



Field Office: 21459 County Road 5 Rifle, Colorado 81650  
Division Office: PO Box 6501 Englewood, Colorado 80155

March 15, 2016

Love Ranch Centralized E&P Waste Annual Report  
Piceance Creek Facility  
Facility ID: 149012

Mr. Alex Fischer  
COGCC Environmental Supervisor – Western Colorado  
1120 Lincoln Street, Suite 801  
Denver, Colorado 80203

Dear Mr. Fischer,

Please find enclosed the Annual Report for the Love Ranch Centralized E&P Waste Facility #149012.

If you should have any concerns or questions regarding the contents related to this submittal please contact me directly at (970) 675-4122 or email at [Jessica\\_Dooling@xtoenergy.com](mailto:Jessica_Dooling@xtoenergy.com). Thanks again for your assistance.

Respectfully,

A handwritten signature in blue ink, appearing to read 'JDooling', written over a horizontal line.

Jessica Dooling  
Piceance EH&S Supervisor

CC: Stan Spencer  
Kyle Littrell



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Centralized E&P Waste Management Facility

Love Ranch Evaporation Pond

COGCC Facility No. 149012

Rio Blanco County, Colorado

Reporting Year: 2016

# 1. Introduction

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Love Ranch Centralized E&P Waste site is located in Rio Blanco County, approximately 45 miles north/northwest of Rifle, Colorado. This site includes a salt water disposal (SWD) pond and its associated pumping and storage facilities. The purpose of the pond is to retain produced water from natural gas operations and production.

Location: SWNW Section 9, Township 2 South, Range 97 West

Latitude/Longitude: 39.892642 / -108.296246



## 2. 2015 Summary of Activities:

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The facility was utilized for rotating storage of ~393,000 bbls of produced water from January 1, 2016 through December 31, 2016. Current produced water storage is ~270,454 bbls. During this period the reservoir was utilized for storage of excess produced water above and beyond the capacity of the Produced Water Distribution and Disposal System, which resulted in a total inflow of ~42,788 bbls, and outflow of ~29,792 bbls and ~0 bbls for recycled use in operational needs. Approximately 0 bbls were injected to disposal. (See Sec.6 below for actual volumes logged by operations)

No releases occurred at the Love Ranch Evaporation Pond in 2016.

