New Mexico Oil Conservation Division 19.15.28 NMAC Operations Plan

Natural Gas Gathering Systems

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Overview

To maintain safety, environmental stewardship and operational integrity, Harvest Midstream (company) strives to minimize the loss of natural gas from its gathering systems.

The company operates a natural gas gathering system consisting of steel pipelines which span across the San Juan Basin. These are buried pipelines that were installed from the 1950's through the current decade and have operating pressures ranging from approximately 75 to 1000 psi. Each of these pipelines is physically marked to identify the presence of a natural gas pipeline. All natural gas gathered by the company is considered to be sweet natural gas, with insignificant amounts of hydrogen sulfide. The company operates both PHMSA regulated and non-PHMSA regulated pipelines. As an operator engaging in natural gas gathering and processing in the State of New Mexico, these operations are subject to 19.15.28 of the New Mexico Administrative Code (NMAC). This rule regulates venting and flaring of natural gas in order to reduce waste and basin-wide methane emissions.

19.15.28.8.C. NMAC requires that operators of natural gas gathering systems develop and implement an operations plan. Pursuant to this requirement, the company is submitting this operations plan to explain how Harvest will comply with each constituent of the rule.

The company will update this plan by March 31st of each year if a new gathering pipeline is added or if the company needs to make changes to the plan.

Venting and Flaring of Natural Gas – 19.15.28.8

Authorized Activities – 19.15.28.8.A. and B

This section discusses the activities authorized for venting and flaring under 19.15.28.8.B. NMAC and scenarios in which Harvest has deemed it technically infeasible or unsafe to flare.

For the categories listed below, Harvest will route natural gas to a portable flare stack that meets the requirements of 19.15.27.8 Subsection E.

- Emergency or malfunction
- Repair and maintenance, including blowing down and depressurizing equipment
- Normal operation of gas activated pneumatic controllers or pumps
- Normal operation of dehydration units and amine treatment units
- Normal operation of compressors, compressor engines, and turbines
- Normal operation of valves, flanges, and connectors
- Normal operation of a storage tank or other low pressure production vessel
- Gauging or sampling a storage tank or other low-pressure vessel
- Loading out liquids from a storage tank or other low-pressure vessel to a transport vehicle
- Blow down to repair a gathering pipeline
- Pigging a gathering pipeline
- Purging a gathering pipeline
- Commissioning of pipelines, equipment, or facilities

Exceptions to this best practice include emergencies and scenarios in which it has been deemed unsafe or technically infeasible to route natural gas to a portable flare. The company has determined that these scenarios include, but may not be limited to, instances in which:

- Flaring would endanger employees and/or the public; the company identifies any situation that would endanger employees or members of the public or any leak from a gathering system or compressor station to meet those criteria
- A request is made by a state or federal agency or tribal entity to immediately depressurize a gathering system
- Flaring would violate local fire restrictions; the company believes that flaring during fire bans is unsafe and irresponsible due to the increased risk of starting a fire while operating the combustion device
- Volume to be flared is less than 4.4 MCF; the company has determined that flaring a volume less than 4.4 MCF would increase the amount of natural gas vented due to purging the flare system and keeping the flare lit for continuous operations. This would be counterproductive to methane emissions reduction. The rationale for this decision is included as Appendix A.
- The flare cannot be set far enough away from existing equipment to operate safely or continuously
- The flare cannot be supplied enough volume from the emission source to operate safely and effectively
- A landowner or state agency will not allow a flare to be utilized at the location
- There exists a potential for oxygen to enter the pipeline or other equipment

Performance Standards – 19.15.28.8.C.

This section outlines the actions that Harvest will take to prevent and minimize leaks and releases of natural gas from its gathering system.

Routine Maintenance Program

Harvest uses an Enterprise Asset Management (EAM) software program to help identify efficient preventative measures and to help minimize unplanned equipment failures. The company has preventative maintenance (PM) schedules set up to generate work orders that are assigned to qualified employees who perform the tasks described within given timeframes. The PM tasks and frequencies are determined and adjusted as needed to best resolve potential failures before they occur. Using an EAM system, the company reduces the number of unplanned failures, which reduces the amount of natural gas venting/flaring events.

