

April 21, 2008

Mr. Jimmy Smith  
Wagonwheel Consulting  
111 East Third Street, Suite 213  
Rifle, CO 81506

Via e-mail: Jwsmith1951@aol.com

RE: Preliminary Findings ETC Canyon South Parachute Loop  
o IVNWMP Report  
o Wildlife and Sensitive Areas Report

Mr. Smith:

This is to provide preliminary findings of the field work WestWater is currently completing for the Integrated Vegetation and Noxious Weed Management Plan (IVNWMP) and Wildlife and Sensitive Areas reports for the ETC Canyon, South Parachute Loop project.

At this time, we have completed surveys of approximately 2/3 of the pipeline alignment between High Mesa and Cottonwood Creek. We anticipate completion of field work by April 22, 2008 and submittal of the reports by April 28, 2008. Based on completed field work and WestWater's knowledge of the project area, the final report will likely identify the following issues:

- (1) Most of the alignment is within CDOW designated winter range for deer and elk.
- (2) A single active red-tail hawk nest was observed on a powerline pole adjacent to the alignment. No other raptor nests have been observed with .25 miles of the alignment so far. There is still some potential to find nests during completion of surveys.
- (3) No individuals or populations of the sensitive plant species *Penstemon harringtonii* (Harrington's penstemon) have been observed. Sensitive species are not protected under the Endangered Species Act (ESA). Federal agencies manage these species in order to avoid potential ESA listing of the species. The eastern extent of the alignment is within 1/8 mile of the most westerly known occurrence of this species in Garfield County.

The portion of the alignment with the highest potential for this plant is located at the eastern most extent of the alignment which has not yet been surveyed. Given the early growing season date of the surveys, it is unlikely we will be able to positively determine if this species is present since penstemon in the project area are not yet in bloom.

(4) The pipeline will cross Battlement Creek. CDOW has documented the presence of Colorado River cutthroat trout in the creek, a State listed sensitive species. CDOW is likely to request that the pipeline be bored under the creek and that no disturbance to the creek bed occur from May 1 to August 1. US Army Corps of Engineers (COE) will likely consider Nationwide Permit 12 to be applicable for this crossing.

(5) We have observed an extensive area of musk thistle over approximately a 1 mile length in the western ¼ of the alignment, and scattered occurrences of musk thistle, bull thistle, Russian knapweed, and hounds tongue along remainder of the alignment surveyed to date. It is likely additional infestations will be found along the portions of the alignment not yet surveyed.

Avoidance and mitigation recommendations will be included in our final IVNWMP and Wildlife and Sensitive Areas reports.

Please feel free to contact our office with any questions concerning our preliminary findings.

Sincerely,

A handwritten signature in cursive script that reads "Michael W. Klish". The signature is written in black ink and is positioned above the printed name and title.

Michael W. Klish  
Principal Environmental Scientist

**EMERGENCY RESPONSE PLAN  
ETC CANYON PIPELINE, LLC  
South Parachute Loop 24” Pipeline**

**IN THE EVENT OF:**

- **Accidental Release of Regulated Substance (e.g., hydrocarbons), Fire, or Bodily Injury (e.g., heart attack) of Property Damage.**
  - Evacuate degree of non-incident release.
  - If Non-Catastrophic, notify Superintendent, District Manager and the Manager of Safety, Health, and Environment to determine the course of action and make appropriate reporting contacts.
  - If Catastrophic, conduct Emergency Shutdown (ESD), make appropriate notifications, evaluate impact of release to employees and public, and evacuate facility per Emergency Evacuation Plan as necessary. Notify Superintendent and District Manager to engage Emergency Response Plan.
  
- **Need For Emergency Response Support:**

Art Smith, Engineering Manager of Projects	(720) 225-4011 Phone (303) 888-2843 Mobile
Scott Pierce, Operations Superintendent	(970) 263-0934 Phone (970) 216-1750 Mobile
Jimmy Smith, Construction Manager Wagon Wheel Consulting, Inc.	(970) 625-8433 Phone (303) 726-9070 Mobile
Gregory Norton, Lead Inspector	(970) 625-8433 Phone (435) 621-0285 Mobile
Will Ross, Construction Superintendent	(970) 366-1320 Mobile
Joe Longtin, Construction Superintendent	(501) 276-7473 Mobile
Garfield County Sheriff	(970) 625-1899 or 911
Parachute Fire	911
Rifle Fire Department	911
  
- **Need for Emergency Health Care:**
  - Grand River Medical Center  
Located at: 501 Airport Rd., Rifle, Colorado
  
  - Ambulance 911  
Designated employees trained in Medic 1<sup>st</sup> Aid are to perform 1<sup>st</sup> Aid procedures on injured employees as applicable.

## **EVACUATION AND ESCAPE INFORMATION**

**NOTE:** All personnel are responsible for their own evacuation, and should actively solicit evacuation assistance if needed.

### **Escape Route:**

- **PRIMARY ROUTE**

Proceed county road 301, west on county road 301 to Battlement Mesa then to the Martin Staging Area of East on county road 301 to Rulison and then I-70 to the Construction Office, see attached map.

### **Post-Evacuation Employee Accounting:**

- Employees are to report by phone (501-276-7473), or in person to the Construction Office located in Rifle, Colorado.
- The incident Commander will alert emergency responders of any employees who are unaccounted for after an emergency evacuation, so that rescue operations can be addressed.

### **Reporting Emergencies:**

- Emergency Phone Contact List on attached page.

### **Critical Duties**

All employees will evacuate during a catastrophic ESD emergency. The Construction Engineering Manager, Operations Superintendent or Construction Manager, or Construction Supervisor are the only qualified persons to issue permission to enter the facility, or response area.

- Activate Emergency Shutdown (ESH) system.
- Activate Emergency Response System by notifying Superintendent or Engineering Manager of your emergency.
- Render medical assistance to any injured employees. Only persons trained in First Aid and CPR are qualified to render aid.
- Evacuate right-of-way per this Emergency Evacuation Plan.
- Make appropriate notifications of emergency conditions.

### **Additional Emergency Plan Information**

- **Emergency Responses shall occur as follows:**
  - First responder notification: Any facility or field personnel noticing a release or other potentially hazardous situation shall notify the person in charge immediately of the nature of the hazardous occurrence. Location, product involved, release quantity, and status of personnel in the area shall be communicated.
  - Personnel identifying the emergency shall evacuate the area as necessary. Only personnel designated and trained for the particular function may take actions required to combat the emergency.
  - The Person in charge will assume the functions of the Site Commander until emergency responders (EMS) arrive on scene and coordinated this role. The Site Commander possesses the ability, and has been granted the authority, to assume control and make decisions when an emergency arises. The Emergency Coordinator will:
    - Notify potentially affected personnel of the emergency.



- Sound any applicable emergency alarms (describe alarm system, if any, used to alert on-site personnel).
- Determine if Emergency Shutdown (ESD) and/or Evacuation are/is applicable.
- Take immediate measures as possible to prevent contamination of waterways or other mechanisms that might impact public safety.
- Determine when off-site emergency responders are needed.
- Notify the Engineering Manager, Operations Manager, Construction Manager, Lead Inspector, and Construction Superintendent.
- Designate personnel to remain in the vicinity of the incident to monitor the area for further problems and to assist emergency response personnel with necessary facility functions/site layout.
- Designate appropriate personnel to coordinate meeting emergency response vehicles in order to guide them to the site.
- Utilize appropriate section, township, and range as well as nearest access roads and landmarks or other applicable information when reporting incident.
- Insure that access is maintained to the right-of-way at all times.

#### **Alarm System (Pipeline)**

- Two-way radio or cellular phone
- Note that direct verbal communication of an emergency is satisfactory for the pipeline if this can be effective in alerting all personnel who may be on-site.

#### **Non-Evacuation emergency (Pipeline)**

- Activate Emergency Shutdown (ESD)
- Notify Person in charge - Site Commander, Lead Inspector and Construction Superintendent.

#### **Updating Emergency Plan**

- This Evacuation Plan will be reviewed at least annually and revised to reflect relevant changes.

#### **Employee Training**

- This Evacuation Plan will be reviewed with all new employees during their orientation (or first week of employment), and with all employees on an annual basis.

#### **Cost Reimbursement**

- **ETC Canyon Pipeline, LLC will be responsible for the reimbursement of any cost associated with the emergency response of any and all agencies or departments contacted as a result of an incident requiring services.**

## **SPECIFIC ACTION PLAN FOR ACCIDENTAL RELEASE**

### **Emergency plan decision tree**

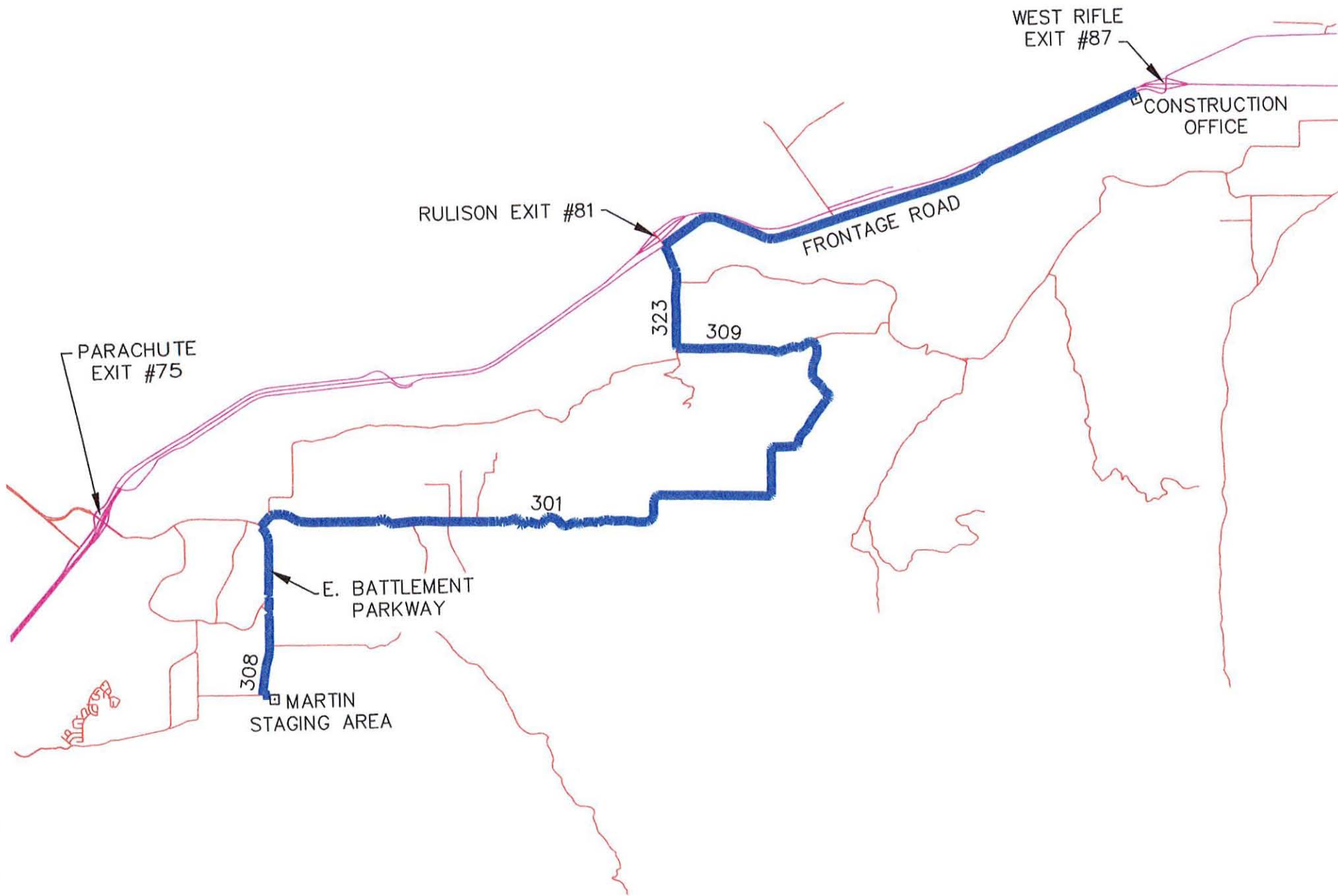
#### **Hydrocarbon Release**

##### **Non-Catastrophic**

- 1. 911 (if required)**
- 2. Notify Superintendent and Foreman**
- 3. Notify Engineering Manager**
- 4. Notify EH&S**
- 5. Assist & assume Site Commander lead until relieved by Foreman or Superintendent**

##### **Catastrophic**

- 1. 911 (if required)**
- 2. ESD Pipeline Operations**
- 3. Notify Foreman, Superintendent**
- 4. Notify Engineering Manager**
- 5. Notify EH&S**
- 6. Assume Role of Site Commander – until relieved by Foreman or Superintendent**



WEST RIFLE  
EXIT #87

CONSTRUCTION  
OFFICE

RULISON EXIT #81

FRONTAGE ROAD

323

309

301

PARACHUTE  
EXIT #75

E. BATTLEMENT  
PARKWAY

308

MARTIN  
STAGING AREA

Hwy 67

# Energy Transfer Company

Incident Reporting

# INCIDENT REPORTING

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## **PURPOSE**

To specify essential reporting and documentation of on the job injuries to satisfy Company and Insurance Company requirements; to identify and implement methods to prevent similar incidents; and to communicate prevention methods and recommendations to all workforce.

## **WHAT MUST BE REPORTED**

The following occurrences and incidents must be reported. Sample forms can be found under a separate tab.

- A. On-the-Job Injuries and Illnesses - Any on-the-job injury or illness must be documented at the time they occur.
- B. Vehicle Accidents - Any accident while operating any vehicle on the job or while on ETC company business.
- C. General Liability Accidents - Any occurrence, excluding vehicle-related accidents, injury to others, or damage to the property of others. Example: A contractor's employee is seriously injured on Company property.
- D. Other Accidents or Losses - Any theft, accident, or losses such as fire, vandalism or damage to company property.
- E. Near Miss - File a report on near misses in order to analyze, perform and communicate measures necessary to prevent a reoccurrence at all locations. Use the Accident Report Form and mark "NEAR MISS" at the top.
- F. Any occurrence which has the potential to cause or result in regulatory agency, mass media visit, inspection, or request for information

## **STANDARDS:**

- 1) This procedure provides guidance for reporting and conducting Incident Investigations.
- 2) The company considers all documents (notes, records, drawings, photographs, videotapes, reports) and physical evidence prepared as part of an incident investigation to be confidential.
- 3) External requests for information concerning Incidents or Incident investigations shall be immediately referred to the Safety and Legal Department.
- 4) All requests for information from the media (newspapers, television, and radio) shall be referred to Corporate Communications and the Legal Department.

## **DEFINITIONS:**

**Incident:** An event meeting the criteria described by "Reportable Incident Class" in this document involving:

- 1) Contract personnel while performing Company business,
- 2) Company equipment,
- 3) Company assets, or
- 4) Other Third Party personnel or equipment while on Company business
- 5) An event that will attract media attention

**Note:** Property damage/loss due to normal wear and tear and/or mechanical equipment failure without potential for harm to personnel or the environment is not covered by this procedure but should be reviewed by facility management.

# INCIDENT REPORTING

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## **REPORTABLE INCIDENT CLASSES:**

Incident Class or Category: The ranking of an Incident based upon the level of actual and/or potential consequences.

### **Class 1:**

- OSHA-Recordable injury or substantial first aid injury to a Contractor or Third Party.
- Company, Contractor, or Third Party property damage or environmental remediation estimated to cost between \$10,000 to \$50,000
- Near miss incident with the potential to generate Class 1 consequences

### **Class 2:**

- Lost Time Injury to a Contractor or Third Party
- Company, Contractor or Third Party property damage/loss or environmental remediation estimated to cost between \$50,000 and \$250,000
- Fires which are immediately controlled, but have the potential to generate Class 2 consequences
- Explosions that generate Category 2 consequences
- Spills or releases that exceed Reportable Quantities under CERCLA; excluding spills less than 10 gallons into waters of the US, or international equivalent.
- Near miss incident with the potential to generate Category 2 consequences

### **Class 3:**

- Employee or Third Party fatalities or lost time injuries resulting in a loss of consciousness or requiring overnight hospitalization
- 2 or more OSHA Recordable injuries related to an Incident
- Company, Contractor, or Third Party property damage/loss or environmental remediation estimated to exceed \$250,000
- Explosions and fires which cannot be immediately controlled, contained or extinguished
- Near miss incident with potential to generate Class 3

## **PROCEDURE:**

The following steps provide guidance for conducting Incident Investigations.

### **INITIAL INCIDENT ASSESSMENT**

The Inspector or other company representative at the scene of an Incident is responsible for the initial assessment, which includes:

- Care for the injured and protect people/public
- Initiate notification procedures.
- Assess the general condition of and secure the site.
- Protect equipment and assets
- Preserve any physical evidence and collect names, addresses, and telephone numbers of personnel on site.
- Gather information necessary to complete the Initial Report of Incident.

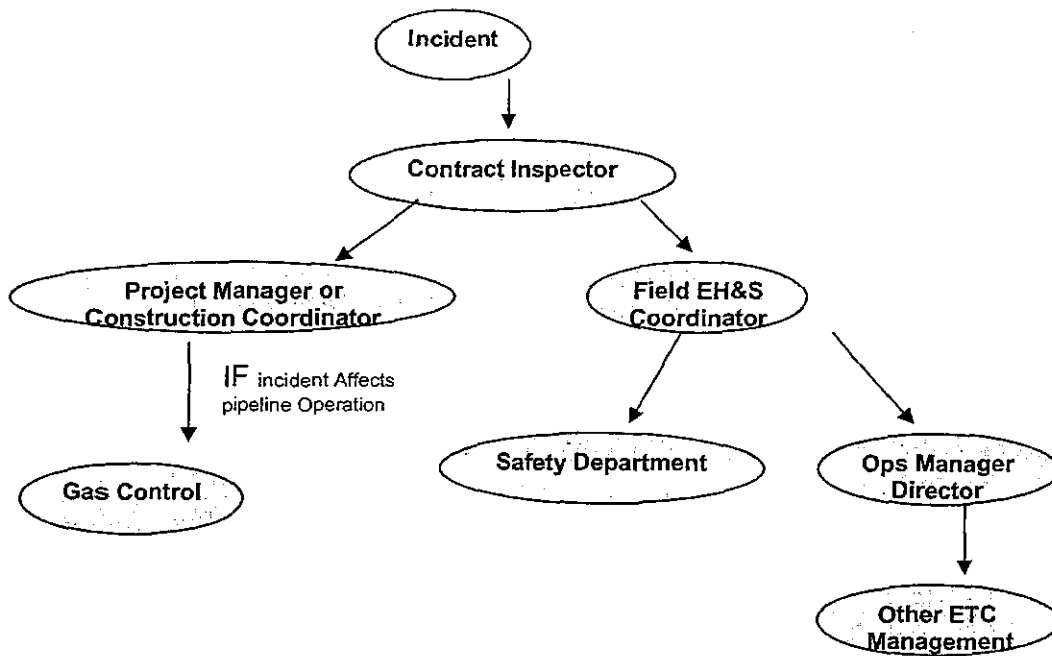
# INCIDENT REPORTING

## DOCUMENTATION:

### **Inspector will:**

Have Contractor document basic information concerning the Incident on an initial report of Incident. A completed copy of the contractor's initial incident report is due within 48 hours (or two business days) and a copy is to be sent to the Safety Department. The Contractor does not have to use ETC's report format or ETC's forms. ETC's forms will be provided if requested but the contractor is not required to use any special ETC form. Contractors can use a format or form of their choice as long as all required information is provided. The initial report of incident will be used by the Safety Department, Operations, and/or Engineering to determine scoping or other requirements for additional information and reports.

## REPORTING TREE





# Energy Transfer Company

Reporting Forms

(Form A)

**ETC FIRST REPORT OF INJURY**

Contractor or Third Party

Date of incident: \_\_\_\_\_ Time: \_\_\_\_\_ AM/PM

Name of injured person: \_\_\_\_\_

Address: \_\_\_\_\_

Phone Number(s): \_\_\_\_\_

Date of birth: \_\_\_\_\_ Male \_\_\_\_\_ Female \_\_\_\_\_

Employing Company: \_\_\_\_\_

Address: \_\_\_\_\_

Phone Number(s): \_\_\_\_\_

Injured person job classification: \_\_\_\_\_

What was injured doing at time of incident: \_\_\_\_\_

\_\_\_\_\_

Location of Incident: \_\_\_\_\_

Type of injury: \_\_\_\_\_

Details of incident: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Injury requires physician/hospital visit? Yes \_\_\_ No \_\_\_

Name of physician/hospital: \_\_\_\_\_

Address: \_\_\_\_\_

Physician/hospital phone number: \_\_\_\_\_

Person preparing this report

Date

Contact Information

Return this form to Safety Department within 48 hours of incident.