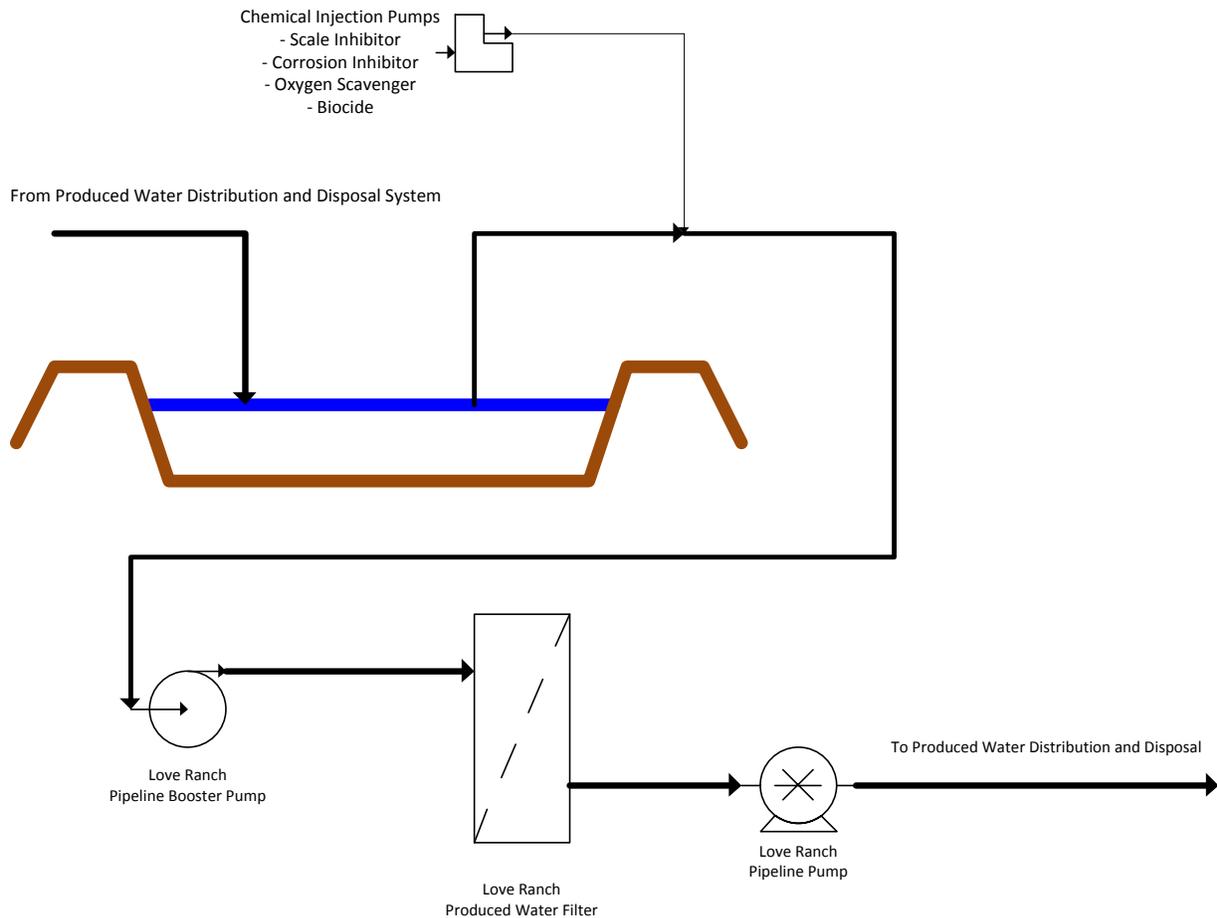
### 3. Facility Flow Process:

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The purpose of the Love Ranch Centralized E&P Waste site is to store produced water in the event disposal/alternative usage is not available. A pipeline pump returns produced water from Love Ranch Pond back to the Produced Water Distribution and Disposal (PWDD) System. Water accumulates in the pond on demand for storage/surge or as a pressure relief for the PWDD system specifically when insufficient users (well drilling, completions and disposal injection wells) exist in comparison to production. Conversely, when users exceed production, produced water that has accumulated in the pond can be pumped back to the pipeline at a low rate, 2000 BBL/day, for use or disposal. All produced water pumped from Love Ranch pond is filtered and treated with oxygen scavenger, biocide, corrosion inhibitor, and scale inhibitor to protect the pipeline, downstream equipment and wells from corrosion and deposits. The Love Ranch Pond can store up to 393,000 BBL of produced water.

### 4. Facility Flow Schematic:

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## 5. Monitoring Process:

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Surface monuments are monitored annually. The testing frequency will change to every two years if there is no significant movement ( $>0.1'$  in lateral and  $>0.3'$  in vertical) detected in the first five years. The monument movement will be plotted and interpreted after every inspection. Due to the nature of the soil, the vertical displacement is anticipated to follow an asymptotic decline. Trained survey personnel will monitor the monuments using precise survey equipment.

Piezometers are monitored quarterly. If water levels are detected in the piezometers, samples will be taken to determine water quality.

Seepage through the dam will be collected in the toe drain system and piped to a manhole. Liquid levels in the manhole will be monitored monthly for normal operations. When the pond is more than 50% full by height, liquid levels in the manhole will be measured weekly. The seepage rate through the toe drain will be measured quarterly by capturing the liquid flowing into the manhole and measuring the volume vs. time.

The pond level readings of the pond shall be recorded at the time of all readings.

All dam instrumentation (including piezometers, drains, reservoir gage, and survey monuments) shall be monitored immediately following an earthquake where ground motions are felt in the area or the owner is informed of seismic activity in the vicinity. Results of the inspection reports and instrumentation readings should be immediately sent to the State Engineer.

