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August 31, 2004

Regular Mail

Mr. Samuel S. Stone
Environmental Affairs Coordinator
Peace River Facility
8998 S.W. County Road 769
Arcadia, FL 31269

**RE: Horse Creek Stewardship Program
Sulfate Impact Assessment – State Road 72 – June 2004**

Dear Mr. Stone:

The sulfate concentration at State Road 72 (261 mg/l) associated with the June 2004 water quality sampling exceeded the Program trigger level (250 mg/l). None of the previous samples taken at State Road 72 during the Program sampling have been above 200 mg/l and none of the stations upstream of State Road 72 (and closer to IMC's activities) have ever exceeded the trigger level. As a consequence of the trigger level exceedance, an impact assessment for sulfate at State Road 72 was performed on July 13, 2004.

Elevated sulfate concentrations were recorded during the impact assessment sampling of the major tributaries (Brandy Branch and Buzzard Roost Branch) of Horse Creek that confluence with the main stem of Horse Creek between State Road 70 and State Road 72. These basins have a disproportionate share of the irrigated agriculture activity in the Horse Creek Basin and appears likely that withdrawal of groundwater (that is enriched in sulfates) for crop irrigation and the subsequent run off into these tributaries (along with very low flow levels in Horse Creek at that time) are the principal factors driving the elevated sulfate concentration at State Road 72 in June 2004.

If you have any other questions or need any further information, please contact me at (813) 634-3922, extension 3655 at your convenience.

Sincerely,

Ross Franklin

IMC Impact Assessment
Sulfate Concentrations - Horse Creek at State Road 72
July 13, 2004

As part of the Horse Creek Stewardship Program, IMC Phosphates samples four locations once per month on Horse Creek in Hardee and Desoto Counties for a number of chemical and physical parameters. One of these parameters is sulfate. A "trigger level" of 250 mg/l was set for sulfate concentrations at all four locations in the Program. To date, 15 months of sampling have been completed and sulfate concentrations determined at the stations. In June 2004, the sulfate concentration at State Road 72 was greater than the trigger level. All of the Stewardship Program sulfate sampling is presented in Table 1 attached. Summary statistics of the sampling are presented in the table below:

Horse Creek Stewardship Program - Sulfate History
2003 - 2004

	State Road 64 Sulfate mg/l	Goose Pond Road Sulfate mg/l	State Road 70 Sulfate mg/l	State Road 72 Sulfate mg/l
Minimum:	15	6	12	20
Median:	27	9	57	74
Mean:	30	14	68	104
Maximum:	77	39	146	261

The entire sulfate history for the State Road 72 sampling station is provided below.

Horse Creek Stewardship Program - Sulfate History
2003 - 2004

Date	State Road 72 Sulfate mg/l
4/30/2003	158
5/27/2003	49
6/19/2003	68
7/14/2003	46
8/28/2003	20
9/25/2003	27
10/29/2003	72
11/20/2003	67
12/16/2003	199
1/29/2004	97
2/24/2004	84
3/16/2004	74
4/14/2004	184
5/26/2004	149
6/29/2004	261

Analysis

All sulfate concentrations recorded as part of the Program are included in Table 1 (attached). A trigger level of 250 mg/l is in effect for the State Road 64, Goose Pond Road, State Road 70, and State Road 72 stations. The lowest sulfate concentrations to date have been recorded at Goose Pond Road, half the level of those at State Road 64 and one-quarter the concentrations seen at State Road 70. The State Road 72 road station is elevated compared to the other three stations, both for the mean and the maximum concentrations.

A special sampling program was carried out on July 13, 2004. The intent was to use the same stations sampled during the previous investigation of dissolved iron concentrations at State Road 72 (Horse Creek at State Road 70, Horse Creek at Pine Level Road, and Horse Creek at State Road 72, Brandy Branch at State Road 70, and Buzzard Roost Branch at State Road 70 and Buzzard Roost Branch at Pine Level Road). The results from these six stations for sulfate, total dissolved solids, and a number of other major ions (chloride, magnesium, calcium, fluoride, sodium, potassium, bicarbonate, and nitrate-nitrite) are presented in Table 2 (attached). There is a large difference in sulfate concentrations across the stations.

