CENTER FOR SUSTAINABLE SHALE DEVELOPMENT, INC.

RECERTIFICATION AUDIT SUMMARY REPORT

Chevron - Appalachian Mountain Business Unit (AMBU)

October 2016

AUDIT INFORMATION

OPERATOR INFORMATION					
Company	Chevron AMBU - Appalachian Mountain Business Unit				
Address	700 Cherrington Parkway, Coraopolis, PA 15108				
AUDITING FIRM INFORMATION					
Lead Auditor	John Stangline			Abbreviation	JAS
Auditor(s)	Hans Umhoefer			Abbreviation	HU
Water Performance Standards Audited:	Standard 1- 8.3	Start Date of Audit	8-8-2016	End Date of Audit	8-12-2016
Air Performance Standards Audited:	Standard 9 - 15.4	Start Date of Audit	8-8-2016	End Date of Audit	8-12-2016
Field/Office Auditor Days	10	Offsite Auditor Days	4	Total Auditor Days	14
Scope of Certification:	These standards apply to unconventional exploration, development, and gathering activities including site construction, drilling, hydraulic fracturing and production in the Appalachian Basin. These regional standards consider geology, topography, population density, infrastructure, surface water, ground water and other issues of particular concern in the Appalachian Basin. Accordingly, until such time as the scope of these standards may be amended, these standards and the CSSD evaluation and certification process will be limited to Operators' unconventional activities in the Appalachian Basin.				

Audit Objectives

The audit objective was to assure continued conformance of the Appalachia Basin assets of Chevron's Appalachian Mountain Business Unit (AMBU) to the Center for Sustainable Shale Development (CSSD) Environmental Performance Standards. This audit report identifies areas of conformance or non-conformance, observations, and applied best practices.

SUMMARY

Chevron's Appalachian Mountain Business Unit (AMBU), formerly the Appalachian "Michigan" Business Unit, achieved certification to the Center for Sustainable Shale Development's (CSSD) Performance Standards on September 18, 2014 and successfully completed an annual certification assurance review on September 19, 2015. Pursuant to certification requirements and on behalf of the CSSD, Bureau Veritas Certification (BVC) conducted a *recertification* audit of Chevron AMBU operations within the Appalachian Basin.

The recertification audit was conducted for conformance to the CSSD Performance Standards (Version 1.4) and in accordance with the requirements of the CSSD Verification Protocol (Version 1.1) and Guidance for Auditors (Version 1.4). A scoping meeting was held remotely on July 14, 2016 to review the geographical and operational scope of Chevron AMBU activities in the Appalachian Basin and to determine the appropriate set of recertification audit sites for field verification.

The desktop portion (document review) of this audit was performed at Chevron AMBU offices in Coraopolis, Pennsylvania on August 8 and 12, 2016. The field verification portion of the audit was performed at locations in Pennsylvania and West Virginia on August 9, 10 and 11, 2016. Each site was visited by a team of at least two auditors with guides from Chevron AMBU.

The verification process included audit team observations, interviews with responsible management, planning and operations personnel, documentation review and site tours. Where necessary and appropriate, the auditors requested explanations of site observations, equipment performance, operations, operating procedures and reviewed documents and records to demonstrate the level of conformance to the standards.

Over the course of the audit, the auditors reviewed approximately 95 records and documents and interviewed 13 employees (2 office based, 11 field personnel) to determine conformance with the performance standards.

Table 1, titled "CSSD Recertification – Chevron AMBU Audit Summary Scorecard" summarizes BVC's audit findings with respect to each performance standard. Table 2, titled "CSSD Recertification – Field Verification Visits, Chevron AMBU" outlines the locations and associated operations visited for observation and verification of conformance to the CSSD Performance Standards. The sites selected include a cross section of Chevron AMBU's operations and geographic locations within the Appalachian Basin that were active during the audit "operational window" as required by CSSD's Verification Protocol. The standards identified in Table 2 for each site are a sample of the areas of field observation and verification addressed by the audit team.

