NEBRASKA
DEPT. OF ENVIRONMENTAL QUALITY

Addendum to the 2016 Ambient Air Monitoring Network Plan
NDEQ Document # 16-020a

Date: November 17, 2016

Purpose: This addendum proposes to establish a new, source-oriented, ambient air monitoring site for SO2 at the OPPD ballpark on Pershing Drive in Omaha, NE.

Background: The Nebraska Department of Environmental Quality (NDEQ), in consultation with EPA Region 7, submitted on June 29, 2016, a proposal in the 2016 Ambient Air Monitoring Network Plan (Attachment F), to use the existing SO_2 site at 1616 Whitmore Street in Omaha, NE to meet the monitoring requirements of 40 CFR Part 51 Subpart BB (a.k.a. the Data Requirements Rule or DRR). Upon further review and consultation with EPA Region 7, the NDEQ now proposes to establish a new monitoring site to meet the DRR monitoring requirements. This new site is to be operational by 1/1/2017.

The existing SO_2 monitoring site at 1616 Whitmore will be retained, as proposed in the 2016 Ambient Air Monitoring Network Plan.

DRR Justification:
Emission Sources

The main major SO_2 emission sources in the vicinity of North Omaha Station are the Station itself, Eppley Airfield in Omaha, and Mid-American's Walter Scott Energy Center in Council Bluffs, IA. North Omaha Station has historically been a coal-fired electrical generating unit (EGU), and is capable of generating approximately 650 megawatts of electricity.

Based on annual Acid Rain Program data over the past 10 years, North Omaha Station's total SO_2 emissions (for Units 1 through 5) have ranged from approximately 10,500 tpy to 15,000 tpy with the average being approximately 13,000 tpy. For 2015, the total SO_2 emissions for all units were 13,892 tons. Figure Ad-1 shows these data, demonstrating an overall downward trend in SO_2 emissions.

Quarterly Acid Rain Program data from the past 10 years indicate that, in general with few exceptions, the highest SO_2 emissions from the facility occur during the 3rd quarter and sometimes 4th quarter. This is to be expected during the hottest months of the year due to increased demand on power stations for cooling needs. Figure Ad-2 demonstrates these trends.

In 2014, the OPPD board of directors approved a plan to retire three of the five coal-burning units at North Omaha Station, and to install emissions controls on the remaining two units which will be refueled in 2023 with natural gas. OPPD ceased coal operation of the first three coal-burning units in April 2016 (these units are still capable of firing natural gas); these three units accounted for approximately 47% of the facility's annual SO_2 emissions, on average, while burning coal.