Twice a year, the company's PHMSA regulated pipelines undergo a right of way inspection. These inspections include a leak survey. Any identified leaks are immediately addressed to reduce the volume of lost natural gas.

All new pipelines are hydrotested to check for defects that could lead to leaks before being placed into active service. This ensures there is no loss of natural gas from new pipelines.

Cathodic Protection

Cathodic protection (CP) systems are currently implemented on certain pipelines to provide applied protective current to below grade piping to minimize or reduce external corrosion. A typical system is comprised of several components that include CP ground beds, test leads, isolation kits, and external pipeline coating.

External coatings are the initial defense against below grade corrosive soil environments. This is followed by supplemental CP current. Isolation kits control and focus the segments of pipeline to which CP is applied and protect against interference from other pipeline CP systems. Finally, test leads are used to meet PHMSA regulatory/ NACE SP0169 monitoring requirements of the CP levels that are applied, and to allow adjustments to be made to the areas along the pipe that need additional CP current.

The systems are designed to increase CP voltage levels to meet regulatory/ NACE SP0169 criteria of -850 [mV] or more negative. Also, in some cases, the PHMSA regulatory/ NACE SP0169 alternative criteria of 100 [mV] shift is utilized to prove pipelines are cathodically protected.

Most CP systems are impressed current systems that allow for broader coverage of various lengths of pipeline segments in different soils. Other types of CP systems include sacrificial anodes that allow for a targeted approach to segments of pipeline where there are lower levels of cathodic protection.

The CP system is monitored through periodic inspections that ensure the system is operating, potential issues are identified, and that areas of concern are addressed. Annual pipeline CP surveys are performed once a year, in a timeframe not to exceed 15 months. Rectifier inspections for impressed current CP systems are performed every two months, in a timeframe not to exceed 2.5 months. Any deficiencies found with the CP system are required to be addressed before the next scheduled inspection.

Additionally, as required by PHMSA regulations, all above ground pipeline is inspected for atmospheric corrosion once every three years, in a timeframe not to exceed 39 months. Typically, the dry environment the above ground piping is exposed to in the San Juan Basin does not present high atmospheric corrosion risk.

Internal Corrosion Control Program

The internal corrosion control program is written in the Pipeline Corrosion Control Plan (PCCP). PHMSA 192 and NACE SP0106-2006 are used as guidelines for gas pipeline systems when tailoring the internal corrosion control program to Harvest systems. The control program is implemented across the assets operated by the company and includes corrosion mitigation, corrosion monitoring, and corrosion prediction. A chemical company has been appointed by the company to perform internal corrosion control services for Harvest.

Corrosion Mitigation

Corrosion inhibitors, biocides and/or H_2S scavengers are used to mitigate corrosion risk by either continuous injection into the gas stream or by batch treatment application. The method utilized is

contingent on operating conditions and/or facilities setup and may be particular to the specific pipeline system. A pigging program is implemented where feasible.

Corrosion Monitoring

- Corrosion coupons are installed at pipelines and facilities to monitor internal corrosion. They are pulled and analyzed at least twice a year, with intervals not exceeding 7.5 months.
- Sessile bacteria samples are collected on coupon surfaces when they are pulled.
- Coupon results are used to make appropriate adjustments to the pipeline corrosion control program.
- If water is present when pulling coupons, it is collected for analysis of planktonic bacteria, chemical residuals, dissolved gas, alkalinity etc., based on the amount of water present in the sample.
- If pipe is removed for any reason, the internal surface of the pipe will be inspected for evidence of corrosion and evidence of corrosive gas. Necessary adjustments to the chemical treating program can also be made based on these inspection results.

Corrosion Prediction

To optimize the corrosion mitigation and monitoring program, corrosion modeling/prediction assessments can be performed internally or by a chemical service company. This corrosion analysis is performed to help gather data that can be used to further refine corrosion mitigation and monitoring strategy.

