

COMPLIANCE TEST REPORT

FOR THE OUTLET OF
U1 WGS/FCCU

HESS CORPORATION
PORT READING REFINERY
PORT READING, NEW JERSEY

FACILITY ID NUMBER 17996
PERMIT NUMBER BOP100003

Prepared for

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Submitted to

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Test Date: September 14-21, 2010

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TABLE OF CONTENTS

WGS/FCCU Emissions Test Report
September 2010

1.0 INTRODUCTION	1
2.0 PERSONNEL & CERTIFICATIONS	2
3.0 SUMMARY OF RESULTS	3

TABLES

TABLE 1: WGS/FCCU Operations and Gaseous Emissions Summary	3
TABLE 2: WGS/FCCU Operations and Cyanide Emissions Summary	4
TABLE 3: WGS/FCCU Operations and Lead Emissions Summary	5
TABLE 4: WGS/FCCU Operations and SO ₃ /H ₂ SO ₄ Emissions Summary	5
TABLE 5: WGS/FCCU Operations and Ammonia Emissions Summary	6
TABLE 6: WGS/FCCU Operations and Benzene Emissions Summary	6
TABLE 7: WGS/FCCU Cyanide (CTM-033) Flowrate Summary	7
TABLE 8: WGS/FCCU Cyanide (CARB 426) Flowrate Summary	8
TABLE 9: WGS/FCCU Lead Flowrate Summary	9
TABLE 10: WGS/FCCU SO ₃ /H ₂ SO ₄ Flowrate Summary	10
TABLE 11: WGS/FCCU Ammonia Flowrate Summary	11
TABLE 12: WGS/FCCU Benzene Flowrate Summary	12

APPENDICES

I	PROTOCOL AND CORRESPONDENCE
II	PROCESS INFORMATION
III	EMISSIONS CALCULATIONS
IV	FIELD DATA
V	CALIBRATION DATA
VI	LABORATORY DATA SUMMARY REPORTS

1.0 INTRODUCTION

Arrow Environmental Consulting, LLC (Arrow) completed compliance emissions testing at Hess Corporations' Port Reading New Jersey facility. The wet gas scrubber's emissions were tested under normal refinery operations.

Testing was completed on September 14-17 and 21, 2010.

Emissions of cyanide, benzene, lead, sulfuric acid mist/sulfur trioxide, ammonia, carbon monoxide (CO), volatile organic compounds (VOC), nitrogen oxides (NO_x as NO₂), and sulfur dioxide (SO₂) were measured. The firing rates achieved during testing were the maximum, sustainable firing rates possible. The results are summarized in Tables 1 through 12.

Testing in general was completed as scheduled and without incident. Two exceptions to that are the CTM-033 sampling for cyanide and the RM 15 sampling for hydrogen sulfide and carbonyl sulfide (H₂S and COS).

A fourth run for the CTM-033 cyanide sampling was completed due to concerns with the pH checks completed during run 1. The pH was checked after 30 minutes and found to be less than 12 for impingers 1 and 2. Arrow changed out the impingers with fresh reagent and resumed sampling. Subsequent review by the NJDEP determined that, since the pH was less than 12, run 1 should have been voided. (The low pH indicates that the reagent's ability to absorb the cyanide is diminished and breakthrough becomes a concern.) A fourth run was performed September 21. Prior to initiating the 4th run, Arrow and the NJDEP reviewed the method. It was negotiated that a fourth impinger with reagent would be used to abate breakthrough concerns. If the pH checks on the first impinger fell below 12, the first and second impinger would be replaced with new reagent and sampling would continue. Please see Table 2 footnotes for additional details.

RM 15 was not completed due to difficulties encountered with sampling. The permeation tubes had not fully stabilized and testing could not be initiated as scheduled on Wednesday, September 15. Leak check issues delayed starting sampling the morning of September 16. Leak check issues were resolved; however, a severe storm impacted the area, requiring that the stack be secured prior to initiating RM15 sampling. The following morning, September 17, the GC was not performing correctly, presumably due to water having entered the system. RM15 testing was not completed and will be rescheduled for a later date.