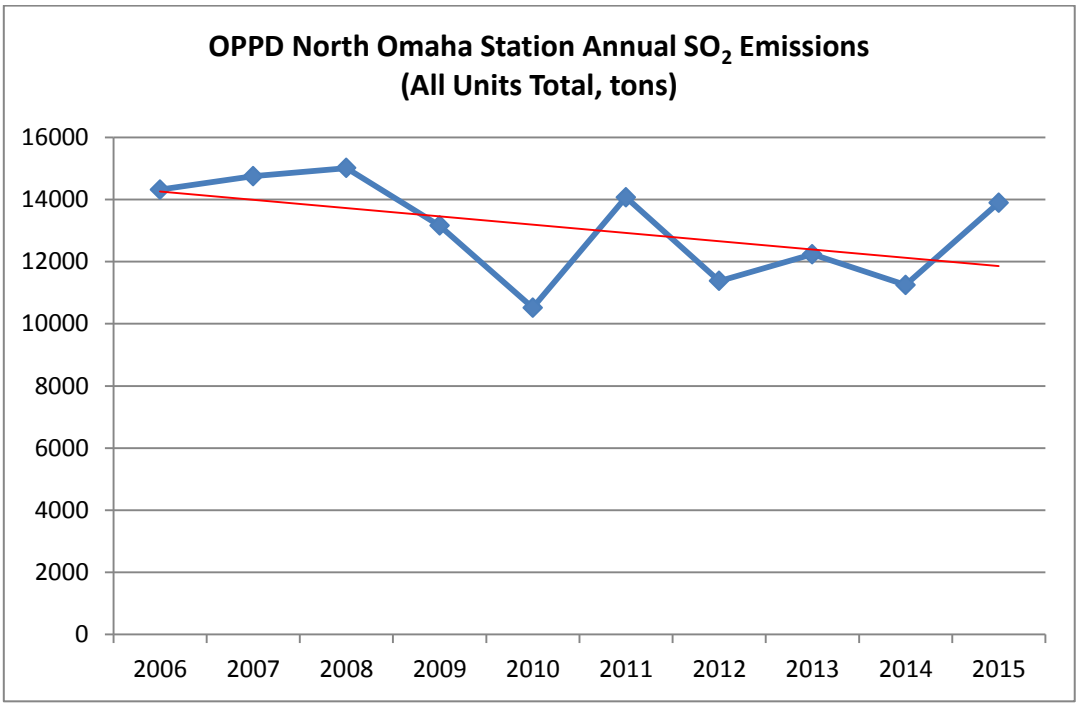

Figure Ad-1: OPPD North Omaha Station Annual SO_2 Emissions

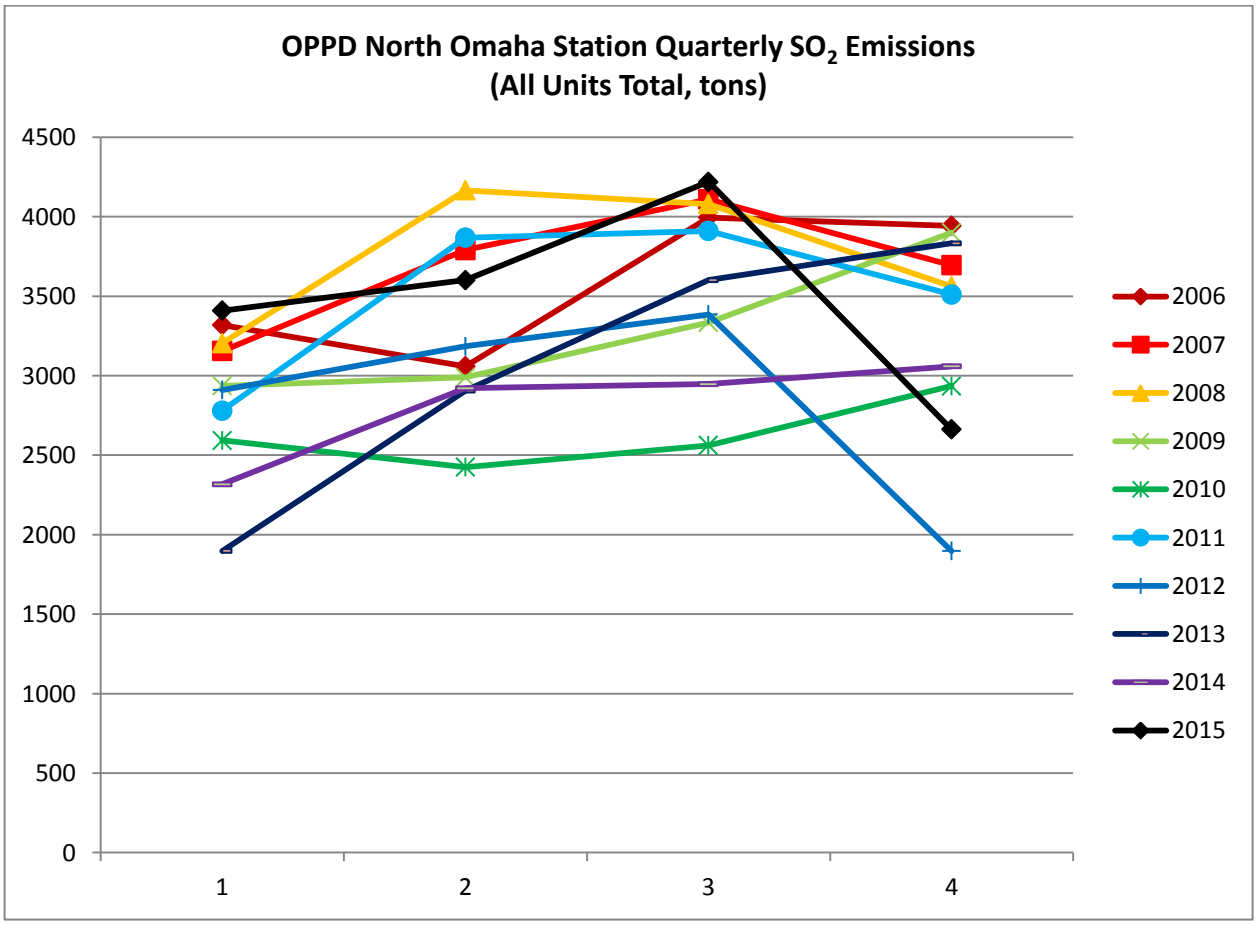

Figure Ad-2: OPPD North Omaha Station Quarterly SO_2 Emissions

Existing Air Quality Data

Due to existing SO_2 monitors in the Omaha area, including the Whitmore monitor, data are available to characterize air quality with respect to SO_2 for an extended period of time. As demonstrated in Figure Ad-3, excerpted from NDEQ's *2015 Ambient Air Monitoring Network Plan & Assessment*, there is a significant overall downward trend in maximum annual average SO_2 in the Omaha MSA since measurement collection began, and also a significant decline in the range of maximum annual values in more recent years.

