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Colorado Oil and Gas Conservation Commission

Fort Morgan Gas Storage Field Hearing  
Staff Presentation  
January 15, 2008

Carol Harmon  
Enforcement Officer

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Engineering Manager

Randall Ferguson  
Environmental Supervisor

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Introduction

- Release of natural gas from a well in Morgan County.
- Serious issues related to:
  - public health, safety and welfare
  - environmental impacts
- Administrative Order by Consent (AOC)

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Purpose of Presentation

- On October 22, 2006, Colorado Interstate Gas (CIG) reported to the COGCC staff of a gas leak from a well in the Fort Morgan Gas Storage Field in Morgan County.
- Further investigation by COGCC staff indicated significant environmental impacts from this leak.
- COGCC staff has prepared an Administrative Order by Consent (AOC) citing seven rule violations and one statutory violation which has been approved and signed by CIG.

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## Gas Storage Fields

- Provide underground storage of processed natural gas.
- These facilities serve as storage to allow high volume delivery of natural gas at times of peak demand.
- Gas is injected into a subsurface reservoir for storage during the summer months and is withdrawn during the winter months for pipeline delivery.

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- Generally, gas storage facilities are permitted and regulated by the Federal Energy Regulatory Commission (FERC).
- The drilling of the injection / withdrawal wells requires submittal of an APD that is approved by the COGCC.
- COGCC staff does not normally monitor daily operations of the gas storage field nor does it regularly inspect the well sites with the exception of UIC wells.

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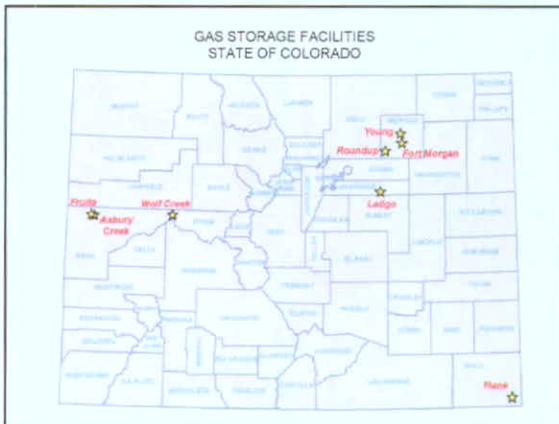
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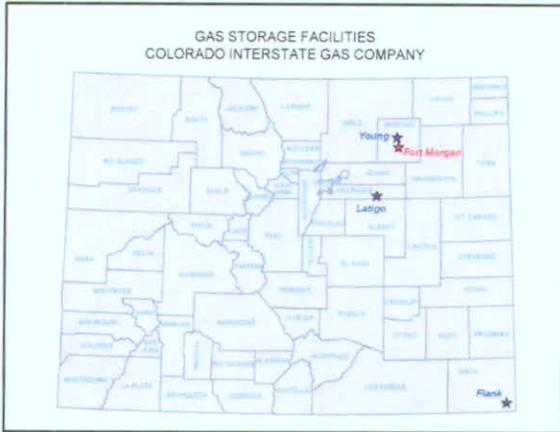
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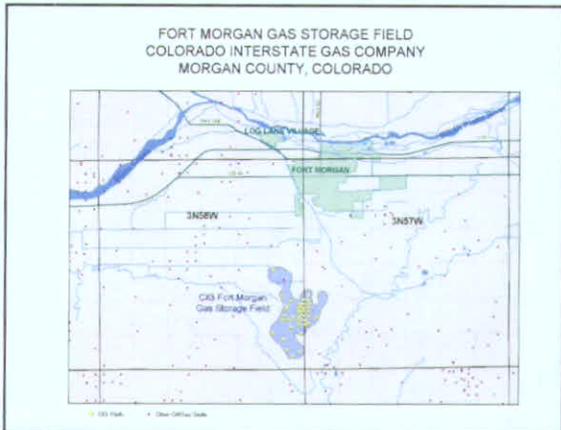
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### Fort Morgan Field History

- The Fort Morgan Field was discovered in 1954 as a "D" Sand reservoir.
- Natural gas injection – recycling operations were approved by the Commission in 1958 for the purpose of pressure maintenance.
- CIG acquired the field in 1961 as a potential gas storage facility.
- The Federal Power Commission (precursor to FERC) approved the Fort Morgan gas storage facility in 1966.