Samples from July 13, 2004	Sulfate (mg/l)
Horse Creek at State Road 70	45
Horse Creek at Pine Level Road	109
Horse Creek at State Road 72	133
Brandy Branch at State Road 70	522
Buzzard Roost Branch at State Road 70	541
Buzzard Roost Branch at Pine Level Road	462

The main stem of Horse Creek at State Road 70 had the lowest sulfate concentration and indicated that mining activities upstream of this site have no impact on Horse Creek sulfate concentrations. There was no discharge of waste water to Horse Creek in either June or July 2004 from IMC Phosphates industrial wastewater system. The Horse Creek sulfate concentrations doubled at Pine Level Road (after the confluence with Brandy Branch) and then increased by a third at State Road 72 (after the confluence with Buzzard Roost Branch). One difference between the June 29, 2004 sample and the July 13, 2004 sample was the stream flow magnitude. The stream flow at State Road 72 was 36 cfs on June 29th, by the time of the special sampling on July 13, 2004 stream flows had tripled to 107 cfs. The effect of the elevated sulfates in Brandy and Buzzard Roost Branch was diluted by the greater amount of water in the main stem of Horse Creek on the date of the special sampling event. Sulfate concentrations however, still increased three-fold between State Road 70 and State Road 72

These levels of sulfate concentrations for Buzzard Branch and Brandy Branch are not unusual. Sulfate concentrations of well over 250 mg/l have been recorded in past sampling efforts (*Hydrologic and Water-Quality Conditions in the Horse Creek Basin, West Central Florida, October 1992 – February 1995, USGS, Table 11*). The United States Geological Survey has irregularly sampled Horse Creek at State Road 72 for sulfate since 1962. The results are presented in Table 3 (attached) and a summary of the data is presented below:

Horse Creek at State Road 72 - USGS Sulfate Sampling Summary
1962 – 1999

	Sulfate mg/l
Minimum:	4.8
Median:	37
Mean:	53.7
Maximum:	340
Count:	63

The dozen highest sulfate concentration samples along with their date of occurrence and the associated stream flow values are presented in Table 4 (attached). The four highest sulfate concentrations (those over 200 mg/l) occurred in March, April, May, and June as did eight of the dozen highest concentrations. Stream flow values associated with the highest sulfate concentrations were all less than 100 cfs and all but one were less than 50 cfs. Three of the four highest concentrations occurred when stream flow at State Road 72 was less than five cfs. The June 29, 2004 sulfate concentration of 261 mg/l fits in this pattern (occurring in June and with a stream flow of less than 50 cfs).

Conclusion

Between State Road 70 and State Road 72, two (Buzzard Branch and Brandy Branch) of Horse Creek's four principal sub-basins confluence with the main stem of the river. No mining activities occur within these two sub-basins. These two sub-basins do however have a much higher percentage of non-cattle agricultural activity than the other sub-basins or the main stem drainage of Horse Creek. There is a fair amount of citrus in the middle part of the basin; but these two sub-basins have the large concentrations of irrigated agriculture in the Horse Creek Basin (*Hydrologic and Water-Quality Conditions in the Horse Creek Basin, USGS, pp. 12-14*). The discharge or run off of sulfate-enriched well water for irrigation purposes from these activities results in elevated sulfate concentrations in Brandy and Buzzard Roost Branch. At times (principally the spring of the year), the discharge of irrigation water will coincide with dry conditions throughout the Basin and result in discharge from these two sub-basins making up a disproportionately high percentage of the discharge at State Road 72. When this situation occurs, sulfate concentrations at State Road 72 can exceed the 250 mg/l trigger level.