A copy of the approved NJDEP protocol and associated correspondence is contained in Appendix I. Process data are presented in Appendix II. All calculations are presented in Appendix III. All field data are contained in Appendix IV. Calibration data, including certificates for all calibration gas standards, are in Appendix V. Laboratory summary data are in Appendix VI. The complete data packages for all analyses are included on the CD that is on the inside of the rear cover of this report.

2.0 PERSONNEL AND CERTIFICATIONS

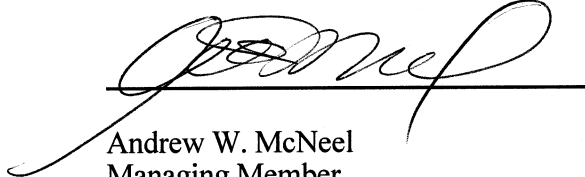
2.1 NJDEP Personnel


Testing was observed by Mr. Dan Stochak of the NJDEP Bureau of Technical Services.

2.2 Testing Firm Certifications

Testing was completed by Arrow Environmental Consulting, LLC. The emissions testing and reporting for the WGS/FCCU was performed by Andrew W. McNeel, John M. Collette, Brian E. Cleary, and Michael Walters.

I certify under penalty of law that I believe the information provided in this document is true, accurate and complete. I am aware that there are significant civil and criminal penalties, including the possibility of fines or imprisonment or both, for submitting false, inaccurate or incomplete information.


 Andrew W. McNeel
 Managing Member
 Arrow Environmental Consulting, LLC


 George H. Wagner II, CIH
 Certified Industrial Hygienist
 CIH #5643

2.3 Facility Certification

I certify under penalty of law, that I have personally examined and am familiar with the information submitted in this document and all attached documents and, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete.

I am aware that there are significant civil and criminal penalties, including the possibility of fines or imprisonment or both for submitting false, inaccurate or incomplete information.

I am the responsible official as defined in N.J.A.C 7:27-1.4 with direct knowledge and overall responsibility for the information contained in this report.

 Name

 Title

 Signature

 Date

3.0 SUMMARY OF RESULTS

Table 1: WGS/FCCU Operations and Gaseous Emissions Summary

RUN	1	2	3	Allowable
DATE	09/14/10	09/14/10	09/14/10	
TIME	0925-1025	1050-1150	1256-1356	
PROCESSING RATE				
Average Feed Throughput (MBPD)	67.6	68.2	68.2	70.0
NITROGEN OXIDES (as NO ₂) (RM 7E) ¹				
PPMV (DRY)	52.9	51.3	51.8	N/A
PPMVD @ 0% O ₂	56.3	54.7	55.2	150
POUNDS/HOUR	49.8	48.2	47.0	150
CARBON MONOXIDE (RM 10)				
PPMV (DRY)	138	127	132	N/A
PPMVD @ 0% O ₂	147	135	141	300
POUNDS/HOUR	79.2	72.5	72.9	160
VOLATILE ORGANIC COMPOUNDS (RM 25A less 18)				
PPMV (DRY)	19.6	15.0	18.6	N/A
PPMVD @ 0% O ₂	20.8	16.1	19.9	234
POUNDS/HOUR	6.40	4.92	5.87	61.1
SULFUR DIOXIDE (6C)				
PPMV (DRY)	18.9	17.5	16.9	N/A
PPMVD @ 0% O ₂	20.1	18.7	18.1	141
POUNDS/HOUR	24.7	22.9	21.4	80

¹ An NO₂ to NO converter test was completed using an NO₂ standard prior to the start and at the conclusion of testing. The converter efficiency of the NO_x analyzer satisfied the specifications of the CE test for all checks. NO_x CE data and results of all calibrations, biases, and drifts of the real time instrumentation are included in Appendix IV.

A gaseous stratification check was performed per RM 7E. A three-point check was completed and no stratification was observed. Results of the stratification check are presented in Appendix III.