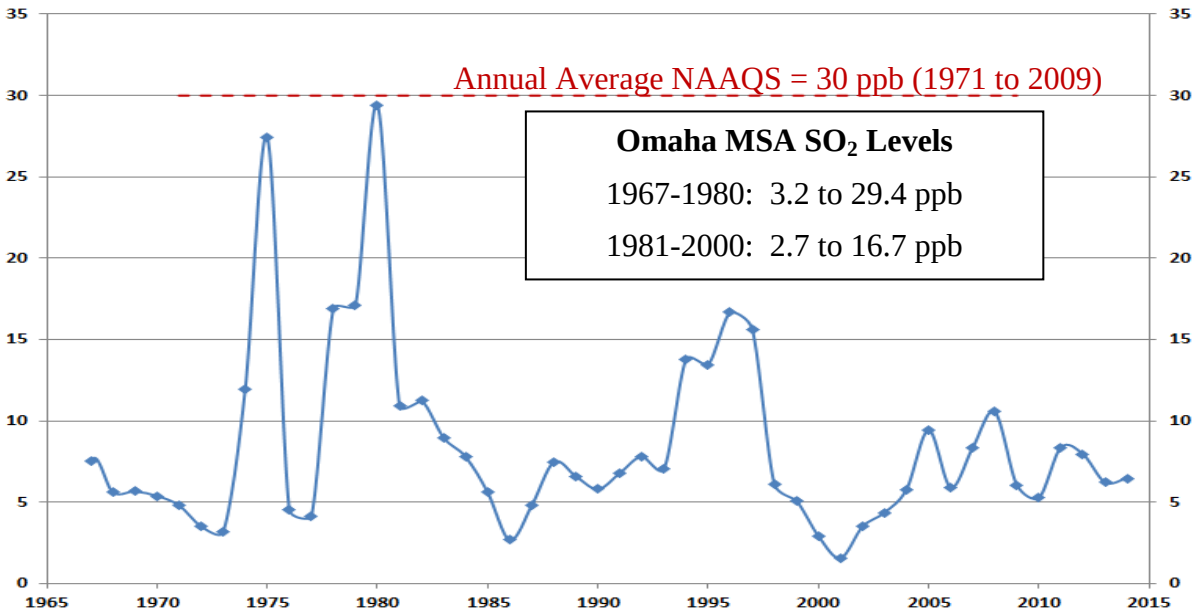

Figure Ad-3: Maximum Annual Average SO2 in Omaha MSA: 1967-2014

As demonstrated in Figure Ad-4, the Whitmore monitor has recorded an overall downward trend in annual 99th percentile SO_2 values since 2006, as well as declines in the three-year design values. No design values have exceeded the 2010 1-hour SO_2 NAAQS since 2009.

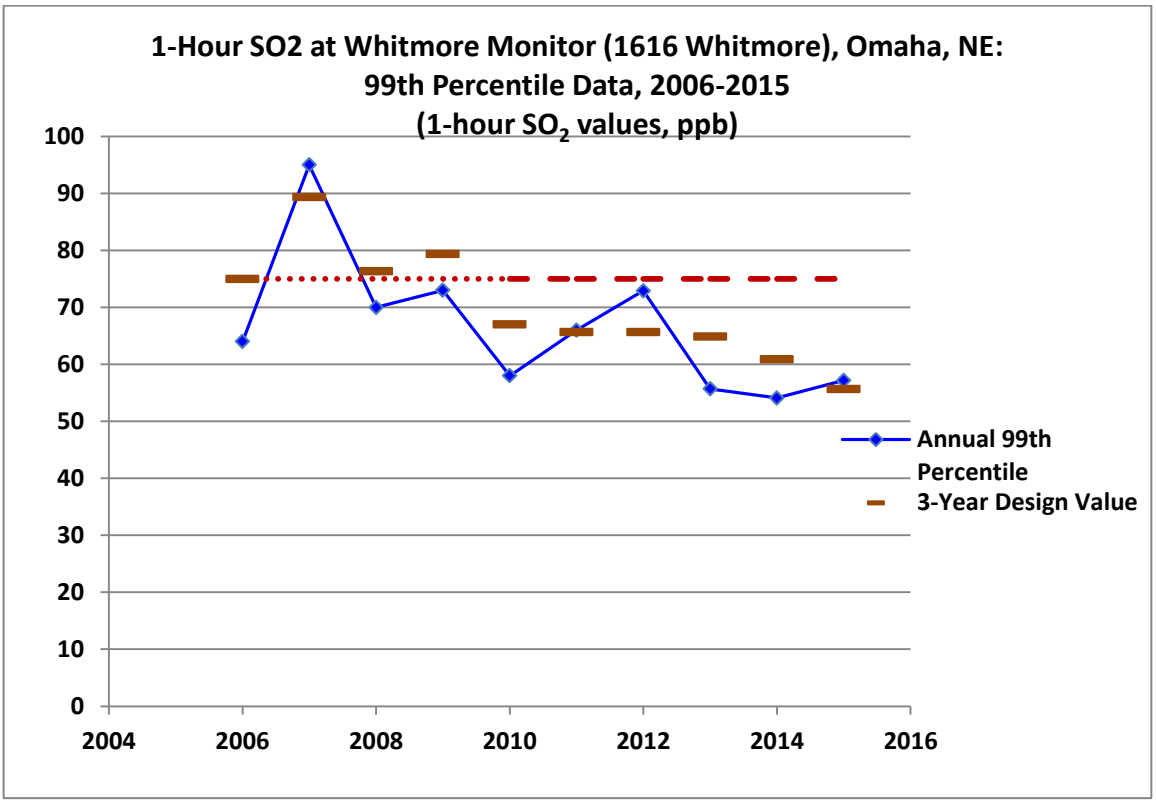

Figure Ad-4: 99th Percentile and Design Values of 1-hour SO_2 at Whitmore Monitor, 2006-2015

Modeling and Studies

A 1997 University of Nebraska master's thesis (*Examination of SO_2 Ambient Air Monitoring Location Using Air Dispersion Modeling* by Eitan Tsabari) examined SO_2 concentrations in the north Omaha area and the use of an air dispersion model to appropriately identify monitoring locations. The study identified the highest 1-hour SO_2 concentrations to the southeast of North Omaha Station, and modeled SO_2 concentrations (while consistently higher than measured concentrations) also fell within this area.

NDEQ conducted AERMOD modeling in June 2016 in support of considering monitor placement for North Omaha Station for DRR purposes. This more recent modeling indicates the highest average 1-hour SO_2 concentrations fall to the southeast and west of North Omaha Station, as indicated in Figure Ad-5.