Table 1
Horse Creek Stewardship Program - Sulfate History
2003 - 2004

Date	State Road 64 Sulfate mg/l	Goose Pond Road Sulfate mg/l	State Road 70 Sulfate mg/l	State Road 72 Sulfate mg/l
4/30/2003	45	39	66	158
5/27/2003	36	12	34	49
6/19/2003	24	12	22	68
7/14/2003	77	9	35	46
8/28/2003	20	9	12	20
9/25/2003	33	8	22	27
10/29/2003	22	8	69	72
11/20/2003	16	9	57	67
12/16/2003	31	16	146	199
1/29/2004	27	26	71	97
2/24/2004	23	20	52	84
3/16/2004	15	14	52	74
4/14/2004	23	9	130	184
5/26/2004	27	6	110	149
6/29/2004	27	7	139	261
Minimum:	15	6	12	20
Median:	27	9	57	74
Mean:	30	14	68	104
Maximum:	77	39	146	261

Table 2
 Sulfate Impact Assessment Sampling
 July 13, 2004

Location	Time	Conductance umhos/cm		Chloride mg/l	Dissolved Sodium mg/l	Dissolved Magnesium mg/l	Dissolved Potassium mg/l
Horse Creek at State Road 70 (HCSW-3)	10:40	177	D	11	4.7	6.8	3.2
Brandy Branch at State Road 70	11:05	1098	D, J	30	13.7	53.6	15.9
Buzzard Branch at State Road 70	11:20	1149	D, J	32	13.5	54.8	23.5
Horse Creek at Pine Level Road	11:35	328	D	15	6.2	13.1	5.4
Buzzard Roost Branch at Pine Level Road	11:45	1019	D, J	27	14	50.5	12.8
Horse Creek at State Road 72 (HCSW-4)	12:00	426	D	20	9.3	17.3	6.7

A standard of 1,000 umhos/cm was used to calibrate the conductivity meter.
 Three of the samples exceeded this limit. As TDS and all the major ions were being analyzed on all the samples,
 a dilution or calibration with a higher standard was not done.

Table 2
 Sulfate Impact Assessment Sampling
 July 13, 2004

Location	Dissolved Calcium mg/l	Nitrate-Nitrite mg/l	Fluoride mg/l	TDS mg/l	Sulfate mg/l	Bicarbonate mg/l CaCO ₃
Horse Creek at State Road 70 (HCSW-3)	16	0.3	0.2	167	45	22
Brandy Branch at State Road 70	146	0.42	0.5	970	522	!
Buzzard Branch at State Road 70	143	0.4	0.6	1038	541	!
Horse Creek at Pine Level Road	32.7	0.36	0.3	279	109	16
Buzzard Roost Branch at Pine Level Road	125	0.25	0.7	815	462	44
Horse Creek at State Road 72 (HCSW-4)	43.3	0.37	0.3	348	133	28

Table 3:
Horse Creek at State Road 72 - 1
1962 - 1999

Date	Streamflow cfs	Sulfate mg/l
6/13/1962	68	25
2/20/1963	375	8.8
5/17/1963	1.1	25
1/16/1964	398	10
2/26/1964	240	6.8
3/25/1964	96	9.7
4/14/1964	56	7.2
9/22/1964	214	4.8
5/11/1965	0.5	25
9/14/1965	61	37
1/24/1966	89	21
2/28/1966	812	5.1
4/21/1966	30	14
5/23/1966	10	99
1/1/1967	5.4	45
1/10/1967	6.7	44
1/19/1967	8.4	70
6/8/1967	3.4	69
9/1/1967	907	8.8
9/16/1967	140	22
5/17/1968	11	138
5/22/1969	9.2	30
6/9/1970	351	5.5
6/10/1970	265	6.8
10/25/1978	15	40
10/17/1979	173	10
10/21/1980	6.6	39
10/21/1981	19	42
8/26/1982	325	13
10/18/1982	285	6.8
10/18/1983	212	28
10/24/1984	2.8	65
10/24/1985	49	47
10/29/1986	73	130
10/19/1987	123	37
10/26/1989	18	60
10/31/1990	41	23
6/6/1991	245	26
6/11/1992	18	230
9/24/1992	245	19
10/28/1992	34	37
9/8/1993	465	27
1/28/1994	48	65

