT (m)	DIAM (m)	VEL (m/s)	TEMP (K)	EMIS (g/s)	SOURCE DESCRIPTION
9.03	7.89	15.2	4.21	56.21	820	466.40	FPC DEBARY PROP TURBINES
8.62	7.72	15.2	4.21	56.21	820		FPC INT. CITY PROP TURBINES (1)
8.62	7.72	15.2	7.04	32.07	881		FPC INT. CITY PROP TURBINES (1)
6.95	7.80	97.6	4.88	23.23	442	98.40	FLORIDA CRUSHED STONE CPL
7.49	7.69	60.3	2.44	16.40	353	-50.40	CF IND. BASELINE C
7.49	7.69	60.3	2.44	17.77	353	54.60	CF IND. PROPOSED C
7.49	7.69	60.3	2.44	16.40	353	-50.40	CF IND. BASELINE D
7.49	7.69	60.3	2.44	17.77	353	54.60	CF IND. PROPOSED D
6.88	7.82	27.4	4.88	7.48	470	1.45	FLORIDA MINING & MATERIALS
6.99	7.59	149.4	7.32	19.81	342	654.70	TECO BIG BEND-UNIT 4
6.99	7.59	149.4	7.32	28.65	422	-2436.00	TECO BIG BEND-UNITS 1&2
6.99	7.59	149.4	7.32	14.33	418	-1218.00	TECO BIG BEND-UNIT 3
6.70	7.75	83.8	3.05	15.70	394	14.10	PASCO COUNTY RRF
7.40	7.74	12.3	0.40	9.20	466	0.20	EVANS PACKING
6.98	7.82	8.5	1.08	10.95	357	2.25	ASPHALT PAVERS NO. 4
6.95	7.80	12.2	1.37	10.58	377	2.25	ASPHALT PAVERS NO. 3
7.30	7.66	30.5	5.79	28.22	783	29.11	LAKELAND UTILITIES CT
7.66	7.60	61.0	2.60	14.28	350	-170.10	IMC SAP #1,2,3 BASELINE (2)
7.66	7.60	61.0	2.60	15.31	350	182.85	IMC SAP #1,2,3 PROJECTED (3)
7.66	7.60	60.7	2.60	15.31	350	121.90	IMC SAP #4,5 PROJECTED (4)
7.66	7.60	36.6	1.83	20.15	319	5.54	IMC DAP
7.45	7.75	30.5	3.35	17.13	384	5.04	PROPOSED PASCO CO. COGEN.
8.38	7.89	30.5	3.35	17.13	384	5.04	PROPOSED LAKE CO. COGEN.
7.38	7.81	9.1	0.61	4.57	478	2.99	FDOC BOILER #3
7.47	7.79	10.7	1.83	8.99	327	0.82	E.R. JAHNA (LIME DRYER)
6.95	7.81	7.6	1.83	6.29	347	2.09	OHAN CONST. (ASPHALT)
6.58	7.70	12.2	3.05	6.47	339	0.23	DRIS PAVING (ASPHALT)
6.87	7.76	9.1	1.30	16.00	408	3.67	OVERSTREET PAV. (ASPHALT)
6.40	7.71	11.0	0.31	3.88	544	0.06	NEW PORT RICHEY HOSP BLR #1
6.40	7.71	11.0	0.31	3.88	544	0.03	NEW PORT RICHEY HOSP BLR #2
6.44	7.75	11.0	0.31	4.00	533	0.08	HOSP CORP OF AM BOILER #1
6.44	7.75	11.0	0.31	4.00	533	0.08	HOSP CORP OF AM BOILER #2
6.58	7.70	9.1	1.40	22.30	436	7.25	COUCH CONST-ODESSA (ASPHALT)
7.54	7.72	6.1	1.38	21.00	422	3.54	COUCH CONST-ZEPHYRHILLS (ASPHALT)
7.87	7.58	45.7	1.60	39.06	350		AGRICO PROPOSED (1)
7.87	7.58	45.7	1.60	26.40	350		AGRICO BASELINE (5)
9.30	7.77	167.6	5.80	21.60	326	105.40	OUC STANTON
9.30	7.77	167.6	5.80	23.50	324	242.40	OUC STANTON

(1) Not permitted at the time the IMC permit was issued.

(2) IMC sulfuric acid plants Nos. 1, 2 and 3; baseline emissions are not increment consuming.

(3) IMC sulfuric acid plants at 2900 tpd H_2SO_4, each plant.

(4) IMC sulfuric acid plants at 2900 tpd H_2SO_4, each plant. Plants were previously permitted at 2750 tpd, each plant.

(5) Agrico sulfuric acid plant baseline emissions are not increment consuming.