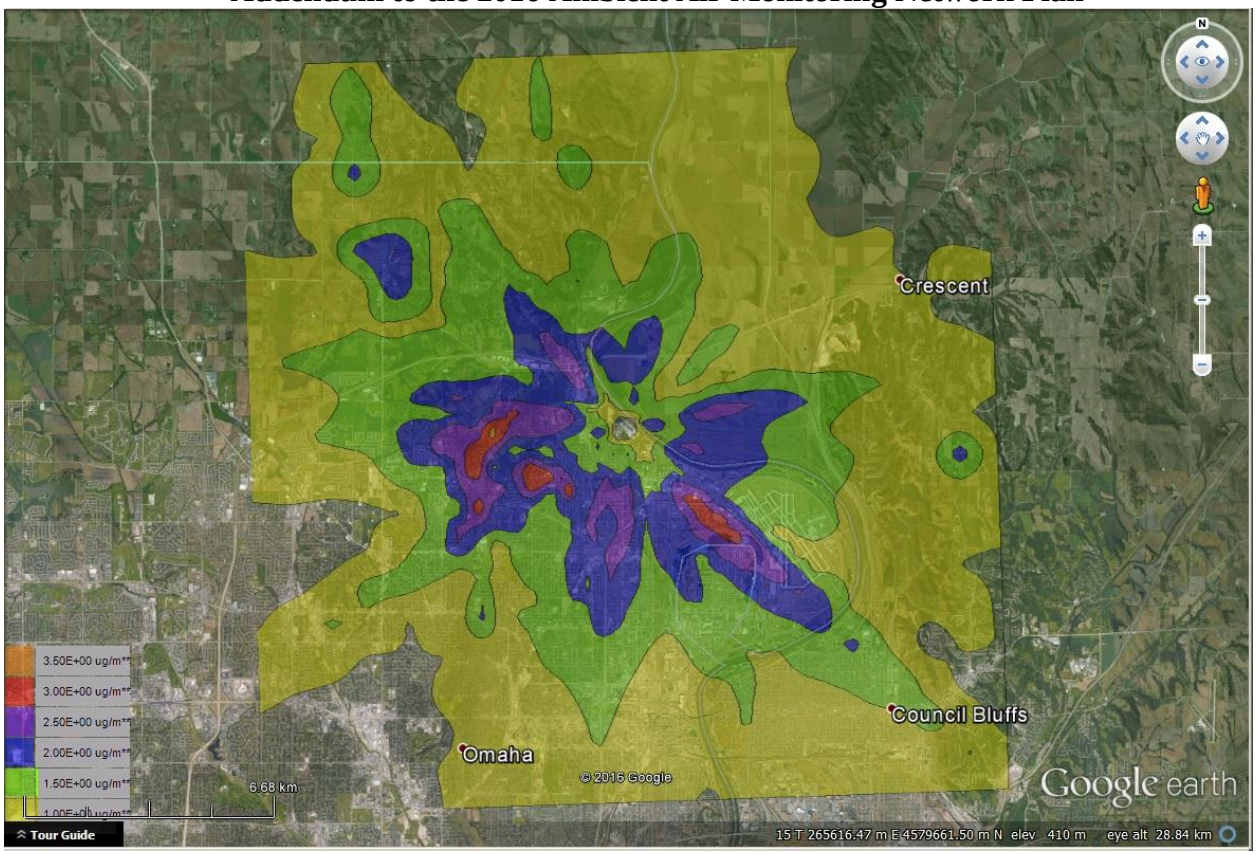

Figure Ad-5: NDEQ-modeled First-high Average 1-hour SO_2 Concentrations, 2016

Following original submission of the network monitoring plan to EPA on June 29, 2016, NDEQ and the Iowa Department of Natural Resources (IDNR) were contacted by EPA and requested to consider impacts from the Walter Scott Energy Center (approx. 19 km southeast) on North Omaha Station and vice versa, in part to consider whether the two sources should use the same data characterization method per the DRR, being in the same "area". IDNR produced modeling that demonstrated the impacts of emissions from North Omaha Station were not reciprocal to impacts from the Walter Scott Energy Center on North Omaha Station, and that attainment around the Walter Scott Energy Center would best be characterized through modeling, while attainment surrounding North Omaha Station could effectively be characterized through monitoring. EPA also requested additional modeling from NDEQ to further analyze the impacts of the Walter Scott Energy Center around North Omaha Station for purposes of monitor placement, and produce a ranking analysis that follows the recommended approach from the EPA 1-hr SO2 Monitoring Technical Assistance Document (TAD) and is similar to that found in the Georgia Department of Natural Resources 2016 Ambient Air Monitoring Plan. The dispersion modeling, which used 3 years (2012-2014) of normalized emissions data from North Omaha and Walter Scott was conducted in cooperation with EPA Region 7 staff, through approved protocols.

The MAXDAILY output file produced by AERMOD was analyzed using Excel spreadsheet formulae to determine, for each modeled day of meteorology, the receptor with the maximum 1-hour SO2 concentration on that day and is combined with the 4th highest maximum 1-hr SO2 modeled concentration to produce a receptor score. From this, the top 100 receptors were ranked (Table Ad-1 and Figure Ad-6), with the lowest scores representing the top ranked receptors.