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- The field currently consists of:
  - 26 injection/withdrawal wells.
  - 6 observation wells.
  - 2 UIC / SWD wells (under COGCC jurisdiction)
- Storage capacity of approx. 14.8 BCF natural gas at 2000 psi.
  - Working gas        8.5 BCF
  - Gas lost            0.45 to 0.70 BCF

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- ### Details of Gas Release
- On October 22, 2006, a landowner in the Fort Morgan Field area notified CIG that water and gas was escaping to the surface within the Field.
  - CIG immediately notified COGCC.
  - COGCC staff began field inspections on October 27, 2006.

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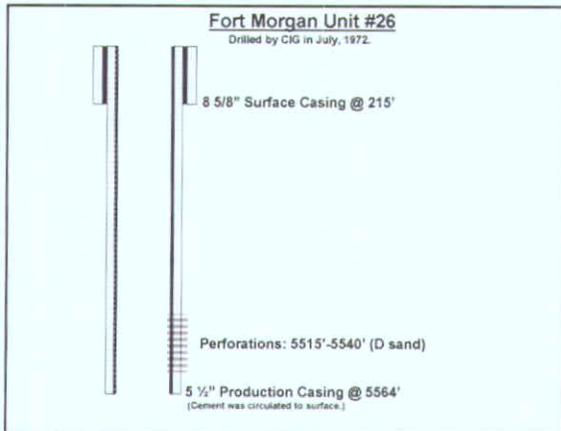
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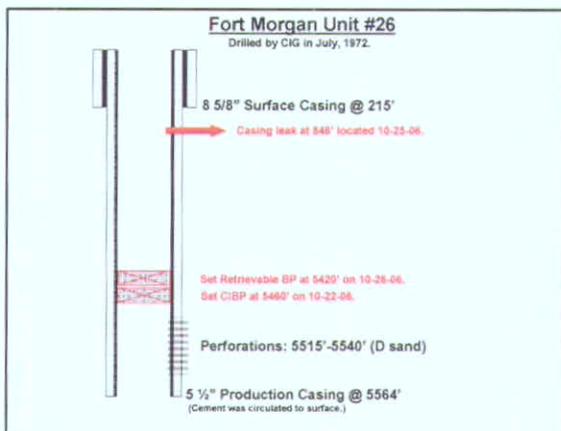
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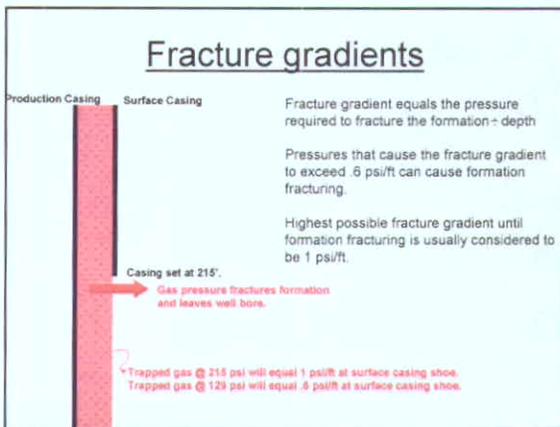
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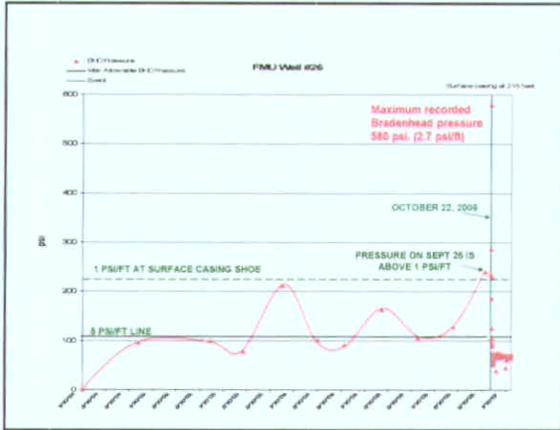
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### Chronology of Gas Release Events

- October 22, 2006 – Gas release from Well #26. COGCC and other regulatory agencies notified by CIG. Thirteen nearby homes were evacuated.
- October 23-24, 2006 – CIG began initial screening of nearby homes for gas with portable instruments. Gas monitors were placed in homes upon request.
- October 25, 2006 – COGCC discussed initial abatement and corrective action with CIG personnel.
- October 25-27, 2006 – CIG began initial sampling of nearby water wells. Analyses included dissolved gases and volatile organic compounds (VOCs). Sampling was not conducted on the water wells at the two closest homes due to high gas readings and safety concerns. H100 located 1,000 ft. east and H101 located 1,700 ft. southeast of the gas processing facility.
- October 26-28, 2006 – Residents were allowed to return home with exception of H100 and H101.

