

STATEMENT OF BASIS

For the issuance of Draft Air Permit # 0882-AR-8 AFIN: 14-00011

1. PERMITTING AUTHORITY:

Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, Arkansas 72118-5317

2. APPLICANT:

Albemarle Corporation - West Plant
1550 Highway 371 West
Magnolia, Arkansas 71754

3. PERMIT WRITER:

Jesse Smith

4. NAICS DESCRIPTION AND CODE:

NAICS Description: Natural Gas Liquid Extraction
NAICS Code: 211112

5. SUBMITTALS:

| Date of Application | Type of Application (New, Renewal, Modification, Deminimis/Minor Mod, or Administrative Amendment) | Short Description of Any Changes That Would Be Considered New or Modified Emissions |
|---------------------|---|--|
| 3/26/2015 | Modification | Two fire pumps changed from insignificant activity to sources(SN-EM-02 and SN-EM-03) due to ZZZZ applicability and added to emission bubble. Removal of groundwater treatment process and equipment (SN-GT-03 and SN-GT-04) |

6. REVIEWER'S NOTES:

The Albemarle Corporation owns and operates a facility near Magnolia, Arkansas, which manufactures bromine and bromine-related compounds. This facility is known as the

West Plant. Albemarle requested this modification to remove out of service equipment (SN-GT-03 and SN-GT-04), modify the stack testing requirements to be in line with the south plant and for clarity, revise the process description for the Hexabromocyclododecane process, and to incorporate all applicable requirements of C.F.R. Part 63 Subpart ZZZZ for the fire pump engines (now SN-EM-02 and SN-EM-03). The following are the permitted emission changes due to this permitting action: +0.4 tpy PM/PM10, +0.3 tpy SO2, and -1.0 tpy VOC. The HAP emissions were reduced as follows: -0.9 tpy EDC, -0.2 tpy EDB, and -0.05 tpy DBCP.

7. COMPLIANCE STATUS:

The following summarizes the current compliance of the facility including active/pending enforcement actions and recent compliance activities and issues.

There are no active or pending enforcement actions for this facility.

8. PSD APPLICABILITY:

a) Did the facility undergo PSD review in this permit (i.e., BACT, Modeling, etc.)? N

b) Is the facility categorized as a major source for PSD? N

- *Single pollutant ≥ 100 tpy and on the list of 28 or single pollutant ≥ 250 tpy and not on list*

If yes, explain why this permit modification is not PSD.

9. SOURCE AND POLLUTANT SPECIFIC REGULATORY APPLICABILITY:

| Source | Pollutant | Regulation (NSPS, NESHAP or PSD) |
|------------------------------|-----------------|----------------------------------|
| SN-SG-03, SN-SG-06, SN-SG-07 | Records keeping | 40 CFR 60, Subpart Dc |
| SN-EM-02, SN-EM-03 | HAP | 40 CFR 63, Subpart ZZZZ |

10. EMISSION CHANGES AND FEE CALCULATION:

See emission change and fee calculation spreadsheet in Appendix A.

11. AMBIENT AIR EVALUATIONS:

a) Reserved.

b) Non-Criteria Pollutants:

This permit modification did not change the values of any of the following from the previous permit, so modelling was not performed again for the PAIL analysis.

1st Tier Screening (PAER)

Estimated hourly emissions from the following sources were compared to the Presumptively Acceptable Emission Rate (PAER) for each compound. The Department deemed PAER to be the product, in lb/hr, of 0.11 and the Threshold Limit Value (mg/m^3), as listed by the American Conference of Governmental Industrial Hygienists (ACGIH).

| Pollutant | TLV (mg/m^3) | PAER (lb/hr) = 0.11*TLV | Proposed lb/hr | Pass? |
|-----------------------|--------------------------------|-------------------------|----------------|-------|
| H ₂ S | 13.94 | 1.533 | 1.97 | No |
| Br ₂ | 0.66 | 0.073 | 2.60 | No |
| HBr | 9.93 | 1.092 | 0.17 | Yes |
| NH ₃ | 17.42 | 1.916 | 1.20 | Yes |
| Cl ₂ (HAP) | 1.45 | 0.16 | 0.91 | No |
| HCl (HAP) | 7.46 | 0.821 | 0.10 | Yes |
| Ethylene Glycol (HAP) | 100 | 11 | 0.64 | Yes |
| 1,4 Dioxane (HAP) | 73.20 | 8.06 | 1.88 | Yes |