Liquids Management

Harvest implements a liquids management program to maintain the integrity of its assets. The program reduces the venting of natural gas by mitigating the risk of pipeline failure that might be caused by internal corrosion from liquids and impurities in natural gas.

The company surges pipelines by shutting a valve downstream of one or more wells, building pressure, and then opening the valve and sending liquids into a piggable pipeline. There is no natural gas loss associated with these measures. Where surging is not effective and the pipeline is not piggable, Harvest sweeps liquids out of its pipelines into water trucks. This is usually completed through a two-phase blow down. Because this activity results in the greatest amount of natural gas loss, it is only performed when absolutely necessary. If these volumes will be greater than 4.4 MCF, Harvest will vent natural gas to a portable flare stack to reduce the amount of gas release to atmosphere.

Pigging is performed to remove liquids from pipelines. The company's pigging schedule varies from pipeline to pipeline with some being pigged multiple times per week and others being pigged on an as needed basis. Where possible, the company manages liquids from pigging at a facility that is controlled by a dump controller set to leave a liquid seal. This is a single-phase release with no gas loss. For some pigging operations, the company reduces the loss of natural gas by conducting pig runs in a series, in which multiple pigs are caught, and the last pig brings associated liquids to the facility. This best practice ensures that the pig trap only needs to be opened once for multiple pigs, limiting opportunities for natural gas loss.

The company performs controlled pressurized draining from its pipelines to remove liquids. This is performed by manually opening a valve and draining liquids into a tank on location. Natural gas loss is minimized during these operations by shutting a valve as the product transitions from single-phase (liquid) to two-phase (liquid and gas). In colder months, this preventive maintenance task is completed to clear all liquids and prevents valves and other equipment from failing due to freezing and expanding.

The company liquid management program also prioritizes the prevention and mitigation of freeze-related failure during colder months. Freezes can increase the risk of pipeline failure due to water expansion as it changes from a liquid to solid state. Freeze mitigation can be performed naturally by depressurizing lines on both sides of a freeze-point and allowing ambient temperature and atmospheric pressure to gradually alleviate the problem, or by other means such as chemical injection, surging or sweeping the pipeline as described above.

Integrity Management

49 Code of Federal Regulations (CFR) Part 192 Subpart O details requirements for pipeline integrity management for gas transmission pipeline segments located in High Consequence Areas (HCAs). Per the requirements, Harvest has an active written plan on how to manage the integrity of lines that meet this requirement. An HCA is defined as an area meeting one of the following criteria:

i. the area within a potential impact circle that contains 20 or more buildings intended for human occupancy; or

ii. the area within a potential impact circle that contains an identified site

Periodic HCA studies are completed to verify changes in data sources to identify any new HCA sections along the pipelines. If an HCA is identified and confirmed, the pipeline would be included in the Baseline Assessment Plan (BAP) and would be scheduled for the appropriate integrity assessment type (hydrotest or in-line inspection) in order to evaluate potential threats.

Following the baseline integrity assessment, a comprehensive risk assessment (CRA) would be performed to analyze the severity and likelihood for all types of threats. Pending results of the CRA, an assessment frequency would be established for the pipeline asset, and a preventive and mitigative measures (P&MM) evaluation would be completed to determine if any actions should be taken to reduce the likelihood and mitigate the consequences of a pipeline incident that "could affect an HCA." This includes analyzing the risks of applicable segments and identifying additional actions that would enhance public safety or environmental protection.

Weekly AVO Inspections

Harvest will conduct weekly audio, visual, olfactory (AVO) inspections of the compressors, dehydrators, and treatment facilities associated with its natural gas gathering system. Any leaks identified during these inspections will be promptly addressed to minimize the amount of natural gas vented to atmosphere. The company has developed an internal inspection checklist, included as Appendix B, that is completed for each AVO inspection. The inspection checklist includes the elements identified in 19.15.28.8.C.4. This checklist will be modified as necessary. The company will complete the inspection checklist for each inspection and will maintain records of inspection completion for a minimum of five years.

