

Pipeline Failure Investigation Report

Pipeline System: LS-16 (Concord to San Jose) Operator: Kinder Morgan Energy Partners
Location: Walnut Creek, Contra Costa County, CA Date of Occurrence: 9 November 2004
Medium Released: Premium Gasoline Quantity: 564 Barrels

CSFM Arrival Time & Date: 1545 hours 11/09/04 Total Damages \$ TBD

Investigation Responsibility: State OPS NTSB Other _____

Company Reported Apparent Cause: Corrosion Excavation
 Natural Forces Incorrect Operation Other Outside Force Damage
 Material and/or Welds Equipment and Operations Other _____

Rupture Yes No
Leak Yes No
Fire Yes No
Explosion Yes No
Evacuation Yes No

Number of Persons 270 Area _____

Narrative Summary

Short summary of the Incident/Accident which will give interested persons sufficient information to make them aware of the basic scenario and facts.

At 1322 hours on 9 November 2004, excavation equipment operated by Mountain Cascade, Inc., struck Kinder Morgan's LS-16 pipeline, a 51.4 mile long intrastate products pipeline that travels from Concord to San Jose. The excavator was working on a large-diameter water supply expansion project in Walnut Creek, CA for the East Bay Municipal Utility District (EBMUD).

Upon puncture of the Kinder Morgan pipeline, gasoline under high pressure was immediately released into the surrounding area. Kinder Morgan control center operators in Concord immediately noticed the large pressure drop and started to shut the pipeline down. Several seconds after the line was hit, the gasoline streaming out of the line was ignited by welders employed by Matamoros Pipelines, Inc. who were also working on the new water supply pipeline. The ensuing explosion and fire resulted in the deaths of five workers and significant injury to four others. One nearby two-story structure was burned and other property was damaged.

The direct cause of the accident was the excavator's bucket striking the pipeline and puncturing through the wall of the pipe. However, there were several factors that significantly contributed to this accident. These include inadequate line locating, inadequate project safety oversight and communication, and failure to follow the one-call law.

Region/State: Western/California
Principal Investigator: Linda Zigler
Date: 17 June 2005

Reviewed by: Robert Gorham
Title: Supervising Pipeline Safety Engineer
Date: 20 June 2005

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<i>Failure Location & Response</i>			
Location (City, Township, Range, County/Parish): Walnut Creek, Contra Costa County, California			(Acquire Map)
Address or M.P. on Pipeline: ⁽¹⁾ MP 8.48; South Broadway between Newell Street and Rudgear Road		Type of Area (Rural, City): ⁽¹⁾ Urban; Residential	
Date: 9 November 2004		Time of Failure: 1322 hours	
Time Detected: 1322 hours		Time Located: 1322 hours	
How Located: Contra Costa County Fire Protection District			
OES Report #: (Attach Report) #04-5845		Time Reported to OES: 1358	Reported by: Kinder Morgan
Type of Pipeline:			
Gas Distribution		Gas Transmission	
<input type="checkbox"/> LP		<input type="checkbox"/> Interstate Gas	
<input type="checkbox"/> Municipal		<input type="checkbox"/> Intrastate Gas	
<input type="checkbox"/> Public Utility		<input type="checkbox"/> Jurisdictional Gas Gathering	
<input type="checkbox"/> Master Meter		<input type="checkbox"/> Offshore Gas	
		<input type="checkbox"/> Offshore Gas - High H ₂ S	
		<input type="checkbox"/> CO ₂	
Hazardous Liquid			
<input type="checkbox"/> Interstate Liquid			
<input checked="" type="checkbox"/> Intrastate Liquid			
<input type="checkbox"/> Offshore Liquid			
<input type="checkbox"/> Jurisdictional Liquid Gathering			
<input type="checkbox"/> LNG			
<input type="checkbox"/> LNG Facility			
Pipeline Configuration (Regulator Station, Pump Station, Pipeline, etc.): 10-inch products pipeline			
<i>Operator/Owner Information</i>			
Owner: Kinder Morgan Energy Partners		Operator: Kinder Morgan Energy Partners	
Address: 500 Dallas St #1000 Houston TX 77002		Address: 500 Dallas St #1000 Houston TX 77002	
Company Official: Ron McClain		Company Official: Ron McClain	
Phone No.: (713) 369-9152		Phone No.: (713) 369-9152	
Fax No.: (713) 495-2735		Fax No.: (713) 495-2735	
<u>Drug and Alcohol Testing Program Contacts</u>			
<input checked="" type="checkbox"/> N/A			
Drug Program Contact & Phone:			
Alcohol Program Contact & Phone:			