2nd Tier Screening (PAIL)

ISCST3 air dispersion modeling was performed on the estimated hourly emissions from the following sources, in order to predict ambient concentrations beyond the property boundary. The Presumptively Acceptable Impact Level (PAIL) for each compound was deemed by the Department to be one one-hundredth of the Threshold Limit Value, as listed by the ACGIH.

| Pollutant | (PAIL, $\mu\text{g}/\text{m}^3$) = 1/100 of Threshold Limit Value | Modeled Concentration ($\mu\text{g}/\text{m}^3$) | Pass? |
|-----------------------|--|--|-------|
| H ₂ S | 139.4 | 50.29 | Yes |
| Br ₂ | 6.6 | 6.30 | Yes |
| Cl ₂ (HAP) | 14.5 | 2.21 | Yes |

c) H₂S Modeling:

A.C.A. §8-3-103 requires hydrogen sulfide emissions to meet specific ambient standards. Many sources are exempt from this regulation, refer to the Arkansas Code for details.

Is the facility exempt from the H₂S Standards

N

If exempt, explain: _____

| Pollutant | Threshold value | Modeled Concentration (ppb) | Pass? |
|------------------|--|-----------------------------|-------|
| H ₂ S | 20 parts per million (5-minute average*) | 0.056 ppm | Y |
| | 80 parts per billion (8-hour average) residential area | 19.99 ppb | Y |
| | 100 parts per billion (8-hour average) nonresidential area | 19.99 ppb | Y |

*To determine the 5-minute average use the following equation

$$C_p = C_m (t_m/t_p)^{0.2} \text{ where}$$

C_p = 5-minute average concentration

C_m = 1-hour average concentration

t_m = 60 minutes

t_p = 5 minutes

12. CALCULATIONS:

| SN | Emission Factor Source (AP-42, testing, etc.) | Emission Factor (lb/ton, lb/hr, etc.) | Control Equipment | Control Equipment Efficiency | Comments |
|-------|---|---------------------------------------|-------------------|------------------------------|---|
| GS-01 | Tanks 4.0 | - | None | - | - |
| BR-01 | Aspen modeling | - | Scrubber | 98% | - |
| BR-03 | Mass Balance | - | Scrubber | 99% | - |
| SR-01 | AP-42 (flare) | See AP-42 Table 13.5-1. | None | - | - |
| SG-03 | AP-42 (boiler) | See AP-42 Table 1.4-1 and 1.4-2. | None | - | - |
| SG-06 | Dusty White of Power Equipment Company (boiler) | - | None | - | Emission data are from Cleaver-Brooks Boiler, Model CB-L2000-1500-200ST |
| SG-07 | Dusty White of Power | - | None | - | Emission data are derived from Cleaver-Brooks Boiler, |

| SN | Emission Factor Source (AP-42, testing, etc.) | Emission Factor (lb/ton, lb/hr, etc.) | Control Equipment | Control Equipment Efficiency | Comments |
|----------------|--|---|-------------------|------------------------------|--|
| | Equipment Company (boiler) | | | | Model CB-L2000-1500-200ST. Emission factor of SO ₂ is calculated from the combustion of sweetened field gas, which is 1.343 lb/MM Btu. |
| BD-03 | Facility estimate, based upon process analysis. | - | None | - | - |
| HB-02 | Ideal gas calculation. | - | None. | - | - |
| HB-06 | Maximum loading. | 0.06 gr/ft ³ | Baghouse | 98% | - |
| HB-08 | Aspen modeling. | - | Scrubber | Not quantified. | - |
| HB-09 | Maximum loading. | 0.02 gr/ft ³ | Baghouse | 90% | - |
| PT-01 | EPA "Protocol for Equipment Leak Emission Estimates". | - | - | - | - |
| EM-01 | AP-42 Section 3.3 Vendor Test Data (CO, PM, NO _x) | lb/hp-hr: NO _x 6.58E-03 CO 5.76E-03 VOC 2.51E-03 PM ₁₀ 3.29E-04 SO ₂ 2.05E-03 | None. | - | VOC emissions based on TOC emission factor, and SO ₂ emissions based on SO _x emission factor in AP-42 |
| EM-02 EM-03 | AP-42 Section 3.3 | lb/hp-hr: NO _x 0.031 CO 6.68E-03 VOC 2.51E-03 PM ₁₀ 2.20E-04 SO ₂ 2.05E-03 | None. | - | VOC emissions based on TOC emission factor, and SO ₂ emissions based on SO _x emission factor in AP-42 |