Table Ad-1: Receptor Ranking from NDEQ/EPA Modeling around North Omaha Station. The lowest total scores represent the highest ranked receptor locations.

location (UTM)	max freq count	4th max concentration	Count rank	Fourth rank	total_score (count_rank + fourth_rank)
253661.1 4580764.4	4	3.60068	65	164	229
250911.1 4578514.4	6	3.01916	47	182	229
253090.9 4579683.8	1	7.90919	174	54	228
247911.1 4581014.4	2	5.43359	116	110	226
252411.1 4578764.4	2	5.5969	116	106	222
253661.1 4578264.4	1	8.44074	174	46	220
252911.1 4580264.4	5	3.55149	53	167	220
251911.1 4580264.4	1	8.61063	174	45	219
251661.1 4581764.4	1	8.63094	174	44	218
249911.1 4584014.4	1	8.6461	174	43	217
251911.1 4578014.4	4	3.92929	65	150	215
254161.1 4580014.4	3	4.96206	89	125	214
251661.1 4578764.4	1	9.04993	174	36	210
253056 4580098.5	3	5.08667	89	121	210
253778 4579345.2	2	6.01046	116	93	209
251911.1 4577764.4	3	5.1654	89	119	208
250911.1 4586264.4	2	6.12349	116	90	206
250661.1 4582514.4	1	9.27907	174	31	205
250911.1 4583764.4	1	9.29149	174	30	204
252161.1 4578264.4	1	9.57256	174	28	202
253072.1 4579782	2	6.23888	116	85	201
253649.8 4579068.3	2	6.26343	116	84	200
249411.1 4582764.4	1	9.7304	174	25	199
253911.1 4578514.4	5	4.3059	53	146	199
248161.1 4580514.4	2	6.42779	116	81	197
253411.1 4578264.4	2	6.48141	116	80	196

Table Ad-1: Receptor Ranking from NDEQ/EPA Modeling around North Omaha Station. The lowest total scores represent the highest ranked receptor locations.

location (UTM)	max freq count	4th max concentration	Count rank	Fourth rank	total_score (count_rank + fourth_rank)
252161.1 4577764.4	2	6.52924	116	79	195
253745.4 4579494.9	3	5.63415	89	105	194
252661.1 4579764.4	2	6.66788	116	74	190
248411.1 4582014.4	1	10.67337	174	15	189
253670.1 4579560.7	2	6.72931	116	71	187
253661.1 4579014.4	2	6.82083	116	69	185
253081.5 4579732.9	2	6.92502	116	67	183
253161.1 4578514.4	7	4.40795	37	143	180
253181.1 4579988.9	3	6.18878	89	87	176
253911.1 4578764.4	10	3.85841	22	154	176
253444.4 4579758.4	2	8.17908	116	49	165
253100.2 4579634.7	2	8.35747	116	48	164
248661.1 4582014.4	3	6.65851	89	75	164
249911.1 4585764.4	2	8.37373	116	47	163
253911.1 4580014.4	7	5.0618	37	124	161
250161.1 4579264.4	2	8.92528	116	40	156
252911.1 4579514.4	2	8.93183	116	39	155
251161.1 4578514.4	3	7.1286	89	66	155
250161.1 4585014.4	2	9.00141	116	37	153
252661.1 4579014.4	3	7.20133	89	64	153
253557.3 4579659.5	3	7.55158	89	61	150
253661.1 4580014.4	6	5.67643	47	103	150
253411.1 4580514.4	4	6.28314	65	83	148
253411.1 4578514.4	3	7.82657	89	56	145
253661.1 4580514.4	6	5.84887	47	98	145
250161.1 4583014.4	2	9.67187	116	26	142

Table Ad-1: Receptor Ranking from NDEQ/EPA Modeling around North Omaha Station. The lowest total scores represent the highest ranked receptor locations.

location (UTM)	max freq count	4th max concentration	Count rank	Fourth rank	total_score (count_rank + fourth_rank)
253594.9 4579626.6	4	6.63399	65	76	141
250411.1 4581764.4	2	9.85925	116	24	140
253911.1 4580264.4	7	5.74945	37	100	137
253248.1 4579237	4	6.79289	65	70	135
253692.4 4579094.4	7	5.85256	37	97	134
253109.6 4579585.5	3	8.65345	89	42	131
253283.4 4579201.5	4	7.14351	65	65	130
252411.1 4579514.4	4	7.93854	65	53	118
252911.1 4579014.4	5	7.30569	53	63	116
253119 4579536.4	4	8.14088	65	50	115
253353.8 4579130.6	5	7.71737	53	58	111
252911.1 4579264.4	5	7.90059	53	55	108
250411.1 4582014.4	3	10.74439	89	14	103
249911.1 4583014.4	4	9.10055	65	33	98
253256.3 4579923.1	7	8.04318	37	52	89
253389.1 4579095.1	4	9.94604	65	20	85
253411.1 4580014.4	5	9.15268	53	32	85
251411.1 4581764.4	4	10.4599	65	17	82
253218.7 4579956	10	7.55485	22	60	82
253161.1 4580264.4	16	6.68595	8	72	80
251411.1 4580264.4	4	10.9018	65	13	78
253607.2 4579042.2	7	8.78206	37	41	78
251661.1 4582014.4	4	11.57316	65	11	76
253409.2 4579074.8	4	11.61527	65	10	75
253632.5 4579593.7	6	9.64629	47	27	74
253430.4	4	13.01129	65	6	71

Table Ad-1: Receptor Ranking from NDEQ/EPA Modeling around North Omaha Station. The lowest total scores represent the highest ranked receptor locations.

location (UTM)	max freq count	4th max concentration	Count rank	Fourth rank	total_score (count_rank + fourth_rank)
4579071.8					
253406.8 4579791.3	6	10.45729	47	18	65
253161.1 4580514.4	20	7.55502	5	59	64
253411.1 4579014.4	5	11.80037	53	9	62
251911.1 4580514.4	5	11.94383	53	8	61
253661.1 4580264.4	24	7.73063	3	57	60
253411.1 4578764.4	7	9.92953	37	21	58
253519.7 4579692.5	10	9.07595	22	34	56
253661.1 4578514.4	11	8.97698	18	38	56
253411.1 4580264.4	37	8.11045	1	51	52
253661.1 4578764.4	17	9.06968	7	35	42
253294 4579890.1	10	10.13393	22	19	41
252661.1 4579514.4	11	9.90786	18	22	40
253161.1 4578764.4	15	9.4022	10	29	39
253494.8 4578973.3	8	13.9279	33	3	36
253431.9 4579071.6	9	13.20433	29	5	34
253485 4578988.7	9	14.03447	29	2	31
253161.1 4579014.4	16	9.86968	8	23	31
253564.5 4579016	10	12.36971	22	7	29
253331.6 4579857.2	15	10.669	10	16	26
253458 4579030.8	10	14.25943	22	1	23
253369.2 4579824.2	21	11.51426	4	12	16
253521.9 4578989.9	19	13.32461	6	4	10