Attn: Safety Department

Fax to (832) 668-1129 AND (210) 403-7530

Form - B

**First Report**  
ETC PROPERTY DAMAGE

Dept. \_\_\_\_\_ Dept. Location: \_\_\_\_\_ Date of Loss: \_\_\_\_\_

Time: \_\_\_\_\_ a.m./p.m. Date of this Report: \_\_\_\_\_

Reporting Employee: \_\_\_\_\_ Phone: ( ) \_\_\_\_\_

Reporting Supervisor: \_\_\_\_\_ Phone: ( ) \_\_\_\_\_

**LOSS INFORMATION**

**Type of Loss:**      Mechanical Damage      Storm Damage      Other  
\_\_\_\_\_

**Location of Loss:** \_\_\_\_\_  
  Street Address                          City                          State                          Zip

**Description of Loss:**  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Cost to Repair/Replace:** \$ \_\_\_\_\_

**PREPARED BY**

Prepared By: \_\_\_\_\_ Date: \_\_\_\_\_ Phone: \_\_\_\_\_

Form C

FIRE OR EXPLOSION FIRST REPORT

Dept. \_\_\_\_\_ Dept. Location: \_\_\_\_\_ Date of Loss: \_\_\_\_\_

Time: \_\_\_\_\_ a.m./p.m. Date of this Report: \_\_\_\_\_

Reporting Employee: \_\_\_\_\_ Phone: ( ) \_\_\_\_\_

Reporting Supervisor: \_\_\_\_\_ Phone: ( ) \_\_\_\_\_

**LOSS INFORMATION**

Type of Loss:     Explosion Damage     Fire Damage     Other  
\_\_\_\_\_

Location of Loss: \_\_\_\_\_  
  Street Address                          City                          State                          Zip

**Description of Loss:**

\_\_\_\_\_  
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\_\_\_\_\_  
\_\_\_\_\_

Cost to Repair/Replace: \$ \_\_\_\_\_

**PREPARED BY**

Prepared By: \_\_\_\_\_ Date: \_\_\_\_\_ Phone: \_\_\_\_\_

# (Form D)

## FIRST REPORT

### Vehicle Accident

Date of Accident	Location
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If you're in an accident . . .

1. Call Police if:
  - A person is injured.
  - There is more than \$1,000 damage to the vehicle(s).
  - Your vehicle has been vandalized or subject to a hit and run or theft.
  - The other driver is uninsured or driving with a suspended license.
  - The other driver is impaired.
2. If applicable, forward copies of your completed form to your insurance agent, supervisor or appropriate organization contact

#### A. Your Organization

Organization/Branch		Customer Number (if applicable)	
Address			
Phone	Fax	E-mail	

#### B. Vehicle

Unit Number	License Plate Number	Make/Model
-------------	----------------------	------------

#### C. Driver

Name		Driver's License Number	Driver's License Expiration Date
Day Phone	Evening Phone	Fax	E-mail

#### D. Occupants – Total Number of Occupants: \_\_\_\_ (not including driver) (Please attach a separate sheet if more than one occupant was involved)

Name		Address	
Day Phone	Evening Phone	Fax	E-mail

#### E. Other Vehicles and Drivers – Total Number of Vehicles Involved: \_\_\_\_ (including your vehicle) (Please attach a separate sheet if more than two vehicles were involved)

License Plate Number	State of Plate	License Expiration Date	
Name of Insurance Company		Policy Number	Name of Agent and Address
Year and Make		Model (Body Type: Sedan, Mini Van, etc.)	
Driver's Name		Driver's License Number	Driver's License Expiration Date
Address			
Day Phone	Evening Phone	Fax	E-mail
Vehicle Owner's Name (if not Driver)		Address	
Day Phone	Evening Phone	Fax	E-mail

Return this form to Safety Department within 48 hours of incident.  
 Attn: Safety Department  
 Fax to (832) 668-1129 AND (210) 403-7530

**(Form D)**

Return this form to Safety Department within 48 hours of incident.  
Attn: Safety Department  
Fax to (837) 668-1129 **AND** (210) 403-7530

# (Form D)

## F. The Accident

Date	Time (AM/PM)	Location	At the time of the accident was the vehicle being used for. <input type="checkbox"/> Business <input type="checkbox"/> Personal use
Light Conditions (Dawn, Day, Dusk, Dark)	Weather at Time of Accident	Type of Road Surface	Road Condition
Name of Witnesses (other than occupants)	Witness Phone	Witness Address	
Had You Consumed any Alcohol? <input type="checkbox"/> Yes <input type="checkbox"/> No	If so, How Much	When	
Did the Other Driver Appear to Have Been Drinking? <input type="checkbox"/> Yes <input type="checkbox"/> No	Give any Details		
Direction of Vehicle	On What Road?	What Side of Road?	Speed
Direction of Other Vehicle	On What Road?	What Side of Road?	Speed
What Traffic Signals Were Present?			
Did you Give A Warning Signal? <input type="checkbox"/> Yes <input type="checkbox"/> No	What Kind?	Which Lights Did You Have On (if any)?	
Did the Other Driver Give A Warning Signal? <input type="checkbox"/> Yes <input type="checkbox"/> No	What Kind?	Did the Other Driver Have their Headlights On? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Has the Accident been Reported to Police? <input type="checkbox"/> Yes <input type="checkbox"/> No	Did Police Attend the Scene of the Accident? <input type="checkbox"/> Yes <input type="checkbox"/> No	Name of Police Force	
Police Officer's Name	Police Phone	Police File Number	
Have the Police Charged Anyone? <input type="checkbox"/> Yes <input type="checkbox"/> No	Name of Person Charged	Nature of Charge	

## G. Injuries and Damage (please attach a separate sheet if you require more room.)

Nature of Damage to other Vehicles
Nature of Injuries to Drivers or Occupants
Nature of Damage to Unit

## H. Driver's Detailed Description of How Accident, Loss or Mechanical Damage Occurred

Who Do You Think Was to Blame?	Why?
Driver Signature	Date

If helpful, illustrate the accident at right. Be sure to note:

- The name of all streets,
- Course of all cars involved, and
- Position of vehicles at instant of accident.

Return this form to Safety Department within 48 hours of incident.

Attn: Safety Department

Fax to (832) 668-1120 AND (210) 403-7530



(Form D)

Return this form to Safety Department within 48 hours of incident.

Attn: Safety Department

Fax to (832) 668-1170 **ANN** (710) 402-7530

Form - E

**First Report**  
ETC PROPERTY THEFT/LOSS

Type of Loss:       Theft                                   Vandalism                   Other

Was Theft Reported to Police:    Yes                           No  
 Date

**Police Contact information:**

\_\_\_\_\_ Agency Contact Person  
\_\_\_\_\_ City State Phone

**Loss Location:**

\_\_\_\_\_ Street Address City State Zip

**Time/Date Loss Was Discovered**

\_\_\_\_\_ Time Date

**Last Known Time/Date before Loss**

\_\_\_\_\_ Time Date

**Description of Loss:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
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\_\_\_\_\_  
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\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Initial Cost                              \$ \_\_\_\_\_

Cost to Repair/Replace:      \$ \_\_\_\_\_

**PREPARED BY**

Prepared By: \_\_\_\_\_ Date: \_\_\_\_\_ Phone: \_\_\_\_\_

Form - E

Return this form to Safety Department within 48 hours of incident.  
Attn: Safety Department  
Fax to (832) 668-1129 AND (210) 403-7530

# Energy Transfer Company

Hot Work Procedures  
and Hot Work Permitting

## Inspector Permit Qualification Process

### **Safety Principle:**

Total job safety is the objective. Energy Transfer Company has developed and put in place Safety Management Systems which work to prevent accidents and fires, eliminate personal injury, and protect the environment and general public. An example of one such system is the Hot Work Permit System. This system is designed with specific requirements as to who has the authority to issue permits and approve work. The Inspector qualification program is used to authorize non-operations, and in some cases non-Company, personnel to issue certain types of hot work permits.

### **Application:**

This process applies to existing pipeline facilities owned and/or operated by Energy Transfer Company. This process covers the issuance of Hot Work Permits and Confined Space Work Permits related to excavation work associated with pipeline activities. This also includes general pipeline and right-of-way work activities that do not require depressurization or opening process or pipeline equipment containing hydrocarbons.

### **Applicability Note:**

This process is not intended for and does not apply to "Greenfield" engineering and construction activities which are new construction and gas free and are not yet connected to any Energy Transfer Company pipe or facility. Permitting activities for "Greenfield" operations and projects are the responsibility of project contractors.

### **Procedure:**

Local pipeline operations supervision and Safety representatives may authorize qualified construction or contract inspectors to issue hot work permits in accordance with this process as a designated Operation representative. In order to serve as the designated Operation representative, non-operations Energy Transfer Company employee or contract inspector must be approved by Operations Manager and the local Safety Coordinator from the area in which the person is to perform as a Designee. The Operation Representative Designee must:

1. Be qualified to recognize and address abnormal operating conditions and other required job tasks in accordance with the Energy Transfer Company Operator Qualification (OQ) program, as it applies to the work being conducted. This includes the ability to effectively coordinate the mitigation of an unplanned release of the product in the system being worked.
2. Have a thorough understanding of the equipment (piping, valves, etc.) in the system where the work is being conducted. This includes the physical location and access routes of associated isolation valves upstream and downstream of the work site and other associated equipment that may be involved.
3. Be familiar with the operating conditions of the system on which the work is being conducted.
4. Be familiar with and be in possession of the Emergency Action Plan covering the area where the work is being conducted, or have the necessary emergency contacts for the area if it is not covered by an existing Emergency Action Plan (i.e., new project).
5. Demonstrate understanding of Energy Transfer Company's Safety Policies and Procedures, including the use and calibration of portable gas detection equipment, and all other precautionary measures outlined in the various permitting processes.
6. Have a thorough knowledge of applicable OSHA regulations pertinent to the work being conducted.

## Inspector Permit Qualification Process

The following is provided as clarification regarding the issuance of permits by a Company Representative Designee.

**Hot Work Permits** Any hot work involving welding or other spark producing activities **on any opened / depressurized process equipment or piping containing hydrocarbons / chemicals** requires a hot work permit issued by an Energy Transfer Company Operations Employee. A Operation Representative Designee(s) who is not an Energy Transfer Company employee can not issue a hot work permit for work that requires the process or piping containing the hydrocarbons / chemicals to be opened to the atmosphere. New pipeline construction projects (i.e., well ties) where hydrocarbons are not introduced into the system do not require a hot work permit.

**Hot Work Permits for Pipeline Integrity Excavations / Repairs Outside of Compressor/Pump Stations and Processing Facilities (Anomaly Investigations)** All initial excavations on in-service or depressurized lines **with evidence of leaking hydrocarbon / chemicals** require the issuance of a Hot Work Permit, the completion of the Excavation Checklist, and the presence of an Energy Transfer Company Operations Employee.

For other pipeline integrity excavations and repairs (clock spring installation, bolt on clamps, weld on sleeves) when there is no evidence of a hydrocarbon / chemical leak, and the job plan does not call for the piping or equipment to be opened to the atmosphere, the hot work permit may be issued by a Operation Representative Designee.

### **Confined Space Entry Permits**

As defined in the Confined Space Policy, an excavation with a depth of four (4) feet or more is initially classified as a confined space. Confined space excavations in which physical and atmospheric hazards are eliminated and a means of egress is provided within every twenty-five (25) feet may be re-classified as Non-Permit Required (non-regulated) confined spaces by the Operation Company Representative Designee. Non-Permit Required confined space entries such as excavations do not require the continuous presence of an operations representative or designee. However, the non-permit required spaces must be inspected daily (prior to entry, or if conditions change) by a "competent person" to ensure physical and atmospheric conditions at the work site have not changed (e.g., water or hydrocarbon accumulation, sloughing of walls, fissures in walls, etc.). While this inspection is required on a daily basis, the job does not require continuous oversight by the operations representative or designee. **All Permit-Required Confined Space Entry Permits must be issued by an Energy Transfer Company Operations Representative.**

# Inspector Permit Qualification Process

## Appendix A – Supplemental Reference Material and Definitions

**Air Mover** - A portable lightweight device for securing a positive forced movement of air or gas, either into or out of a closed area. It requires compressed air or gas to operate and has no moving parts. The device converts the pressure of a compressed air or gas by expansion at a high velocity through an annular orifice, and produces a powerful venturi or jet effect. This causes a large volume of the gas in the pipeline to be drawn through the bell of the air mover, and be delivered with the expanded air or gas supply through the outlet horn.

**Auto-ignition Temperature** - The lowest temperature at which a flammable gas or vapor-air mixture will ignite from its own heat source or a contacted heat surface without the necessity of spark or flame.

**Blanking or Blinding** - The absolute closure of a pipe, line or duct by fastening across its bore a solid plate or "cap" which completely covers the bore.

**Combustible Liquids** - Liquids with a flash point at or above 100°F. When these liquids are heated to or above their flash point, they may have some of the same characteristics and hazards of a flammable liquid.

**Combustion** - The act or process of continuous burning that follows after ignition, which involves rapid oxidation accompanied by the evolution of heat and usually light.

**Convection** - The transfer of heat or electricity by means of mixing or circulating heated or electrified particles.

**Double Block and Bleed** - The closure of a line, duct or pipe by locking open and tagging a drain or vent valve which is open to the atmosphere in the line between two closed and locked valves.

**Explosion** - A rapid increase of pressure in a confined space followed by its sudden release due to the rupture of the container.

**Explosive Limits** - The minimum, Lower Explosive Limit (LEL), and maximum, Upper Explosive Limit (UEL), concentration of vapor or gas in air below the LEL or above the UEL which explosion or propagation of flame does not occur in the presence of ignition.

**Explosive Range** - The difference between the lower (LEL) and upper (UEL) flammable (explosive) limits, expressed in terms of percentage by volume of vapor or gas in air.

**Explosive Mixture** - A mixture of flammable vapor or gas and air within the lower (LEL) and upper (UEL) limits of the explosive range.

**Extinguishing Agent** - Material or substance which performs a fire extinguishing function.

**Fire** - Rapid oxidation with the evolution of heat and light.

**Flame** - The visible heat rays which appear when the ignition of a material is reached.

**Flame Propagation** - The spread of flame throughout a combustible vapor area which may be in a container or across a surface, independently of the ignition source. Generally used in connection with the capability and rate of such movement.



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**Flammable** - Any substance that is easily ignited, burns intensely, or has a rapid rate of flame spread. Flammable and inflammable are identical in meaning.

**Flammable Limits** - (See Explosive Limits)

**Flammable Liquids** - Liquids having a flash point below 100°F and having vapor pressure not exceeding 40 PSIA at 100°F. A flammable liquid does not burn, rather, the vapors from the liquid burn.

**Flammable Range** - (See Explosive Range)

**Flammable Vapor** - A concentration, by volume, of vapors in the air from a flammable liquid within the lower (LEL) and upper (UEL) flammable limits.

**Flash Point** - The lowest temperature of a liquid at which it gives off sufficient vapor to form an ignitable mixture with the air near the surface of the liquid or within the vessel used.

**Hazardous Atmosphere** - An atmosphere exposing employees to risk of death, incapacitation, or injury or acute illness due to:

- Flammable gas, vapor or mist in excess of 10% of the LEL.
- Oxygen concentration below 19.5% or above 23.5%.
- Atmospheric concentration of a hazardous substance above its Permissible Exposure Limit (PEL).
- Atmospheric condition recognized as Immediately Dangerous to Life or Health (IDLH).

**Hot Work** - Any operation that produces sufficient heat or has the potential for developing sufficient heat to cause ignition of flammable materials. Examples: Open flame, welding, grinding, gas or diesel engine, electric equipment, sandblasting, dynamiting, static electricity, jack out/draw out/drop out of electrical disconnect switches, hot taps.

**Hot Work Permit** - The employer's written authorization to perform welding, cutting, heating or other operations which could serve as a source of ignition in a restricted area.

**Ignition Temperature** - The minimum temperature to which a substance in air must be heated in order to initiate or cause self-sustaining combustion independent of the heating source.

**Interior Line Breaking** - The intentional opening of a pipe, line or duct that is or has been in service carrying flammable, corrosive or toxic material, or carrying any fluid at a pressure greater than atmospheric or temperature greater than 110°F, or cold enough to cause a severe flinch reaction or thermal injury.

**Lockout and Tagout** - A means of isolating a pipeline or system by securing all energy sources and placing a padlock or tag on the control (valve, switch, etc.) to assure that all employees are aware that the condition or placement of the valve or switch should not be changed.

**Oxidation** - The combination of a substance with oxygen.

**Restricted Area** - Those areas or activities which have been designated by location supervision as requiring the Hot Work Permit procedure. These include all areas where hydrocarbons, are handled,

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stored, piped or processed. Example: Compressor Stations, NG Treating Plant, Gasoline Plants, LPG Pump Stations, LPG Tank Farms, LPG Loading Areas, API Separators, and Hydrocarbon Pipelines.

**Spontaneous Ignition** - Ignition resulting from a chemical reaction in which there is a generation of heat from oxidation of organic compounds until the combustion or ignition temperature of the material is reached.

**Technician** - The employee designated to render technical safety information pertaining to specialized job operations prior to the execution of some work permits. Examples would include the employee who operates a pipe locator.

**Operations Representative Designee** - The appointed person for the unit/area where that permit is issued and has been designated, in writing, by the location Supervisor and the Safety & Health as capable (by education and experience) of anticipating, recognizing and evaluating worker exposure to hazards/unsafe conditions and will use good judgment in arriving at their decision. The Designee shall be capable of specifying necessary control and/or protective action to insure worker and equipment safety. This person authorizes and issues the Work Permit.

**Vapor** - The gaseous phase of a substance which is a liquid at normal temperature and pressure.

**Vapor Density** - Weight of a vapor per unit volume at any given temperature and pressure.

**Vapor Pressure** - The pressure exerted at any given temperature by a vapor either by itself or in a mixture of gases. It is measured at the surface of an evaporating liquid.

### **FIRE THEORY**

**FIRE** is made up of the four following components:

1. **Fuel** - The most common fuels contain hydrogen and carbon.
2. **Heat** - A necessary condition for ignition to occur.
3. **Oxygen** - Oxygen plays a key role in regulating the speed of burning for most fuels and is a necessary element for combustion to initiate and continue.
4. **Chemical Chain Reaction** - A chemical reaction in which intermediate products are formed which are necessary for the existence and continuation of flames.

### **CLASSIFICATIONS OF FIRES**

The National Fire Protection Association has broken all fires into four separate classes based on the type of extinguishing media necessary to combat each.

1. **Class A Fires** - Fires that occur in ordinary combustible materials such as wood and paper. Water is the recommended media for cooling and quenching Class A fires.
2. **Class B Fires** - Fires that occur in a vapor-air mixture above the surface of flammable liquids.
3. **Class C Fires** - Fires that occur in or near electrical equipment where non-conductive extinguishing agents are required.
4. **Class D Fires** - Fires that occur in combustible metals such as magnesium, titanium, lithium and sodium. Each flammable metal requires its own extinguishing agent.

The following is a classification system established by the National Fire Protection Association:

#### **Flammable Liquids**

Class I - Flash points below 100°F

Class IA - Flash points below 73°F and boiling points below 100°F

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Class IB - Flash points below 73°F and boiling points above 100°F

Class IC - Flash points at or above 73°F and below 100°F

**Combustible Liquids** - Liquids with flash points at or above 100°F

Class II - Flash points at or above 100°F and below 140°F

Class III A - Flash points at or above 140°F and below 200°F

Class III B - Flash points at or above 200°F

### COMMON FLAMMABLE AND COMBUSTIBLE MATERIALS WITHIN THE GAS INDUSTRY

Various flammable and combustible materials, including solids, liquids and gases, exist within the gas industry. This section is dedicated to the identification of the more common of these and where they exist in the work place.

#### GASES

**Methane** - Methane, in various concentrations, exists in virtually all processes within the industry. Methane is also referred to as natural gas, sweet gas or marsh gas. It is the main product in marketable or commercial gas. Natural gas containing high concentrations of methane (87-95%) has the following properties:

Specific Gravity (AIR = 1.0).....	.590 - .614
Ignition Temperature.....	900 - 1170oF
Limits of Flammability.....	04.7 - 15.0%

From these properties, it is easily concluded that methane is an extremely flammable gas. It is lighter than air and is easily ignited.

High concentrations of methane are found in all pipelines (main and field gas gathering), mainline and field compressor stations, treating and gasoline plants.

**Hydrogen Sulfide** - H<sub>2</sub>S also exists in various concentrations in most processes within the industry. Hydrogen sulfide is a highly flammable and toxic gas. H<sub>2</sub>S of 98% or more has the following properties:

Specific Gravity (AIR = 1.0).....	1.2
Ignition Temperature.....	500°F
Limits of Flammability.....	4.3 - 46.0%

Hydrogen sulfide is an extremely flammable and poisonous gas. It exists in high concentrations in sulfur plants, treating plants, flare lines, many gathering lines and some compressor stations. Work with or around H<sub>2</sub>S should not be attempted without a thorough knowledge of the compound.

**Iron Sulfide** - (A by-product of H<sub>2</sub>S) - Iron sulfide is formed in a finely divided state as a film or sludge whenever H<sub>2</sub>S is in contact with iron or steel. It may also be formed in the presence of iron, sulfur and heat. Spontaneous combustion may take place on exposure of iron sulfide to the oxygen in the air, thus providing an unwanted ignition source. Steaming of vessels containing iron sulfide is the most effective way to remove carbon vapors and liquids. If this is not possible, iron sulfide should be kept wet during work activities.

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**LP Gas** - (Propane, Butane, Ethane) - LP Gas is a mixture of materials all comprised of carbon and hydrogen. In commerce, LP gas is mainly either propane or normal butane or mixtures of these with smaller amounts of ethane, ethylenes, propylene and butylene.