13. TESTING REQUIREMENTS:

The permit requires testing of the following sources.

| SN | Pollutants | Test Method | Test Interval | Justification |
|-----------------------|---|-------------|----------------|---|
| Amine Unit | H ₂ S, calculated to SO ₂ . | 2D 15 | Annual | To confirm amine unit efficiency and resulting emissions at process flare and at NaHS loading stations. |
| SG-03, SG-06 &, SG-07 | NO _x CO | 7E 10 | Every 5 years | Permit limit (bubble) @ 98.5 ton/yr. |
| HB-08 | 1,4 dioxane | 18 | Every 5 years. | Toxicity of HAP involved. Confirmation of dispersion modeling. |

14. MONITORING OR CEMS:

The permittee must monitor the following parameters with CEMS or other monitoring equipment (temperature, pressure differential, etc.)

| SN | Parameter or Pollutant to be Monitored | Method (CEM, Pressure Gauge, etc.) | Frequency | Report (Y/N) |
|-------|--|---|---|--|
| SG-03 | Fuel inlet flow | Flow meter | Continuous | Yes-SO ₂ , CO and NO _x |
| SG-06 | Fuel inlet flow | Flow meter | Continuous | Yes-SO ₂ , CO and NO _x |
| SG-07 | Fuel inlet flow | Flow meter | Continuous | Yes-SO ₂ , CO and NO _x |
| SR-01 | Fuel inlet flow | Flow meter | Continuous | Yes-SO ₂ , CO and NO _x |
| HB-08 | Scrubber recirculating flow rate, scrubber liquid temperature, scrubber liquid concentration | Flow monitor, temperature gauge, lab analysis | Twice per day for flow and temperature. Once per day for DEDO concentration. | No |
| BR-03 | Recirculating scrubbing liquor flow rate, weight percent of the scrubbing liquor | Flow meter, lab analysis | Daily | No |

15. RECORDKEEPING REQUIREMENTS:

The following are items (such as throughput, fuel usage, VOC content, etc.) that must be tracked and recorded.

| SN | Recorded Item | Permit Limit | Frequency | Report (Y/N) |
|---|---|---|---|--------------|
| SR-01 SG-03 SG-06 SG-07 | Purchased gas H ₂ S concentration | Maximum 6.5 ppm (vol) H ₂ S | As purchased | No |
| SR-01 | H ₂ S concentration of sweetened gas and resulting SO ₂ emissions | 22.1 lb/hr SO ₂ emissions | Once per day | Yes |
| SR-01 SG-03 SG-06 SG-07 EM-01 EM-02 EM-03 | SO ₂ emissions | 0.1 lb/hr SO ₂ , each boiler 22.1 lb/hr SO ₂ from flare 2.1 lb/hr SO ₂ from non- emergency generators 0.62 lb/hr SO ₂ from fire pumps 7-source bubble: 98.1 ton/yr | Once per month | Yes |
| SR-01 SG-03 SG-06 SG-07 EM-01 EM-02 EM-03 | NO _x emissions CO emissions VOC emissions PM ₁₀ emissions | See permit for lb/hr limits. 7-source bubble: 98.5 tpy, for both NO _x and CO, 20.7 tpy for VOC, and 15.8 tpy for PM ₁₀ | Once per month | Yes |
| HB-08 | Scrubber recirculating flow rate, scrubber liquid temperature, scrubber liquid concentration. | Flow = 9000 lb/hr (min). T = 10 degrees Centigrade (max). Concentration = 6% DED0 (max). | Twice per day for flow and temperature. Once per day for DED0 concentration. | No |
| HB-08 | Average lb/hr | 1.60 lb/hr | Once per day | No |

| SN | Recorded Item | Permit Limit | Frequency | Report (Y/N) |
|----------------|---|---|-----------------------------|--------------|
| | DEDO (1,4 dioxane) emissions | | | |
| BR-03 | Scrubbing liquor flow rate, scrubbing liquor weight percent | Flow = 25 gpm (min) Weight % = 1.5 (min) | Once per day | No |
| EM-02 EM-03 | Records of maintenance Hours of operation | - 100 hr/yr non-emergency | As performed Monthly | No |