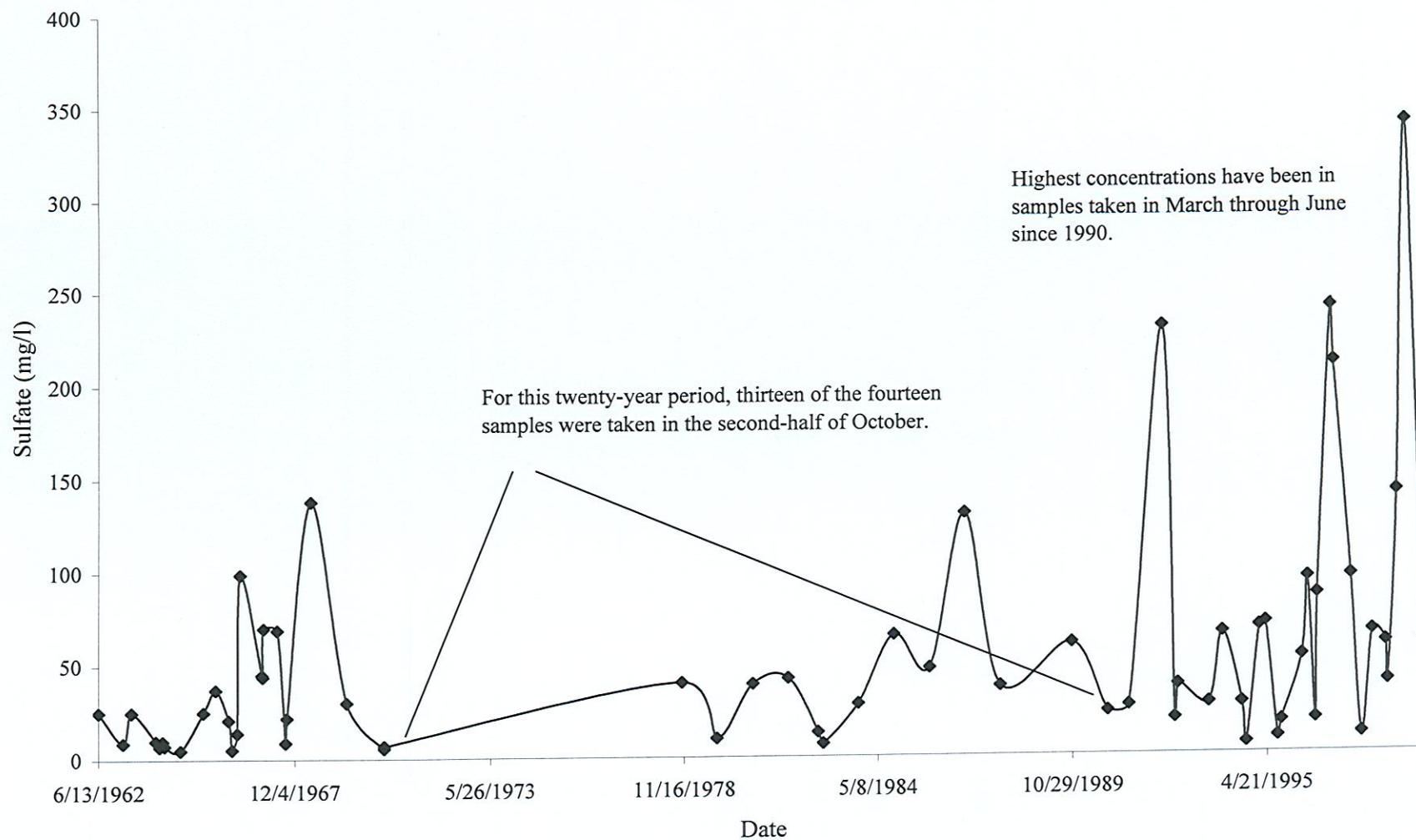
Table 3:
Horse Creek at State Road 72 - 1
1962 - 1999