Annual Pipeline Inspection

Harvest will monitor the entire length of its gathering pipeline each year. Any leaks discovered during the annual monitoring will be promptly addressed to minimize the amount of natural gas vented to atmosphere. The company will accomplish the required monitoring by using one or a combination of the methods specified at 19.15.28.8.C.5 NMAC. These include:

- AVO techniques
- Aerial visual inspections
- Other valid methods

The company will maintain records of all monitoring completed to satisfy this requirement for at least five years.

Reporting to Affected Upstream Operators – 19.15.28.8.D.

In accordance with 19.15.28.8.D., Harvest will report to affected upstream operators no less than 14 days prior to the date of scheduled maintenance, replacement, or repair of its natural gas gathering system. The company's written notification to upstream operators will provide the date and expected duration that its system will not gather natural gas.

In the event of an emergency, malfunction, or the need for unscheduled maintenance of its natural gas gathering system, the company will exceed respective requirements to notify affected upstream operators within 12 hours telephonically and 24 hours via written means by initiating automated electronic communication immediately following the shutdown and subsequent re-starts of applicable assets.

Measurement or Calculation of Vented and Flared Natural Gas – 19.15.28.8.E.

Harvest will follow the methodologies specified in this section for measuring or calculating the amount of vented or flared gas.

Emergency and Non-scheduled Maintenance or Malfunction

Harvest will calculate the amount of natural gas vented as a result of emergency situations such as pipeline leaks. For leaks, the volume will be based upon a standard orifice flow calculation. The calculation will be based on the pressure of the system, diameter of the orifice through which natural gas is released, and the duration of the release. System depressurization to repair the leaks will also be accounted for. For larger line leaks, volume and pressure data trending will be conducted where available, as well as pipeline modeling to determine gas loss.

For any non-scheduled maintenance or malfunction, the volume vented will be calculated based on the volume of the system or equipment being depressurized as well as the temperature and pressure of the system.

Beneficial use, including pilot and purge gas, fired equipment and engines

Harvest will measure the amount of gas that it uses for fuel throughout the system.

Any beneficial use that is not measured will be calculated using a combination of equipment specifications, and standard industry practices.

Scheduled pipeline operations (routine repair, maintenance, blowdown, purging, pigging, depressurization)

Harvest will calculate gas vented from routine pipeline operations using sound engineering judgement and standard industry calculation methodology. Calculations will account for system volume, pressure, temperature and be based on use of the Ideal Gas Law.

Storage tank emissions

Harvest will calculate the amount of gas vented as a result of normal storage tank operation. Emission calculations will be based on flash calculations performed on a representative liquid sample for each system. Emissions rates will be related on a volumetric basis of tank throughput. System pressures and intermediate separation functions will also be considered in these calculations.

Venting as a result of normal operation of pneumatic controllers and pumps

Harvest will calculate the amount of gas vented as a result of normal operation of pneumatic controllers and pumps. Manufacturer specifications will be utilized wherever possible. If bleed rates are not published, data from similar devices will be utilized as a best approximation. The number of devices and type of actuation (steady state vs intermittent bleed) will be considered when performing venting calculations.

Reporting of Vented or Flared Natural Gas – 19.15.28.8.F.

Emergency, Malfunction, or of Long Duration

Harvest will notify the division of a venting or flaring event that:

- Results from an emergency or malfunction and exceeds 50 MCF or
- Lasts eight hours or more cumulatively within any 24-hour period and exceeds 50 MCF.

To report natural gas venting and flaring events that meet the criteria specified in 19.15.28.8.F, The company will file a C-129 form with the division on or before the specified deadlines:

- For venting or flaring that exceeds 50 MCF in volume and either results from an emergency or malfunction or lasts eight hours or more cumulatively within any 24-hour period from a single event and exceeds 50 MCF
    - The company will file a C-129 no later than 15 days following discovery of venting or flaring.
- For venting or flaring that equals or exceeds 500 MCF or otherwise qualifies as a major release as defined in 19.15.29.7 NMAC from a single event
    - The company will notify the division verbally or by email as soon as possible and no later than 24-hours following discovery of venting or flaring
    - No later than 15 days following the discovery of venting or flaring, the company will file a form C-129 that verifies, updates, or corrects the verbal or email notification.