All measurements and descriptive details that are required to monitor the performance of the dam will be recorded. The information will be grouped into the following three categories:

**LOCATION** — the location of any questionable area or condition will be accurately described to allow that area or condition to be evaluated. The location along the length of the dam, as well as height above the toe or distance down from the dam's crest, will be established and recorded.

**EXTENT OF AREA**—the length, width, and depth or height of any area where a suspected problem is found shall be recorded.

**DESCRIPTIVE DETAIL**—a brief yet detailed description of a condition or observation will be given.

Some description items are:

- Quantity of Toe Drain Intercept Outflow
- Quantity of Seepage from Point and Area Sources
- Length, Displacement, and Depth of Cracks
- Is Area Moist, Wet, or Saturated
- Is Protective Cover Adequate
- Is Surface Drainage Adequate
- Sloughing / Erosion of Slopes
- Settlement / Depression Location, Depth, Length, and Width
- Do Slopes appear too steep
- Does Deterioration appear to be rapid or slow
- Have Conditions Changed

## **Monitoring Process continued:**

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The above listing of inspection findings that must be recorded is not meant to be a complete list but is to serve as a guide. If an inspector thinks a condition has changed since the last inspection it will be documented and the State Engineer will be contacted. Photos will also be taken of the area, carefully noting the date and writing a description of the scene shown on the photo.

Dam Inspections will be conducted quarterly. It is the responsibility of those obtaining the data to know if readings are within normal historical and/or design operating parameters. Emergency conditions should be assumed if readings exceed normal historical and/or design operating parameters and immediate notification of the State Engineer is required.

## **6. Waste Tracking:**

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2015 Volumes

| Location        | Produced Water Inflow (bbl.) | Produced Water Outflow (bbl.) |          |
|-----------------|------------------------------|-------------------------------|----------|
|                 |                              | Injected/Disposal             | Recycled |
| Love Ranch Pond | 42,788                       | 29,792                        | 0        |
|                 |                              |                               |          |

## **7. Monitoring Reports:**

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- 2016 Annual Dam Report, State Engineers Office (Attachment A)

## **8. Sampling Reports:**

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Samples were collected for 2016(See Table 1). The facility is currently being used for storage of ~270,454 bbls of produced water. Please see #2 above.

# ATTACHMENT A



February 6, 2017

State Engineer's Office – Division 6  
PO Box 773450  
Steamboat Springs, CO 80487

Attention: Dana Miller – Dam Safety Engineer

Subject: 2016 Annual Monitoring Report  
Love Ranch Evaporation Pond Dam  
Construction File Number: C-1881  
Water Division 6, DAMID: 430220

Reference: Instrumentation and Monitoring Plan; Love Ranch Evaporation Pond  
ExxonMobil Production – U.S. Production  
Dated: July 15, 2005  
Piceance Tight Gas Initial Development Project  
Rio Blanco County, Colorado

Dear Ms. Miller,

On behalf of XTO Energy, a fully owned subsidiary of ExxonMobil, please find attached the 2016 Annual Monitoring Report for the subject site. This report includes the required monthly and quarterly Instrumentation Records. The February 2017 report serves as the 2016 Annual Report with the monthly and quarterly reports starting with January 2016 thru December 2016. The completion of these reports was in compliance with the referenced Instrumentation and Monitoring Plan.

If you have any questions regarding these reports or the overall status of the subject dam, please do not hesitate to contact me.

Regards,



Jessica Dooling

**Piceance EH&S Supervisor**

Office: 970-675-4122

Cell: 970-2769-6048

Attachment: 2016 Annual Monitoring Report

# **2016 ANNUAL REPORT**

## **LOVE RANCH 8 EVAPORATION POND (SWD POND) RIO BLANCO COUNTY, COLORADO**

**JANUARY 2017**

**Prepared for:**

**XTO ENERGY, INC.  
Rifle, Colorado**



# **2016 ANNUAL REPORT**

## **LOVE RANCH 8 EVAPORATION POND (SWD POND) RIO BLANCO COUNTY, COLORADO**

**JANUARY 2017**

**Prepared for:**

**XTO ENERGY, INC.  
21459 County Road 5  
Rifle, Colorado 81650**

**Prepared by:**

**LT ENVIRONMENTAL, INC.  
820 Megan Avenue, Unit B  
Rifle, Colorado 81650  
(970) 285-9985**



**2016 ANNUAL REPORT  
LOVE RANCH 8 EVAPORATION POND (SWD POND)  
LTE Project Number: 012916016**

**Prepared  
by:**

*Brittany Cocina*

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Brittany Cocina  
LTE Project Geologist

