

PIPELINE SAFETY VIOLATION REPORT

US DOT Pipeline and Hazardous Materials Safety Administration

PART A - OPERATOR INFORMATION

Pipeline Operator/Owner	Williams Partners Operating LLC
OPID # (Enter ONLY One OPID #)	39054
Company Official Information	
Name	Joe Neave
Title	VP Safety and Regulatory Compliance
Telephone #	713-215-4811
Mailing Address	295 Chipeta Way, Salt Lake City, UT 84108
FAX # (optional)	N\A
Email Address	Joe.r.neave@williams.com
Nature and Size of Operator's System (system identification, products transported, and total miles) Plymouth is a Liquefied Natural Gas (LNG) Peak Shaving Plant located in Benton County in the Town of Plymouth, WA.	From PHMSA System Profile dated 3/2/2016: The LNG facility consists of 2 tanks with a capacity of 348,000 Bbl each (90 feet tall). Tank 1 has a NI alloy inner tank and tank 2 has an AL alloy inner tank. The outer tanks are made of carbon steel and sit on a concrete ring foundation that rises about 3 feet above the ground. The liquefaction process consists of 2, 6mmcf cold towers, each operated as an integrated cascade loop system. The facility includes four vaporizers rated @ 75mmcf. There are two storage tanks. These components make up two separate LNG units, LNG 1 and LNG 2 that share 4 vaporizers. LNG 1 was placed into operation in 1975 and LNG 2 was placed in operation in 1979. The facility is located approximately 45 minutes southwest of Pasco, WA west of the interstate 395 & HWY 82, west of Plymouth, Washington. The Plymouth LNG facility uses an integrated cascade loop liquefaction process to produce and store liquefied natural gas during the summer months as a peak shaving operation. The liquefied natural gas can then be vaporized and injected into the pipeline during times of higher than normal demand (extended cold winter periods). The boil off is re-injected into the pipeline.

PART B - INSPECTION DETAILS

Date(s) of Onsite Inspection	Multiple inspections were conducted from March 31, 2014 to the present. This was an active failure investigation until October 2015 when PHMSA and UTC investigators received the final lab analysis necessary to
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	complete the investigation. A joint WUTC and PHMSA accident reported was completed on February 21, 2016 and is currently under review.
Pipeline Service (check all that apply)	Gas <input type="checkbox"/>
	LNG <input checked="" type="checkbox"/>
	Hazardous Liquid <input type="checkbox"/>
System #	N/A
Unit #(s)	1155
PHMSA/State Inspector team-names and organization	Scott Rukke, Washington Utilities and Transportation Commission Peter Katchmar, PHMSA Western Region Accident Coordinator
Inspection Location and Facilities Inspected This was a failure investigation of the Williams' Plymouth LNG Plant explosion that occurred on March 31, 2014. NRC incident #1078325, WUTC Investigation number #5996. Plant address is: 42612 East Christy Road P.O. Box 330 Plymouth, WA 99346	

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PART C - HISTORY OF PRIOR OFFENSES

Paste the report from SMART below to replace this part/page.

List of offenses during the 5-year period prior to the estimated date of this Violation Report's Notice Letter

Date of Final Order, Consent Order or Decision on Petition for Reconsideration	CPF #	What type of enforcement action(s) (CO, CP)	Number of offenses	Identify the regulation(s) violated (Part, Section, and specific Paragraph)
Please see the attached System Profile with operator history.				

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PART D – CONSEQUENCES OF AN ACCIDENT/INCIDENT

If more than one accident/incident is involved in this enforcement action, copy and paste additional Accident/Incident Data Tables below to provide information for each reportable incident regardless of whether they were reported. If DOT Form 7000 was submitted, include a copy in the Evidence exhibits for each accident/incident.