The company understands that it may have to provide and certify additional information that is requested by the division.

Reporting

Beginning October 1, 2021, Harvest will gather monthly data for quarterly reports required to be submitted on:

- February 15, 2022 for the fourth quarter of 2021 and
- May 15, 2022 for the first quarter of 2022.

Beginning April 1, 2022, the company will submit a form C-115B monthly, on or before the 15th day of the second month following the month in which the natural gas was vented or flared.

For the following categories, the company will report the volume of vented and flared natural gas:

- Emergency
- Non-scheduled maintenance or malfunction, including the abnormal operation of equipment
- Routine repair and maintenance, including blowdown and depressurization
- Beneficial use, including pilot and purge gas, fired equipment and engines
- Gathering pipeline blowdown and purging
- Gathering pipeline pigging
- Storage tanks
- Venting as a result of normal operation of pneumatic controllers and pumps
- Improperly closed or maintained thief hatches; and
- Other surface waste as defined in subparagraph (1) of paragraph (b) of subsection W of 19.15.2.7 NMAC

For each of these categories, the company will specify if the volume was measured or estimated in the report. For volumes that are estimated, the company will provide the calculation methodology in the initial report and will report changes to calculation methodology in the appropriate future reports.

The company will make and keep records of the measured and calculated volumes, including records showing how the volumes were calculated, for no less than five years.

Calculations

Natural gas lost must be reported on both a volumetric and gas capture percentage basis. To calculate the lost natural gas on a volumetric basis, Harvest will use the following methodology.

Total loss – (BU+EM+PV) = a

Where:

Total loss = total volume of natural gas loss from all categories specified at 19.15.28.8.F.2.

BU = volume of natural gas used for beneficial use

EM = volume of natural gas vented or flared during an emergency

PV = volume of natural gas vented as a result of normal operation of pneumatic controllers and pumps

a = volume of natural gas lost

To calculate the lost natural gas on a percentage basis, the company will use the following methodology specified at 19.15.28.8.F.3.b

(T-a)/T = p

Where:

T = total volume of natural gas gathered (reported on C-115B)

a = total volume of natural gas lost (calculated above)

p = total percentage of natural gas captured

Location Requirements – 19.15.28.9

GIS Map

Harvest will file a GIS digitally formatted as-built map which includes pipeline size and construction material type by August 23, 2021. By July 1st of each year thereafter, the company will file with the division an updated GIS digitally formatted as-built map, including a layer which identifies the date, location, and volume of vented or flared natural gas associated with each emergency, malfunction, and release reported to the division. The company will maintain a database of all natural gas releases as a result of venting or flaring from each emergency, malfunction, and release reported to the division each year. This database will be used to create the annual update to the GIS map that is filed with the division.

Statewide Natural Gas Capture Requirements – 19.15.28.10

Requirements

Harvest will continue efforts to capture at least ninety-eight percent of the natural gas that it gathers by following the measures outlined in this operating plan. The company will, if necessary, increase its annual percentage of natural gas captured by the applicable percentage specified in 19.15.28.10.A.1 NMAC. To document its minimum required annual natural gas capture percentage increase, the company will follow the methodology specified at 19.15.28.10.A, listed below.

For 2022

(baseline loss rate minus two percent)/5*0.75

For 2023-2026

(baseline loss rate minus two percent)/5

Accounting

Beginning in 2023, Harvest will submit a report certifying compliance with the statewide gas capture requirements by February 28 of each year. To calculate its gas capture percentage, the company will follow the procedures outlined in the *Reporting of Vented or Flared Natural Gas* section of this operations plan on a monthly basis.

Third-Party Verification

Harvest acknowledges that the division may request that the company verify any data or information collected or reported pursuant to 19.15.28 NMAC, make recommendations to correct or improve the collection and reporting of data and information, submit a report of the verification and

recommendations to the division by the specified date, and implement the recommendations in the manner approved by the division. If the division and the company cannot reach agreement on the division's request, the company may file an application for hearing before the division. The company, at its own expense, may retain a third party approved by the division to conduct the activities agreed to by the division and the company or ordered by the division following a hearing.