1 Photo documentation

Pipeline Failure Investigation Report

<i>Damages</i>					
Product/Gas Loss or Spill ⁽²⁾ 564 barrels	Estimated Property Damage \$ TBD				
Amount Recovered 60 barrels	Associated Damages ⁽³⁾ \$ TBD				
Estimated Amount \$ \$35, 379.72					
Description of Property Damage: One two-story house burned; construction vehicles were burned; windows broken in other surrounding structures					
Customers out of Service: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Number: _____					
Suppliers out of Service: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Number: _____					
<i>Fatalities and Injuries</i>					
Fatalities: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Company: -0- Contractor: -5- Public: -0-					
Injuries - Hospitalization: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Company: -0- Contractor: -4- Public: -0-					
Injuries - Non-Hospitalization: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Company: -0- Contractor: -0- Public: -0-					
Total Injuries (including Non-Hospitalization): Company: -0- Contractor: -4- Public: -0-					
Name	Job Function	Yrs w/ Comp.	Yrs. Exp.	Type of Injury	
See Page 13					
<i>Drug/Alcohol Testing</i>					<input checked="" type="checkbox"/> N/A
Were all employees that could have contributed to the incident, post-accident tested within the 2 hour time frame for alcohol or the 32 hour time frame for all other drugs? <input type="checkbox"/> Yes <input type="checkbox"/> No					
Job Function	Test Date & Time	Location	Results		Type of Drug
			Pos	Neg	
			<input type="checkbox"/>	<input type="checkbox"/>	
			<input type="checkbox"/>	<input type="checkbox"/>	
			<input type="checkbox"/>	<input type="checkbox"/>	
			<input type="checkbox"/>	<input type="checkbox"/>	

2 Initial volume lost or spilled
3 Including cleanup cost

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<i>System Description</i>				
Describe the Operator's System: LS-16 is a 51.39 mile long, 10-inch products pipeline that delivers refined products from Kinder Morgan's Concord Pump Station to their San Jose Terminal. There is one downstream intermediate booster pump located at Dougherty Road in the City of Dublin, CA.				
<i>Pipe Failure Description</i>				<input type="checkbox"/> N/A
Length of Failure (inches, feet, miles): 1" (about the size of a quarter) (1)				
Position (Top, Bottom, include position on pipe, 6 O'clock): ⁽¹⁾ 3 o'clock position		Description of Failure (Corrosion Gouge, Seam Split): ⁽¹⁾ 100% through wall puncture (from rock tooth of excavation bucket)		
Laboratory Analysis: <input type="checkbox"/> Yes <input type="checkbox"/> No				
Performed by: Metallurgical tests are pending				
Preservation of Failed Section or Component: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
If Yes - Method: Puncture was covered with a temporary clamp and wrapped in plastic.				
In Custody of: Anamet, Inc., Hayward, CA - metallurgical test laboratory (for CalOSHA)				
Develop a sketch of the area including distances from roads, houses, stress inducing factors, pipe configurations, etc. Bar Hole Test Survey Plot should be outlined with concentrations at test points. Direction of Flow.				
<i>Component Failure Description</i>				<input checked="" type="checkbox"/> N/A
Component Failed: (1)				
Manufacturer:		Model:		
Pressure Rating:		Size:		
Other (Breakout Tank, Underground Storage):				
<i>Pipe Data</i>				<input type="checkbox"/> N/A
Material: Steel		Wall Thickness/SDR: 0.188 inch		
Diameter (O.D.): 10.750 inch		Installation Date: 1965 for original line 1987 for accident site section		
SMYS: 52,000 psi		Manufacturer: Unknown		
Longitudinal Seam: High Frequency ERW		Type of Coating: Polyken Tape		
Pipe Specifications (API 5L, ASTM A53, etc.): API 5L X-52 ERW				
<i>Joining</i>				<input checked="" type="checkbox"/> N/A
Type:		Procedure:		
NDT Method:		Inspected: <input type="checkbox"/> Yes <input type="checkbox"/> No		
<i>Pressure @ Time of Failure @ Failure Site</i>				<input type="checkbox"/> N/A
Pressure @ Failure Site: 973 psig		Elevation @ Failure Site: 164 feet		
Pressure Readings @ Various Locations:			Direction from Failure Site	
Location/M.P./Station #	Pressure (psig)	Elevation (ft msl)	Upstream	Downstream
Concord Station	1165 psig	+23 feet	X	

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Upstream Pump Station Data		<input type="checkbox"/> N/A
Type of Product: Premium Gasoline	API Gravity: 59.6	
Specific Gravity: 0.74	Flow Rate: 4483 bph	
Pressure @ Time of Failure ⁽⁴⁾ 1165 psig	Distance to Failure Site: 8.48 miles	
High Pressure Set Point: 1360 psig	Low Pressure Set Point: None	
Upstream Compressor Station Data		<input checked="" type="checkbox"/> N/A
Specific Gravity:	Flow Rate:	
Pressure @ Time of Failure ⁽¹⁾	Distance to Failure Site:	
High Pressure Set Point:	Low Pressure Set Point:	
Operating Pressure		<input type="checkbox"/> N/A
Max. Allowable Operating Pressure: 1310 psig	Determination of MAOP: Hydrostatic pressure test	
Actual Operating Pressure: 1165 psig		
Method of Over Pressure Protection: pressure switch and transmitter		
Relief Valve Set Point: San Jose Terminal – 800 psig	Capacity Adequate? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Integrity Test After Failure		<input type="checkbox"/> N/A
Pressure Test Conducted in place? (Conducted on Failed Components or Associated Piping):		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
If NO, Tested after removal?		<input type="checkbox"/> Yes <input type="checkbox"/> No
Method: static pressure of 525 psi was held for one hour as a stand up test after replacement pipe was installed		
Describe any failures during the test. None		
Soil/water Conditions @ Failure Site		<input type="checkbox"/> N/A
Condition of and Type of Soil around Failure Site (Color, Wet, Dry, Frost Depth): Damp		
Type of Backfill (Size and Description):		
Type of Water (Salt, Brackish):	Water Analysis ⁽⁵⁾ <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