February 3, 2017

\_\_\_\_\_  
Date

**Reviewed  
by:**

*Chris McKisson*

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Chris McKisson  
LTE Western Slope Manager

February 3, 2017

\_\_\_\_\_  
Date



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## EXECUTIVE SUMMARY

LT Environmental, Inc. (LTE) has been retained by XTO Energy, Inc. (XTO) to conduct compliance monitoring at the Love Ranch 8 Evaporation Pond (SWD Pond). The project area is southwest of Meeker, Colorado, in Rio Blanco County and is located in the northeast quarter of the southwest quarter of Section 9, Township 2 South and Range 97 West.

The purpose of the 2016 site activities was to conduct compliance monitoring of the Love Ranch 8 Evaporation Pond according to the *Instrumentation and Monitoring Plan* (Monitoring Plan) prepared by ExxonMobile Production, dated July 15, 2005. The scope of work included collecting data from installed monitoring instrumentation devices and conducting visual inspections to ensure the pond is functioning as designed.

In October 2016, LTE was retained by XTO to conduct the remaining annual inspections. LTE obtained the previous inspection reports conducted by SMA (previously KRW) from XTO and conducted the required remaining inspections. Inspections were conducted on a weekly basis for seepage and visual inspections. LTE inspected the piezometers for water during the fourth quarter of 2016. In addition, LTE surveyed the settlement monument points on October 28, 2016, to evaluate potential displacement.

During the first three quarterly inspections, the toe drain along the east side of the pond was continuing to produce minor silt/gravel and approximately 0.25 feet (3 inches) of clean water. During the fourth quarter 2016 inspections, the toe drain along the east side of the pond had approximately 0.61 feet (7 inches) of clean water in the bottom of the monitoring manhole.

Quarterly monitoring in 2016 of the piezometers (PZ-1 through PZ-10) indicated trace amounts to no presence of water.

In addition, it was noted in the 2016 inspections conducted by the previous consultant that rodent holes and minor rill erosion were addressed during 2016. Rill erosion as well as rodent holes that develop will be scheduled for repair on an ongoing basis, typically in the spring and fall of each year.

During the annual survey of the settlement monument points, measurements indicated a slight horizontal and vertical shift of the 11 monument points. No significant changes were observed in the 11 monument points between October 28, 2016, and the previous survey conducted on October 13, 2015.

LTE will continue to conduct compliance monitoring and visual inspections to ensure the pond is functioning as designed and in accordance with the Monitoring Plan.

## 1.0 INTRODUCTION

LT Environmental, Inc. (LTE) has been retained by XTO Energy, Inc. (XTO) to conduct compliance monitoring at the Love Ranch 8 Evaporation Pond (SWD Pond) in Rio Blanco County, Colorado.

### 1.1 OBJECTIVE

The purpose of the 2016 site activities was to conduct compliance monitoring at the Love Ranch 8 Evaporation Pond (SWD Pond) according to the *Instrumentation and Monitoring Plan* (Monitoring Plan) prepared by ExxonMobile Production, dated July 15, 2005. The scope of work included collecting data from installed monitoring instrumentation and conducting visual inspections to ensure the pond is functioning as designed.

### 1.2 PROJECT LOCATION

The project area is southwest of Meeker, Colorado, in Rio Blanco County and is located in water division 6 and water district 43 within the northeast quarter of the southwest quarter of Section 9, Township 2 South, and Range 97 West, as depicted on Figure 1.