Appendix A – Justification for Flaring Volume

Harvest's justification for venting less than 4,400 SCF is based on the assumptions below.

1. Temporary pipe to flare: to put the flare a safe distance from the source it is assumed Harvest would lay ~250 ft of 6" pipe to the temporary 4" flare. Per American Gas Association (AGA) purging and principles and practice document (Third Edition) Section 5.3(f), the pressure must be kept at 3 psig (Table 5.1) or greater and recommends a two minute/mile purge time. Having less than one half mile of pipe, Harvest has gone with the 45 seconds of purge time.

2. Section 5.3(f) part seven states an additional percentage of volume should be purged to obtain a safety margin to ensure that the pipe is void of a flammable mixture. Harvest uses 200% of the initial purge duration to ensure pipe is void of flammable mixture. Harvest has calculated that it takes two minutes and fifteen seconds of purge time to void the temporary piping of air.

3. Harvest utilizes the Oliphant flow formula since pressure on the system is between 0-100 psi. Using the Oliphant equation below, we identify the flow rate needed to maintain 3 psig at the inlet of the temporary piping.

Oliphant Formula

P1=((L(Q/(985*(d^2.5+d^3/30))^2)/(312/(S*T))+P2^2)^.5

Flare stack		
Flow rate	2.83	MMSCFD
MW	19.00	
Pressure at endpoint	11.50	psia
pipe diameter	4.00	inch
length	25.00	ft
temperature	70.00	F
pressure at beginning	13.04	psia
6" temporary piping to Flare Stack		
Flow rate	2.83	MMSCFD
MW	19.00	
Pressure at endpoint	13.04	psia
pipe diameter	6.23	inch
length	250.00	ft
temperature	70.00	F
pressure at beginning	**14.50**	psia

Based on the calculation above, flowing 2.83 MMSCFD for two minutes and fifteen seconds gives us a vent rate of 4400 SCF. Harvest believes that anything less than 4400 SCF should be vented instead of flared to reduce emissions and meet the intent of the regulation.

Appendix B – Weekly AVO Inspection Checklist

Facility Name*	Wild Horse
Compressors inspected?*	-- select --
Flare Stack(s) inspected?*	-- select --
Closed vent systems inspected?*	-- select --
Pressure relief devices inspected?*	-- select --
Pumps inspected?*	-- select --
Thief Hatches inspected?*	-- select --
Valves, Lines, Flanges, Connectors and associated piping inspected?*	-- select --
Dehydrators inspected?*	-- select --
Defects, leaks, or releases discovered?*	-- select --
If you answered yes to any defects, leaks, or releases discovered above, please describe findings:	Enter text
Were corrective actions taken to repair findings?	-- select --
If no, describe reasoning:	Enter text
If yes, describe the corrective actions taken to repair the defect, leak, or release:	Enter text
Name of Inspector:*	Enter text
Date of Inspection:*	M/D/YYYY

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State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
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QUESTIONS

Action 43548

QUESTIONS

Operator: Harvest Four Corners, LLC 1111 Travis Street Houston, TX 77002	OGRID: 373888
	Action Number: 43548
	Action Type: [NGGS] NGGS Operations Plan (NGGS-OP)

QUESTIONS

Verification	
Does the operator own the selected facility	Yes
Is the selected facility a natural gas gathering system	Yes

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ACKNOWLEDGMENTS

Operator: Harvest Four Corners, LLC 1111 Travis Street Houston, TX 77002	OGRID: 373888
	Action Number: 43548
	Action Type: [NGGS] NGGS Operations Plan (NGGS-OP)

ACKNOWLEDGMENTS

☑	I certify that, after reasonable inquiry, the statements in and attached to this Natural Gas Gathering System Operations Plan are true and correct to the best of my knowledge and acknowledge that a false statement may be subject to civil and criminal penalties under the Oil and Gas Act.