4 Obtain event logs and pressure recording charts

5 Attach copy of water analysis report

Pipeline Failure Investigation Report

External Pipe or Component Examination		<input type="checkbox"/> <i>N/A</i>
External Corrosion? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No ⁽¹⁾	Coating Condition (Disbonded, Non-existent): ⁽¹⁾ Good condition	
Description of Corrosion: N/A		
Description of Failure Surface (Gouges, Arc Burns, Wrinkle Bends, Cracks, Stress Cracks, Chevrons, Fracture Mode, Point of Origin): 100% through wall puncture		
Above Ground: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No ⁽¹⁾	Buried: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No ⁽¹⁾	
Stress Inducing Factors: ⁽¹⁾	Depth of Cover: About 60 inches at accident site ⁽¹⁾	
Cathodic Protection		<input checked="" type="checkbox"/> <i>N/A</i>
P/S (Surface):	P/S (Interface):	
Soil Resistivity:	pH:	Date of Installation:
Method of Protection: Impressed current – last cathodic protection survey was completed in August 2004		
Did the Operator have knowledge of Corrosion before the Incident? <input type="checkbox"/> Yes <input type="checkbox"/> No		
How Discovered? (Close Interval Survey, Instrumented Pig, Annual Survey, Rectifier Readings, ECDA, etc):		
Internal Pipe or Component Examination		<input checked="" type="checkbox"/> <i>N/A</i>
Internal Corrosion: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No ⁽¹⁾	Injected Inhibitors: <input type="checkbox"/> Yes <input type="checkbox"/> No	
Type of Inhibitors:	Testing: <input type="checkbox"/> Yes <input type="checkbox"/> No	
Results (Coupon Test, Corrosion Resistance Probe):		
Description of Failure surface (MIC, Pitting, Wall Thinning, Chevrons, Fracture Mode, Point of Origin):		
Cleaning Pig Program: <input type="checkbox"/> Yes <input type="checkbox"/> No	Gas and/or Liquid Analysis: <input type="checkbox"/> Yes <input type="checkbox"/> No	
Results of Gas and/or Liquid Analysis ⁽⁶⁾		
Internal Inspection Survey: <input type="checkbox"/> Yes <input type="checkbox"/> No	Results ⁽⁷⁾	
Did the Operator have knowledge of Corrosion before the Incident? <input type="checkbox"/> Yes <input type="checkbox"/> No		
How Discovered? (Instrumented Pig, Coupon Testing, ICDA, etc.):		

6 Attach copy of gas and/or liquid analysis report

7 Attach copy of internal inspection survey report

Pipeline Failure Investigation Report

Outside Force Damage		<input type="checkbox"/> N/A
Responsible Party: Mountain Cascade, Inc.		Telephone No.: (925) 373-8370
Address: 555 Exchange Court, P.O. 5050, Livermore, CA 94551-5050		
Work Being Performed: Excavation of ditch for installation of 72-inch (OD) water line for East Bay Municipal Utility District		
Equipment Involved: Track hoe excavator ⁽¹⁾	Called One Call System? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
One Call Name: USA North	One Call Report # ⁽⁸⁾	
Notice Date:	Time:	
Response Date:	Time:	
Details of Response: ---Refer to Narrative Section - attached		
Was Location Marked According to Procedures? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Pipeline Marking Type: ⁽¹⁾	Location: ⁽¹⁾	
State Law Damage Prevention Program Followed? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> No State Law		
Notice Required: <input type="checkbox"/> Yes <input type="checkbox"/> No	Response Required: <input type="checkbox"/> Yes <input type="checkbox"/> No	
Was Operator Member of State One Call? <input type="checkbox"/> Yes <input type="checkbox"/> No	Was Operator on Site? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Is OSHA Notification Required? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Natural Forces		<input checked="" type="checkbox"/> N/A
Description (Earthquake, Tornado, Flooding, Erosion):		