Table 1: CSSD Recertification
Chevron AMBU Audit Summary Scorecard - 2016

WATER	WATER PERFORMANCE STANDARDS	Finding (C,N,NA)*
1.0	**Std 1: No wastewater discharge**	
1.1	Maintain zero discharge of wastewater (including drilling, flowback and produced waters) to Waters of the Commonwealth of PA and other states.	C
1.2	In order to facilitate comprehensive wastewater management programs that consider environmental, safety, health, and economic factors, Operators may send shale wastewater to a Centralized Waste Treatment facility (CWT) for treatment and discharge if the Operator demonstrates certain conditions are satisfied at the CWT.	NA[1]
1.3	Prior to using a CWT that may discharge, the operator must conduct an evaluation of the CWT's performance and permit compliance status.	NA[1]
1.4	Operator must conduct CWT effluent monitoring.	NA[1]
1.5	Operators may not initiate, and will immediately cease, deliveries to a CWT if the CSSD determines the CWT discharges increase the risk of harm to human health or the environment or is in susbstantial non-compliance with its NPDES permit.	NA[1]
1.6	Operator shall provide CWT evaluation data to the CSSD and in the event of identifying potential non-compliance findings, shall notify the CWT, the permitting agency, and CSSD.	NA[1]
2.0	**Std 2: Recycle water**	
2.1	Maintain a plan to recycle flowback and produced water, for usage in drilling or fracturing a well, to the maximum extent possible.	C
2.2	Recycle a minimum of 90% of the flowback and produced water, by volume, from wells in all core operating areas in which an Operator is a net water user.	C
2.3	CSSD will consider a recycling standard for a net water producer within one year. Operators will maximize the use of recycled water to the extent possible during this time.	C
3.0	**Std 3: Closed loop drilling / pits**	
3.1	Any new pits designed shall be double-lined and equipped with leak detection.	NA[2]
3.2	Contain drilling fluid, when using oil-containing drilling fluids to drill a well, in a closed loop system at the well pad (e.g. no ground pits).	C
3.3	Contain all drilling fluid and flowback water in a closed loop system at the well pad, eliminating the use of pits for all wells.	C

*C = Conformance with the standard NA = Not applicable

[1] Chevron AMBU did not utilize a CWT. Therefore, Standards 1.2 through 1.6 are not applicable for Chevron AMBU.
[2] No new pits are in use or planned by Chevron AMBU, therefore, Standard 3.1 does not apply for Chevron AMBU.

4.0	**Std 4: Centralized wastewater impoundments**	
4.1	Ensure that free hydrocarbons are removed from the water prior to storage; new impoundments must be double-lined with an impermeable material, equipped with leak detection; and take measures to reasonably prevent hazards to wildlife.	NA[3]
5.0	**Std 5: Geologic risk assessment**	
5.1	Establish an Area of Review, prior to drilling a well, which encompasses both the vertical and horizontal legs of the planned well; conduct a comprehensive characterization of subsurface geology , including a risk analysis; and conduct a thorough investigation of any active or abandoned wellbores within such area of review or other geologic vulnerabilities (e.g., faults) that penetrate the confining layer and adequately address identified risks.	C
6.0	**Std 6: Groundwater monitoring**	
6.1	Develop and implement a plan for monitoring existing water sources and demonstrate that water quality and chemistry measured during a pre-drilling assessment are not impacted by operations.	C
6.2	Conduct periodic monitoring for at least one year following completion of the well and monitoring must be extended if results indicate potentially adverse impacts on water quality or chemistry by operations.	C
6.3	Develop and implement an investigative and corrective action plan if monitoring establishes a possible link between an Operator's activities and of contamination of a water source	C
6.4	Conduct additional monitoring in the event a well is re-stimulated.	C
7.0	**Std 7: Well integrity; fluid design & disclosure**	
7.1	Design and install casing and cement to completely isolate the well and all drilling and produced fluids from surface waters and aquifers and prevent vertical movement of fluids in the annulus.	C
7.2	Do not use diesel fuel in the hydraulic fracturing fluids.	C
7.3	Publically disclose the chemical constituents intentionally used in well stimulation fluids.	C
7.4	Work toward use of more environmentally neutral additives for hydraulic fracturing fluid.	C
7.5	Perform mechanical integrity tests when refracturing an existing well.	NA[4]

[3] Chevron AMBU does not utilize centralized impoundments to store flowback water or produced water in the Appalachian Basin; therefore, Standard 4.1 does not apply to Chevron AMBU.

[4] Chevrons AMBU has not performed re-fracturing operations in the Appalachian Basin during the certification period nor are re-fracturing operations planned at the time of the audit; therefore, Standard 7.5 does not apply to Chevron AMBU.