3.0 SUMMARY OF RESULTS (continued)

Table 2: WGS/FCCU Operations and Cyanide Emissions Summary

RUN	1 ¹	2	3	4 ^{1, 2}	Allowable
DATE	09/14/10	09/14/10	09/14/10	09/21/10	
PROCESSING RATE					
Average Feed Throughput (MBPD)	67.6	67.7	68.2	69.8	70.0
Cyanide (CTM-033) ^{4, 5}					
TIME	0920-1138	1256-1505	1610-1810	0909-1128	---
POUNDS/HOUR	11.9	11.3	12.6	16.2	None ⁵
Adjusted Volume (dscf) ³	39.34	37.49	37.98	40.01	N/A
Isokinetics (%)	98.1	97.0	96.7	105	90 – 110
Cyanide (CARB 426) ⁵					
TIME	0921-1139	1258-1506	1612-1818	---	---
POUNDS/HOUR	0.92	0.75	0.81	---	7.8
Volume Sampled (dscf)	39.75	37.40	38.90	---	N/A
Isokinetics (%)	97.0	96.4	95.8	---	90 – 110

¹ pH checks were performed at 18 minute intervals (quarterly during the 72 minute test run duration). Impinger 1 and 2 solutions were changed-out when the pH was found to be less than 12. Run 1 had impingers changed twice – three sets of impinger 1 and 2 catches resulted for run 1. Run 4 had impingers changed once – two sets of impinger 1 and 2 catches resulted for run 1.

² Run 4 under CTM033 was completed due to concerns with breakthrough during run 1. To minimize/eliminate likelihood of breakthrough due to reagent depletion, a fourth impinger was added to the sampling train for run 4. Note that, based upon the reported analytical results, no breakthrough occurred during any of the test runs.

³ CO₂ is absorbed by the reagent. To account for the volume of CO₂ that does not get measured by the dry gas meter, the CO₂ concentration exiting the sampling train is continuously measured. The volume of gas sampled as measured by the dry gas meter is then adjusted to include the volume of CO₂ absorbed.

⁴ Every impinger was recovered and analyzed individually; no combining of samples occurred. Impinger 1 catches were the only samples that resulted in reportable concentrations. All catches for the respective impingers 2, 3, and 4 resulted in results reported as less than the detection limit. For those sample fractions, half of the detection limit has been used for calculating and reporting emissions.

⁵ The CARB 426 method was completed to enable direct comparison to the CTM 033 results. CARB 426 has been used for performing previous testing. The DEP now requires that CTM-033, modified for the FCCU exhaust characteristics, be used. Due to the change in required testing method, Hess and the NJDEP have established that results from the newly-implemented CTM 033 testing will not be enforceable against the existing permit limit.

3.0 SUMMARY OF RESULTS (continued)

Table 3: WGS/FCCU Operations and **Lead** Emissions Summary

RUN	1	2	3	Allowable
DATE	09/15/10	09/15/10	09/15/10	
TIME	0947-1123	1421-1556	1703-1853	
PROCESSING RATE				
Average Feed Throughput (MBPD)	69.9	69.9	69.8	70.0
Lead (RM 29)				
POUNDS/HOUR ¹	0.0013-0.0022	0.0011-0.0020	0.0014-0.0023	0.043
Volume Sampled (dscf)	51.71	50.87	54.35	N/A
Isokinetics (%)	96.0	96.7	97.6	90 – 110

¹ Lower limit of reporting range is completed using blank correction. Upper limit is without blank correction.

Table 4: WGS/FCCU Operations and **SO₃/H₂SO₄** Emissions Summary

RUN	1	2	3	Allowable
DATE	09/15/10	09/15/10	09/15/10	
TIME	0949-1217	1515-1701	1915-2031	
PROCESSING RATE				
Average Feed Throughput (MBPD)	69.9	69.9	69.8	70.0
Sulfur Trioxide / Sulfuric Acid Mist (RM 8)				
POUNDS/HOUR as H ₂ SO ₄	5.11	3.12	3.36	12.86
Volume Sampled (dscf)	37.98	39.34	40.94	N/A
Isokinetics (%)	96.0	98.7	101	90 – 110

3.0 SUMMARY OF RESULTS (continued)

Table 5: WGS/FCCU Operations and **Ammonia** Emissions Summary

RUN	1	2	3	Allowable
DATE	09/16/10	09/16/10	09/17/10	
TIME	1327-1433	1500-1603	0836-0940	
PROCESSING RATE				
Average Feed Throughput (MBPD)	69.0	69.0	63.7	70.0
Ammonia (CTM 027)				
POUNDS/HOUR	0.751	0.975	0.924	13.86
Volume Sampled (dscf)	41.32	38.28	38.59	N/A
Isokinetics (%)	103	102	103	90 – 110