8 Attach copy of one-call report

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<i>Failure Isolation</i>		<input type="checkbox"/> N/A
Squeeze Off/Stopple Location and Method: (1) stopple installed downstream of puncture; hot tap installed upstream of puncture		
Valve Closed - Upstream: Concord Outgoing Block Valve Time: 1730 hours 11 November 2004	I.D.: M.P.: 00.00	
Valve Closed - Downstream: Hillgrade Block Valve Time: 1415 hours 9 November 2004	I.D.: M.P.: 10.098	
Pipeline Shutdown Method: <input checked="" type="checkbox"/> Manual <input type="checkbox"/> Automatic <input type="checkbox"/> SCADA <input type="checkbox"/> Controller <input type="checkbox"/> ESD		
Failed Section Bypassed or Isolated:		
Performed By: Kinder Morgan	Valve Spacing: 10.098 miles between these two block valves	
<i>Odorization</i>		<input checked="" type="checkbox"/> N/A
Gas Odorized: <input type="checkbox"/> Yes <input type="checkbox"/> No	Concentration of Odorant (Post Incident at Failure Site):	
Method of Determination: <input type="checkbox"/> Yes <input type="checkbox"/> No	% LEL: <input type="checkbox"/> Yes <input type="checkbox"/> No	% Gas In Air: <input type="checkbox"/> Yes <input type="checkbox"/> No
	Time Taken: <input type="checkbox"/> Yes <input type="checkbox"/> No	
Was Odorizer Working Prior to the Incident? <input type="checkbox"/> Yes <input type="checkbox"/> No	Type of Odorizer (Wick, By-Pass):	
Odorant Manufacturer: Model:	Type of Odorant:	
Amount Injected:	Monitoring Interval (Weekly):	
Odorization History (Leaks Complaints, Low Odorant Levels, Monitoring Locations, Distances from Failure Site):		
<i>Weather Conditions</i>		<input type="checkbox"/> N/A
Temperature: High 60°'s	Wind (Direction & Speed):	
Climate (Snow, Rain): Cloudy – rain expected	Humidity:	
Was Incident preceded by a rapid weather change ? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Weather Conditions Prior to Incident (Cloud Cover, Ceiling Heights, Snow, Rain, Fog):		

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<i>Gas Migration Survey</i>							<input checked="" type="checkbox"/> N/A
Bar Hole Test of Area: <input type="checkbox"/> Yes <input type="checkbox"/> No				Equipment Used:			
Method of Survey (Foundations, Curbs, Manholes, Driveways, Mains, Services) ⁽⁹⁾							(1)
<i>Environment Sensitivity Impact</i>							<input checked="" type="checkbox"/> N/A
Location (Nearest Rivers, Body of Water, Marshlands, Wildlife Refuge, City Water Supplies that could be or were affected by the medium loss):							(1)
OPA Contingency Plan Available? <input type="checkbox"/> Yes <input type="checkbox"/> No			Followed? <input type="checkbox"/> Yes <input type="checkbox"/> No				
<i>Class Location/High Consequence Area</i>							<input type="checkbox"/> N/A
Class Location: 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/>			HCA Area? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A				
Determination: _____			Determination: _____				
Odorization Required? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A							
<i>Pressure Test History</i>							<input type="checkbox"/> N/A
	Req'd ⁽¹⁰⁾ Assessment Deadline Date	Test Date	Test Medium	Pressure (psig)	Duration (hrs)	% SMYS	
Installation	N/A	1965	Water	1760	8		
Next							
Next							
Most Recent							
Describe any problems experienced during the pressure tests.							
<i>Internal Line Inspection/Other Assessment History</i>							<input type="checkbox"/> N/A
	Req'd ⁽¹⁰⁾ Assessment Deadline Date	Assessment Date	Type of ILI Tool ⁽¹¹⁾	Other Assessment Method ⁽¹²⁾	Indicated Anomaly If yes, describe below		
Initial					<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Next					<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Next					<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Most Recent					<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Describe any previously indicated anomalies at the failed pipe, and any subsequent pipe inspections (anomaly digs) and remedial actions.							
A smart pig inspection was conducted in August 2001. NOTE: a geometry tool inspection was also conducted on 15 November 2004 (after the accident) to ensure the pipeline's integrity							

9 Plot on site description page

10 As required of Pipeline Integrity Management regulations in 49CFR Parts 192 and 195

11 MFL, geometry, crack, etc.

12 ECDA, ICDA, SCCDA, "other technology," etc.

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<i>Pre-Failure Conditions and Actions</i>	<input checked="" type="checkbox"/> N/A
Was there a known pre-failure condition requiring ⁽¹⁰⁾ the operator to schedule evaluation and remediation? <input type="checkbox"/> Yes (describe below or on attachment) <input type="checkbox"/> No	
If there was such a known pre-failure condition, had the operator established and adhered to a required ⁽¹⁰⁾ evaluation and remediation schedule? Describe below or on attachment. <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Prior to the failure, had the operator performed the required ⁽¹⁰⁾ actions to address the threats that are now known to be related to the cause of this failure? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A List below or on an attachment such operator-identified threats, and operator actions taken prior to the accident.	
Describe any previously indicated anomalies at the failed pipe, and any subsequent pipe inspections (anomaly digs) and remedial actions.	
<i>Maps & Records</i>	<input type="checkbox"/> N/A
Are Maps and Records Current? ⁽¹³⁾ <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Comments:	
<i>Leak Survey History</i>	<input checked="" type="checkbox"/> N/A
Leak Survey History (Trend Analysis, Leak Plots):	
<i>Pipeline Operation History</i>	<input checked="" type="checkbox"/> N/A
Description (Repair or Leak Reports, Exposed Pipe Reports):	
Did a Safety Related Condition Exist Prior to Failure? <input type="checkbox"/> Yes <input type="checkbox"/> No Reported? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Unaccounted For Gas:	
Over & Short/Line Balance (24 hr., Weekly, Monthly/Trend):	