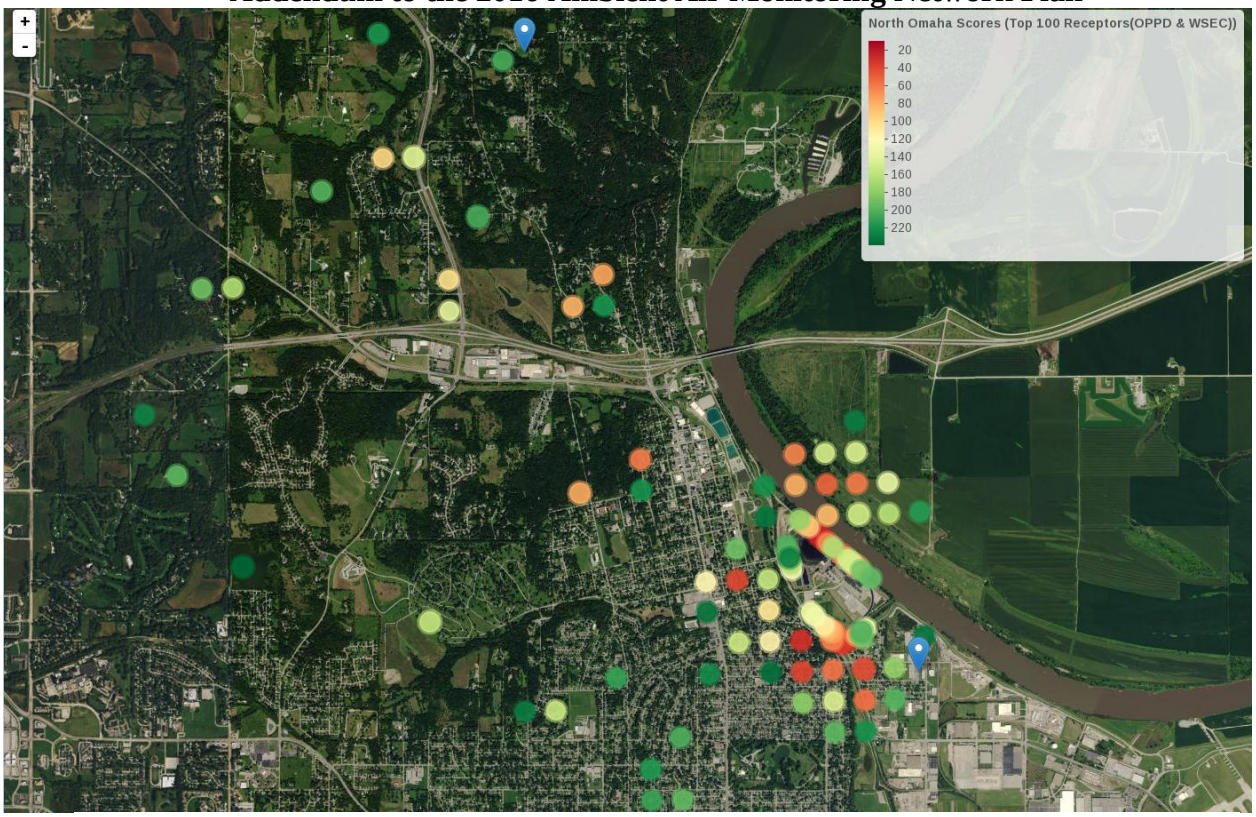

Figure Ad-6: Top 100 Receptor Locations Surrounding North Omaha Station. The lowest total scores (red dots) represent the top ranked receptor locations.

As Figure Ad-6 demonstrates, the cluster of highest-ranked receptors not in the Missouri River or along its banks (and therefore in danger of flooding) appear south of North Omaha Station. The proposed monitoring location is in this area.

Meteorological Data

As shown in Figure Ad-7, wind roses from the nearest meteorological stations (OMA and CBF) indicate general prevalent wind direction in the area as NW/NNW or S/SSE.