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### Chronology of Gas Release Events

- October 27, 2006 – Initial field inspection by COGCC staff.
- Four areas of significant surface disturbances were identified.
  - Small area approx. 1/2 mile southeast of Well #26.
  - Large area approx. 3/4 mile south and southeast of Well #26 and as close as 500 ft. from the gas processing facility.
  - Area approx. 3/4 mile southeast of Well #26, on and adjacent to CR 18.
  - Isolated area approx. 1 mile southwest of Well #26.

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FORT MORGAN GAS STORAGE FIELD  
COLORADO INTERSTATE GAS COMPANY  
MORGAN COUNTY, COLORADO



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FORT MORGAN GAS STORAGE FIELD  
MORGAN COUNTY, COLORADO  
OCTOBER 30, 2008  
SOUTH OF GAS PROCESSING FACILITY - VIEW TO NORTH



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FORT MORGAN GAS STORAGE FIELD  
MORGAN COUNTY, COLORADO  
OCTOBER 30, 2008  
SOUTHEAST OF GAS PROCESSING FACILITY



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FORT MORGAN GAS STORAGE FIELD  
MORGAN COUNTY, COLORADO  
OCTOBER 30, 2006  
CR 18 - VIEW IS WEST



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FORT MORGAN GAS STORAGE FIELD  
MORGAN COUNTY, COLORADO  
OCTOBER 30, 2006  
CR 18 - VIEW TO SOUTH



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FORT MORGAN GAS STORAGE FIELD  
MORGAN COUNTY, COLORADO  
OCTOBER 30, 2008  
CR 18 - VIEW TO NORTH



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FORT MORGAN GAS STORAGE FIELD  
MORGAN COUNTY, COLORADO  
OCTOBER 30, 2006  
SOUTHEAST OF GAS PROCESSING FACILITY - VIEW EAST



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FORT MORGAN GAS STORAGE FIELD  
MORGAN COUNTY, COLORADO  
OCTOBER 30, 2006  
SOUTHEAST OF GAS PROCESSING FACILITY - VIEW SOUTH



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FORT MORGAN GAS STORAGE FIELD  
MORGAN COUNTY, COLORADO  
NOVEMBER 5, 2006  
SOUTHWEST AREA OF SURFACE IMPACTS



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FORT MORGAN GAS STORAGE FIELD  
MORGAN COUNTY, COLORADO  
NOVEMBER 5, 2008  
SOUTHWEST AREA OF SURFACE IMPACTS



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FORT MORGAN GAS STORAGE FIELD  
MORGAN COUNTY, COLORADO  
NOVEMBER 5, 2008  
SOUTHWEST AREA OF SURFACE IMPACTS



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MORGAN COUNTY, COLORADO  
NOVEMBER 5, 2008  
SOUTHWEST AREA OF SURFACE IMPACTS



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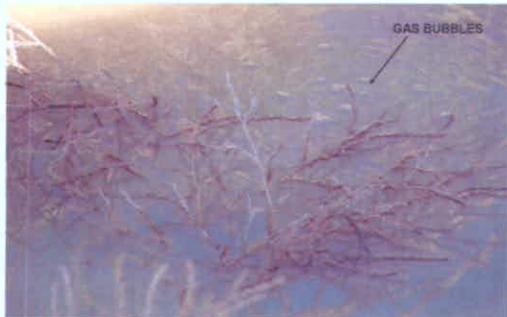
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FORT MORGAN GAS STORAGE FIELD  
MORGAN COUNTY, COLORADO  
NOVEMBER 5, 2006  
SOUTHWEST AREA OF SURFACE IMPACTS