### 1.3 SCOPE OF WORK

The following data were collected in 2016 at the frequencies specified in the Monitoring Plan:

- *Seepage Inspections:* Seepage inspections were conducted weekly when the pond was greater than 50 percent (%) full. Seepage inspections included investigating a monitoring manhole through which any seepage through the toe drain system is routed. If seepage is routinely observed, the seepage rate of flowing water will be measured.
- *Piezometers:* LTE inspected 10 existing piezometers quarterly for the presence of water using a water-level indicator. If water sourced from the pond was identified, samples would be collected for analysis to determine water quality. LTE would communicate with XTO to determine if sampling was necessary and what analyses would be conducted to investigate the origin of the water.
- *Visual Inspections:* LTE conducted visual inspections quarterly to monitor the condition and performance of the dam. Items that were documented are included on the Dam Inspection Report Forms provided in Appendix A.
- *Settlement Monitoring Survey:* LTE conducted an annual survey of 11 established settlement monument points (SMK-1 through SMK-11) during 2016 site visit using a registered land surveyor to measure northings, eastings, and elevations. The survey data was compared to historical data to evaluate potential displacement.



- *Reservoir Level:* During the 2016 site visits, LTE recorded the water level of the pond using the existing previously installed staff gage.
- *Reporting:* LTE has compiled all the data collected into the annual report required by the Colorado Division of Water Resources State Engineer's Office.



## **2.0 INSPECTION ACTIVITIES AND RESULTS**

### **2.1 PROPERTY ACCESS**

The pond and the associated inspection locations are located southwest of Meeker in Rio Blanco County, Colorado, and are located in Section 9, Township 2 South, and Range 97 West. LTE personnel were granted permission to access the property when needed by XTO during 2016 inspection activities.

### **2.2 SEEPAGE INSPECTIONS**

Per the 2005 Monitoring Plan for the pond site, seepage detection and toe drain monitoring inspections were conducted on a weekly basis during 2016 due to the pond being greater than 50% full by height. The seepage and toe drain inspections were conducted by visual observation and using an interface probe to measure any flowing water.

During the first 3 quarterly inspections, the toe drain along the east side of the pond was continuing to produce minor silt/gravel and approximately 0.25 feet (3 inches) of clean water. During the 2016 fourth quarter inspections, the toe drain along the east side of the pond had approximately 0.61 feet (7 inches) of clean water in the bottom of the monitoring manhole. The water present in the bottom of the monitoring manhole was most likely the result of surface runoff and/or groundwater.

There has been no observable water flowing from the pipes entering the monitoring manhole during any of the 2016 weekly inspections. No pond seepage was detected below the dam during the 2016 weekly inspections.

### **2.3 PIZEOMETERS**

On December 9, 2016, LTE conducted a quarterly inspection of 10 existing piezometers for the presence of water using a water-level indicator.

The quarterly 2016 field monitoring of the piezometers (PZ-1 through PZ-10) indicated trace to no presence of water. Figure 1 depicts the locations of the 10 piezometers and the attached Table 1 presents the piezometer 2016 and historical inspection data.

LTE will continue to monitor the piezometers on a quarterly basis in 2017. Any measurable changes in the piezometer water levels will be noted. Should water sourced from the pond be identified, LTE will collect samples to determine water quality and communicate with XTO to determine if sampling is necessary and what analyses will be conducted to investigate the origin of the water.

### **2.4 VISUAL INSPECTIONS**

During the fourth quarter of 2016, LTE conducted a visual inspection to monitor the condition and performance of the dam. Rodent holes and some minor rill erosion were observed during



the 2016 fourth quarter inspection; however, no significant erosion rills were noted during the inspections. The Dam Inspection Report Forms are included as Appendix A.

Rill erosion as well as rodent holes that develop will be scheduled for repair on an ongoing basis – typically in the spring and fall of each year.

## **2.5 SETTLEMENT MONITORING SURVEY**

On October 28, 2016, LTE personnel escorted TriState Survey personnel to conduct the annual survey of 11 established settlement monument points (SMK-1 through SMK-11) to measure northings, eastings, and elevations using a Trimble R6-2 GPS receiver.

Initial monitoring began in July 2005. No significant changes were observed in the 11 monument points between October 28, 2016, and the previous survey conducted on October 13, 2015. The following summary of survey measurements represent the total movement of the monuments since the embankment was completed. Historical and 2016 settlement data are presented in Table 1.