13 Obtain copies of maps and records

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<i>Operator/Contractor Error</i>				<input checked="" type="checkbox"/> N/A
Name:		Job Function:		
Title:		Years of Experience:		
Training (Type of Training, Background):				
Was the person "Operator Qualified" as applicable to a precursor abnormal operating condition? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A				
Type of Error (Inadvertent Operation of a Valve):				
Procedures that are required:				
Actions that were taken:				
Pre-Job Meeting (Construction, Maintenance, Blow Down, Purging, Isolation):				
Pre-Job Meeting (Construction, Maintenance, Blow Down, Purging, Isolation):				
Prevention of Accidental Ignition (Tag & Lock Out, Hot Weld Permit):				
Additional Actions (Contributing factors may include number of hours at work prior to failure or time of day work being conducted):				
Training Procedures:				
Operation Procedures:				
Controller Activities:				
Name	Title	Experience	Hours on Duty Prior to Failure	Shift
Alarm Parameters:				
High/Low Pressure Shutdown:				
Flow Rate:				
Procedures for Clearing Alarms:				
Type of Alarm:				
Company Response Procedures for Abnormal Operations:				
Over/Short Line Balance Procedures:				
Frequency of Over/Short Line Balance:				
Additional Actions:				

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Additional Actions Taken by the Operator

N/A

Make notes regarding the emergency and Failure Investigation Procedures (Pressure reduction, Reinforced Squeeze Off, Clean Up, Use of Evacuators, Line Purging, closing Additional Valves, Double Block and Bleed, Continue Operating downstream Pumps):

At 1322 hours on 9 November 2004, Mountain Cascade's excavator punctured Kinder Morgan's products pipeline. At 1326 hours, Kinder Morgan's control center in Concord shut the line down. They drained down into both their Concord Pump Station and their San Jose Terminal. At 1415 hours, the downstream block valve (Hill Grade) was closed; the block valve at the Concord Station was kept open so that gasoline could continue to drain back to the station.

A stopple plug was inserted into the pipeline south of the rupture (downstream) and a hot tap was installed in the pipeline north of the rupture (upstream) giving Kinder Morgan the ability to remove the residual gasoline in the line. By 0430 hours on 11 November 2004, Kinder Morgan was able to recover 60 barrels of gasoline and a temporary clamp was installed over the puncture site. At 1730 hours, the upstream valve at Concord Station was closed.

The pipe containing the rupture was removed by cold cutting and pre-tested replacement pipe was welded into place. Repairs were finished at about 2000 hours on 13 November 2004. At 2050 hours on that same evening, LS-16 was pressured to 525 psi for a one hour static pressure test. The line was put back into service at 2221 hours later that night although Kinder Morgan only operated at 80% of their maximum operating pressure (1045 psi). They also ran a gauge plate/sizing plate that night from the Concord Station to the San Jose Terminal to confirm its integrity and make sure that no undetected third party damage had occurred.

Attachments:

Roster of Deceased/Injured Workers
Narrative Report (20041109LMZ1)
Illustration 1 – Walnut Creek Accident Site
Illustration 2 – Map of Rupture Site
Photo A – LS-16 pipeline with through-wall puncture
Photo B – LS-16 pipeline with temporary clamp over puncture
Photo C – LS-16 pipeline offset at original location
Photo D – LS-16 pipeline offset section removed
Photo E – Mountain Cascade excavator bucket with rock teeth
Item 1 – Kinder Morgan Pipeline Alignment Sheet 16-7D
Item 2 – Carollo drawing showing Note 2
Item 3 – USA/North Ticket Data

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Title: Kinder Morgan LS-16 / Walnut Creek
Date of Accident: 9 November 2004
Investigator: Linda Zigler, Pipeline Safety Engineer

Deceased Workers:

The victims listed below died as a result of burns received from the pipeline explosion/fire.

1.	Tae Chin Im	Age 47	Foreman	Mountain Cascade
2.	Javier Ramos	Age 35	Laborer	Mountain Cascade
3.	Israel Fernandez	Age 36	Welder	Matamoros Pipelines
4.	Miguel Reyes	Age 43	Foreman	Matamoros Pipelines
5.	Victor Rodriguez	Age 26	Welder	Matamoros Pipelines

Injured Workers:

The victims listed below were severely injured and were hospitalized as a result of burns received from the pipeline explosion/fire.

1.	Miguel Angel Fuentes	Age 28	Laborer	Mountain Cascade
2.	Martin Topete	Age 48	Laborer	Mountain Cascade
3.	Jeremy Knox	Age 26	Welder	Matamoros Pipelines
4.	Roger Paasch	Age 27	Welder	Matamoros Pipelines

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Supplemental Narrative

Title: Kinder Morgan LS-16 / Walnut Creek
Date of Accident: 9 November 2004
Investigator: Linda Zigler, Pipeline Safety Engineer

SUMMARY:

At 1322 hours on 9 November 2004, excavation equipment operated by Mountain Cascade, Inc., struck Kinder Morgan's LS-16 pipeline, a 51.4 mile long intrastate products pipeline that travels from Concord to San Jose. The excavator was working on a large-diameter water supply expansion project in Walnut Creek, CA for the East Bay Municipal Utility District (EBMUD).