**Propane** has the following properties:

Specific Gravity (AIR = 1.0)..... 1.5  
Ignition Temperature..... 842°F  
Limits of Flammability..... 2.15 - 9.60%

**Butane** has the following properties:

Specific Gravity (AIR = 1.0)..... 2.0  
Ignition Temperature..... 550°F  
Limits of Flammability..... 1.55 - 8.60%

LP Gas vapor is normally 1-1/2 - 2 times heavier than air, therefore it will tend to spread along the ground sometimes associated with a visible fog of condensed water vapor LPG is extremely flammable and is most commonly found in gasoline and fractionation plants, liquid storage and loading facilities.

## LIQUIDS

**Natural Gasoline** (C5 +) - An extremely flammable liquid hydrocarbon. Gasoline is a product of the distillation process in most gasoline plants. Drip gasoline may also be found in field operations. This liquid has the following properties:

Specific Gravity (WATER= 1.0)..... .72 -.76  
Flash Point..... 45°F  
Auto-ignition Temperature..... 536 -850°F  
Limits of Flammability..... 1.4 -7.6%  
Vapor Density (AIR = 1.0)..... 3.0 -4.0

**Gasoline** - A dangerous fire and explosion hazard when exposed to heat and flames. Vapors are three to four times heavier than air and can flow along surfaces, reach distant ignition sources and flash back. This liquid may be found in gasoline plants, storage and loading facilities, field gathering pipelines, scrubbers and drips. Gasoline can react violently with oxidizing agents.

**Glycol** - Glycol readily absorb moisture and are widely used in dehydration of natural gas. Di-ethylene and tri-ethylene glycol have been used to dehydrate natural gas since the 1940's. Glycol is a combustible liquid with a low fire hazard unless heated, and has the following properties:

Boiling Point ..... 446°F  
Flash Point ..... 230°F  
Auto-ignition Temperature ..... 442°F  
Limits of Flammability ..... 0.9 - 6.2%

Glycol is a colorless, sweet tasting, poisonous liquid. This combustible is mainly found in field treating operations and treating plants. Caution should be exercised when hot work is performed near glycol.

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## OTHER COMBUSTIBLE LIQUIDS

Many liquids exist in various areas in the industry. Before any "Hot Work" is attempted in or around facilities containing liquids, knowledge of that substance and its properties should be acquired.

**Lubrication Oil** - A low fire hazard, unless heated. Many different types of oils are used on various equipment. Most lube oils have high flash points and auto-ignition temperatures.

**Amine Treating Solutions** - The various treating amines (DEA, MEA, DGA) are made up mainly of water. However, after the treating process has taken place and the treating solutions absorb hydrocarbons, these hydrocarbons may cause a fire hazard when heat is applied.

**Safety Solvent** - A petroleum type solvent used for cleaning that has replaced Varsol at most all of EPNG's locations. This solvent goes by the name of Lube Rite and Solvent 140-66. Safety solvent is an NFPA class IIIA combustible liquid. Like lubricating oil, this solvent can become explosive if heated.

Flash Point.....	142-150 deg. F
Auto-ignition Temperature.....	No Data
Limits of Flammability.....	1.0 - 6.0%
Vapor Density (Air = 1.0).....	5.48
Specific Gravity (Water = 1.0).....	.780

## Establishing Hot Work Areas

This appendix provides guidance on determining and establishing hot work areas in a facility inside which a hot work permit would be required to conduct hot work. The work product is intended to serve as a training and resource tool to ensure consistent and safe application of the hot work procedure.

### Class I Locations

Class I locations are those in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures. Class I locations shall include those specified in (a) and (b) below.

(a) Class I, Division 1. A Class I, Division 1 location is a location (1) in which ignitable concentrations of flammable gases or vapors can exist under normal operating conditions; or (2) in which ignitable concentrations of such gases or vapors may exist frequently because of repair or maintenance operations or because of leakage; or (3) in which breakdown or faulty operation of equipment or processes might release ignitable concentrations of flammable gases or vapors, and might also cause simultaneous failure of electric equipment.

(b) Class I, Division 2. A Class I, Division 2 location is a location (1) in which volatile flammable liquids or flammable gases are handled, processed, or used, but in which the liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems, or in case of abnormal operation of equipment; or (2) in which ignitable concentrations of gases or vapors are normally prevented by positive mechanical ventilation, and which might become hazardous through failure or abnormal operation of the ventilating equipment; or (3) that is adjacent to a Class I, Division 1 location, and to which ignitable concentrations of gases or vapors might occasionally be

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communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clean air, and effective safeguards against ventilation failure are provided.

**Class II and Class III** - definitions are summarized below but are not normally expected to occur. Issuers of hot work permits should be aware of these hazards from combustible materials when issuing permits.

Class II locations are those that are hazardous because of the presence of combustible dust.

Class III locations are those that are hazardous because of the presence of easily ignitable fibers or flyings, but in which such fibers or flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures.

### WORK SITUATIONS REQUIRING HOT WORK PERMIT

Operations or work situations requiring the Hot Work Permit are those creating or capable of creating sufficient heat to cause the ignition of flammable materials.

#### Welding Operations

##### Arc

The most common type of arc welding is shielded metal arc (sometimes called stick welding). The intense heat from an electrical arc is used to melt and fuse metals to form a weld. The heat created by this operation is sufficient to cause the ignition of virtually all flammable materials in the gas industry. Welding can also create enough heat that the flash point of many other materials can be reached.

##### Gas

Gas welding is a manual fusion welding process similar to arc welding except welds are made with a very hot gas flame instead of with the heat from an electrical arc. The metal surfaces to be joined are melted by the gas flame so they merge or mingle and, after cooling, form a strongly bonded joint.

Oxygen and acetylene are the gases most widely used for gas fusion because they produce a hotter flame than other gas mixtures. The Oxyacetylene flame has a maximum temperature of about 6,300°F, which is more than sufficient heat to cause the ignition of flammable materials.

#### Oxygen and Acetylene Cutting Operations

When fitted with a special cutting torch, an oxyacetylene welding outfit is quickly converted to an oxygen cutting outfit. The gas and oxygen mixture is regulated so that the temperature is sufficient to melt the metal and added oxygen pressure blows the molten metal from the cut. This operation, like the welding flame, reaches temperatures in excess of 6,000°F.

#### Grinding Operations

Portable and table grinders are among the most helpful power tools used by a maintenance craftsman. These tools are also capable of creating sufficient heat to ignite many flammable materials.

The mechanical energy used in overcoming the resistance to motion when two solids are rubbed together is known as frictional heat. Any friction generates heat. Friction sparks include the sparks which result from the impact of two hard surfaces, at least one of which is usually metal. Although the temperatures generated vary with different types of metal, in most cases they are sufficient to cause ignition of flammable materials. Other operations creating friction sparks include steel tools.

#### Static Electricity

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Static electricity (sometimes called frictional electricity) is an electrical charge that accumulates on the surfaces of two materials that have been brought together and then separated. One surface becomes charged positively, the other negatively. If the substances are not bonded or grounded, they will eventually accumulate a sufficient electrical charge so that a spark discharge may occur. Static arcs are ordinarily of very short duration, and do not produce sufficient heat to ignite ordinary combustible materials such as paper. Some, however, are capable of igniting flammable vapors, gases, and clouds of combustible dust.

Sand blasting operations are capable of producing such an electrical charge and static discharge.

Other operations capable of creating a static spark include: LPG loading operations, tank filling, liquid transfer etc.

### Electricity

Electricity is capable of creating sufficient heat, in many situations, to ignite flammable liquids and vapors.

The heat from arcing electrical current is the most common source of electrical ignition of flammables. Arcing occurs when an electrical circuit which is carrying current is intentionally or accidentally interrupted. The arc temperatures are very high, and the heat released may be sufficient to ignite flammable materials. Arcing may be caused by improperly wired tools or equipment, switches and plugs, frayed wiring, etc.

## EQUIPMENT

The equipment and accessories used in order to assure safe working conditions involving hot work must be understood and demonstrated.

**Explosive-meter** – Eagle, MSA, Scout, Gas Scope, Etc.

**H<sub>2</sub>S Detection** - When working in areas where H<sub>2</sub>S may be present, it is extremely important to test for this highly toxic gas. Not only is the extreme flammability of the substance a concern, but also its toxic effect on workers.

### Fire Extinguishers

It is important when monitoring hot work to select a fire extinguisher that is suitable for the flammable or combustible materials involved and the nature of the work area. The selection of the extinguishing method should be made with caution. Each work situation should be evaluated individually, with consideration placed on the type of fire that may be encountered.

- Carbon dioxide, dry chemical, foam and vaporizing liquid (halon) type extinguishing agents have proven to be effective for use on flammable liquid fires of moderate size.
- CO<sub>2</sub> and halon extinguishers are normally used for electrical fires in the work area. Due to the non-conductivity of these agents and easy clean-up, these have been found to be suitable.
- For fires involving natural gas, where little or no liquids are involved, dry chemical and halon have proven to be the most effective. It should be noted that fire extinguishers combat fire by breaking the chain reaction and displacing the oxygen. Therefore, caution should be taken not to displace the oxygen within a work area, making the environment unsuitable for workers.
- Water spray is particularly effective on Class A fires and fires involving flammable liquids having flash points above 100°F. Water may be ineffective fighting fires in low flash point liquids.



## Inspector Permit Qualification Process

- It is always preferable to create a hot work situation where no fire is involved. However, due to gas leakage from valves, flammable liquids and other factors, this is not always possible. When supervising hot work, always anticipate these problems and be ready to react.



# Hot Work Permit

Issued to \_\_\_\_\_ to perform work in  
(Department or Company)

area \_\_\_\_\_ section \_\_\_\_\_

Work description \_\_\_\_\_

Work Order No. \_\_\_\_\_ Permit Ref. No. \_\_\_\_\_

\* Date \_\_\_\_\_ \* Permit valid from \_\_\_\_\_ to \_\_\_\_\_

Revalidation Date \_\_\_\_\_ Time \_\_\_\_\_ to \_\_\_\_\_

Revalidation Authorization: \_\_\_\_\_

\* Permit valid only for the date and time stated. Revalidation good for one shift or maximum of 12 hours.

	Yes	No	Initials
1. Is the equipment properly isolated or blinded?	<input type="checkbox"/>	<input type="checkbox"/>	_____
2. Is the instrumentation tubing disconnected, depressured, and capped?	<input type="checkbox"/>	<input type="checkbox"/>	_____
3. Is the equipment depressured and drained?	<input type="checkbox"/>	<input type="checkbox"/>	_____
4. Have all valves been properly closed, blinded, locked, and tagged?	<input type="checkbox"/>	<input type="checkbox"/>	_____
5. Has equipment been steamed or flushed?	<input type="checkbox"/>	<input type="checkbox"/>	_____
6. Has equipment been purged? Type _____	<input type="checkbox"/>	<input type="checkbox"/>	_____
7. Is equipment free of flammables?	<input type="checkbox"/>	<input type="checkbox"/>	_____
8. Have sewers been covered?	<input type="checkbox"/>	<input type="checkbox"/>	_____
9. Is the proper electrical breaker locked, tagged, and start test tried?	<input type="checkbox"/>	<input type="checkbox"/>	_____
10. Is fire extinguisher available?	<input type="checkbox"/>	<input type="checkbox"/>	_____
11. Is firewatch required and assigned?	<input type="checkbox"/>	<input type="checkbox"/>	_____
12. Has toxicity of hazardous atmospheres been tested for?	<input type="checkbox"/>	<input type="checkbox"/>	_____
13. Special instructions to be followed are: _____	<input type="checkbox"/>	<input type="checkbox"/>	_____

**The following protective equipment is required but not restricted to:**

- |  |  |   |
|--|--|---|
| <input type="checkbox"/> Faceshields         | <input type="checkbox"/> Goggles         | <input type="checkbox"/> Gloves                   |
| <input type="checkbox"/> Boots               | <input type="checkbox"/> Chemical Suit   | <input type="checkbox"/> Chemical Apron           |
| <input type="checkbox"/> Breathing Apparatus | <input type="checkbox"/> Welding Goggles | <input type="checkbox"/> Leather Gloves/Gauntlets |
| <input type="checkbox"/> Fall Protection     | <input type="checkbox"/> Other _____     |   |

Verified By: \_\_\_\_\_

*Operations Signature*

Explosimeter test results \_\_\_\_\_ % LEL (Reading must be 10% LEL or lower). If above 10% LEL, management must approve and sign the permit

Other Pertinent Tests

Substance Tested for: \_\_\_\_\_ Result: \_\_\_\_\_

Firewatch: \_\_\_\_\_

(Full name- No initials)

Permit issued to: \_\_\_\_\_

(Full name- No initials)

Permit issued by: \_\_\_\_\_

(Person in charge, Full name- No initials)

To be filled out by a Permit Worker, signed, and returned to the Person-In-Charge.

	Yes	No	Initials
1. Locks and tags (Deisolation) have been removed.	<input type="checkbox"/>	<input type="checkbox"/>	_____
2. Work area and equipment have been cleaned.	<input type="checkbox"/>	<input type="checkbox"/>	_____
3. Work has been completed.	<input type="checkbox"/>	<input type="checkbox"/>	_____

Permit Worker Signature \_\_\_\_\_

Date \_\_\_\_\_

**This permit is automatically canceled when any emergency alarm is sounded.**



# Energy Transfer Company

Gas Detection  
Instrumentation

# **Hazardous Atmosphere Testing**

## Qualification Training

### **Training Expectation**

To ensure that the hazardous atmosphere (gas) testing program is implemented properly.

And to explain the general roles and responsibilities of those Employees and Contractors involved in the hazardous atmosphere testing program.

### **Responsibilities for Equipment Preparation**

Designation and preparation of equipment for work including any associated hazardous atmosphere testing is responsibility of Operations and/or a designated Contract Inspector. In defining the job to be done it may be necessary to consult with personnel from other departments, i.e. group performing work. When equipment has been selected and job defined, the responsible person ensures proper preparations of equipment, which may include items listed below:

**Isolation**

**Depressurization**

**Lockout**

**Blinding**

**Washing with water**

**Ventilating with air**

**Steaming**

**Purging**

**Cleaning**

### **Hazardous Atmospheres**

Depending upon a worker's background, the term "Hazardous Atmosphere" can range from toxic air contaminants to flammable atmospheres. For purposes of this training an atmosphere is hazardous if it meets the following criteria.

**Mixture of any flammable material in air whose concentration is within the material's flammable range (i.e. between the material's lower flammable limit and its upper flammable limit).**

**Hazardous substance has potential of exceeding permissible exposure limit.**

Atmosphere has potential to become an oxygen deficient or an oxygen enriched atmosphere.

## Types of Direct Reading Instruments

There are several types of instrumentation for detecting hazardous atmospheres.

### Oxygen Indicators

Oxygen indicators are used to evaluate an atmosphere.

Oxygen content for respiratory purposes in normal air is 20.9% oxygen. If oxygen content decreases below 19.5% it is considered oxygen deficient and special respiratory protection is needed. Increased risk of combustion; concentrations above 23.5% are considered oxygen enriched and increase the risk of combustion.

Some instruments require sufficient oxygen for operation. For example, some combustible gas indicators do not give reliable results at oxygen concentrations below 10%, the inherent safety approvals for instruments are for normal atmospheres and not for oxygen enriched atmospheres. We can not over emphasize importance of conducting testing for oxygen deficient/enriched atmospheres first.

### Combustible (Gas) Atmosphere Indicators

Combustible gas indicators (CGIs) measure the concentration of a flammable vapor or gas in air, indicating results as a percentage of the lower flammable limit of the calibration gas.

The LEL (lower explosive limit) or LFL (lower flammable limit) of a combustible gas or vapor is the minimum concentration of material in air that will propagate flame on contact with an ignition source. The UFL (upper flammable limit) is the maximum concentration. Above the UFL the mixture is too rich to support combustion so ignition is not possible. Below the LFL there is insufficient fuel to support combustion.

**The LEL and UEL for natural gas are approximately 5% and 15% respectively.**

NOTE: The lower explosive limit (LEL) and lower flammable limit (LFL) have the same meaning.

### Toxic Atmosphere Monitors

Along with oxygen concentration and flammable gases or vapors there is a concern about chemicals present at toxic concentrations. This usually involves measurements at concentrations lower than would be indicated by oxygen indicators or combustible gas indicators.

There is a need to determine if toxic chemicals are present and identify so the environmental concentration can be compared to exposure guidelines. Toxic atmosphere monitoring is done to:

**Identify airborne concentrations that could pose a toxic risk to workers and the public.**

**Set up work zones or areas where contaminants are or are not present.**

## **Evaluate need for and type of personal protective equipment including respiratory protection.**

There are several different instruments used for these purposes.

### **Colormetric Indicator Tubes (Detector Tubes)**

Colormetric indicator tubes consist of a glass tube impregnated with an indicating chemical. The tube is connected to a piston or bellows type pump. A known volume of contaminated air is pulled at a predetermined rate through the tube, by the pump. The contaminant reacts with the indicator chemical in the tube, producing a change in color whose length is proportional to the contaminant concentration.

Detector tubes are normally chemical specific. There are different tubes for different gases; for example, chlorine detector tube for chlorine gas, etc. Some manufacturers do produce tubes for groups of gases, e.g. aromatic hydrocarbons, alcohols. Detector tubes can not be mixed. An MSA tube can not be use with a Drager pump, etc.

### **Multi-Gas indicators**

Multi-purpose instrument designed to monitor areas for flammable/combustible vapor and oxygen deficiency as well as other gases such as H<sub>2</sub>S or CO. These indicators function the same as those described above, but allow the operator to sample the atmosphere for all hazards using one instrument. In today's environment the multi-gas indicator is used for most applications. These indicators, depending on manufacturer have visual and audio alarms for each channel to warn the operator or worker of atmospheric hazards. The multi-gas indicator requires a calibration gas containing a standard for each contaminate the indicator is capable of testing, only calibration gas specifically manufactured for the instrument can be used.

## **Atmospheric Testing Requirements**

There are several sections of the ETC Safety Handbook that may require atmospheric testing, including Confined Space Entry, H<sub>2</sub>S, Respiratory Protection, and Excavation.

When equipment has been properly prepared, the "Job Site" is ready for testing. Atmospheric testing to fulfill requirements of the Work Permit Program must be performed, i.e. hot work permit, and/or confined space entry permit. Periodic gas tests may be required to assist personnel with the various steps of equipment preparation.

### **Hot Work Permit**

If hot work is to be performed in an area where flammable mixtures may be present, a gas test for flammable vapors must be performed. Ideally zero LEL should be obtained before proceeding with hot work, but hot work can performed up to a 10% LEL level, if 10% or less can not be achieved , the work can only be performed with management approval and signature.

Tests for toxic or corrosive substances must also be performed when their presence is suspected.

### **Permit Entry Confined Space**

When entry into a permit entry confined space is required, gas tests for flammable vapors and oxygen content must be performed. Entry into a Permit Required Confined Space has extensive safety and regulatory requirements which must be met. Every reasonable effort needs to be made to remove hazards and downgrade the confined space to the “safest” state. If the space can not be downgraded to a “non permit” required confined space ETC employees will enter only as a last resort and then only with Safety Department approval after all regulatory requirements have been met. If a Permit Entry is required, ETC will contract the entry to a qualified and experienced Contractor and defer to that Contractor’s PECS program.

Tests for toxic or corrosive substances must also be performed when their presence is suspected.

### **Performing Atmospheric Tests**

When a hazardous atmosphere test is required, the issuing authority notes this fact on permit and specifies particular gas test needed. In most cases the permit issuer will also perform the testing.

#### **Before going to work on site the person performing the test must:**

- Understand specific equipment involved and tests to be performed.
- Ensure testing instrument is functioning.
- Select correct Drager tube (detector tube) when tests for toxic substances are specified.

**Perform atmospheric tests stipulated on work permit in accordance with guidelines.**

### **Confined Space**

When entry into a permit entry confined space is necessary for testing, the person performing the test must be provided with supplied air respiratory protection and any other protective equipment that may be needed such as impervious boots, chemical resistant slicker suit, gloves, etc.

Ventilation must be stopped 15 minutes prior to conducting the gas test, except when continuously monitoring.

Perform tests throughout large spaces such as tanks, drums, towers, or excavations where it may be possible for gas to be trapped in dead end nozzles, plugged downcomers, structural members, etc.

Perform tests at many levels in taller vessels since some gases are heavier than air and tend to fall to the bottom and some which are lighter rises to the top.

## **Inert Atmospheres**

Using a gas tester to analyze an inert gas atmosphere can produce a false reading. Always consult with the manufacturer about special requirements.

## **Open Areas**

The primary concern in open areas is flammable/combustible gas, however; gas tests for toxic substances should also be conducted if presence of toxic substances is suspected.

Checks should be made around and at all openings of equipment where work is to be done.

Tests at sewer openings, open vents, bleeds, and at any other possible locations in area where leaks may be suspected.

## **General**

It is recommended gas testing be continued throughout the course of work or at specified intervals, i.e. hot work in an area when conditions could change or tank cleaning when work may cause a change in conditions (agitating sludge or other by products).

For a gas test to be valid it should be performed as close as possible to the time work in the tested area begins.