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FORT MORGAN GAS STORAGE FIELD  
MORGAN COUNTY, COLORADO  
NOVEMBER 5, 2006  
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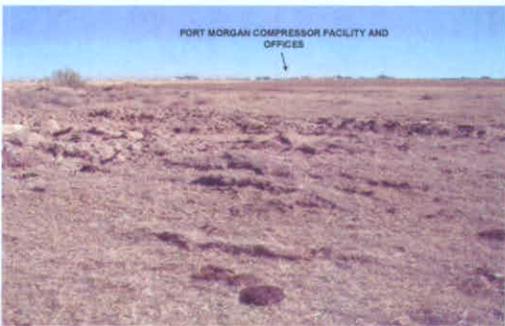
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FORT MORGAN GAS STORAGE FIELD  
MORGAN COUNTY, COLORADO  
NOVEMBER 5, 2006  
SOUTHWEST AREA OF SURFACE IMPACTS



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**CHRONOLOGY OF REGULATORY  
OVERSIGHT**

- November 7, 2006 – As required by COGCC staff, a Form 19 – Spill/Release Report and a Form 27 – Site Investigation and Remediation Workplan were submitted by CIG.
- November 17, 2006 – CIG submitted a draft Environmental & Engineering Assessment Workplan as a supplement to the Form 27 for COGCC review.
- December 5, 2006 – CIG submitted an addendum to the Sampling Plan of the draft workplan.
- December 11, 2006 – COGCC staff approved the draft workplan and addendum with required changes.

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**ENFORCEMENT**

- December 18, 2006 - Notice of Alleged Violation (NOAV) issued to CIG; ten rule violations cited.
- Four well bore violations:
  - Rule 317 d. - failure to maintain casing to prevent migration of gas from one horizon to another;
  - Rule 326 d. - failure to maintain mechanical integrity;
  - Rule 327. - failure to take reasonable precautions to prevent gas from blowing uncontrolled, and;
  - Rule 404 - failure to complete the well with adequate casing to prevent leakage to a fresh water source.

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**ENFORCEMENT**

- Six environmental violations:
  - Rule 209. - failure to exercise due care in the protection of water-bearing formations;
  - Rule 324A a. - failure to take precautions to prevent significant adverse environmental impacts to air or water;
  - Rule 324A c. - performing an act which constitutes a violation of any comprehensive plan adopted by the Air Quality control Commission;
  - Rule 324A d. - failure to demonstrate that injection activities would not result in a violation of any primary drinking water regulation;
  - Rule 906 a. - failure to control and contain a spill/release of E&P waste immediately upon discovery, and;
  - Rule 907 a. - failure to ensure that E&P waste is properly handled.

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### CORRECTIVE ACTION

- CIG has collected samples from over 50 domestic water wells within a 3-mile radius of Well #26. Lab results have indicated that only one domestic water well (H100) has been impacted: significant methane concentrations up to 23 mg/l and benzene concentrations below the Colorado Basic Standards for Ground Water at 5 µg/l.
- A total of 85 cone penetrometer test (CPT) borings were drilled; 78 were completed as piezometers to determine the extent of potential impacts to the shallow aquifer.
- A total of 132 soil samples were collected in and around the surface disturbed areas. Based on lab results, COGCC staff approved reclaiming those areas.
- Based on periodic sampling results, two separate dissolved methane plumes were identified in the general area of the surface disturbances. Points-of-Compliance (POCs) have been established.

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### ADDITIONAL ENFORCEMENT

- During the June sampling event, lab results indicated a benzene concentration of 6.0 µg/l in CPT piezometer #41D which exceeded the benzene standard for ground water at 5 µg/l.
- As a result of exceeding the water quality standard for benzene, an additional NOAV issued to CIG on August 31, 2007; one rule violation was cited.
- One environmental violation:
  - Rule 324A b. - conducting oil and gas operations which constituted a violation of water quality standards established by the WQCC.

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### ADMINISTRATIVE ORDER BY CONSENT

- Violation of 8 regulatory and statutory provisions;
- Fine of \$374,000 (does not exceed \$1,000 per violation/day);
- CIG will continue environmental remediation, investigation, monitoring and reporting as required;
- CIG will carry out field activities in accordance with the Operating Plan, amended and approved by COGCC staff to include bradenhead readings 3 times weekly.

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