In general, survey measurements indicated a slight horizontal and vertical shift of the 11 monument points. A horizontal shift in an easterly/ northeasterly direction was noted in monument points SMK-1 (8+00), SMK-2 (9+00), SMK-5 (11+50), SMK-6 (12+00), SMK-7 (13+00), and SMK-8 (14+00). A horizontal shift in an easterly/ southeasterly direction was noted in monument point SMK-9 (15+00). No significant movements (greater than 0.04 feet (0.48 inches)) were measured in monument points SMK-3 (10+00), SMK-4 (10+50), SMK-10 (16+00), and SMK-11 (17+50).

The monument points located on the east side of the pond (SMK-1 through SMK-8) in areas of the deepest embankment fill had total measured shift ranging between -0.11 feet in SMK-6 to -0.02 feet in SMK-1 (a maximum of 1.08 inches) in northing (movement toward the north); and ranges between -0.13 feet in SMK-8 to -0.02 feet in SMK-3 and SMK-4 (a maximum of 1.32 inches) in easting (movement toward the east). The elevation changes in the 11 monument points ranged from a slight rise in monument point SMK-5 of 0.03 feet (0.36 inches) to a maximum settlement in monument point SMK-8 of 0.37 feet (4.4 inches).

In monument points located on the north side of the pond (SMK-9 through SMK-11) had a total measured shift ranging between 0.00 feet in SMK-10 to 0.08 feet in SMK-9 (a maximum of 0.96 inches) in northing; and ranges between -0.04 feet in SMK-10 and SMK-11 to 0.28 feet in SMK-9 (a maximum of 1.44 inches) in easting. The elevation changes in the 11 monument points ranged from 0.08 feet in SMK-10 to 0.23 feet in SMK-9 (a maximum of 1.80 inches).

## **2.6 RESERVOIR LEVEL**

During the 2016 site visits, LTE recorded the water level of the pond using the existing previously installed staff gage.

The pond level during the December 2016 inspection indicated approximately 12 feet of water (reservoir elevation of 6,160 feet). Water levels in the pond during 2016 ranged from 12 feet (reservoir elevation of 6,160 feet) to 13 feet (reservoir elevation of 6,161 feet). The maximum



gage height for the pond is 17 feet. The pond was half full or more for all the site visits in 2016 based the gage height measurements.



### 3.0 CONCLUSIONS

In October 2016, LTE was retained by XTO to conduct the remaining annual inspections. LTE obtained the previous inspection reports from XTO and conducted the remaining required inspections. Inspections were conducted on a weekly basis for seepage and visual inspections. LTE inspected the piezometers for water during the fourth quarter of 2016. Additionally, LTE contracted TriState Survey on October 28, 2016, to survey the settlement monument points to evaluate potential displacement.

During the first 3 quarterly inspections, the toe drain along the east side of the pond was continuing to produce minor silt/gravel and approximately 0.25 feet (3 inches) of clean water. During the 2016 fourth quarter inspections, the toe drain along the east side of the pond had approximately 0.61 feet (7 inches) of clean water in the bottom of the monitoring manhole. The water present in the bottom of the monitoring manhole was most likely the result of surface runoff and/or groundwater.

Quarterly monitoring in 2016 of the piezometers (PZ-1 through PZ-10) indicated trace amounts to no presence of water.

In addition, it was noted in the 2016 inspections conducted by the previous consultant that rodent holes and minor rill erosion were addressed during 2016. Rill erosion as well as rodent holes that develop will be scheduled for repair on an ongoing basis, typically in the spring and fall of each year.

During the annual survey of the settlement monument points, measurements indicated a slight horizontal and vertical shift of the 11 monument points. No significant changes were observed in the 11 monument points between October 28, 2016, and the previous survey conducted on October 13, 2015.

LTE will continue to conduct compliance monitoring from installed monitoring instrumentation and conducting visual inspections to ensure the pond is functioning as designed according to the Monitoring Plan prepared by ExxonMobile Production, dated July 15, 2005.



## FIGURES