At a minimum gas tests must be repeated when:

**Two or more hours pass between test and start of work.**

**Work is stopped and resumes at a later time.**

**Conditions change.**

Record results of gas tests and sign work permit.

**If at anytime during the course of work the instrument alarm sounds, warn other workers to exit the area, the permit is cancelled. Take the instrument to clean air to clear the instrument, and re-test and assess the area before returning.**

## **Ignition Sources**

**Examples of ignition sources include but are not limited to:**

**Acetylene/gas burning**

**Welding**

**Use of open flames**

**Grinding**

**Drilling**



Gasoline engines driving equipment such as pumps, generators etc.

Ignition sources must not be introduced into an area that may contain a flammable concentration in air without first performing atmospheric testing. Hot Work Permits are required when ignition sources are to be used within 40 feet of any threaded or flanged pipe connection, vent source, flammable liquid storage/dispensing area, process equipment, tanks etc., that handles flammable products or within any facility containing such products.

## **Maintenance and Calibration of Monitors**

To ensure proper operations and meter responses, it is important to maintain and calibrate all instruments. The following establishes responsibilities and methods by which maintenance and calibration will be accomplished:

**Have available a calibration kit from vendor and use them to verify meter calibration at least monthly or in accordance with the manufacturers recommendations. Calibration is performed by using a known gas/air mixture to ensure the meter response is accurate.**

**Place a calibrated sticker on instruments immediately after calibration. Include date and initials of person performing calibration. Calibration checks should be recorded in an appropriate log.**

**Carry out battery and meter adjustment checks each time an instrument is used. Functional checks of oxygen and combustible gas meters should be carried out each day before use. Functional or bump test is defined as a brief exposure of the monitor to a known concentration of gases for the purpose of verifying sensor and alarm operation and is not intended to be a measure of the accuracy of the instrument.**

**Any instrument not operating properly or out of calibration should be tagged "DANGER DO NOT OPERATE" and sent to the appropriate vendor for necessary repair.**

### **Drager/MSA Type Gas Detector**

This hand operated bellows pump draws measured amounts of air through a gas tube which contains a variety of substances that react selectively with certain chemicals to change colors of the materials in the tube.

The concentration of the particular chemical in sampled area is measured as parts per million, PPM, by volume and is indicated by color change within a selected tube. Permissible exposure limits for these contaminants may be found in Federal Regulations Code 29 CFR 1910.1000.

Tests for over two hundred of these contaminants can be made with this instrument. In today's environment this instrument is seldom used due to availability of the Multi-gas monitor, but it is important that personnel understand that this device can be used for testing when necessary.

## **Permit Responsibilities**

### **Permit Issuer/Company Representative**

Conduct pre-job safety meeting with ETC and contract personnel.

Inspect the work site and conduct gas tests for flammable and/or other hazardous conditions.

Ensure a minimum of two fire extinguishers and other necessary safety and communication equipment is available.

Identify any special precautions necessary and list on the permit.

Complete and sign the permit verifying the permit conditions have been met and monitor the work as it progresses ensuring the conditions have not changed.

Stop the work if a change occurs which creates an unsafe condition. Work will not resume until a safe condition is restored.

Designate a safe area for all personnel to meet in case of an emergency.

### **Person doing the work (permit worker):**

Read, understand, and sign the Hot Work permit.

Advise other works of any special precautions or conditions pertain to the job.

Know where the nearest fire extinguisher and other necessary safety and communication equipment are located.

Provide necessary equipment, such as: combustible gas detectors, dry chemical fire extinguishers, oxygen meters, safety belts, respiratory equipment, barricades, shoring, etc., as required.

Clean up and secure work area after completion of work.

When any emergency announcement is made, stop all work and proceed to a safe area. Do not resume work until notified by an ETC representative.

## **Fire Watch**

Observe an area of at least 50' around the hot work site, and maintain the area free of combustibles and tripping hazards.

Have no other duties assigned while on watch.

Sign the Hot Work permit and adhere to the conditions listed on the permit.

Be properly trained in the use of the fire extinguisher and other safety equipment.

Call for emergency assistance and extinguish any small fires.

Fire watch will remain on watch for 30 minutes after completion of cutting or welding to make certain no ignition takes place from residual heat.

### **Hands On Training**

To operate specific atmospheric test equipment the candidate will need access to that instrument, instrument calibration equipment and the operator's manual.

# Hazardous Atmosphere Testing

## Direct Reading Instruments

### **General Knowledge**

- Responsibilities for Equipment/Vessel Preparation
  - Describe what is required to prepare equipment or the job site, for gas testing.
- Hazardous Atmospheres
  - Describe three types of hazardous atmospheres.
- Types of Direct Reading Instruments
  - Describe the following:
    - Combustible Atmosphere Indicators
    - Oxygen Indicators
    - Toxic Atmosphere Monitors
    - Multi-gas indicators
  - Describe LEL and UEL in relation to flammable concentrations in the atmosphere.
  - Identify the LEL and UEL of natural gas.
- Atmosphere Testing Requirements
  - Describe when atmospheric testing is required.
  - Describe how often testing is required.
  - Describe when re-testing is required.
- Ignition Sources
  - Describe why ignition sources must be limited.
  - Describe types of ignition sources.

### **Periodic instrument calibration**

- Describe and demonstrate instrument calibration according to manufacturer's recommendations.
- Describe the recordkeeping requirements for instrument calibration.

### **Bump testing**

- Describe when bump testing is required.
- Demonstrate bump testing.

### **Performing atmospheric testing**

- Describe and Demonstrate hazardous atmospheric testing.

### **Issuing Hot Work Permits**

- Describe the role of the permit issuer/authorizer.
- Describe the role of the worker receiving the permit (permit worker).
- Describe the fire watch requirements.
- Describe when a Hot Work Permit is cancelled.
- Demonstrate completion of a "Hot Work Permit".

## Hazardous Atmosphere Testing Qualification

This is to certify that \_\_\_\_\_ has satisfied the qualification requirements to perform hazardous atmospheric testing related to the completion of "Hot Work Permits" for Energy Transfer Company. The person named above has completed training and demonstrated the physical ability to conduct the necessary tests required by the Energy Transfer Company Hot Work Permit program.

Qualification Evaluator Signature \_\_\_\_\_ Date \_\_\_\_\_

I have completed the training required for hazardous atmosphere testing. I understand the importance of hazardous atmospheric testing and the Hot Work Permit program and will fulfill those duties to the best of my ability.

Candidate Signature \_\_\_\_\_ Date \_\_\_\_\_

# Energy Transfer Company

Lock-Out Tag-Out

# ENERGY ISOLATION

## Lock out/Tag out

Energy Transfer Company requires compliance with applicable Energy Isolation Standards. This is accomplished through the use of appropriate engineering controls, management controls, employee training, personal protective equipment, recordkeeping, and safe work practices.

### **Application:**

All machines and equipment are isolated and rendered inoperative by locking out and tagging all applicable energy isolating devices that physically prevent the transmission or release of energy to the machine or equipment while work is being performed. A positive means of isolation must be implemented and verified before work commences. This section is applicable when any ETC employee or contractor is required to work on various sources of energy, including electrical, mechanical, hydraulic, and pneumatic or stored pressure. Examples of work activities as described above include, but are not limited to maintenance and service of pumps and compressors; repair and/or replacement of valves or pipelines; motor repairs; tower and tray work; filter change-out; equipment and vessel cleaning; etc.

### **Acceptable Energy Isolation Devices**

There are six types of mechanical energy isolating devices used to isolate equipment and prevent the unexpected release of stored energy while service and maintenance work is being performed:

1. Electrical source disconnects.
2. Double block-and-bleed valves (i.e., twin seal valves or valve arrangement; two single in-line block valves with a bleeder; sample or vent outlet between the valves).
3. Single block valves that provide a positive seal and can be verified.
4. Air gapping with blind flanges or spool piece removal.
5. Isolation blinds
6. Stopples

### **Important Note:**

The use of “stopples” as isolation devices requires the development of a detailed job safety plan and approval. Pipeline Operation must provide procedures for clearing the line segment down stream of the stopple fitting as well as procedures to verify all liquids have been removed to verify the stopple fitting has properly sealed preventing any leaking of hydrocarbons past the stopple fitting. The use of these devices is an integral part of our established safety practices and procedures for preparation of equipment for maintenance. However, under this policy, these devices are locked out and tagged prior to any work being performed in the upstream/downstream de-energized side of these devices.

### **Requirement Guidelines:**

1. Workers will be trained and qualified
2. Perform an initial evaluation of the equipment being isolated to determine any hazard

# ENERGY ISOLATION

## Lock out/Tag out

3. Use locks for energy isolation controls which are user-identified and uniquely keyed which add protection against tampering with locked or tagged systems, and ensure others do not tamper with LOTO devices.
4. Resolve any Company/Contractor energy isolation control differences or conflicts that may create a hazard before work begins.
5. Notify Affected Employees of the application of energy isolation devices.
6. Isolate and/or lockout all identified energy sources.
7. Tag devices with tags identifying the Authorized Employee and date applied.
8. Clear the area surrounding the equipment of personnel.
9. Test the equipment to verify energy sources are controlled before beginning work
10. Immediately stop unsafe activities and report them to location supervision.
11. Make notification to Affected Employees of the removal of LOTO devices.
12. Remove locks / tags used to control hazardous energy.

### **Procedures:**

#### **General Energy Isolations Procedures**

The responsibility for compliance with Lockout/Tagout procedures rests with the supervisors and workers performing the Lockout/Tagout procedures. This can include Operations, Engineering, Inspectors, Construction or Contract personnel performing and authorizing the work. The operations supervisor/designee authorizing the work and the individuals of each crew performing the work are required to follow all safety procedures outlined. The following basic procedures apply in all Lockout/Tagout situations.

#### **Detailed Procedures**

The following guidance applies to all pipeline operations. Refer all questions regarding the application of these procedures to the operations supervisor or a safety department representative.

1. Pipeline operations personnel must notify all employees and contractors when Lockout/Tagout procedures are required prior to the work being performed.
2. Ensure that all necessary notifications regarding equipment isolation and decommissioning are made to the facility control room or pipeline control.
3. Review the most current flow or equipment diagrams to assist in locating all isolation points.
4. Survey the work area and equipment to identify isolation points and the proper methods of energy isolation.
5. In compression/pump stations, render safe the equipment being worked on by isolating and relieving any stored hazardous energy, by closing valves or switchgear, opening vents, disconnecting, restraining or blinding. Blinds are installed when the release of flammable or toxic liquids, vapors or gases into the work area cannot be controlled.
6. On pipeline operations, close all block valves that feed into the line where work is performed. Chain, lock, and tag the isolation valves with a DANGER: DO NOT OPERATE or other appropriate tag. Blinds (where applicable) are installed when the introduction of flammable materials into the work area is not controlled.



# ENERGY ISOLATION

## Lock out/Tag out

7. Pipeline Operations prepares the isolation and/or blinds identifying all electrical and/or mechanical isolation points associated with the equipment/machine taken out-of-service. The following guidelines are presented to assist in preparing the "Isolation/Blind List", and implementing these procedures:
  - All piping is physically traced and verified by single line drawings, if possible, to determine all sources of pressure such as pumps, hydrostatic head pressure, and manifold lines, and to identify which valves and pressure sources need to be blinded, closed, disconnected and/or depressurized.
  - Valves that stop the flow of material to the equipment being opened are closed, locked and tagged. Single block valves in hydrocarbon service must provide a positive seal. If a positive seal is not achieved, a thorough hazard evaluation must be conducted and a Job Plan developed to make the work safe. Precautionary measures may include installation of blinds behind leaking valves or use of stopples. In addition air movers may be utilized to pull hydrocarbons out of the lines or equipment to clear the work zone. In some cases, where the use of one of these methods is not feasible or is ineffective, it may be necessary to de-pressure upstream of the isolation valve to prevent the escape of hydrocarbon vapors while the work is being performed. Where possible, two valves on the upstream side of the point of work are closed, and both valves are locked and tagged in the closed position. Any residual pressure between the two valves is bled from the line and a positive means of keeping the line vented is maintained by means of locking and tagging a valve (bleed) in the opened position, or by means of spool removal.
  - If the equipment being opened is connected to a common header, it may be necessary to blind, lock out and tag the valves on the downstream side of the work point. Never depend on check valves to prevent backflow of contents in the pipelines.
  - Verify the equipment is ready for maintenance and/or servicing by such methods as checking pressure gauges downstream of the isolation points; "sniffing" the line for hydrocarbons or checking for other materials; opening bleed valves; and checking on/off switches or other normal operating controls. Operations personnel ensure the equipment is totally de-energized and isolated from any potential energy sources.
  - Notify all personnel (Company and contractors) involved in the work to be performed of the type and magnitude of the energy hazard involved. This information includes the electrical current/voltage; hazardous characteristics of the product, potential pressure involved, mechanical action or other energy potential, emphasizing the significance of proper implementation and compliance of these procedures.
8. In the process of decommissioning the equipment, pipeline operations first locks out and tags each isolation device as it is closed, de-energized, and/or installed in such a manner that renders the equipment inoperative and/or totally isolates it from any potential energy source. Operations places the **first** lock and tag "on" and take the **last** lock and tag "off" the equipment being isolated.

# ENERGY ISOLATION

## Lock out/Tag out

9. When servicing and/or maintenance is performed by a crew, craft, department or other group, they utilize a procedure which affords personnel a level of protection equal to that provided by the implementation of a personal lockout or tagout device.
10. As a minimum, one lock and tag for each craft, group, or contractor working on the equipment is attached to the lockout device at each energy isolation point. The use of the "lock box" methodology may be followed in some cases where the direct application of the lock is not practical. When this methodology is used, it must be compatible with the contractor's energy isolation procedure. The contractor has the right to verify and place their locks on each isolation point.
11. Pipeline Operations ensures all additional procedures are completed for decommissioning the equipment and all requirements of the Permit System are implemented prior to work commencing.
12. Before lockout or tagout devices are removed and energy is restored to the machine or equipment, the authorized employee(s) will ensure the work area is inspected and that nonessential items have been removed and that machine or equipment components are operationally intact. In addition, the work area shall be checked to ensure that all employees have been safely positioned or removed from the equipment being energized.

### **Blinding Procedures for Pipeline Operations (Compression and Pump Stations):**

Blinds are installed to control the release of combustible or toxic liquids, vapors or gases during maintenance or construction. Full-rated blind meeting ANSI standards shall be installed. All "shop built or home made" blinds must be approved by Engineering and meet ANSI standards. In addition to this the following guidelines apply:

1. Blinds are tagged for identification.
2. All blinds are removed when work is complete.
3. During hydro-test applications (line, vessel, drum, etc.), only a rated blind flange is used.
4. During a confined space entry, a skillet blind is inserted at each flange closest to the vessel.
5. A skillet blind (vendor manufactured, shop built, or on-site manufactured) is used ONLY if a tagged vent to atmosphere is located between a closed and locked block valve and the blind.

### **Preparation Guidelines for Isolating Electrical Equipment**

The following procedures are applicable when maintenance/service work is performed directly on any electrically-operated equipment where the potential exposure of electrical current and/or equipment activation (startup) may result in injury to employees and/or contractors.

1. Qualified personnel prepare the equipment for repair and disconnect the electrical circuit from its source of power by means of the circuit breaker or disconnect switch.
2. The following are conducted by qualified personnel: all power circuit disconnects of 600 Volts and above; any de-energizing activities that require the opening of

# ENERGY ISOLATION

## Lock out/Tag out

the switchgear door, cover or other protective devices; and any reaching into and/or entering the equipment in any manner.

- Disconnection of the electrical power is done at the main power or disconnect switch and never through an "off-on" push button, selector switch or electrical interlocks that de-energize electric power circuits indirectly through contacts, controllers or other electrically-operated disconnecting devices.
- Once the power source is disconnected, locked out and tagged, personnel verify the equipment/machine operating controls (such as push button selector switches and electrical interlocks or other operating mechanism) are properly de-energized to ensure the equipment/machine is not restarted and/or activated in any manner.
- Electrical circuits to machine/equipment worked on directly are checked with appropriate test equipment by qualified personnel to verify the equipment and circuits are totally de-energized. (Safety procedures for checking "test equipment" are followed in accordance to NFPA 70E).
- Where it is not possible to lock open a circuit, the removal of a fuse or buss is an acceptable method of isolation. The fuse or buss in the switchgear is removed by a qualified person/electrician. Both operations' personnel and the qualified person are required to place their "Danger" tag at this point of power disconnect. Where it is neither possible to remove a fuse or buss nor to lockout disconnects at the power source, qualified personnel disconnect from the power source and place a "Danger" tag on the electrical wires to the equipment.
- All "on-off" switches and/or control points between the one locked out and the equipment being worked on must be in the "off" position so that when power or utility is restored, no damage occurs from auxiliary control panels being in the "on" position.

**Note: Some automatic equipment has a built-in memory and in many instances may cycle or be activated in some manner when power is restored to the equipment. This is applicable to "timed" and/or remotely activated equipment such as pumps, cooler fans and computer-controlled equipment.**

### Work Activities NOT Requiring Lockout / Tagout

1. Employee controlled cord- and plug- connected electrical tools.
2. Hot tapping operations where continuity of service is essential and shutdown of the system is impractical and the work is performed in accordance with the existing established safe operating procedures that do not involve any type of maintenance/service work which exposes the individual or others to potential injury when performing "hot tap" procedures.
3. Normal operating duties and functions routinely performed by operations personnel in accordance with established safe operating procedures and do not involve any type of maintenance work that exposes the individual to the release of unexpected energy.
4. Welding on in-service pipelines conducted in accordance with specific engineering standards, procedures, and safety requirements developed for this type of work.

# **ENERGY ISOLATION**

## **Lock out/Tag out**

5. Any job and/or work activities that meet the criteria of this policy, but are not locked out and tagged in accordance to these procedures due to abnormal situations and/or conditions, are reviewed by the respective location supervisor and safety personnel to determine acceptable alternatives that protect against employee exposure to potential injury.

**TRAFFIC IMPACT:** Traffic along county roads will increase due to construction activities. Measures will be taken to minimize this impact through scheduling and limiting access to the pipeline right-of-way. Actual construction of the pipeline will take place in four (4) phases. Anticipated "Traffic Impact" for each phase is as follows:

**Phase #1 – Right-of-Way Clearing and Trenching:**

Construction personnel = 12                      Vehicles = 4  
Inspection personnel = 2                      Vehicles = 2  
Heavy haul Trucks = 3                      Trips = 3 ea.  
Phase #1 Duration = 5 weeks (6days/week, 10 hrs/day)  
Percent of County Rd. 301 impact = 50%  
Percent of County Rd. 300 impact = 30%  
Percent of County Rd. 309 impact = 10%  
Percent of County Rd. 329 impact = 10%

**Phase #2 – Weld and Install Pipeline**

Construction personnel = 72                      Vehicles = 10 (includes 2 buses)  
Inspection personnel = 2                      Vehicles = 2  
Heavy haul Trucks = 6                      Trips = 1/day x 30 days  
Phase #2 Duration = 6 weeks (6 days/week, 10 hrs/day)  
Percent of County Rd. 301 impact = 50%  
Percent of County Rd. 300 impact = 30%  
Percent of County Rd. 309 impact = 10%  
Percent of County Rd. 329 impact = 10%

**Phase #3 – Nitrogen-test Pipeline:**

Construction personnel = 9                      Vehicles = 3  
Inspection personnel = 1                      Vehicles = 1  
Nitrogen Transport Trucks = 3  
Phase #3 Duration = 2 Days  
Percent of County Rd. 329 impact = 100%

**Phase #4 – Right-of-Way Cleanup and Reseeding**

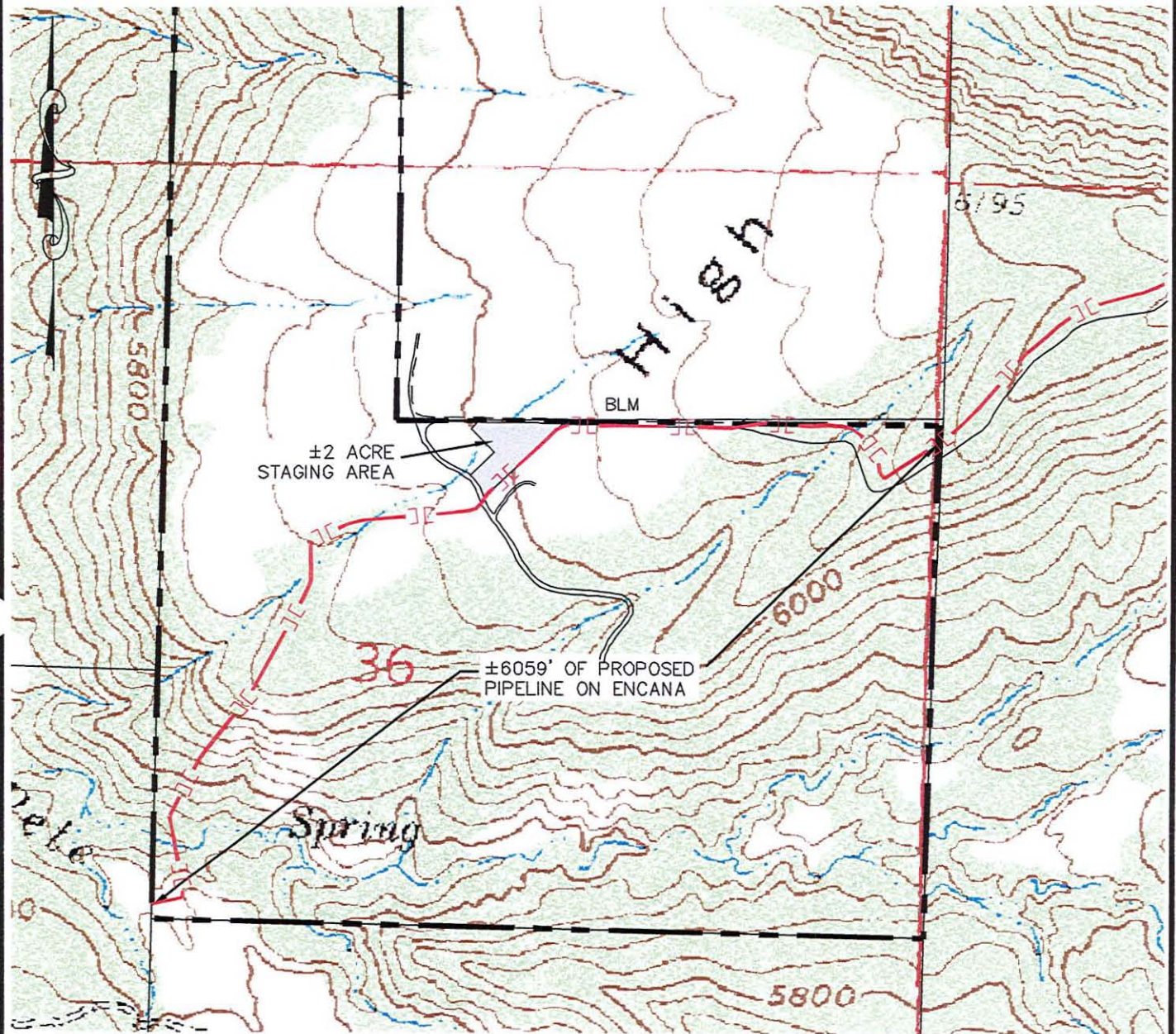
Construction personnel = 12                      Vehicles = 4  
Inspection personnel = 2                      Vehicles = 2  
Heavy haul Trucks = 3                      Trips = 3 ea.  
Phase #4 Duration = 3 to 5 weeks (6 days/week, 10 hrs/day)  
Percent of County Rd. 301 impact = 50%  
Percent of County Rd. 300 impact = 30%  
Percent of County Rd. 309 impact = 10%  
Percent of County Rd. 329 impact = 10%

Contractor has made arrangements to house personnel in the Glenwood Springs area. Employees will be bused to the staging areas and then dispersed as needed along the right-of-way. Construction personnel will return to the staging area following the completion of work each day and where busses will transport them back to their living accommodations. The construction schedule will be a six day work week (Monday through Saturday) with work commencing at 7:00am and ending at 5:00pm each day.