Upon puncture of the Kinder Morgan pipeline, gasoline under high pressure was immediately released into the surrounding area. Kinder Morgan control center operators in Concord immediately noticed the large pressure drop and started to shut the pipeline down. Several seconds after the line was hit, the gasoline streaming out of the line was ignited by welders employed by Matamoros Pipelines, Inc. who were also working on the new water supply pipeline. The ensuing explosion and fire resulted in the deaths of five workers and significant injury to four others. One nearby two-story structure was burned and other property was damaged.

The direct cause of the accident was the excavator's bucket striking the pipeline and puncturing through the wall of the pipe. However, there were several factors that significantly contributed to this accident. These include inadequate line locating, inadequate project safety oversight and communication, and failure to follow the one-call law.

FOCUS OF INVESTIGATION:

The lead agency in this accident investigation is the California Department of Industrial Relations, Division of Occupational Safety and Health (CalOSHA). Although the State Fire Marshal's Pipeline Safety Division (SFM) participated with CalOSHA staff as they conducted their investigation, the authority for SFM to conduct its own accident investigation is derived from Section 13107.5 of the California Health and Safety Code which states: "The State Fire Marshal may investigate every break, and shall investigate every explosion or fire, involving a pipeline reported by a local agency pursuant to Chapter 5.5 (commencing with Section 51010) of Division 1 of Title 5 of the Government Code...".

The SFM investigation is limited to the determination of whether there had been any violations of 49 Code of Federal Regulations (Part 195); Section 4216 of the California Government Code; and, Sections 51010-51019.1, of the California Government Code.

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DESCRIPTION OF ACCIDENT

NOTIFICATION AND RESPONSE:

At approximately 1430 hours on 9 November 2004, SFM Supervising Pipeline Safety Engineer Bob Gorham, received notification from the Emergency Warning Center at the Governor's Office of Emergency Services that Kinder Morgan had reported a potential leak on their pipeline in the City of Walnut Creek. Gorham immediately assigned SFM Pipeline Safety Engineer Linda Zigler to respond to the accident site and assume responsibility as SFM Lead Investigator. Zigler arrived on scene at 1545 hours. The following additional SFM personnel responded to or assisted with the accident investigation: State Fire Marshal Ruben Grijalva; Division Chief Nancy Wolfe; Supervising Pipeline Safety Engineer Bob Gorham; Pipeline Safety Engineers Doug Allen, Chuck MacDonald and Emmett Cooper; and Senior Deputy State Fire Marshal Tin Tran.

ACCIDENT EVENTS:

As part of a project for East Bay Municipal Utilities District (EBMUD), Mountain Cascade was in the process of digging a trench for the installation of a new 72-inch diameter water pipeline along South Broadway between Newell Avenue and Rudgear Road in Walnut Creek, CA. The Kinder Morgan pipeline, which was buried about 60 inches deep in this area, deviated from a straight line to form a curved "offset" or "point of intersection" (PI) at this location (Kinder Morgan Mile Post 8.48). When the pipeline was constructed, the PI was installed to accommodate the location of a large oak tree; at some later time, the tree was cut down. The remaining stump and root ball were covered by soil and not readily visible at the time of the accident.

EBMUD identified early on in the design process that there was a hazardous liquid pipeline in the vicinity of the proposed water line and that special measures were to be taken to prevent damage to the pipeline. EBMUD and their engineering consultants had been in contact with Kinder Morgan in October 2000 regarding general alignment and drawings of the petroleum pipeline. Kinder Morgan provided as-built drawings to EBMUD that clearly indicated the offset between Stations 100+00 and 101+00.

EBMUD and its engineering contractors provided design drawings to excavating contractor Mountain Cascade who had taken over the project in August 2004. (EBMUD had cancelled its contract with Modern Continental, the original excavator, in May 2004.) These design drawings showed a potential conflict between the installation of the new water line and the existing petroleum pipeline. Although the field marking of the offset was not present at time of the excavation, construction drawing DWG W-8780-36, Note 2, states "Contractor shall verify location of 10" petroleum lines prior to any construction between pipe stations 100+00 to 101+00 ...". Mountain Cascade workers did not expose the petroleum pipeline by hand tools at this location to positively locate the Kinder Morgan pipeline.

At 1322 hours on 9 November 2004, the operator of the Mountain Cascade excavator struck Kinder Morgan's 10-inch products pipeline (LS-16) with one of the rock teeth from the excavation

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bucket. Premium gasoline, which was being shipped at the time from Kinder Morgan's Concord Pump Station to their San Jose Terminal, streamed from the pipeline into the surrounding area. The hole made by the excavator was approximately one-inch in diameter (about the size of a quarter). The pressure for LS-16 at the failure site at the time of the accident was 973 PSI.

Several seconds after the pipeline was hit, the gasoline was ignited by welders who were also working on the new water line project. The subsequent explosion and fire resulted in the deaths of five workers and severe injury to four others. A nearby two-story house was severely burned and other property was damaged. A total of 564 barrels of gasoline was released, none of which found its way into any waterways.