Table 6: WGS/FCCU Operations and **Benzene** Emissions Summary

RUN	1	2	3	Allowable
DATE	09/17/10	09/17/10	09/17/10	
TIME	1145-1245	1335-1435	1524-1624	
PROCESSING RATE				
Average Feed Throughput (MBPD)	65.0	65.6	66.2	70.0
Benzene (RM 18)				
POUNDS/HOUR	0.0457	0.0606	0.0508	0.56
Volume Sampled (dscf)	1.743	1.771	1.712	N/A
R (recovery coefficient)	1.13			0.7 < R < 1.3

3.0 SUMMARY OF RESULTS (continued)

Table 7: WGS/FCCU Cyanide (CTM-033) Flowrate Summary

RUN	1	2	3	4
DATE	09/14/10	09/14/10	09/14/10	09/21/10
TIME	0920-1138	1256-1505	1610-1810	0909-1128
STACK DIAMETER (in)	91.0	91.0	91.0	91.0
STACK CROSS SECTION (sq ft)	45.17	45.17	45.17	45.17
BAROMETRIC PRESSURE ("Hg)	29.90	29.89	29.89	30.24
AVG. STACK TEMP (°F)	135	135	134	134
STACK PRESSURE ("H ₂ O)	0.85	0.95	0.83	0.93
MOISTURE (% vol)	18.5	18.5	18.8	20.4
O ₂ (% vol)	1.4	1.4	1.7	1.4
CO ₂ (% vol)	18.5	18.6	18.5	18.2
N ₂ (% vol by difference)	80.1	80.0	79.8	80.4
AVG. ACTUAL VELOCITY (ft/sec)	67.2	64.8	66.0	64.8
ACTUAL FLOW RATE (acfm)	182,000	176,000	179,000	176,000
STD FLOW RATE (scfm)	162,000	156,000	159,000	158,000
DRY STD FLOW RATE (dscfm)	132,000	127,000	129,000	126,000
CYCLONIC FLOW CHECK	Done 8/09/10	6.1° average	9° max. observed	---

3.0 SUMMARY OF RESULTS (continued)

Table 8: WGS/FCCU Cyanide (CARB 426) Flowrate Summary

RUN	1	2	3
DATE	09/14/10	09/14/10	09/14/10
TIME	0921-1139	1258-1506	1612-1818
STACK DIAMETER (in)	91.0	91.0	91.0
STACK CROSS SECTION (sq ft)	45.17	45.17	45.17
BAROMETRIC PRESSURE ("Hg)	29.90	29.89	29.89
AVG. STACK TEMP (°F)	136	136	135
STACK PRESSURE ("H ₂ O)	0.86	0.86	0.82
MOISTURE (% vol)	19.0	19.1	18.8
O ₂ (% vol)	1.4	1.4	1.7
CO ₂ (% vol)	18.5	18.6	18.5
N ₂ (% vol by difference)	80.1	80.0	79.8
AVG. ACTUAL VELOCITY (ft/sec)	69.2	65.7	68.4
ACTUAL FLOW RATE (acfm)	188,000	178,000	185,000
STD FLOW RATE (scfm)	166,000	158,000	165,000
DRY STD FLOW RATE (dscfm)	135,000	128,000	134,000
CYCLONIC FLOW CHECK	Done 8/09/10	6.1° average	9° max. observed

3.0 SUMMARY OF RESULTS (continued)

Table 9: WGS/FCCU **Lead** Flowrate Summary

RUN	1	2	3
DATE	09/15/10	09/15/10	09/15/10
TIME	0947-1123	1421-1556	1703-1853
STACK DIAMETER (in)	91.0	91.0	91.0
STACK CROSS SECTION (sq ft)	45.17	45.17	45.17
BAROMETRIC PRESSURE ("Hg)	30.11	30.05	30.10
AVG. STACK TEMP (°F)	135	135	135
STACK PRESSURE ("H ₂ O)	0.85	0.85	0.83
MOISTURE (% vol)	18.0	18.2	18.2
O ₂ (% vol)	1.5	1.3	1.3
CO ₂ (% vol)	18.1	18.7	19.0
N ₂ (% vol by difference)	80.4	80.0	79.7
AVG. ACTUAL VELOCITY (ft/sec)	66.8	65.5	69.2
ACTUAL FLOW RATE (acfm)	181,000	177,000	188,000
STD FLOW RATE (scfm)	162,000	159,000	168,000
DRY STD FLOW RATE (dscfm)	133,000	130,000	137,000
CYCLONIC FLOW CHECK	Done 8/09/10	6.1° average	9° max. observed