All vehicles will be licensed to meet DOT regulations. All permits will be obtained as required by Garfield County for trucking of heavy and/or wide loads. Dust control will be a daily construction activity taken to mitigate any public impact.



**EXHIBIT "A"**  
**PROPOSED PIPELINE ON ENCANA OIL & GAS (USA) INC. PROPERTY**  
**SEC 36, T. 7 S., R. 96 W., 6TH P.M.**  
**GARFIELD COUNTY, COLORADO**



**FOOTAGES:**

±6059 L.F. (367.2 RODS) OF PROPOSED PIPELINE ON ENCANA PROPERTY.

**NOTE:**

EXHIBIT "A" IS NOT INTENDED TO SHOW THE FINAL LOCATION OF THE ROW OR PIPELINE AS ACTUALLY CONSTRUCTED. THE ACTUAL LOCATION OF THE ROW WILL BE DETERMINED BASED ON WHERE THE PIPELINE IS ACTUALLY LAID. AS SUCH, EXHIBIT "A" SHALL BE SUPPLEMENTED WITH AN AS-BUILT PIPELINE EXHIBIT AFTER CONSTRUCTION IS COMPLETE.



**ECLIPSE**  
*surveying*

111 E. THIRD ST., SUITE 208, RIFLE, CO 81650  
 (970) 625-3048

SCALE: 1" = 800'

DATE: 01/18/08

SHEET: 1 of 1

FILE:\ENCANA EXH.DWG

**ETC CANYON PIPELINE, LLC**

1600 Broadway, Suite 1900  
 Denver, CO 80202

**ENCANA PROPERTY**

**EXHIBIT "A" - PRECONSTRUCTION PIPELINE EXHIBIT**

**LEASE AGREEMENT FOR TEMPORARY STAGING AREA**

This Lease Agreement for Temporary Staging Area, hereinafter referred to as Agreement is made and entered into this 15 day of APRIL, 2008, by and between Marl M. Martin and Patricia L Martin, as GRANTOR, and ETC Canyon Pipeline, LLC, as GRANTEE.

WHEREAS, for good and valuable consideration GRANTOR has granted to GRANTEE the right to a staging area for the construction of a pipeline adjacent to Grantors property for six months from when Grantor is notified that construction is beginning by Grantee. This agreement will expire December 31, 2009.

NOW THEREFORE, GRANTEE agrees to pay GRANTOR a payment of \$1,000/acre for a staging area estimated to be 4 acres shown on attached Exhibit "A", to fully compensate GRANTOR for surface damages resulting from construction of the facilities, for a total payment of \$4,000.

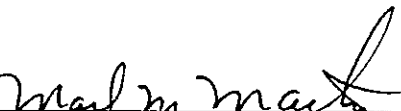
This Agreement shall not be recorded by either party. In addition, GRANTOR agrees to hold the terms of this Agreement confidential and to not disclose the terms or provide copies of this Agreement to any third party, without prior written consent of GRANTEE. Either party may disclose this Agreement and its terms to the extent required by a court of competent jurisdiction.


Any distribution to tenants, heirs, creditors or others will be made at GRANTOR'S sole discretion

EXECUTED the date first written above.


**GRANTOR:**

**GRANTEE:**

By:   
Marl M. Martin

ETC Canyon Pipeline, LLC  
By:   
Arthur Smith  
Manager of Engineering - Projects

Tax ID Number: \_\_\_\_\_

By:   
Patricia L. Martin

Tax ID Number: 523-64-4360



**TEMPORARY STAGING AREA STIPULATIONS**

GRANTEE agrees to the following stipulations:

1. Repair all fence crossings to as good or better than previous condition.
2. Cease construction operations in excessively muddy conditions and dust shall be controlled.
3. Any and all construction vehicles, equipment and materials, while not in use, shall be parked or placed in the staging area ( 4 acres).
4. The staging and access roads shall be kept safe and in good order, and shall at all times be kept free of litter and debris caused as a direct result of GRANTEE'S activities.
5. Except for normal and routine maintenance and repair during construction activities, no construction equipment shall be repaired or maintained upon staging area. No motor fluids will be disposed of on the staging area.
6. All gates shall be left as they are found. Access must be coordinated with tenants, if any.
7. No firearms, pets, alcohol or illegal drugs shall be allowed on the staging area at any time.
8. GRANTEE shall seed all disrupted areas with either BLM seed mix, or the seed-type(s) selected by GRANTOR.
9. GRANTEE shall be responsible for weed control in all areas disturbed by GRANTEE until grass is established on staging area.
10. Any large rocks (greater than 4" in diameter) excavated by GRANTEE shall be distributed or disposed of by GRANTEE as directed by GRANTOR.
11. The staging area shall be returned to the original topography, to the extent feasible, so that there are no permanent mounds, ridges, sinks or trenches.
12. Notice by either party hereto shall be promptly given orally, and if necessary or possible, confirmed in writing and mailed to:

13. *Underground power line to pump + water line from pump house shall be protected. Locate utility lines before construction.*  
 GRANTOR:  
 Marl and Patricia Martin  
 700 CR 303  
 Parachute, CO 81635  
 H (970) 285-9284  
*MLM  
 PLM off 4-15-08*

**GRANTEE:**  
 ETC Canyon Gas Resources, LLC  
 1600 Broadway, Suite 1900  
 Denver, Colorado 80202  
 (720) 225-4000  
 (720) 225-4001 fax

**Request for Taxpayer  
Identification Number and Certification**

Give form to the requester. Do not send to the IRS.

Print or type  
See Specific Instructions on page 2.

Name (as shown on your income tax return) <b>PATRICIA LUCILE MARTIN</b>	
Business name, if different from above	
Check appropriate box: <input checked="" type="checkbox"/> Individual/Sole proprietor <input type="checkbox"/> Corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Limited liability company. Enter the tax classification (D=disregarded entity, C=corporation, P=partnership) ▶ ..... <input type="checkbox"/> Exempt payee <input type="checkbox"/> Other (see instructions) ▶	
Address (number, street, and apt. or suite no.) <b>700 COUNTY ROAD 303</b>	Requester's name and address (optional)
City, state, and ZIP code <b>PARACHUTE, CO 81635</b>	
List account number(s) here (optional)	

**Part I Taxpayer Identification Number (TIN)**

Enter your TIN in the appropriate box. The TIN provided must match the name given on Line 1 to avoid backup withholding. For individuals, this is your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Social security number <b>523 64 4360</b>
or
Employer identification number

**Note.** If the account is in more than one name, see the chart on page 4 for guidelines on whose number to enter.

**Part II Certification**

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me), and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding, and
3. I am a U.S. citizen or other U.S. person (defined below).

**Certification instructions.** You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the Certification, but you must provide your correct TIN. See the instructions on page 4.

**Sign Here**

Signature of U.S. person ▶ *Patricia L Martin*

Date ▶ *April 15, 2008*

**General Instructions**

Section references are to the Internal Revenue Code unless otherwise noted.

**Purpose of Form**

A person who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) to report, for example, income paid to you, real estate transactions, mortgage interest you paid, acquisition or abandonment of secured property, cancellation of debt, or contributions you made to an IRA.

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN to the person requesting it (the requester) and, when applicable, to:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income.

**Note.** If a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

**Definition of a U.S. person.** For federal tax purposes, you are considered a U.S. person if you are:

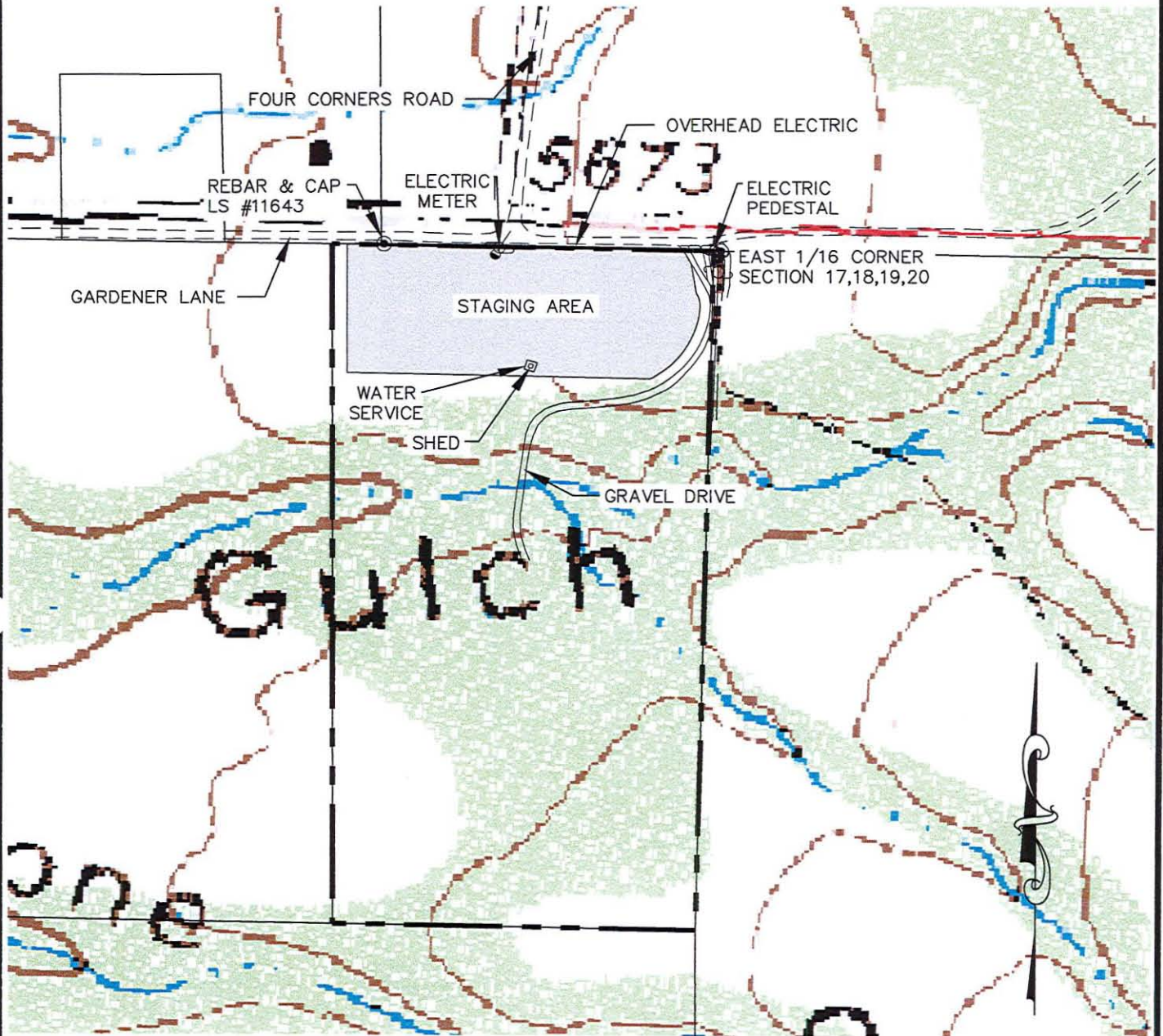
- An individual who is a U.S. citizen or U.S. resident alien,
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States,
- An estate (other than a foreign estate), or
- A domestic trust (as defined in Regulations section 301.7701-7).

**Special rules for partnerships.** Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax on any foreign partners' share of income from such business. Further, in certain cases where a Form W-9 has not been received, a partnership is required to presume that a partner is a foreign person, and pay the withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid withholding on your share of partnership income.

The person who gives Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States is in the following cases:

- The U.S. owner of a disregarded entity and not the entity,

**EXHIBIT "A"**  
**PROPOSED STAGING AREA ON MARTIN PROPERTY**  
**SEC 20, T. 7 S., R. 95 W., 6TH P.M.**  
**GARFIELD COUNTY, COLORADO**



**NOTE:**

A 4.0 ACRE PARCEL OF LAND LOCATED IN THE NE<sup>1</sup>/<sub>4</sub> NE<sup>1</sup>/<sub>4</sub> OF SECTION 20, TOWNSHIP 7 SOUTH, RANGE 95 WEST OF THE SIXTH PRINCIPAL MERIDIAN, GARFIELD COUNTY, COLORADO FOR THE PURPOSE OF TEMPORARY STORAGE OF MATERIALS AND EQUIPMENT NEEDED FOR THE CONSTRUCTION OF A NATURAL GAS PIPELINE.



**ECLIPSE**  
*surveying*

111 E. THIRD ST., SUITE 208, RIFLE, CO 81650  
 (970) 625-3048

SCALE: 1" = 300'

DATE: 04/14/08

SHEET: 1 of 1

FILE:\MARTIN STAGE.DWG

**ETC CANYON PIPELINE, LLC**

1600 Broadway, Suite 1900  
 Denver, CO 80202

**MARL & PARTICIA MARTIN PROPERTY**  
**EXHIBIT "A" - STAGING AREA EXHIBIT**

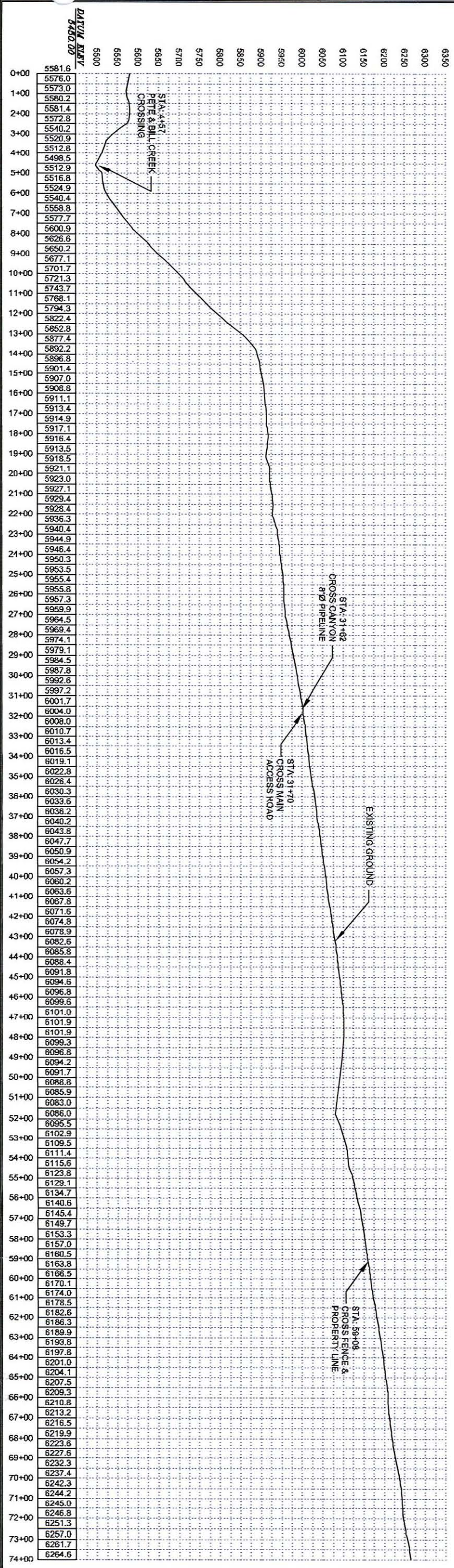
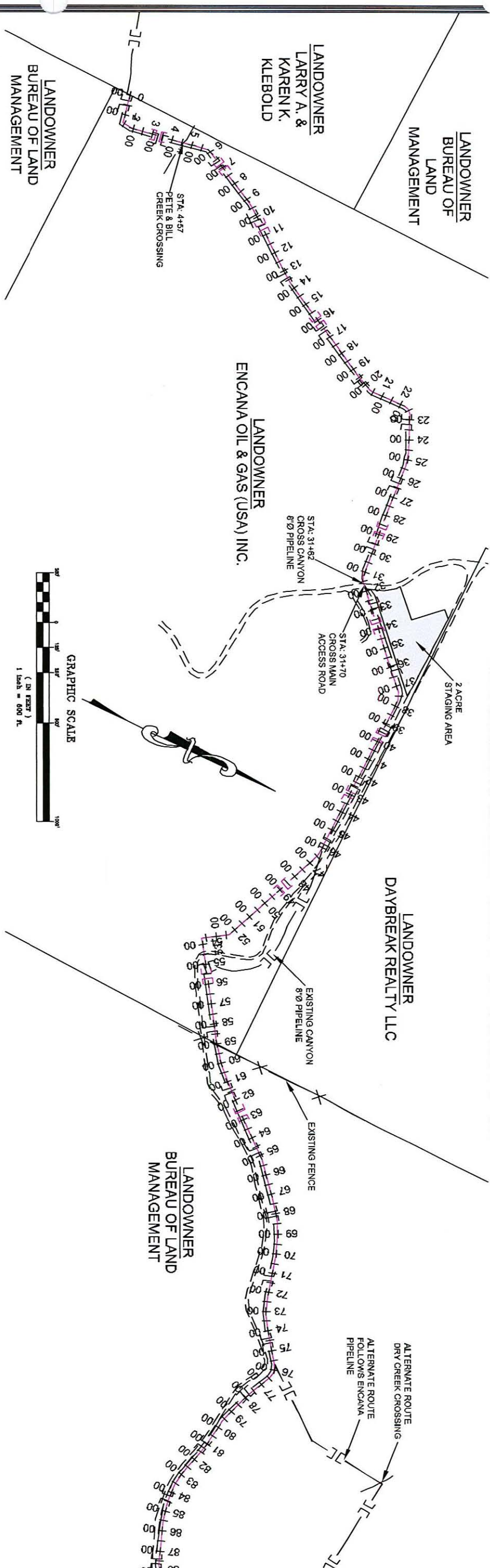
## **PRESSURE TESTING**

**No water is planned to be used for the pressure testing of the South Parachute Loop Pipeline. The pipeline will be tested using nitrogen as a test material.**