Date	Streamflow cfs	Sulfate mg/l
8/11/1994	648	27
9/19/1994	3840	5.6
2/8/1995	51	68
4/12/1995	40	70
8/8/1995	1670	8.6
9/14/1995	720	17
4/18/1996	33	52
6/19/1996	27	94
8/29/1996	95	18
9/25/1996	17	85
3/6/1997	3	240
4/2/1997	1.2	210
9/11/1997	18	95
12/17/1997	2640	10
4/16/1998	45	65
9/2/1998	84	59
9/17/1998	133	38
1/6/1999	43	140
5/3/1999	2.9	340
9/29/1999	212	61
Count:		63
Minimum:		4.8
Median:		37
Mean:		53.7
Maximum:		340

Table 4:
Horse Creek at State Road 72 - USGS Sulfate Sampling - Twelve Highest Values
1962 - 1999

Date	Streamflow cfs	Sulfate mg/l
5/3/1999	2.9	340
3/6/1997	3	240
6/11/1992	18	230
4/2/1997	1.2	210
1/6/1999	43	140
5/17/1968	11	138
10/29/1986	73	130
5/23/1966	10	99
9/11/1997	18	95
6/19/1996	27	94
9/25/1996	17	85
1/19/1967	8.4	70
4/12/1995	40	70

Horse Creek at State Road 72
USGS Sulfate Sampling - 1962 - 1999





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HON. SHANNON STAUB
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PATRICK J. LEHMAN, P.E., EXECUTIVE DIRECTOR

MEMORANDUM

September 16, 2004

TO: File

FROM:  Sam Stone

RE: Horse Creek Stewardship Program
Horse Creek at State Road 72 (HCSW-4)
High Sulfate Levels Impact Assessment

In June 2004 the Horse Creek at State Road 72 (HCSW-4) sample location experienced sulfate levels above the trigger level of 250 mg/l. IMC proceeded to implement an impact assessment of these conditions and transmitted the written assessment to the Authority (see attached). The Authority staff (in cooperation with Earth Balance) has reviewed and discussed IMC's assessment and provide the following comments.

The sulfate levels over the past 15 months are all below the trigger level at Stations 1, 2, and 3. Sulfate levels at station 4 typically are higher than at the other stations for a given set of monthly samples. Historical sulfate levels from the USGS at State Road 72 show that higher levels of sulfate are not uncommon and that the highest levels have a tendency to occur during the drier Spring time of the year. A special sampling program was initiated on July 13, 2004 by IMC on the main Horse Creek channel and from tributaries to Horse Creek between State Road 70 and State Road 72. From this information it is evident that the higher sulfate levels are coming from the Brandy Branch and Buzzard Roost Branch tributaries into Horse Creek. Since there are no phosphate activities within these two local basins we can agree with IMC that the sulfate levels in excess of the trigger level found at Station 4 is most likely not related to phosphate mining activities. A review of the other parameters collected as part of the special sampling, also show high TDS, calcium, conductivity and high fluoride similar to what would be expected from ground water mixed with surface water. USGS Water Resources Report 96-4146 also reports that it is not uncommon to find high sulfate ground water in the western DeSoto and Hardee County area where these tributaries originate. It is therefore very likely that the high sulfate levels at station 4 are related to some local activity related to ground water pumping (possibly agricultural irrigation) and subsequent run off into Brandy Branch and Buzzard Roost Branch.

As a result of this event the Authority and IMC will continue to monitor for sulfates at Station 4 with the expectation that sulfate levels may increase again next year as stream flows and rainfall decline.

xc: Pat Lehman
Sunny Diver
Ralph Montgomery
Terry Briggs

Rob Brown
James Chisholm
John Ryan
Ross Franklin