Accident /Incident Data Table		Data Entry Select all that apply
Accident /Incident Data Address/Location (city or county, state, pipeline/facility name)		42612 East Christy Road P.O. Box 330 Plymouth, WA 99346
Type of Commodity Released	Natural Gas or Other Gas	N\A
	Predominant Hazardous Liquid	N\A
	LNG	X – PRIMARILY AS BOIL OFF
Estimated Volume Released Unintentionally	BBL	N\A
	MCF	168 MMSCF
Estimated Volume (in BBL) of Intentional and/or Controlled Release/Blowdown (only reported for HVL and CO2 commodities)		N\A
Estimated Gas Volume of Intentional and Controlled Release/Blowdown (MCF)		168.2 Million Standard Cubic Feet (MMSCF) as of February 2016
Estimated Volume of Commodity Recovered (BBL)		N\A
Accident totally contained on operator controlled property. (Hazardous Liquid only)	Yes	N\A
	No	N\A
Wildlife Impacted	Yes	N\A
	No	X
Soil Contamination	Yes	N\A
	No	N\A
Water Contamination		N\A
Number of Fatalities		0
Estimated Amount of Hazardous Liquid Released In or Reaching Water (BBL)		N\A
Number of Fatalities		N\A
Number of Injuries Requiring Inpatient Hospitalization		1
Additional Information- Five (5) employees were injured with 4 treated on site and one airlifted to a local hospital for treatment of burns.		

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PART E – PROBABLE VIOLATION INFORMATION

(Copy and Paste Part E for additional violations.)

PART E1 – DESCRIPTION OF VIOLATION

Identify the regulation violated with the part, section, and most specific paragraph of Title 49, and include the text of the regulation. When other regulatory sections are used to help specify the requirement, these regulations should be included below in the operator's conduct that violated the regulation.

§193.2517 Purging

When necessary for safety, components that could accumulate significant amounts of combustible mixtures must be purged in accordance with a procedure which meets the provisions of the Purging Principles and Practices (incorporated by reference, see § 193.2013) after being taken out of service and before being returned to service.

[[Amdt. 193-2](#), 45 FR 70390, Oct. 23, 1980; [Amdt. 193-25](#), 80 FR 168, January 5, 2015]

Describe the operator's conduct that violated the regulation:

Part 193.2517 requires operators to purge in accordance with a procedure that meets the requirements of the *American Gas Association (AGA) Purging Principles and Practices (incorporated by reference, see § 193.2013)* after being taken out of service and before being returned to service where components could accumulate significant amounts of air.

On November 1, 2013 Williams removed 3 manual valves from the Plymouth LNG-1 Purification and Regeneration (P&R) system for maintenance. Once the valves were removed, the flanges where the valves were previously installed were covered in plastic and taped shut. No blind flanges were installed. Either through the valve removal process, use of plastic and tape on the valve flanges instead of blind flanges, or the valve installation process, and more than likely all of the above, air containing 20.9% oxygen was allowed to enter into the normally closed system.

On March 18, 2014 new valves were installed and the system was purged in preparation for annual startup of the liquefaction process. Williams used the procedure *C.3 PURGE AND PRESSURIZE that is contained within their Regeneration Compressor and Purification Adsorber – LNG I Start-up and Shutdown Procedure 41.04.133LNG, REV 11, dated 10/31/13.*

Following the procedure as written, employees performing the purge, brought the P&R system up to 100 psig using natural gas, and then blew down the system to approximately 5 psig through the blowdown valve downstream of the regen gas compressor. This was conducted 3 times. Williams conducted a Root Cause Failure Analysis (RCFA) which was issued as a Final Report on October 29, 2015. (attached) Within this report they compiled information from several consultants that were hired to assist in this investigation. The root cause was determined to be an

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air/gas mixture left within the P&R system after an inadequate purge operation conducted after maintenance.

The report stated that:

“ Because the blowdowns for each pressure purge were only done to ~5 psig instead of the industry recognized 0-1 psig, oxygen remained in the system. The valve configuration outlined in the procedure combined with the nested piping configuration around the adsorbers also made blowing down to 0-1 psig a must. The system was left at ~5 psig after the 3rd and final pressure purge.”

The valve configuration noted above from RCFA required in the purge procedure 41.04.133LNG (C.3) (attached) utilized by Williams, required that one valve, the “Hot Valve” D-400 be left in the closed position during the purge. This created a dead leg segment of pipeline that could not be purged of an air/gas mixture with the procedure as written. Even if all of the valves were in the open position it is doubtful that an adequate purge could have been obtained. Due to the piping and vessel configuration even in a straight through purge the gas would have taken the path of least resistance and potentially bypassed portions of the system.