**(See Appendix "D" of the Plan of Development)**



# SOUTH PARACHUTE LOOP ALIGNMENT SHEET STA 0+00 THUR 74+00



REVISION 1
REVISION 2
REVISION 3
REVISION 4
REVISION 5

**ECLIPSE** surveying  
111 E. THIRD ST., SUITE 208  
DENVER, CO 80202  
970-625-3048

SOUTH PARACHUTE LOOP  
RIFLE SYSTEM

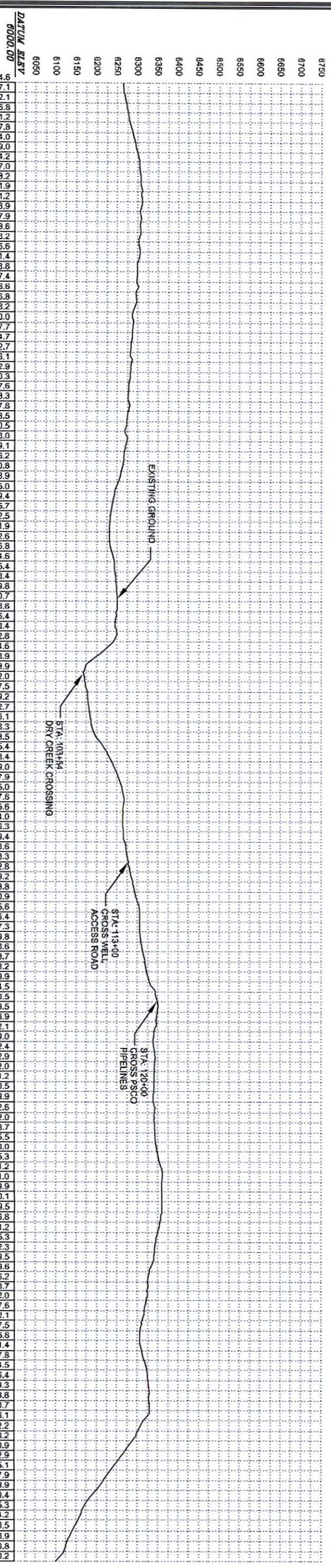
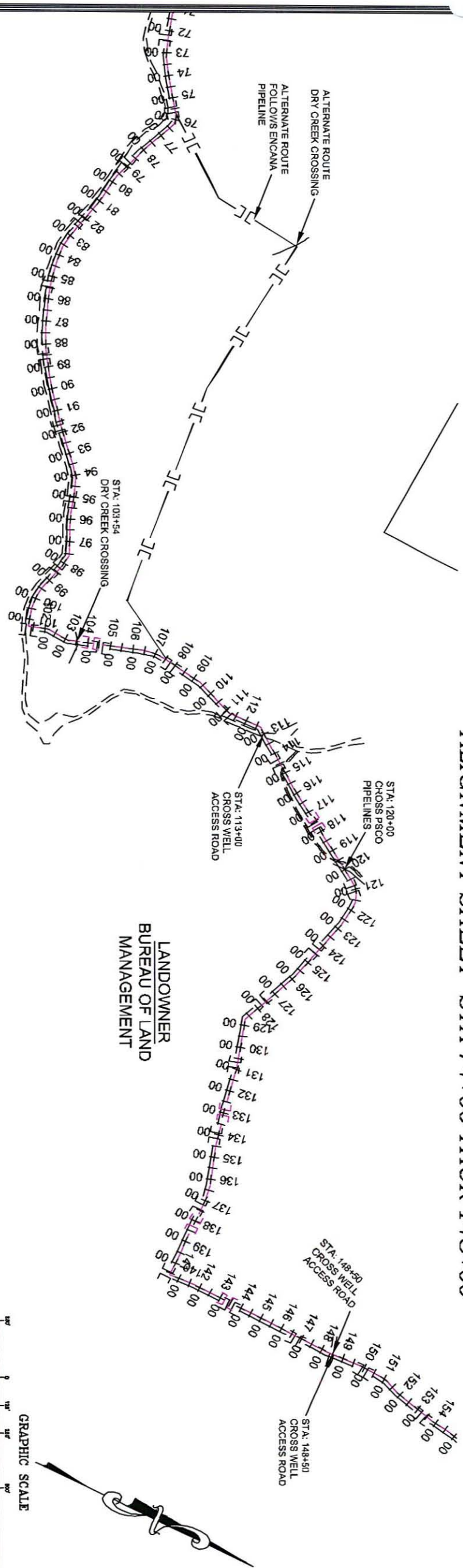
ETC CANYON PIPELINE, LLC  
1600 BROADWAY, SUITE 1900  
DENVER, CO 80202

FILE ALIGN SHIT
DPT. JAK
CHK. JMS
DATE 1/21/08
PROJECT NO. 0704
SHEET 1 OF 10



# SOUTH PARACHUTE LOOP

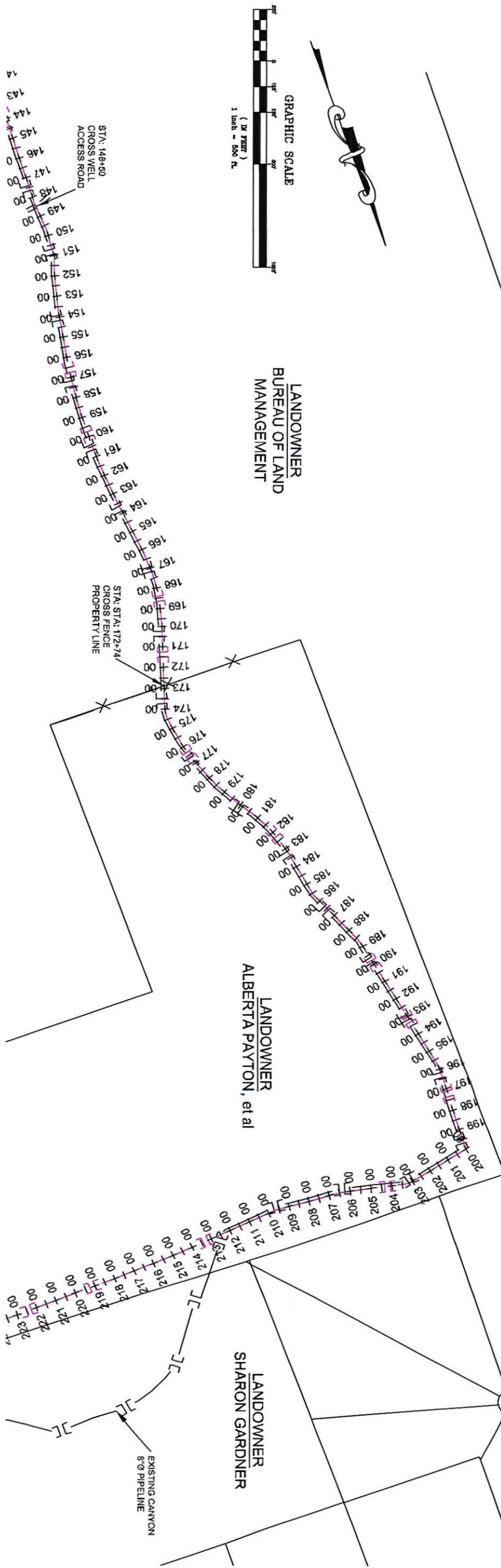
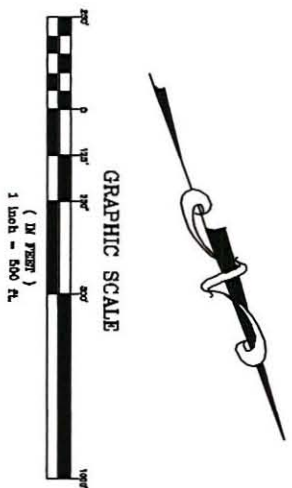
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76+00	6276.8
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78+00	6287.8
79+00	6294.0
80+00	6299.0
81+00	6304.2
82+00	6307.0
83+00	6308.2
84+00	6311.9
85+00	6311.2
86+00	6306.9
87+00	6307.9
88+00	6308.6
89+00	6303.2
90+00	6306.6
91+00	6301.4
92+00	6298.8
93+00	6297.4
94+00	6296.6
95+00	6296.8
96+00	6288.2
97+00	6290.0
98+00	6287.7
99+00	6284.7
100+00	6282.7
101+00	6286.1
102+00	6282.9
103+00	6280.3
104+00	6277.6
105+00	6278.3
106+00	6273.5
107+00	6270.5
108+00	6273.0
109+00	6269.1
110+00	6266.2
111+00	6260.8
112+00	6253.9
113+00	6245.0
114+00	6239.4
115+00	6235.7
116+00	6232.5
117+00	6231.9
118+00	6232.6
119+00	6236.8
120+00	6244.6
121+00	6245.4
122+00	6248.4
123+00	6248.8
124+00	6250.7
125+00	6248.8
126+00	6246.4
127+00	6248.4
128+00	6242.8
129+00	6214.6
130+00	6183.9
131+00	6168.9
132+00	6172.0
133+00	6177.5
134+00	6179.2
135+00	6182.7
136+00	6186.1
137+00	6193.3
138+00	6208.5
139+00	6225.4
140+00	6238.4
141+00	6249.0
142+00	6257.9
143+00	6265.0
144+00	6267.8
145+00	6265.6
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148+00	6269.4
149+00	6273.6
150+00	6278.3
151+00	6282.8
152+00	6289.2
153+00	6293.8
154+00	6300.9
155+00	6305.6
156+00	6306.4
157+00	6307.3
158+00	6309.8
159+00	6313.6
160+00	6318.7
161+00	6323.2
162+00	6329.9
163+00	6344.5
164+00	6350.5
165+00	6349.5
166+00	6346.9
167+00	6342.1
168+00	6339.0
169+00	6342.4
170+00	6342.9
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174+00	6339.9
175+00	6342.6
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178+00	6345.5
179+00	6350.0
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181+00	6361.2
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184+00	6360.1
185+00	6359.5
186+00	6356.8
187+00	6351.2
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208+00	6288.2
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211+00	6235.1
212+00	6217.9
213+00	6199.9
214+00	6179.4
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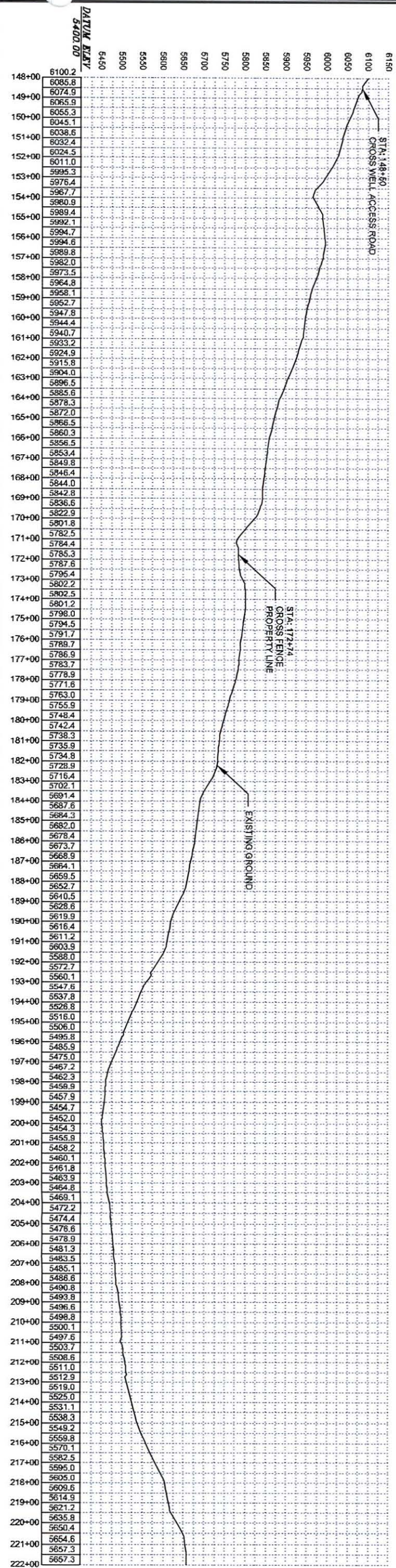
# SOUTH PARACHUTE LOOP ALIGNMENT SHEET STA 148+00 THUR 222+00



LANDOWNER  
BUREAU OF LAND  
MANAGEMENT

LANDOWNER  
ALBERTA PAYTON, et al

LANDOWNER  
SHARON GARDNER



DATE: 07/04	0704
SHEET 3	OF 10

ETC CANYON PIPELINE, LLC  
1600 BROADWAY, SUITE 1900  
DENVER, CO 80202

SOUTH PARACHUTE LOOP  
RIFLE SYSTEM

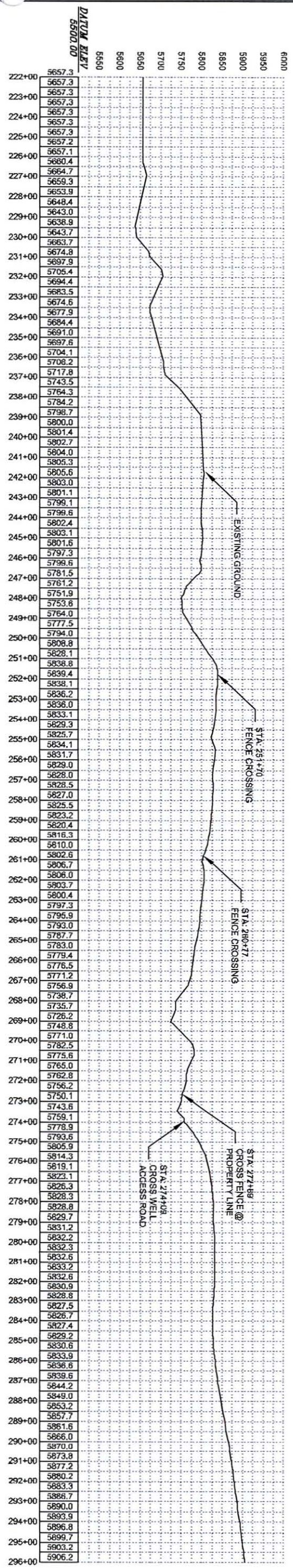
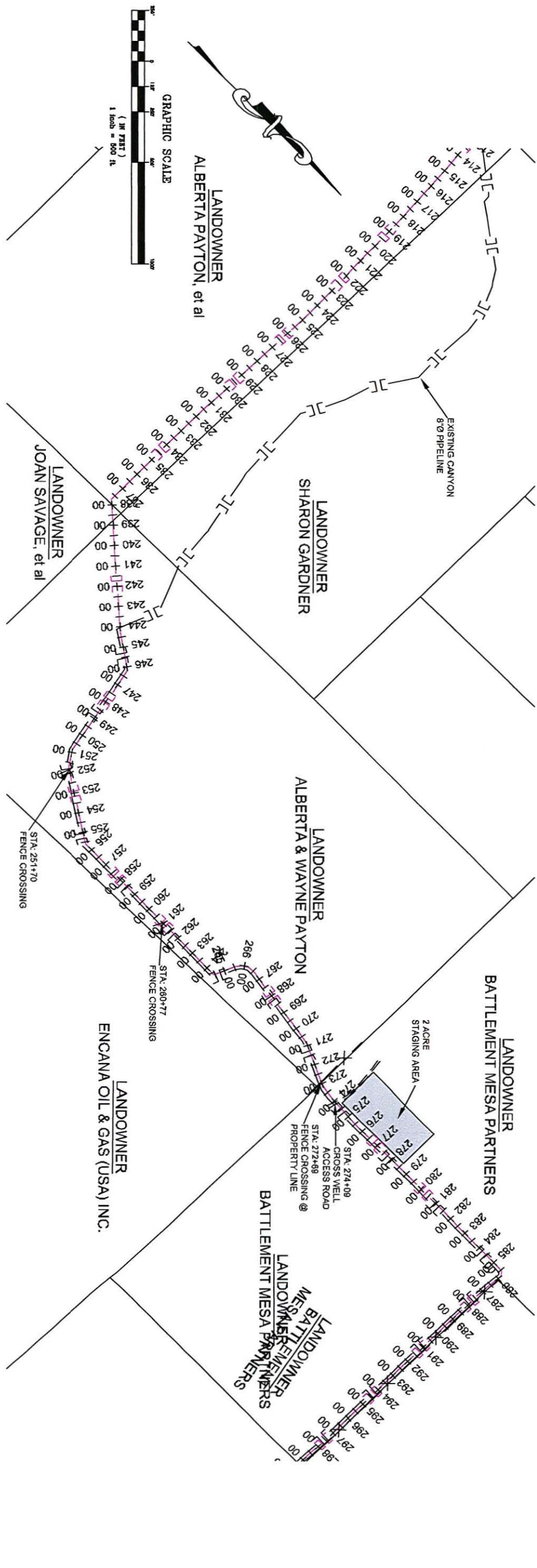
**ECLIPSE** surveying  
111 E. THIRD ST., SUITE 208  
FIFE, CO 81630  
970-625-3048

REVISION 1	
REVISION 2	
REVISION 3	
REVISION 4	
REVISION 5	



# SOUTH PARACHUTE LOOP

## ALIGNMENT SHEET STA 222+00 THUR 296+00



REVISION 1	
REVISION 2	
REVISION 3	
REVISION 4	
REVISION 5	

**ECLIPSE** surveying  
 111 E. THIRD ST., SUITE 208  
 RIFE, CO 81650  
 970-625-3048

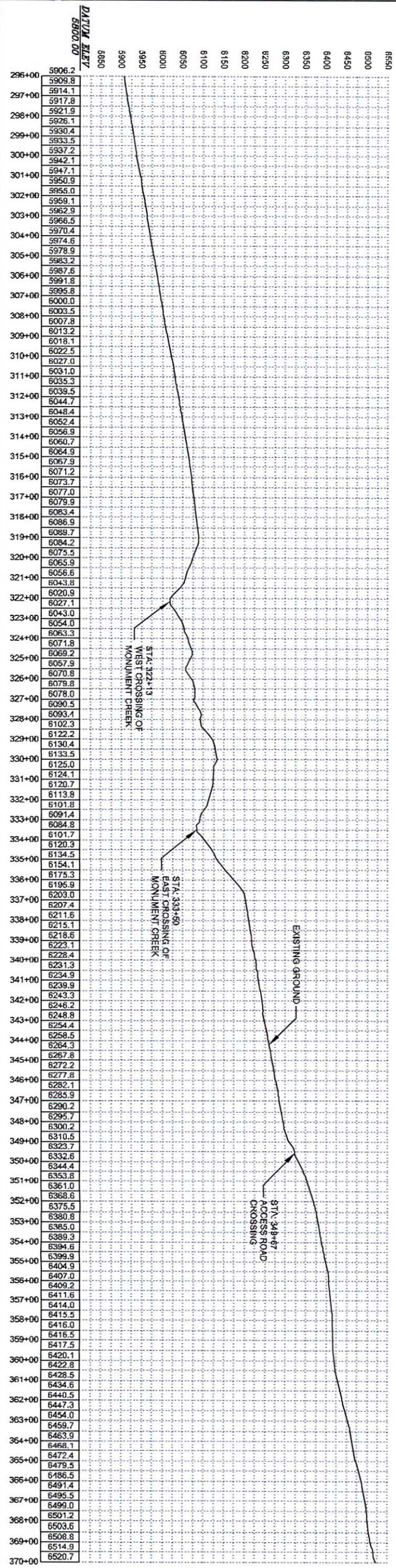
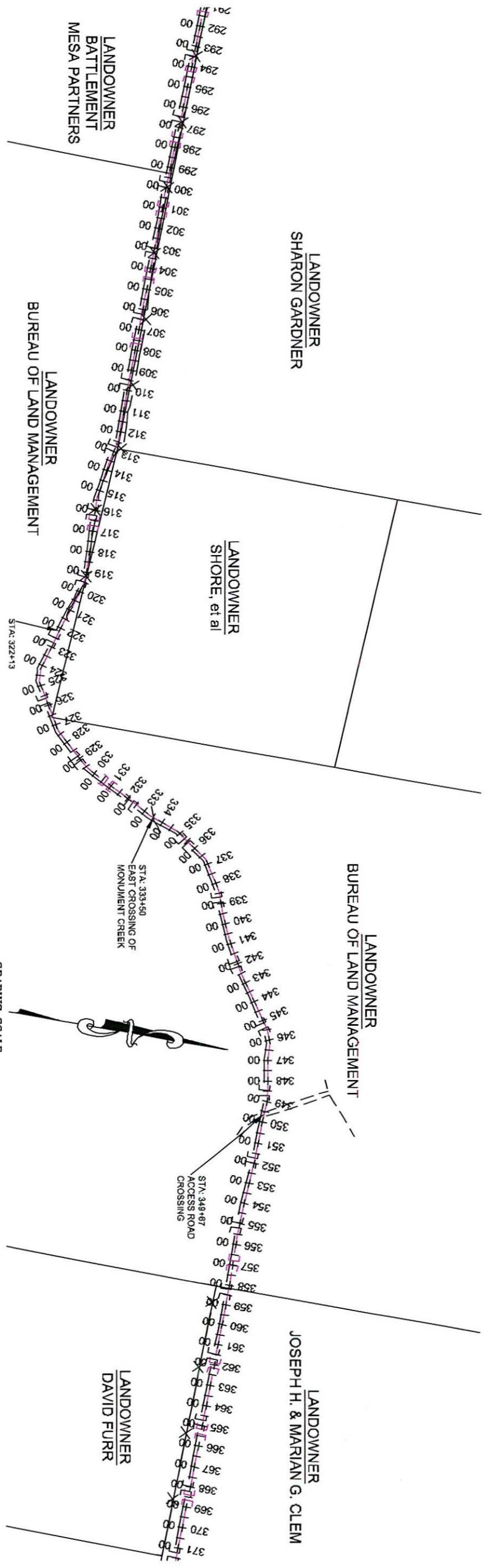
**SOUTH PARACHUTE LOOP**  
 RIFLE SYSTEM