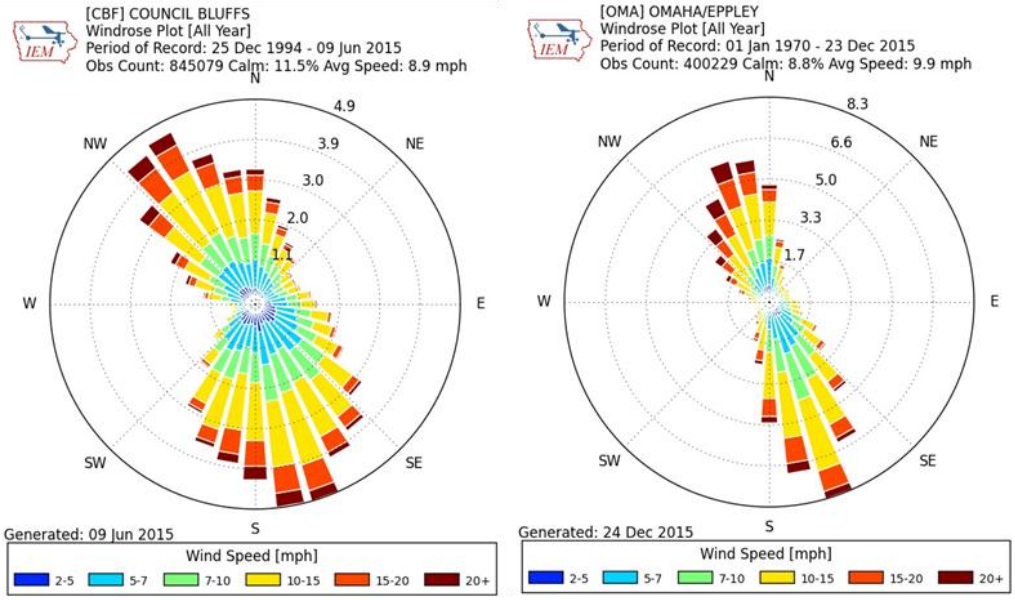

Figure Ad-7: Omaha Area Wind Roses

Geographic Influences

As indicated in Figure Ad-6, much of the area south of OPPD's North Omaha Station consists of metropolitan development, while much of the area north and west of North Omaha Station is wooded or farmland. It should be noted that an SO_2 monitor was previously placed in the wooded area north of North Omaha Station, but was decommissioned in 2010 due to consistently low recordings; it is likely that this monitor was impacted by tree canopy.

Site Determination

Through the additional modeling conducted by NDEQ and EPA Region 7 staff, NDEQ was able to narrow down a proposed site location. Installation of a monitor in or along the Missouri River would be infeasible, as would installation of a monitor within residential neighborhoods or in wooded areas. The remaining most feasible location is in the vicinity of the ballfields/parking area immediately south of the power plant, along John J. Pershing Drive. This is the proposed monitoring location (Figure Ad-8).

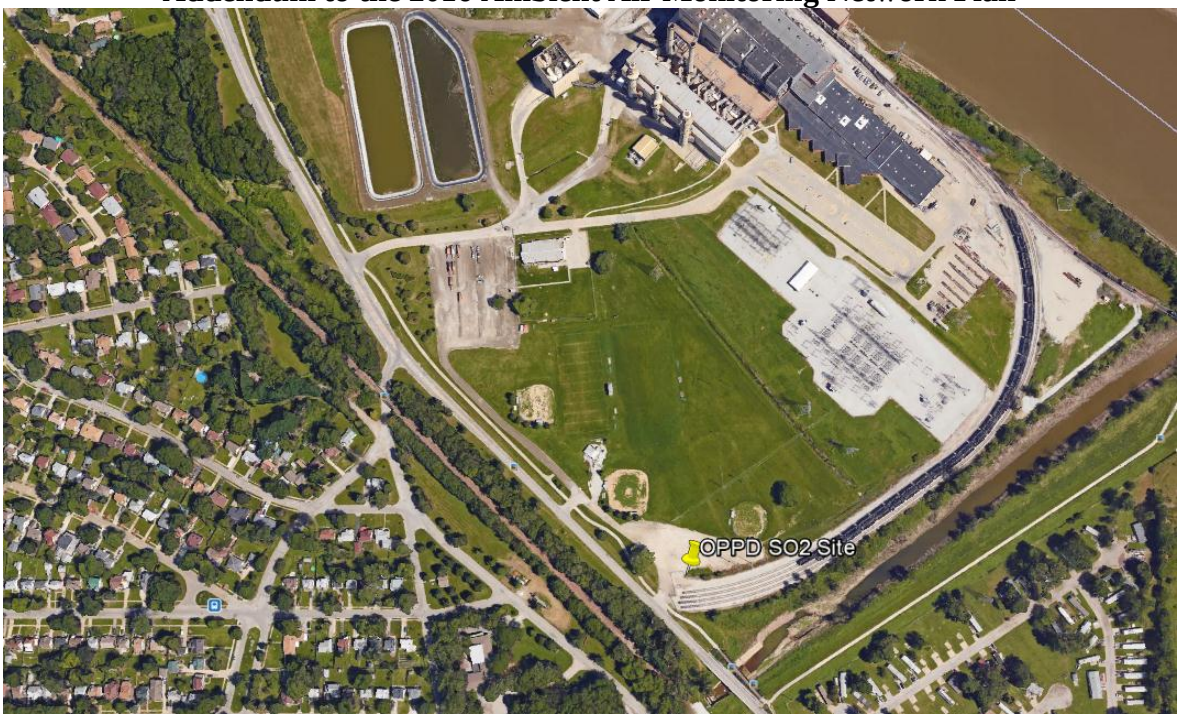

Figure Ad-8: Proposed DRR Monitoring Location for North Omaha Station

EPA Region 7 staff visited the site on November 9, 2016 and confirmed there were no concerns with the location in terms of interference from the roadway or rail line, and that it was appropriately placed to monitor the most feasible area of highest impact as indicated by the cluster of receptors as shown in Figure Ad-6.

The proposed site is fairly level with no trees or other major concerns for placement of the monitor and supporting equipment. Figure Ad-9 provides photos of the proposed site and its surroundings.