3.0 SUMMARY OF RESULTS (continued)

Table 10: WGS/FCCU Sulfur Trioxide/Sulfuric Acid Mist Flowrate Summary

RUN	1	2	3
DATE	09/15/10	09/15/10	09/15/10
TIME	0949-1217	1515-1701	1915-2031
STACK DIAMETER (in)	91.0	91.0	91.0
STACK CROSS SECTION (sq ft)	45.17	45.17	45.17
BAROMETRIC PRESSURE ("Hg)	30.11	30.05	30.10
AVG. STACK TEMP (°F)	137	136	135
STACK PRESSURE ("H ₂ O)	0.85	0.85	0.87
MOISTURE (% vol)	17.8	19.1	18.1
O ₂ (% vol)	1.5	1.3	1.3
CO ₂ (% vol)	18.1	18.7	18.9
N ₂ (% vol by difference)	80.4	80.0	79.8
AVG. ACTUAL VELOCITY (ft/sec)	65.5	67.0	67.4
ACTUAL FLOW RATE (acfm)	177,000	182,000	183,000
STD FLOW RATE (scfm)	158,000	162,000	163,000
DRY STD FLOW RATE (dscfm)	130,000	131,000	134,000
CYCLONIC FLOW CHECK	Done 8/09/10	6.1° average	9° max. observed

3.0 SUMMARY OF RESULTS (continued)

Table 11: WGS/FCCU Ammonia Flowrate Summary

RUN	1	2	3
DATE	09/16/10	09/16/10	09/17/10
TIME	1327-1433	1500-1603	0836-0940
STACK DIAMETER (in)	91.0	91.0	91.0
STACK CROSS SECTION (sq ft)	45.17	45.17	45.17
BAROMETRIC PRESSURE ("Hg)	29.96	29.89	29.86
AVG. STACK TEMP (°F)	135	135	135
STACK PRESSURE ("H ₂ O)	0.85	0.88	0.85
MOISTURE (% vol)	20.2	20.0	20.3
O ₂ (% vol)	1.3	1.3	1.2
CO ₂ (% vol)	18.7	18.8	18.5
N ₂ (% vol by difference)	80.0	79.9	80.3
AVG. ACTUAL VELOCITY (ft/sec)	71.8	67.7	67.8
ACTUAL FLOW RATE (acfm)	195,000	184,000	184,000
STD FLOW RATE (scfm)	173,000	163,000	163,000
DRY STD FLOW RATE (dscfm)	138,000	130,000	130,000
CYCLONIC FLOW CHECK	Done 8/09/10	6.1° average	9° max. observed

3.0 SUMMARY OF RESULTS (continued)

Table 12: WGS/FCCU **Benzene** Flowrate Summary

RUN	1	2	3
DATE	09/17/10	09/17/10	09/17/10
TIME	1145-1245	1335-1435	1524-1624
STACK DIAMETER (in)	91.0	91.0	91.0
STACK CROSS SECTION (sq ft)	45.17	45.17	45.17
BAROMETRIC PRESSURE ("Hg)	29.95	29.97	29.89
AVG. STACK TEMP (°F)	136	136	135
STACK PRESSURE ("H ₂ O)	0.85	0.84	0.83
MOISTURE (% vol)	18.5	19.3	19.9
O ₂ (% vol)	1.4	1.4	1.3
CO ₂ (% vol)	18.6	18.7	18.8
N ₂ (% vol by difference)	80.0	79.9	79.9
AVG. ACTUAL VELOCITY (ft/sec)	68.5	68.9	69.0
ACTUAL FLOW RATE (acfm)	186,000	187,000	187,000
STD FLOW RATE (scfm)	165,000	166,000	167,000
DRY STD FLOW RATE (dscfm)	135,000	134,000	134,000
CYCLONIC FLOW CHECK	Done 8/09/10	6.1° average	9° max. observed