KINDER MORGAN'S EMERGENCY ACTIONS:

At 1322 hours on 9 November 2004, Kinder Morgan's operators monitoring LS-16 from the Concord Pump Station received an alarm indicating a large pressure drop on the line. At 1326 hours, the controllers shut down LS-16 and started draining the product to the San Jose Terminal and Concord Pump Station.

By 1400 hours, Kinder Morgan officials arrived at the accident site and joined the Unified Command staff. The Hill Grade block valve downstream from the accident site (at Mile Post 10.098) was closed at 1415 hours. The upstream block valve at the Concord Station was kept open to facilitate draining product from the line.

Kinder Morgan installed a stopple plug in the pipeline south of the rupture and a hot tap north of the rupture so that the residual gasoline could be removed from the line. This took two days to accomplish due to fire department safety concerns, but by 0430 hours on 11 November 2004, Kinder Morgan was able to recover 60 barrels of gasoline. In addition, a temporary clamp was installed over the puncture. At 1730 hours on 11 November 2004, the upstream valve at the Concord Station was closed. No gasoline escaped to any waterway during this emergency.

REPAIR OF PIPELINE / BACK TO SERVICE DATE:

At 0640 hours on 13 November 2004, the section of LS -16 containing the rupture was removed by cold cutting and saved as evidence. This pipe section was replaced by pre-tested pipe stenciled with the following information: "9-06-02" (date pipe was pressure tested); "CSFM 02-190" (the CSFM test ID number); and "10 .250 X52" (the pipe's specifications).

Two certified welders from contractor ARB welded the new pipe section in place. High Mountain Inspection Company nondestructively tested the pipe welds and at 1535 hours on 13 November 2004, High Mountain reported that the two repair welds were acceptable to API Standard 1104. The replacement pipe section was then coated with Polyken primer and double wrapped with 910 Polyken tape.

On 13 November 2004, Kinder Morgan developed written procedures for resuming operations of LS-16 and submitted them to SFM Pipeline Safety Engineer Emmett Cooper for review and

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approval. With Cooper observing, Kinder Morgan implemented each step of these procedures. A static pressure test of 525 PSI successfully held for one hour. The San Jose Terminal opened the incoming block valve and the Concord Station started pumping with three pumps at 80% of maximum operating pressure (1045 PSI). After the line leveled out, a gauge plate/sizing plate was run through the pipeline from the Concord Station to the San Jose Terminal to check for undetected third-party damage. The pipeline went back into service at 2221 hours on 13 November 2004.

Kinder Morgan personnel were present at the accident location throughout the night of 13-14 November 2004 to monitor the pipeline. Cooper left the site at 0300 hours on 14 November 2004. The line remained at 80% MOP until a geometry tool could be used to confirm the pipeline's integrity and that no undetected damage had occurred.

CHAIN OF CUSTODY:

From 1730 hours on Friday, 12 November 2004, until 0700 hours on 13 November 2004, SFM Pipeline Safety Engineers Doug Allen and Chuck MacDonald and Senior Deputy State Fire Marshal Tin Tran took turns observing that the excavator bucket was not moved or tampered with until it was taken into custody along with the damaged section of pipe containing the rupture.

At 0700 hours, 13 November 2004, both the bucket and 30-foot section of LS-16 containing the rupture were taken into custody by SFM. The rock tooth bucket was labeled #04-5845-1; the piece of pipe was labeled #04-5845-2. Both pieces of evidence were carefully loaded and secured on an ARB trailer and taken to Anamet, Inc., a metallurgical testing lab located in Hayward, CA. where it was met by Ken Pytlewski, Director of Engineering and Laboratories for Anamet. The loading and transportation of the evidence was observed by SFM Pipeline Engineers Linda Zigler and Chuck MacDonald.

When the load arrived at Anamet at 1730 hours on 12 November 2004, the trailer driver reported that the bucket and pipe could not be safely offloaded because of the orientation of the truck's front boom to the laboratory's storage garage. Zigler then contacted the California Department of Forestry and Fire Protection (CDF) Sacramento Command Center to arrange for on-site security for the trailer which was disconnected from the tractor but still had the pipe and bucket secured to it. At 0005 hours on 14 November 2004, CDF Fire Captain Greg Latronica took custody of the pipe and bucket from Zigler and MacDonald. At 0728 hours on 14 November 2004, Fire Captain Eric Wood took custody of the evidence from Captain Latronica.

Later on 14 November 2004, Zigler made arrangements to have a CDF tractor relocate the evidence and trailer from Anamet to the CDF Mobile Equipment Facility in Davis, CA. Captain Wood remained with the evidence as it was transported to Davis where he transferred custody to CDF Equipment Manager Richard Armstrong at 2239 hours on 14 November 2004. The pipe and bucket remained secured at this facility from 14 November 2004 until 17 March 2005.