**ETC CANYON PIPELINE, LLC**  
 1600 BROADWAY, SUITE 1900  
 DENVER, CO 80202

FILE NAME: 0704  
 DATE: 12/10/08  
 PROJECT NO.: 0704  
 SHEET 4 OF 10



# SOUTH PARACHUTE LOOP ALIGNMENT SHEET STA 296+00 THUR 370+00



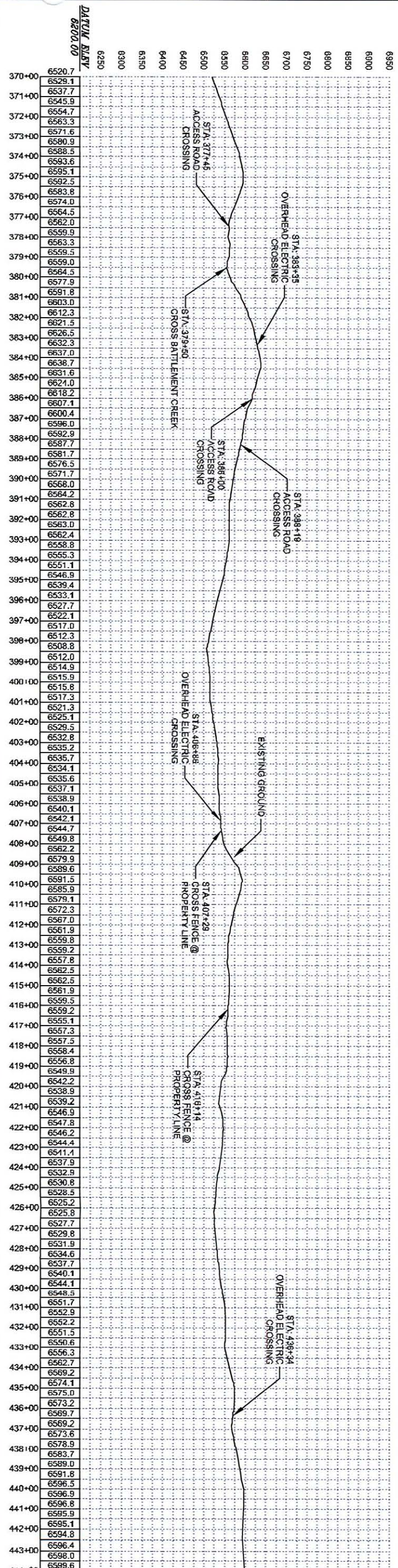
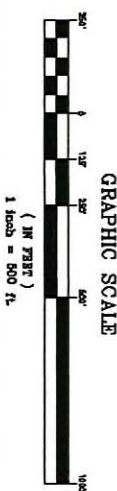
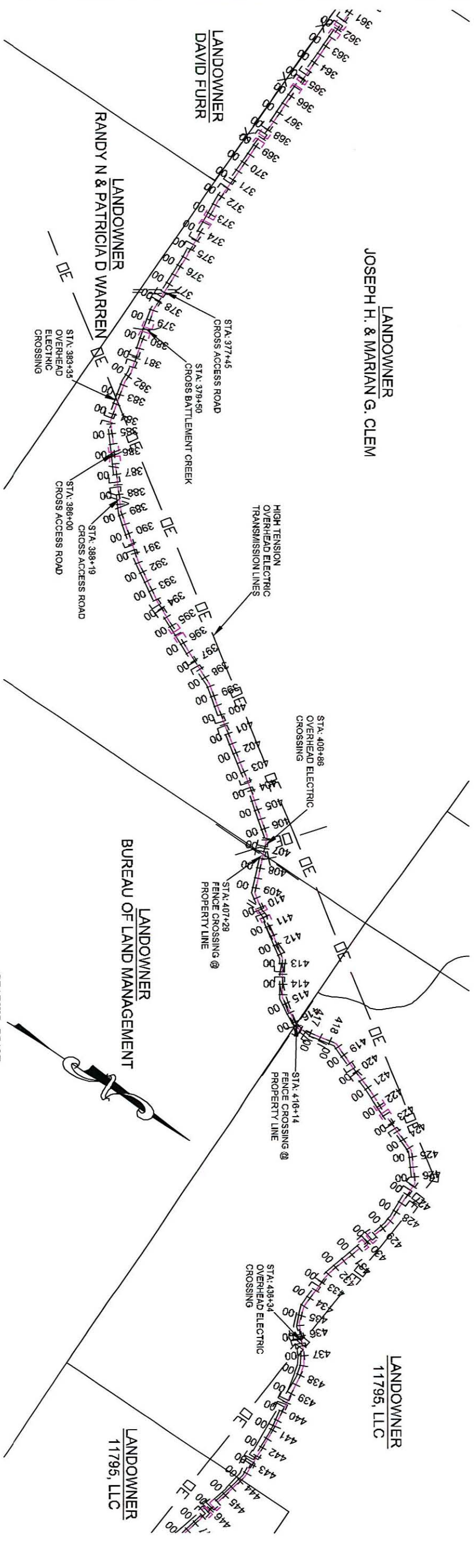


# SOUTH PARACHUTE LOOP ALIGNMENT SHEET STA 370+00 THUR 444+00

LANDOWNER  
JOSEPH H. & MARIAN G. CLEM

LANDOWNER  
11795, LLC

LANDOWNER  
11795, LLC



REVISION 1
REVISION 2
REVISION 3
REVISION 4
REVISION 5

**ECLIPSE** 111 E THIRD ST, SUITE 208  
surveying FIFE, CO 81630  
970-625-3048

SOUTH PARACHUTE LOOP  
RIFLE SYSTEM

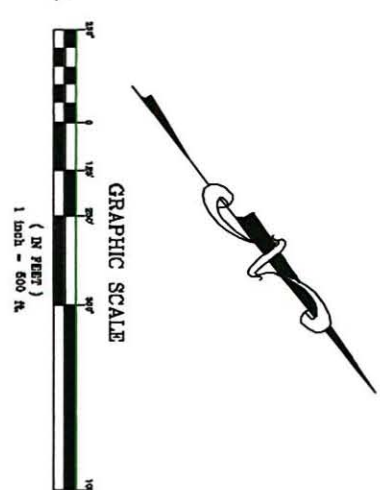
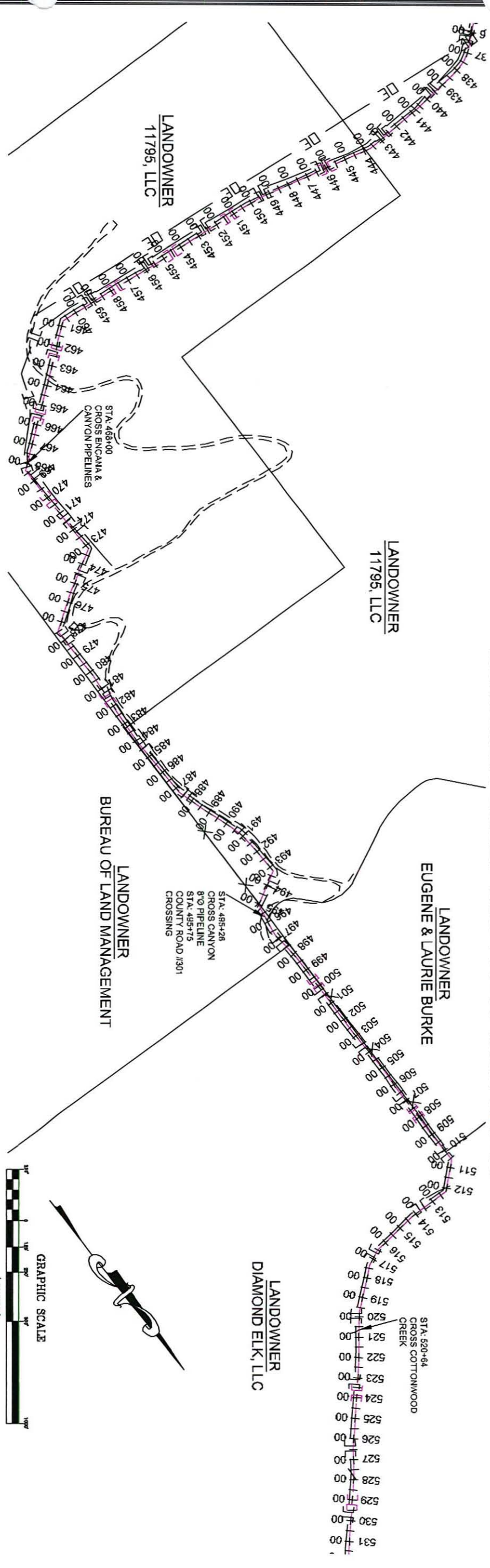
ETC CANYON PIPELINE, LLC  
1600 BROADWAY, SUITE 1900  
DENVER, CO 80202

FILE/ALIGN.BIT  
GDT.LWK  
DCL.JWB  
DATE: 1/11/08  
PROJECT NO.  
**0704**  
SHEET 8  
OF 10



# SOUTH PARACHUTE LOOP

## ALIGNMENT SHEET STA 444+00 THUR 518+00



STATION	ELEVATION
444+00	6589.6
445+00	6602.3
446+00	6609.9
447+00	6616.7
448+00	6623.4
449+00	6628.4
450+00	6630.9
451+00	6631.4
452+00	6631.9
453+00	6632.5
454+00	6633.5
455+00	6633.7
456+00	6632.3
457+00	6628.2
458+00	6624.0
459+00	6625.8
460+00	6627.6
461+00	6630.2
462+00	6634.1
463+00	6637.5
464+00	6634.0
465+00	6630.9
466+00	6631.3
467+00	6632.5
468+00	6634.5
469+00	6634.7
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472+00	6630.7
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487+00	6591.5
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496+00	6519.9
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590+00	6025.2
591+00	6013.7
592+00	6005.3

ETC CANYON PIPELINE, LLC  
1600 BROADWAY, SUITE 1900  
DENVER, CO 80202

SOUTH PARACHUTE LOOP  
RIFLE SYSTEM

**ECLIPSE** surveying  
111 E THIRD ST, SUITE 208  
RIFFLE, CO 81650  
870-625-3048

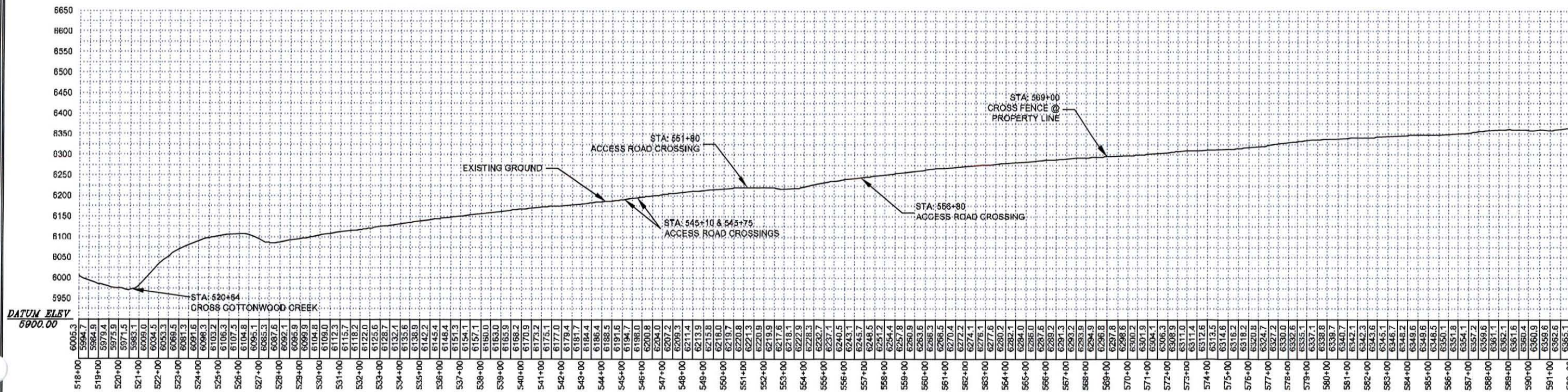
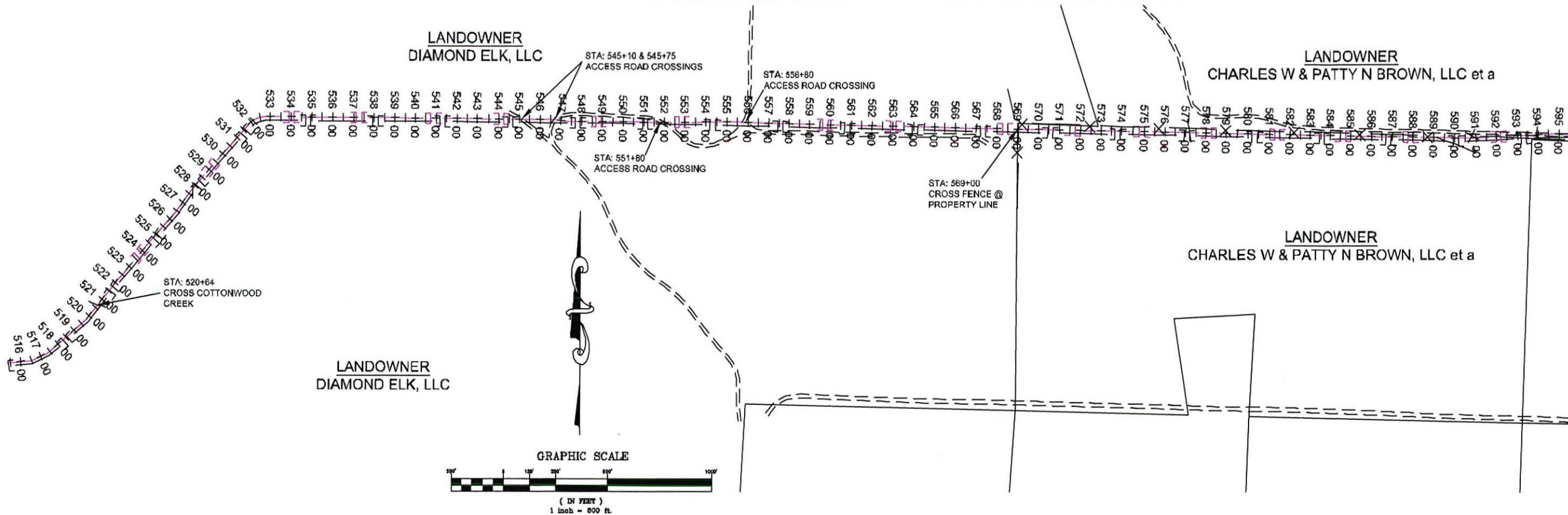
REVISION 1
REVISION 2
REVISION 3
REVISION 4
REVISION 5

PROJECT NO.  
**0704**  
SHEET 7  
OF 10



# SOUTH PARACHUTE LOOP

## ALIGNMENT SHEET STA 518+00 THRU 592+00



STATION	ELEVATION
518+00	6005.3
519+00	5994.7
520+00	5984.9
521+00	5979.4
522+00	5975.9
523+00	5971.5
524+00	5963.1
525+00	6009.0
526+00	6034.5
527+00	6053.3
528+00	6069.5
529+00	6081.3
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533+00	6106.3
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544+00	6115.7
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622+00	6308.9
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652+00	6361.1
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654+00	6360.4
655+00	6360.9
656+00	6359.6
657+00	6362.6
658+00	6365.1

REVISION 1
REVISION 2
REVISION 3
REVISION 4
REVISION 5

11 E. THIRD ST., SUITE 208  
 RIFLE, CO 81650  
**ECLIPSE**  
 surveying  
 970-625-3048

SOUTH PARACHUTE LOOP  
 RIFLE SYSTEM

ETC CANYON PIPELINE, LLC  
 1600 BROADWAY, SUITE 1900  
 DENVER, CO 80202

DATE: 1/31/08  
 PROJECT NO.  
**0704**  
 SHEET 8  
 OF 10



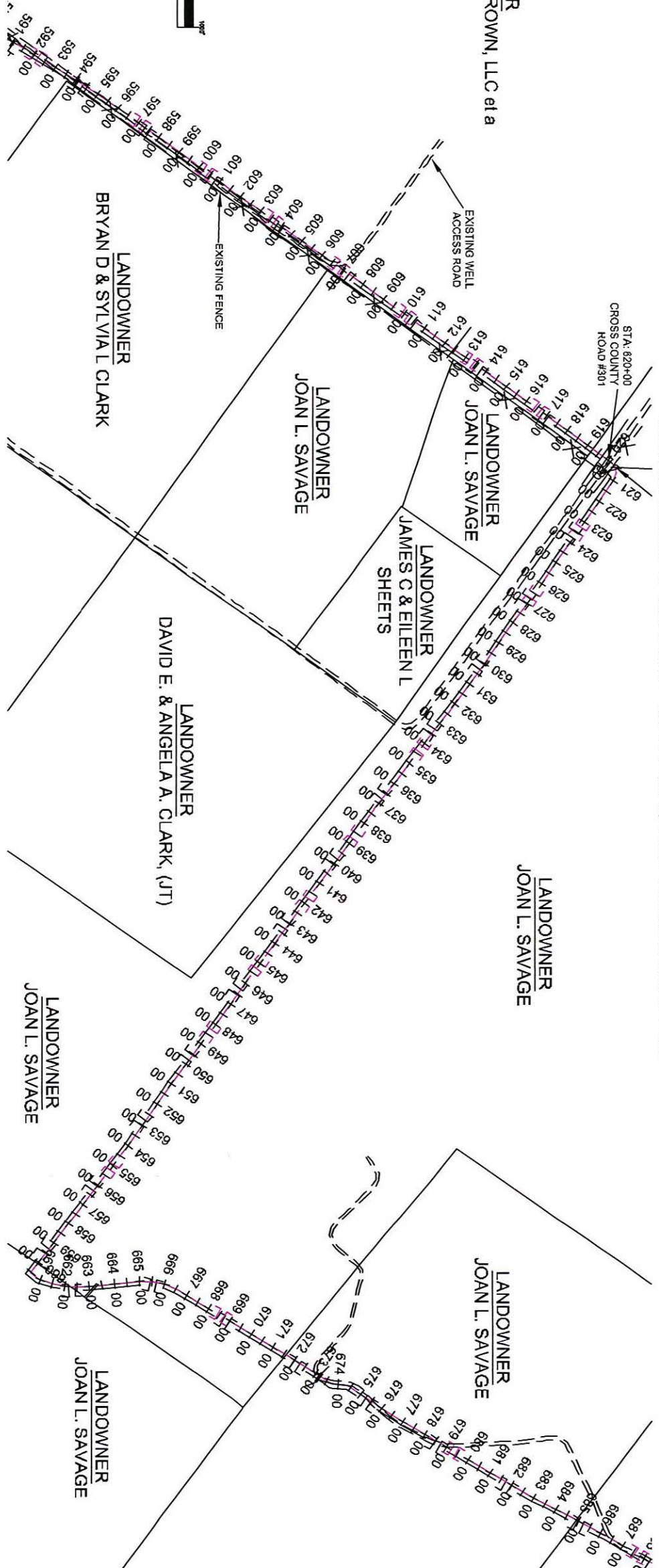
# SOUTH PARACHUTE LOOP ALIGNMENT SHEET STA 592+00 THUR 666+00

LANDOWNER  
CHARLES W & PATTY N BROWN, LLC et al

LANDOWNER  
JOAN L. SAVAGE

LANDOWNER  
JOAN L. SAVAGE

REVISION 1
REVISION 2
REVISION 3
REVISION 4
REVISION 5



STATION	DATA/ELEV
592+00	6365.1
593+00	6367.1
594+00	6370.5
595+00	6372.0
596+00	6373.6
597+00	6374.3
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ETC CANYON PIPELINE, LLC  
1600 BROADWAY, SUITE 1900  
DENVER, CO 80202