16. OPACITY:

| SN | Opacity | Justification for limit | Compliance Mechanism |
|-------|---------|-------------------------|----------------------|
| BR-01 | 5% | Department guidance. | Weekly observations. |
| BR-03 | 5% | Department guidance. | Weekly observation. |
| SR-01 | 20% | Department guidance. | Weekly observation. |
| SG-03 | 5% | Department guidance. | Weekly observations. |
| SG-06 | 5% | Department guidance. | Weekly observations. |
| SG-07 | 5% | Department guidance. | Weekly observations. |
| BD-03 | 10% | Department guidance. | Weekly observations. |
| HB-06 | 10% | Department guidance. | Weekly observations. |
| HB-09 | 10% | Department guidance. | Weekly observations. |
| EM-01 | 20% | Department guidance. | Weekly observations. |
| EM-02 | 20% | Department guidance. | Weekly observations. |
| EM-03 | 20% | Department guidance. | Weekly observations. |

17. DELETED CONDITIONS:

| Former SC | Justification for removal |
|-----------|--|
| SC 17 | All equipment the condition referenced has been removed from the facility. |

18. GROUP A INSIGNIFICANT ACTIVITIES:

| Source Name | Group A Category | Emissions (tpy) | | | | | | |
|---|------------------|---------------------|-----------------|-----|----|-----------------|--------|-------|
| | | PM/PM ₁₀ | SO ₂ | VOC | CO | NO _x | HAPs | |
| | | | | | | | Single | Total |
| Diesel Fuel Storage Tank | A-3 | | | | | | | |
| Groundwater Collection Sump | A-11 | | | | | | | |
| 4 Recycle Water Storage Tanks | A-13 | | | | | | | |
| Diethylene Glycol Storage Tank | A-3 | | | | | | | |
| Bulk Cargo Containers (totes, containing aqueous ammonia or 35% HCL, less than 550 gallon capacity) | A-13 | | | | | | | |
| Tail Brine Metal Extraction Process (skid mounted) | A-13 | | | | | | | |

19. VOIDED, SUPERSEDED, OR SUBSUMED PERMITS:

List all active permits voided/superseded/subsumed by the issuance of this permit.

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|-----------|
| Permit # |
| 0882-AR-7 |

APPENDIX A – EMISSION CHANGES AND FEE CALCULATION

Fee Calculation for Minor Source

Revised 08-25-14

Facility Name: Albemarle Corporation
 - West Plant
 Permit Number: 0882-AR-8
 AFIN: 14-00011

| | | | | |
|-----------------------------------|--------------------------|--|------------|------------|
| | | | Old Permit | New Permit |
| \$/ton factor | 23.89 | Permit Predominant Air Contaminant | 98.5 | 98.5 |
| Minimum Fee \$ | 400 | Net Predominant Air Contaminant Increase | 0 | |
| Minimum Initial Fee \$ | 500 | | | |
| Check if Administrative Amendment | <input type="checkbox"/> | Permit Fee \$ | 400 | |
| | | Annual Chargeable Emissions (tpy) | 98.5 | |

| Pollutant (tpy) | Old Permit | New Permit | Change |
|-----------------------|------------|------------|--------|
| PM | 30.3 | 30.7 | 0.4 |
| PM ₁₀ | 30.3 | 30.7 | 0.4 |
| SO ₂ | 97.8 | 98.1 | 0.3 |
| VOC | 37.4 | 36.4 | -1 |
| CO | 98.5 | 98.5 | 0 |
| NO _x | 98.5 | 98.5 | 0 |
| 1,4 Dioxane (HAP) | 8.2 | 8.2 | 0 |
| Br ₂ | 10.8 | 10.8 | 0 |
| Cl ₂ (HAP) | 3.9 | 3.9 | 0 |
| DBCP(HAP) | 0.05 | 0 | -0.05 |
| EDB(HAP) | 0.2 | 0 | -0.2 |
| EDC(HAP) | 0.9 | 0 | -0.9 |
| Ethylene Glycol (HAP) | 2.8 | 2.8 | 0 |
| H ₂ S | 7.6 | 7.6 | 0 |
| HBr | 0.7 | 0.7 | 0 |
| HCl(HAP) | 0.4 | 0.4 | 0 |
| NH ₃ | 4.9 | 4.9 | 0 |