On 17 March 2005, Ken Pytlewski of Anamet, SFM Pipeline Engineer Linda Zigler and SFM Senior Deputy Tin Tran met Richard Armstrong at the CDF Davis

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Facility for the purpose of inspecting the teeth of the excavation bucket and transporting the evidence back to Anamet's storage and lab facility in Hayward. Richard Armstrong transferred custody of the evidence to Zigler at 1207 hours on 17 March 2005. Assisting with the transportation of the materials were John Perry (truck driver) and Joe Driscoll (heavy equipment operator). Both Perry and Driscoll are employees of Mountain Cascade.

During inspection of the excavation bucket, John Leahy of Cal OSHA (via telephone), Pytlewski, Tran and Zigler all agreed that a tooth from the bucket's right side was most likely to have punctured the pipeline. Eleven teeth from the right side of the bucket were each systematically removed and numbered from #0 to #10 before being placed in a box which was secured in Tran's vehicle.

After the pipe and remaining portions of the bucket were secured to Mountain Cascade's trailer, the evidence was driven by Perry to Anamet's facilities in Hayward. Tran and Zigler monitored the evidence transport from Tran's vehicle. Heavy-duty equipment was provided by Mountain Cascade at Anamet's storage facility to offload the pipe from the trailer. The pipe was secured in the storage garage with the box containing the eleven rock teeth from the bucket. The remaining portion of the bucket itself were returned to its owner (Mountain Cascade). The final transfer of custody took place at Anamet at 1410 hours on 17 March 2005 when the pipe and bucket teeth were transferred to the care of Ken Pytlewski.

METALLURGICAL TESTING:

Both the section of pipe containing the rupture site and eleven rock teeth removed from the excavator bucket remain secured at Anamet's laboratory in Hayward, CA. Metallurgical testing is currently pending.

INVESTIGATION FINDINGS

Line Locating:

Kinder Morgan violated CFR 49 Part 195.442(a) which states: "each operator of a buried pipeline must carry out, in accordance with this section, a written program to prevent damage to that pipeline from excavation activities". Kinder Morgan did not mark the location of LS-16 as required by the company's damage prevention program and as required by Section 4216 of the California Government Code. Specifically, Kinder Morgan did not mark the approximate location of the pipeline to within 24 inches of either side of the exterior surface of the subsurface location at KM Station 447+90 to Station 448+18 (EBMUD Station $\pm 100+15$).

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Kinder Morgan staff did not follow the company's line locating procedure found in Chapter 4, Section 4.2 of their Maintenance Manual which states: "Prior to beginning any maintenance work or excavation work, the location of the pipeline shall be reviewed by the local Line Rider or other company representative and verified by drawings and a pipeline locating device." A Kinder Morgan representative was present on 2 November 2004 to observe benching operations. Neither this contract representative nor the Kinder Morgan Line Rider reviewed and verified by the use of drawings and pipeline locating devices that the location of the pipeline was correctly marked.

California Underground Service Alert "One Call" Law

Mountain Cascade violated Section 4216.4 (a) of the California Government Code (Underground Service Alert "One Call" Law) in that the company failed to determine the exact location of the subsurface installations (10-inch pipeline) that was in conflict with the excavation. Construction drawing DWG W-8780-36, Note 2, states "Contractor shall verify location of 10" petroleum lines prior to any construction between pipe stations 100+00 to 101+00 ..." (NOTE: "Verify" in this context refers to Section 4216.4 of the California Government Code, which requires exposing the petroleum pipeline by hand tools to positively locate the line). Although the field marking of the offset was not present at time of the excavation, the location of the offset was previously provided to Mountain Cascade and was noted on their construction drawings.

Project Safety Oversight:

EBMUD identified early on in the design process that there was a hazardous liquid pipeline in the vicinity of the proposed water line and that special measures were to be taken to prevent damage to the pipeline. EBMUD and their engineering consultants had been in contact with Kinder Morgan in October 2000 regarding general alignment and drawings of the petroleum pipeline. Kinder Morgan provided as-built drawings to EBMUD that clearly indicated the offset between Stations 100+00 and 101+00.

Mountain Cascade replaced the previous contractor in September 2004. EBMUD should have taken a more active role in ensuring that the new contractor, Mountain Cascade, was made fully aware of the petroleum pipeline's location including offsets and its potential for conflict with the installation of the new water line.

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RECOMMENDATIONS

It is recommended that Kinder Morgan:

1. Require that each inspector observing an excavation in the vicinity of the company's pipelines takes all available measures to properly locate the pipeline and/or verify previous location activities.
2. Ensure that all employees involved with line riding, excavation and inspection activities related to one-call notifications follow all of the damage prevention program procedures (including Kinder Morgan policies/procedures, Operator Qualifications protocols and One-Call Damage Prevention requirements).
3. Provide adequate supervision/oversight to ensure that each response made by an employee or contract representative to an excavation notification is handled correctly and that line locating procedures are properly followed.
4. Consider modifications to the company's Operator Qualification Program (OQ). In particular, it is recommended that the company review the adequacy of covered tasks involving line locating, one-call notifications and inspection of excavation activities. Additionally, it is necessary that the company review the adequacy of required training, evaluation and qualification methods for each of these covered tasks to ensure that each employee and/or contractor representative is OQ qualified to perform that task.