8.0	Std 8: Spill containment & emergency response	
8.1	Design each well pad to minimize the risk that drilling related fluids and wastes come in contact with surface waters and fresh groundwater.	C
8.2	Develop and implement an emergency response plan and ensure local responders have appropriate training and equipment to respond to an emergency at the well.	C
8.3	In the event of spill or release, beyond the well pad, immediately provide notification to the local governing body and any affected landowner.	C

AIR	AIR PERFORMANCE STANDARDS	
9.0	**Std 9: gas to pipeline/ limited flaring**	
9.1	Direct all pipeline-quality gas during well completion of development wells, and re-completion or workover of any well into a pipeline for sales.	C
9.2	Any gas not captured and put in the sales pipeline may not be vented and must be flared (in accordance with Standard No. 10).	C
9.3	Acceptable reasons for sending gas to a flare and not directing gas into the sales line include: (a) Low content of flammable gas and (b) for safety reasons.	C
9.4	Circumstances unacceptable for sending gas to flare, instead of directing it into a sales line, are: (a) lack of a pipeline connection except for wells that are designated as either exploratory or extension wells; (b) inadequate water disposal capacity; and (c) undersized flow back equipment, lack of flow back equipment or lack of equipment operating personnel.	C
9.5	Document any upset or unexpected condition that leads to flaring of gas and maintain records of description of the condition, the location, date, and quantity of gas flared.	C
9.6	Exploratory well verification	C
10.0	**Std 10: Flare operation, if permitted**	
10.1a	Use raised/elevated flares or an engineered combustion device with a reliable continuous ignition source, which have at least a 98% destruction efficiency of methane. Pit flaring is not permitted.	C
10.1b	Flaring may not be used for more than 14-days on any development well and no more than 30-days on any exploratory or extension wells. If flaring continues beyond 30-days for an exploratory or extension well, document the extent of additional flaring and reasons requiring flaring beyond the 30-days.	C
10.1c	Flares shall be designed for and operated with no visible emissions, except for periods not to exceed a total of five minutes during any two consecutive hours.	C
11.0	**Std 11: Engine emissions - rig; frac pumps**	
11.1a-e	Dedicated horizontal drill rig (non-road) diesel - average emissions must be equivalent to Tier 2 non-road diesel engine standards or better. All horizontal drill rig diesel non-road equipment must use Ultra-Low Sulfur Diesel fuel (15 ppm of sulfur) at all times.	C
11.2a-b	Dedicated frac pump diesel engines - average emissions must be equivalent to Tier 2 non-road diesel engine standards or better. All frac pump diesel engines must use Ultra-Low Sulfur Diesel fuel (15 ppm of sulfur) at all times.	C

12.0	**Std 12: Engine emissions - compressors**	
12.1	Existing compressor engines greater than 100 horsepower may not emit more than 1.5 grams of NOx per horsepower-hour.	C
12.2	Any new, purchased, replacement, reconstructed, or relocated lean-burn engines greater than 100 horsepower may not emit more than 1.0 g/hp-hr for NOx; 2.0 g/hp-hr for CO; 0.7 g/hp-hr for VOCs.	NA[5]
12.3	Any new, purchased, replacement, reconstructed, or relocated lean-burn engines greater than 500 horsepower may not emit more than 0.5 g/hp-hr for NOx; 47 ppmvd @ 15% O2 or 93% reduction of CO; 0.2 g/hp-hr for VOCs; and 0.05 g/hp-hr for HCHO.	NA[5]
12.4	Any new, purchased, replacement, reconstructed, or relocated rich-burn engines greater than 100 horsepower and up to 500 horsepower may not emit more than 0.25 g/hp-hr for NOx; 0.3 g/hp-hr for CO; 0.2 g/hp-hr for VOCs.	NA[5]
12.5	Any new, purchased, replacement, reconstructed, or relocated rich-burn engines greater than 500 horsepower may not emit more than 0.2 g/hp-hr for NOx; 0.3 g/hp-hr CO; 0.20 g/hp-hr for VOCs; 2.7 ppmvd at 15% O2 or 76% reduction for HCHO.	C
13.0	**Std 13: Tank VOC emissions**	
13.1	All individual storage vessels at the well pad with VOC emissions equal to or greater than 6 tpy must install controls to achieve at least a 95% reduction in VOC emissions.	C
14.0	**Std 14: Fugitive emissions - controllers, seals, inspection**	
14.1	Change rod packing at all reciprocating compressors (both existing and new), including those at the wellhead, either every 26,000 hours of operation or after 36 months.	C
14.2	All pneumatic controllers must be low – bleed, with a natural gas bleed rate limit of 6.0 scfh or less or zero bleed when electricity (3-phase electrical power) is on-site.	C
14.3	Replace worn out wet seals on existing centrifugal compressors with dry seals.	NA[6]
14.4	Implement a directed inspection and maintenance program (DIM) for equipment leaks from all existing and new valves, pump seals, flanges, compressor seals, pressure relief valves, open-ended lines, tanks and other process and operation components that result in fugitive emissions. Monitor weekly (OVA) and annually (FLIR). Once significant leaks are detected, they are required to be repaired in a timely manner.	C
14.5	Eliminate VOC emissions associated with the prevention of well-bore freeze-up.	C
14.6	Pressurize compressors when they are off-line for operational reasons to reduce blowdown emissions.	C

[5] The Chevron AMBU compressor engines were pre-existing at the time of certification and none of the compressor engines are new, purchased, replacements, reconstructed, or relocated.