Figure Ad-9: Photos of Proposed DRR Monitoring Location for North Omaha Station

1. From proposed site, looking north toward North Omaha Station

2. From proposed site, looking east

Figure Ad-9 (cont'd): Photos of Proposed DRR Monitoring Location for North Omaha Station

3. From proposed site, looking south toward John J. Pershing Drive

4. From proposed site, looking west

Because the existing Whitmore monitoring site was placed specifically to capture SO_2 readings from North Omaha Station in an economically disadvantaged area for environmental justice purposes, the NDEQ feels that Whitmore and this single additional proposed monitoring location will satisfy DRR needs. Further, given the expected drastic reduction and possible near-elimination of SO_2 emissions from this facility (given halted operation with coal of Units 1-3 and impending conversion of Units 4 and 5 to natural gas in the coming years), NDEQ feels that additional investment in installing monitors for this source would be an unwise expenditure of limited funding and resources.

NDEQ will provide a trailer to house the monitor and supporting equipment, while the Douglas County Health Department will provide the monitor and supporting equipment. OPPD will provide electricity and fencing around the trailer. Douglas County Health Department will operate the monitor.

Proposed SO_2 Monitoring Site: Additional Information and Part 58 Compliance Review

The proposed SO_2 monitoring location is to be a micro-scale, source-oriented site with respect to OPPD's North Omaha Station, a coal-fired electrical generating unit in Omaha, NE. The site is on the south end of the North Omaha Station property and adjacent to a public parking area associated with ball fields at that location. The approximate Lat/Long coordinates are 41° 19' 32" N and 95° 56' 46" W. The site is ~40 m east of Pershing Drive and 15 m north of a rail car parking area. The location of the proposed site is shown in Figure Ad-8. Also see photos of site location in Figure Ad-9.

The proposed site will meet applicable requirements of 40 CFR Part 58. A compliance review with respect to Part 58 Appendixes A thru E is provided below.

Appendix A - QA Requirements for Monitors used for NAAQS Evaluations: The Douglas County Health Department (DCHD) will operate the site. DCHD has experience operating SO_2 sites and meeting Appendix A QA requirements. Operating, maintenance and QA requirements will comply with the requirements of the *Quality Assurance Project Plan (QAPP)for the Nebraska Ambient Air Monitoring Program for Criteria Pollutants, NCore Parameters, $PM_{2.5}$ Speciation and Total Reduced Sulfur* (EPA approved 11/24/14).

Appendix B - QA Requirements for PSD Monitors: Not applicable. This will not be a PSD air monitoring site.

Appendix C – Ambient Air Quality Monitoring Methodology: The proposed site will utilize a continuous FEM SO_2 analyzer capable of taking 1-minute SO_2 readings.

Other equipment will include a data logger or computer capable of storing the 1-minute analyzer data; and two sets of calibration equipment (i.e., a calibrator, a zero air system and EPA-protocol SO_2 calibration gas). One set is for annual calibration and biweekly zero/span/precision checks and the other is for audits.

The make and model of the FEM analyzer, calibrator and zero air system have not been finalized. The FEM analyzer will be either purchased as a new unit or be no more than 5 years old. The calibrator and zero air system used will meet the specifications required for the FEM analyzer. All equipment will meet 40 CFR Part 58 Appendix C requirements.

Analytical equipment will be housed in a temperature-controlled enclosure that maintains interior temperatures between 20° to 30° C.

Appendix D – Network Design Criteria: Modeling was performed to identify the highest concentration area for the site. The proposed location meets the criteria for a microscale site as set forth in Appendix E Section 4.4.

Appendix E - Probe and Monitoring Path Siting Criteria: The preliminary site review sheet (below) demonstrates that the site will meet Appendix E requirements.

Nebraska NAMS/SLAMS Siting Criteria Review Sheet for Sulfur Dioxide

Pre-Siting Review for proposed SO_2 site at NPPD's Sheldon Station

Agency: Nebraska Department of Environmental Quality :

Location: 7475 Pershing Drive, Omaha, NE

Approximately 425 m SSE of the main entrance to the OPPD North Omaha Station main entrance and ~ 40 m east of Pershing Drive

Approximate Lat/Long 41° 19' 32" N and 95° 56' 46" W

AIRS Site ID: Proposed site - To be assigned (31-055-nnnn)

Date: November 10, 2016

Reviewer: Jim Yeggy

Monitoring Objective: Source-oriented		Scale: Micro-scale
40 CFR Part 58 Appendix E Criteria	**Requirements**	**Review Comments**
Section 2: Horizontal & vertical probe placement	2 to 15 m above ground	Analyzer will be housed within an enclosed trailer or dedicated enclosure structure. Inlet will be constructed to comply with inlet placement criteria. Anticipated inlet height ~3 m.
	At least 1 m from supporting structure	
	If on side of building, should be on side of prevailing winter wind	Not applicable.
Section 3: Spacing from minor sources	No furnace or other minor SO_2 sources nearby	OK. There is a railcar parking area ~ 15 m south of the site, but the locomotive engines used to park the cars maintain a distance of 1500 feet from the monitoring site.
Section 4: Spacing from obstructions	Distance from obstacle to probe at least 2x the obstacle height above the probe	OK. The North Omaha Station stacks range are 204 feet high, and are located 400 to 480 m north of the monitoring site. There are no obstructions between the stacks and the monitoring site.
	Exceptions for street canyon or building mounted inlets	Not applicable
Section 5: Spacing from trees	At least 10 m from tree drip-line	OK. The drip line of the closest tree is ~ 35 m WNW of the proposed site.
	Microscale sites: no trees between source and probe	OK. There are no trees between the stacks and proposed site. The closest tree is located 35 m WNW of the site, while the stacks are directly north.
Section 6: Spacing from Roadways	Not applicable to SO_2	Not applicable
General Comments: None		