We believe that Procedure 41.04.133LNG C.3 did not meet the requirements of the American Gas Association (AGA) Purging Principles and Practices (incorporated by reference, see § 193.2013) as required by Part 193.2517. Williams did not design a purge procedure that had enough details and was clear enough for employees to consistently follow and obtain repeatable and safe results.

In designing their purge procedure Williams did not adequately take into account all of the various aspects of the P&R system, including vessel size, piping configuration, molecular sieve materials, valves, filters, and other obstructions that could cause inadequate purge operations.

The AGA notes many different aspects of a system that must be taken into account when designing purge procedures. It mentions the difficulties in designing a catch all purge procedure for the various systems in place and the necessity to look at individual systems and to design a procedure taking into account the individual characteristics of a system to be purged. In particular, in section 6.4(c) it mentions the difficulties in purging vessels containing molecular sieves due to the potential pressure differentials. The use of inert gases are mentioned throughout the AGA.

AGA Section 6.4 PLANT PIPING AND PROCESS EQUIPMENT, which would be applicable to the Plymouth Plant LNG-1 P&R system states the following:

“A detailed purge procedure should be prepared for each purge project. All personnel involved in the project should be familiar with the procedure and the hazards of oxygen deficiency, fire and explosion.”

Williams states in their RCFA Executive Summary on page 4, that they found *“the leading cause of the incident to be an inadequate purge”*.

Describe the evidence:

1. Williams Procedure 41.04.133LNG, REV 11, dated 10/31/13

Contains the inadequate purge procedure used after system maintenance was performed and air was left in the P&R system.

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2. Williams Root Cause Failure Analysis, dated October 29, 2015.

Contains the P&R schematic indicating the system configuration, valve location (D-400 hot valve), incident cause and incident timeline.

3. Williams Partners Operating LLC, System Profile

Contains operator information, system details, and compliance history.

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INTERVIEW SUMMARY		
Name of Person and Title	Why this person's knowledge, statements, conduct, or other information is evidence for establishing the violation	Provide comments by the person interviewed regarding the violation. List Witnesses (if any)
Jared Ellsworth	Compliance Manager	Mr. Ellsworth concurs that Williams purge procedure was not adequate in removing all of the trapped air in the P&R system. But he also states that they thought they were meeting the code requirements and that the procedure was adequate.
click here to enter	click here to enter	click here to enter
click here to enter	click here to enter	click here to enter

PART E2 – REPEAT VIOLATION	
Is this probable violation a repeat violation? An alleged violation is a repeat violation if, during the 5 years prior to the issuance of this case's notice letter, the allegation cites the same basic conduct that was cited (even if in rare circumstances, a different code section was used) as a finding of violation in PHMSA's final action in a previous case (Final Order, Consent Order, or Decision on Petition for Reconsideration) and it occurred after PHMSA's final decision was issued.	Yes <input type="checkbox"/>
	No <input checked="" type="checkbox"/>
If "Yes" above, provide the reference CPF #(s) and Item #. (The notice letter for this case must include the statement: This probable violation is a repeat violation of CPF# x-xxxx-xxxx, Item # x.)	click here to enter

PART E3 – STANDARD ISSUE (NON-IM) OR ISSUE CATEGORY (IM)	
Was an Inspection Assistant (IA) Severity Score or Risk Category selected for this violation? If "Yes," complete the table below.	Yes <input type="checkbox"/>
	No <input checked="" type="checkbox"/>
List the Standard Issue (Non-IM) or Issue Category (IM) that was	N\A

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selected for this violation			
Select ONLY One	Severity Score (Non-IM)	Description	Data Entry
	A1	Significant impact/widespread occurrence	X
	A2	Significant impact/limited occurrence	[]
	B1	Moderate or small impact/widespread occurrence	[]
	B2	Moderate or small impact/limited occurrence	[]
	C	Documentation/administrative – no significant impact	[]
	Risk Category (IM)	Area Finding click here to enter	Data Entry
	A		[]
	B		[]
	C		[]
	D		[]
	E		[]
For the Severity Score or Risk Category selected, provide supporting information.		This incident caused approximately \$72, 000,000 in damages and injured 5 employees. It resulted in the shut down of the Plymouth Plant LNG-1 for nearly 2 years. It resulted in the loss of approximately 168 million standard cubic feet of gas. It necessitated the evacuation within a 2 mile radius of the plant including the entire town of Plymouth WA.	