[6] Chevron AMBU does not operate centrifugal compressors in the Appalachian Basin; therefore Standard 14.3 does not apply.

15.0	Std 15: Engine emissions - water fleet, other	
15.1	80% of all trucks used to transport fresh water or well flowback water must meet U.S. EPA's Final Emission Standards for 2007 and Later Model Year Highway Heavy-Duty Vehicles and Engines for particulate matter (PM) emissions.	C
15.2	By September 24, 2015, 95% all trucks used to transport fresh water or well flowback water must meet U.S. EPA's Final Emission Standards for 2007 and Later Model Year Highway Heavy-Duty Vehicles and Engines for particulate matter emissions.	C
15.3	All on-road vehicles and equipment must limit unnecessary idling to 5 minutes, or abide by applicable local or state laws if they are more stringent.	C
15.4	All on-road and non-road vehicles and equipment must use Ultra-Low Sulfur Diesel fuel (15 ppm of sulfur) at all times.	C

Table 2: CSSD Recertification - Field Verification Visits Chevron AMBU

Site Name	Assessors	Date	General Location	Operation / Activity	Key CSSD Performance Standards Assessed
Ritter_A	JAS, HDU	August 9, 2016	Southwest Pennsylvania	Production – dry gas	*1 - Zero discharge, 8 – Containment and ERP, 14 – Controllers, Chemical Injectors, LDAR (Leak Detection and Repair), 15 - Truck idling*
San Filippo_A				Production – dry gas	*1 - Zero discharge, 8 – Containment and ERP, 14 – Controllers, Chemical Injectors, LDAR (Leak Detection and Repair), 15 - Truck idling*
Sargent_A				Production – dry gas	*1 - Zero discharge, 8 – Containment and ERP, 14 – Controllers, Chemical Injectors, LDAR (Leak Detection and Repair), 15 - Truck idling*
Wicks				Compressor Station – 1 operating compressor engine	*1 - Zero discharge, 8 – Containment and ERP, 12 - Engine Emissions, 14 – Rod Packing, Controllers, Blowdown for Operations LDAR (Leak Detection and Repair) 15 - Truck idling*
Conner_A	JAS, HDU	August 10, 2016	Northwest West Virginia	Production – wet gas	*1 - Zero discharge, 8 – Containment and ERP, 13 – Tanks / VOC, 14 – Controllers, Chemical Injectors, LDAR (Leak Detection and Repair), 15 - Truck idling*
Hart_B				Production – wet gas	*1 - Zero discharge, 8 – Containment and ERP, 13 – Tanks / VOC, 14 – Controllers, Chemical Injectors, LDAR (Leak Detection and Repair), 15 - Truck idling*
Berger_A				Production – wet gas	*1 - Zero discharge, 8 – Containment and ERP, 13 – Tanks / VOC, 14 – Controllers, Chemical Injectors, LDAR (Leak Detection and Repair), 15 - Truck idling*
Caveny_A				Production – wet gas	*1 - Zero discharge, 8 – Containment and ERP, 13 – Tanks / VOC, 14 – Controllers, Chemical Injectors, LDAR (Leak Detection and Repair), 15 - Truck idling*
Curry_A		August 10, 2016	Northwest West Virginia	Production – wet gas	*1 - Zero discharge, 8 – Containment and ERP, 13 – Tanks / VOC, 14 – Controllers, Chemical Injectors, LDAR (Leak Detection and Repair), 15 - Truck idling*

Site Name	Assessors	Date	General Location	Operation / Activity	Key CSSD Performance Standards Assessed
Miller_A	JAS, HDU	August 11, 2016	Southwest Pennsylvania	Production – dry gas	*1 - Zero discharge, 8 – Containment and ERP, 14 – Controllers, Chemical Injectors, LDAR (Leak Detection and Repair), 15 - Truck idling*
PBG Smith_A				Production – dry gas	*1 - Zero discharge, 8 – Containment and ERP, 14 – Controllers, Chemical Injectors, LDAR (Leak Detection and Repair), 15 - Truck idling*
Bedilion_A				Production – dry gas	*1 - Zero discharge, 8 – Containment and ERP, 14 – Controllers, Chemical Injectors, LDAR (Leak Detection and Repair), 15 - Truck idling*
Grooms_A				Production – dry gas	*1 - Zero discharge, 8 – Containment and ERP, 14 – Controllers, Chemical Injectors, LDAR (Leak Detection and Repair), 15 - Truck idling*

* VOC – Volatile Organic Compound
** ERP – Emergency Response Plan