PART E4 – PROPOSED ACTION

The enforcement procedures only require use of the Violation Report for civil penalty or compliance order items. Individual regions, however, may require the use of the Violation Report for other enforcement actions.

Select ONLY One		Description	Data Entry
	1	Proposed Civil Penalty (PCP)	X
	2	Proposed Civil Penalty (PCP) and Proposed Compliance Order (PCO)	[]
	3	Proposed Compliance Order (PCO) <i>If this action is selected, STOP HERE for this Violation Number</i>	[]
	4	Other Enforcement Action- Describe action: _____ (for example - Warning Item) <i>If this action is selected, STOP HERE for this Violation Number.</i>	[]

PART E5 – NATURE

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Select ONLY One	Records (examples: missing, inaccurate, or incomplete records)	<input type="checkbox"/>
	Activities (examples: performance or conduct of activities such as inspections, tests, maintenance, meetings, notifications, reports, emergency response, not preparing procedures, or not following procedures)	<input checked="" type="checkbox"/>
	Equipment / Facilities (examples: equipment not installed, missing, defective, inoperative, not properly sized, or not compatible with transported commodity)	<input type="checkbox"/>

PART E6- CIRCUMSTANCES

Select ONLY One	<p>Operator - <i>The operator self-reported the violation to PHMSA before it was discovered by PHMSA.</i></p> <p>Note. A joint PHMSA and WUTC investigation was conducted which took nearly 2 years to complete. Williams hired numerous consultants to conduct analysis and once the reports were compiled Williams assembled the information into a Root Cause Failure Analysis report which was submitted to investigators in October of 2015. Although all information pointed to an inadequate purge procedure there were numerous other contributory causes which without any of them this accident would not have happened. Williams worked proactively with investigators in coming to the same conclusions as to the cause. Although Williams did not report the actual violation, they supplied the information and reports to draw conclusions as to the cause.</p>	<input checked="" type="checkbox"/>
	<p>PHMSA (including State Partners) <i>discovered the violation.</i></p> <p>Note: I marked both as this was a cooperative effort with investigators and the operator working together to determine cause.</p>	<input checked="" type="checkbox"/>
	Public reported the violation to PHMSA (including State Partners)	<input type="checkbox"/>
Description		Data Entry
<p>Date the violation started?</p> <p>If the date that the violation started is unknown or was not able to be determined from operator data, enter the date the violation was discovered by PHMSA.</p>		The procedure used was dated to at least 02/28/2012. The incident occurred on 03/31/2014.
<p>Duration of the violation in days (in hours, when duration of the violation is less than a day for telephonic reporting)</p>		See above

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PART E7 – GRAVITY			
Enter the Number of Instances of the Violation			click here to enter
Select ONLY One	Category	Description	Data Entry
	1	The violation was a causal factor in an accident/incident.	X
	2	The violation increased the severity of consequences of an accident/incident.	<input type="checkbox"/>
	3	Pipeline safety or integrity was significantly compromised in an HCA or an HCA “could affect” segment.	<input type="checkbox"/>
	4	Pipeline safety or integrity was compromised in an HCA or an HCA “could affect” segment.	<input type="checkbox"/>
	5	Pipeline safety or integrity was significantly compromised in areas other than an HCA or an HCA “could affect” segment.	<input type="checkbox"/>
	6	Pipeline safety or integrity was compromised in areas other than an HCA or an HCA “could affect” segment.	<input type="checkbox"/>
	7	Pipeline safety or integrity was minimally affected.	<input type="checkbox"/>
Provide Supporting Information for the Selection		<p>This incident was the result of the catastrophic failure of a process vessel and it caused approximately \$72, 000,000 in damages and injured 5 employees. It resulted in the shut down by ESD of the Plymouth Plant and the inoperability of the LNG-1 system for nearly 2 years. It caused damage to an adjacent transmission compression station resulting in it being shut down by ESD. It resulted in the loss of approximately 168 million standard cubic feet of gas. It resulted in the penetration of the outer shell of a 1.2 BSCF LNG storage tank. It necessitated the evacuation within a 2 mile radius of the plant including the entire town of Plymouth WA. It caused extensive damage to plant grounds including the control room and administration building.</p>	

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PART E8 – CULPABILITY

Culpability does not consider corrective actions taken by the operator after PHMSA learned of the violation.

		Description	Data Entry
Select ONLY One	1	The operator took egregious action (such as manipulation of records or reconfiguration of equipment) that evidenced an effort to evade compliance or conceal non-compliance.	<input type="checkbox"/>
	2	The operator made a conscious decision not to comply with a requirement that was clearly applicable.	<input type="checkbox"/>
	3	The operator failed to take appropriate action to comply with a requirement that was clearly applicable.	<input type="checkbox"/>
	4	The operator took significant steps to comply with a requirement but did not achieve compliance.	<input type="checkbox"/>
	5	The operator took significant steps to comply with a requirement but failed to achieve compliance for reasons such as unforeseeable events/conditions that were partly or wholly outside its control.	X
	6	After the operator found the non-compliance, the operator took documented action to address the cause of the non-compliance, and was in the process of correcting the non-compliance before PHMSA learned of the violation.	<input type="checkbox"/>
	7	After the operator found the non-compliance, the operator took documented action to address the cause of the non-compliance, and corrected the non-compliance before PHMSA learned of the violation.	<input type="checkbox"/>
Provide Details to Support the Selection Above	Williams believed they were in compliance and had appropriate purging procedures. The same procedures were used for many years with no issues. Williams took significant action to determine cause by hiring expert consultants and they worked cooperatively with investigators throughout the process. It was obvious they wanted to determine the cause and ensure it didn't happen again. Once all of the information and lab analysis was assimilated and the cause was determined with a high degree of certainty, Williams took the additional steps of replacing process equipment that was of similar era or construction. This was an unusual event and was unforeseen by both the operator and investigators. It required extensive lab analysis to prove what the probable cause was.		

PART E9 – GOOD FAITH

This part is not a gauge of an operator's general, system-wide approach to compliance, but it instead focuses solely on efforts taken to comply with the requirement. Good Faith also does not consider corrective actions taken by the Operator after PHMSA discovered the violation.

	Description	Data Entry
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Select ONLY One	1	The operator's interpretation of the requirement was reasonable, and it had a credible justification for the actions it took.	X
	2	The operator did not make a reasonable interpretation of the requirement.	<input type="checkbox"/>
Provide Details Supporting the Selection Above		This was an unusual incident and apparently has never occurred on an LNG plant prior to this incident. It involved an auto-ignition of an air gas mixture inside a process system that purifies gas for liquefaction in an LNG plant. The procedures that were deemed inadequate had been in use for several years and had never caused an incident. Only when completed in conjunction with other actions that were not a violation, and when done in a particular sequence during start-up operations did all of the causes come together to cause the failure. The lighting of a process heater before system pressure up and the compression of an air gas mix after a bad purge procedure caused the auto-ignition of the mixture. An unforeseen event.	

PART E10- ADDITIONAL CONSIDERATIONS

Additional Comments applicable to a proposed civil penalty that may be considered as "Other Matters as Justice May Require". Some examples follow:

Provide information if the operator's written procedures for the cited violation exceeded the regulatory requirements.

If the Economic Benefit gained from the violation is readily available, provide detail to support the dollar amount of the determined benefit.

As stated above this was a very unusual incident. It required a primary cause which was an inadequate purge procedure and several contributory causes such as the lighting of a process heater prior to system pressurization for it to occur. The procedure in question was in use for several years with no issues and Williams believed they were in compliance with the regulations. It took extensive lab analysis to prove that an auto-ignition had occurred internally. Auto-ignition is a very rare or possibly unknown phenomenon in natural gas facilities and process plants.

Williams worked cooperatively with WUTC and PHMSA investigators in determining cause. They took every possible step during the investigation and they hired the leading industry consultants to assist in the investigation.

Once cause was known they changed their original repair plans for the plant and made the decision to remove any additional, still functional equipment of similar era or construction such as that involved in the incident. This was done at considerable cost.

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APPROVAL SIGNATURES		
Inspector/Supervisor's Name	Signature	Date
PHMSA Region Director's Name	Signature	Date

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Enter Additional Exhibits B, C, D ... as needed

EVIDENCE EXHIBIT A			
Name of Operator: click here to enter			
Violation Number(s) Supported by the Evidence	Evidence (attached)	Evidence Provided By	
		Name of Person	Name of Company (or other organization) this Person Represents
click here	click here	click here	click here
click here	click here	click here	click here