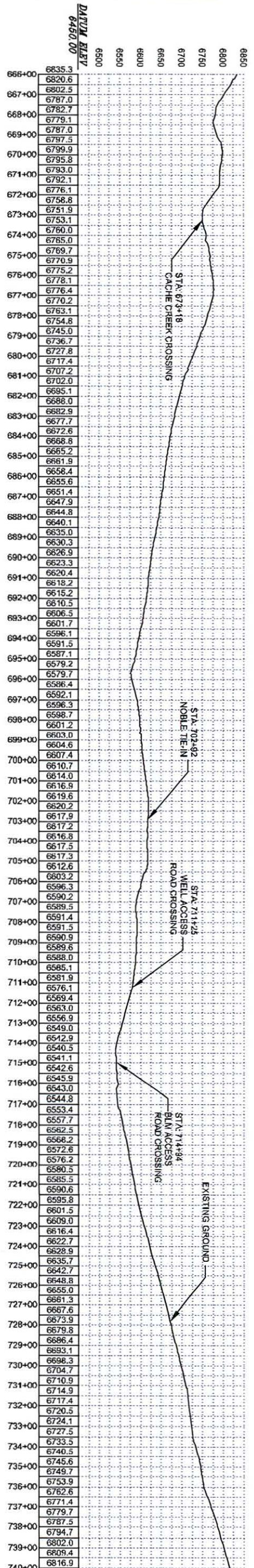
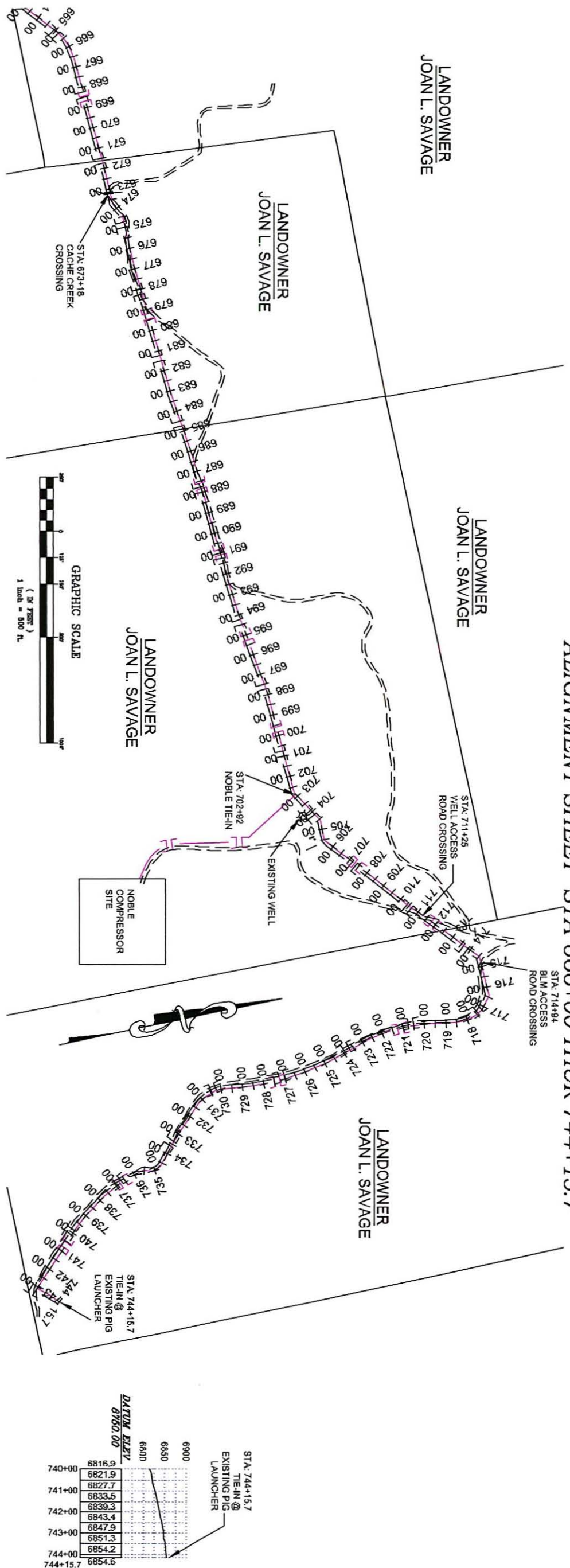
SOUTH PARACHUTE LOOP  
RIFLE SYSTEM

**ECLIPSE** 11 E THIRD ST, SUITE 208  
surveying RIFE, CO 81650  
970-625-3048

FILE/ALIGN SH1  
DATE/1/31/08  
PROJECT NO.  
0704  
SHEET 8  
OF 10



# SOUTH PARACHUTE LOOP ALIGNMENT SHEET STA 666+00 THUR 744+15.7



**DATUM ELEV. 6760.00**

STATION	ELEVATION
740+00	6816.9
741+00	6821.9
742+00	6827.7
743+00	6833.5
744+00	6839.3
745+00	6843.4
746+00	6847.9
747+00	6851.3
748+00	6854.2
749+00	6854.6



ENERGY TRANSFER

# CONSTRUCTION SPECIFICATION FOR LAND PIPELINE CONSTRUCTION

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# CONSTRUCTION SPECIFICATION FOR LAND PIPELINE CONSTRUCTION

Specification Title: <b>General Conditions</b>			
Specification No. <b>LP-01</b>	Issue Date: <b>May 27<sup>th</sup> 2005</b>	Revision Date: <b>8/24/2004</b>	Page <b>2 of 7</b>

## 1. INTRODUCTION

This document contains Company's Construction Specification, hereinafter referred to as "Specification", to be utilized during the fabrication and/or installation of pipelines and/or facilities for COMPANY. The Specification describes requirements for the fabrication, testing, painting, coating, handling, transportation and installation of pipelines and related facilities. The directions, provisions and requirements of this Specification pertain to the Scope of Work. However, this Specification is general in nature and is intended to cover many of Company's similar construction projects.

Local, State and Federal regulations, ordinances, statutes or codes shall govern where compliance is mandatory. Requirements, however, of this Specification shall apply when they are more exacting or do not conflict with such regulations, ordinances, statutes or codes.

## 2. INTENT OF SPECIFICATIONS

Adherence to the Specification is not intended to relieve Contractor of the responsibility to perform the Scope of Work as an independent contractor in accordance with all applicable governmental and regulatory requirements.

All references to codes, standards or other specifications shall be construed to be the most current issue in effect at the time the Contract is executed, and shall be considered as being a part of this Specification.

## 3. SAFETY

The Contractor shall take all reasonable precautions to ensure that labor employed by it and its subcontractors on the rights-of-way or premises of the Company comply with the Company's Safety and Health Handbook and the Contractors' Safety Program. The Company shall furnish the Contractor copies of the Safety and Health Handbook before the Contractor commences its field Work.

## 4. CONTROL OF THE WORK

### 4.1. Authority of the Company Representative

4.1.1. The Company Representative shall have the right to inspect all Work to the end that the results contracted for will be attained, but they shall not have the right to direct or supervise the details of said Work. The Contractor, being an "Independent Contractor", shall have full power and authority to



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select the means, methods, and manner of performing the Work. The Work shall be done to the satisfaction of the Company Representative and in accordance with the Contract, Drawings and Specifications.

- 4.1.2. The Company Representative will decide all questions which may arise as to the quality or acceptability of materials furnished and the Work performed, the manner or performance and the rate of progress of the Work and the interpretations of the Drawings and Specifications.

### 5. INSPECTION

No work shall be done nor material used without approval by the Company's Representative. The Contractor shall furnish the Company's Representative with every reasonable facility for ascertaining whether or not the Work performed is in accordance with the requirements and the intent of the Specifications and Contract including QA & QC equipment. If the Company Representative so requests, the Contractor shall, at Contractor expense, at any time before acceptance of the Work, remove or uncover such portions of the finished Work as may be directed. After examination, the Contractor shall restore said portion of the Work to the standard required by the Specifications.

### 6. CONTROL OF MATERIALS

#### 6.1. Quality of Materials

- 6.1.1. Material not furnished by the Company shall be new and approved by the Company's Representative. If the sources of supply do not furnish a uniform product or if the product proves unacceptable at any time, the Contractor shall furnish approved material from other sources.
- 6.1.2. No materials shall be used in the Work which have in any way become unfit for use after acceptance.
- 6.1.3. When one material is specified by name and "or equal to" is written thereafter, the material mentioned by name is the material desired. If the Contractor desires to use another material in lieu thereof, approval of the Company Representative shall be obtained before making the substitution.
- 6.1.4. Whenever the words "approved by" or "satisfactory to" or similar phrases are used in this Specification, they shall be understood to mean that the item



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or material referred to shall be approved by and be satisfactory to the Company Representative.

### 6.2. Handling Material

- 6.2.1. All pipe, valves, fittings and accessories shall be loaded and unloaded by lifting with slings, hoists or other means to avoid shock or damage.
- 6.2.2. Equipment which comes in contact with pipe surfaces, especially thin film coated pipe, shall be padded with rubber, Teflon, neoprene or equal, to eliminate any pipe contact with metal or other hard surfaces. Sling hooks used to unload or move pipe shall be lined with neoprene or material similar to the pipe being moved to avoid damage to beveled ends. Padding and hooks are to be approved by the Company Representative.
- 6.2.3. The Contractor shall dispose of banding material and dunnage from rail cars or other carriers in a manner acceptable to the Company, and shall clean-up unloading areas to the Company's satisfaction.

### 6.3. Storing Material

- 6.3.1. Materials shall be stored to preserve their quality and fitness for the Work.
- 6.3.2. The interior of all pipe fittings and other accessories shall be kept free from dirt and foreign matter at all times. Valves and accessories shall be drained and stored in a manner which will protect them from damage from freezing.

### 6.4. Defective Material

All materials not conforming to the requirements of this Specification shall be rejected and shall be removed immediately from the site of the Work unless permitted to remain by the Company Representative. Rejected materials, the defects of which have been subsequently corrected, shall have the status of new material once approved by the Company Representative.

### 6.5. Issuing Material to Contractor

Company-furnished material for the project will be issued by the Company to the Contractor's authorized representative who shall acknowledge, in writing, the receipt of the material and shall be responsible for all such material thereafter.



## CONSTRUCTION SPECIFICATION FOR LAND PIPELINE CONSTRUCTION

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### **7. MANUFACTURER'S DIRECTIONS**

All manufactured articles, material, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned as directed by the manufacturer, unless herein specified to the contrary.

### **8. RESPONSIBILITY REGARDING EXISTING UTILITIES OR STRUCTURES**

When Company performs preconstruction survey Company will make every effort to locate all structures (aboveground or underground) during survey and the locations of such structures identified by Company will be shown on the construction drawings. It is the responsibility of the Contractor to make regional "ONE CALL" notification and to investigate and verify the existence and location of all structures whether or not they have been identified by Company. Excavation in the vicinity of existing structures shall be carefully done by hand, by hydro vacuum, or as required by owner/operator of existing structure. The Contractor shall be responsible for protection of and for all damages to existing utilities, pipelines, and structures. Whether Work is preformed on time and material basis or lump sum contract, Contractor is responsible for all cost to repair damages to any structure.

### **9. TOOLS AND EQUIPMENT**

If, at any time during the progress of the Work, tools or equipment appear to the Company's Representative to be insufficient, or inappropriate to secure the quality of work required or at the proper rate of progress, the Company's Representative may request that the Contractor improve the character, augment the number, or substitute new tools or equipment to the satisfaction of the Company.

### **10. MEASUREMENT OF QUANTITIES**

The quantities of Work performed will be computed by the Contractor on the basis of measurements taken by the Company Representative or their assistants.

### **11. COORDINATION OF SPECIFICATIONS AND DRAWINGS**

This Specification, the Drawings, Special Provisions and all supplemental documents are essential parts of the Contract, and a requirement appearing in one is as binding as though appearing in all. In case of discrepancy, figured or field verified dimensions shall govern over scaled dimensions, Drawings shall govern over Specifications, Special Provisions shall govern over both Specifications and Drawings.



## CONSTRUCTION SPECIFICATION FOR LAND PIPELINE CONSTRUCTION

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### 12. DRAWING MATERIAL LISTS

The material lists on Drawings are not intended to be binding for the quantities of materials to be furnished and installed by the Contractor. The material lists are not necessarily complete and are intended to be used as a guide and a method of clarifying details on the drawings by means of item numbers. Contractor shall check all quantities by making its own material take-offs; and should bear in mind that it is to perform and complete all Work represented on the Drawings, and supplemented by material lists and Specifications, in accordance with accepted practices of the construction industry.

### 13. RULES AND PERMITS

Permits and licenses of a temporary nature necessary for the prosecution of the Work shall be secured by the Contractor. The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the Work as drawn and specified. Where the Specifications or the Drawings conflict with local conditions, or city, county, or state ordinances, the Contractor shall notify the Company Representative in writing, who shall then notify the Contractor in writing of the approved changes to resolve the issue.

### 14. INSTALLATION OF TEST LEADS

The Contractor shall install test leads, in accordance with the Drawings, to the pipeline by the Cadweld Thermit Process in locations shown on the Drawings and at such other locations as may be specified by the Company.

- 14.1. Each test lead wire must be connected to the pipeline so as to remain mechanically secure and electrically conductive after backfilling is completed.
- 14.2. Large diameter test leads will be attached using the "crows foot" or three-point attachment. Other test leads may be attached using a single weld.
- 14.3. Test leads shall be attached using a 15-gram thermit weld charge.
- 14.4. Each test lead wire must be attached to the pipeline so as to minimize stress concentration on the pipe.
- 14.5. Only one thermit charge will be placed in the welding mold for any single weld.
- 14.6. When more than one test lead is to be attached, they shall be installed a minimum of 6 in. apart.



## CONSTRUCTION SPECIFICATION FOR LAND PIPELINE CONSTRUCTION

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- 14.7. All bared test lead and bared metallic area at the point of connection to the pipeline must be coated with an electrical insulating material compatible with the pipe coating and the insulation on the wire. Any additional stripped copper wire shall be taped with electrical vulcanizing tape and vinyl electrical tape.



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# CONSTRUCTION SPECIFICATION FOR LAND PIPELINE CONSTRUCTION

Specification Title: Survey			
Specification No. LP-02	Issue Date: May 27 <sup>th</sup> 2005	Revision Date:	Page 1 of 2

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# CONSTRUCTION SPECIFICATION FOR LAND PIPELINE CONSTRUCTION

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Specification No. <b>LP-02</b>	Issue Date: <b>May 27<sup>th</sup> 2005</b>	Revision Date:	Page <b>2 of 2</b>

## 1. SURVEY

- 1.1. The Company will stake the location of the centerline of the proposed pipeline with stakes at approximately 200-foot intervals or other intervals as required by the specific project. Each stake will be marked with a station number and/or survey information for progress reporting and installation purposes. Contractor will reimburse Company for the cost of replacing any stakes disturbed by the Contractor's construction operations.
- 1.2. Where the pipeline is to be installed parallel to an existing pipeline or pipelines, Contractor shall stake the centerline of the closest existing pipeline at intervals not in excess of 100 ft or as required by paralleling pipeline company or ROW conditions..
- 1.3. At the Company's discretion, the Contractor shall not place spoil over existing lines until warning tape is in place at natural grade.
- 1.4. The Company will stake, as necessary, the limits of the construction right-of-way limits, any temporary extra work spaces, staging areas, corners of sites for valve settings, meter stations, compressor/pump stations, scraper traps, other above ground piping and environmental concerns. These stakes shall not be removed until the commencement of respective "Clean up and Restoration" activities. Contractor will reimburse Company for the cost of replacing any stakes disturbed by the Contractor's construction operations.
- 1.5. Company staked property corners will establish dimensional control points for Contractor's installation of fabricated assemblies. Contractor shall perform all other field survey work necessary for the installation of valve settings, meter stations, compressor/pump stations, scraper traps and associated piping. The Contractor shall verify all grades, lines, levels and dimensions as shown on the drawings, and shall report any errors or inconsistencies to the Company.
- 1.6. The Company requires that all construction as-built surveys be conducted after the pipe is lowered into the ditch. To assist in this as-built, Contractor shall remove centerline stakes directly ahead of the trenching operation and relocate them to the outside edge of the construction right-of-way for future reference. These stakes shall not be disturbed until the contractor's cleanup operation removes them. Contractor shall allow adequate time for as-built survey prior to backfilling.

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# CONSTRUCTION SPECIFICATION FOR LAND PIPELINE CONSTRUCTION

Specification Title: <b>Fencing</b>			
Specification No. <b>LP-03</b>	Issue Date: <b>May 27<sup>th</sup> 2005</b>	Revision Date:	Page <b>1 of 8</b>

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# CONSTRUCTION SPECIFICATION FOR LAND PIPELINE CONSTRUCTION

Specification Title: <b>Fencing</b>			
Specification No. <b>LP-03</b>	Issue Date: <b>May 27<sup>th</sup> 2005</b>	Revision Date:	Page <b>2 of 8</b>

## 1. GENERAL

The Contractor shall, before proceeding with the cutting of fences, installation of gates or gaps, clearing or any other right-of-way work, ascertain the staked location of the line from the Company.

### 1.1. Construction

The Contractor, having first ascertained from the Company that permission has been secured from the property owner, shall install gate or gap in every fence at the point of intersection of the proposed pipeline, for access to land crossed by the pipeline, and for passage of construction equipment. Before cutting the fences to make these gates or gaps, the Contractor shall install an H brace in accordance with Drawing No. 02-STD-ONSHR-29-035, or other brace as described in the line list, in order to prevent damages to fences. Gates shall be constructed so that they can be securely closed. Where necessary during construction, the Contractor shall furnish a watchman to maintain these gates to prevent livestock from entering or leaving the property and shall furnish watchmen in any other instance where required by the Company. Contractor will provide chains and locks for each gate located on a public access road or between different landowners, if required by Company. These gates will be locked each night at the close of the workday.

### 1.2. Property Owner Notices

The Contractor shall not remove or take down fences or open gates or construct gates or gaps without first notifying the respective property owner, tenant or occupiers. The Contractor shall use only roads that are designated and approved by the Company. Upon completion of the work, Contractor shall returned all roads used to their original or better condition. All fences shall be replaced by the Contractor in accordance with Drawing No. 02-STD-ONSHR-29-034 with workmanship which equals or exceeds existing fence.

### 1.3. Untreated Posts

The Contractor shall not use untreated fence posts, or posts of lesser size and quality than that of the existing fence being permanently replaced.

### 1.4. Marker Posts

The Contractor shall replace any existing marker post located in original fences on existing or adjacent right-of-way which are damaged or removed due to the Work.



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## CONSTRUCTION SPECIFICATION FOR LAND PIPELINE CONSTRUCTION

Specification Title: Fencing			
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### 1.5. Hedges

Gaps in hedges shall be permanently closed to the satisfaction of the Company and or Landowner.

## 2. CHAIN LINK FENCING

### 2.1. Scope

This Part governs all chain link fencing to be installed where indicated on the Drawings.

### 2.2. Materials

2.2.1. Posts, post tops, rails, gates, frames, braces, barb arms, and all accessories shall conform to ASTM A-120, ASTM A-123, or ASTM A-702. Barbed wire shall conform to ASTM A-121 and chain link fabric to ASTM A-392. All shall be hot-dip galvanized and shall withstand 12 one-minute immersions when tested in accordance with ASTM A-239.

2.2.2. Fabric shall be minimum No. 9 ASW gage steel wire, woven in a 2-in. pattern. The top of the fabric shall be knuckled and the bottom barbed and shall conform to ASTM A-392.

2.2.3. Barbed wire shall be 2-strand, 4-point barbed wire. Main strands shall not be smaller than No. 12½-gage steel wire and barbs not less than No. 14-gage steel wire. The barbs shall be round and not over 5 in. apart. The wire shall be hot-dip galvanized and shall conform to ASTM A-121.

#### 2.2.4. Posts

2.2.4.1. Line posts shall be pipe not less than 2¾ in. O.D., 3.65 lbs./ft.

2.2.4.2. Terminal, end, corner, pull and brace posts shall be pipe not less than 3½ in. O.D., 7.58 lbs./ft.

2.2.4.3. Gate posts (single) less than 13 ft. shall be pipe not less than 4½ in. O.D., 10.79 lbs./ft.

2.2.5. Top rails shall be pipe not less than 1⅝ in. O.D., 2.27 lbs./ft.

2.2.6. Braces shall be pipe not less than 1⅝ in O.D., 2.27 lbs./ft.



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## CONSTRUCTION SPECIFICATION FOR LAND PIPELINE CONSTRUCTION

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Gates shall have frames of not less than 2 in. welded pipe weighing not less than 2.72 lbs./ft., and frames shall have  $\frac{3}{8}$  in. round cross bracing.

- 2.2.7. Hinges shall be ball and socket type; one hinge shall be strong enough to carry the vertical load. Fabric shall be the same as specifies above.
- 2.2.8. All posts shall be fitted with heavy malleable iron or pressed steel tops. Bases of the post tops shall have flanges around the outside of the posts. Post tops for 6-ft. fences shall be barb arms with a minimum of three strands of barbed wire.
- 2.2.9. The top rail shall pass through the base of the line post tops and form a continuous brace from end to end of each run of fence. Couplings shall be outside sleeved type and at least 7-in. long; one coupling in every five shall contain a heavy spring to take up expansion and contraction of the top rail.
- 2.2.10. Bottom tension wire shall be a minimum of No. 7 gage spring coil wire.

### 2.3. Construction

- 2.3.1. The fence line shall be cleared 2 ft. on each side of the center line so that the fence can conform the ground contour. The fence shall be erected to the height shown on the Drawings so that the finished fence is plumb, taut, true to line and grade, and complete in all details. The bottom of the fence shall be placed 1 inch above the ground line, posts shall be spaced not over 10 ft. on centers and set in a concrete footing 9 in. in diameter and 36 in. deep.
- 2.3.2. The fence shall be staked down where required.
- 2.3.3. Barbed wire shall be installed at the top of fences. Barb arms shall be installed to extend to the outside of the fence.
- 2.3.4. All fences shall be erected with standard chainlink stretching equipment.
- 2.3.5. After the fence is erected, all holes from stumps, old posts and rocks shall be filled and properly tamped. New fences shall be connected to existing fences as shown on Drawings.



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### 3. PERMANENT BARBED WIRE FENCING

#### 3.1. Scope

This Part governs all barbed-wire fencing to be installed where indicated on the Drawings.

#### 3.2. Materials

##### 3.2.1. Posts – Specifications

3.2.1.1. Metal posts shall be steel, in “Tee”, Channel, “U” or “Y” shapes, with anchor plates conforming to ASTM A-702, painted or galvanized, and complete with 5 wire fasteners (suitable for attaching wire to the posts) with each post.

3.2.1.2. Wood posts shall be pressure tested with either No. 1 creosote, minimum 8 lbs./ft.<sup>3</sup> or C.C.A. minimum 0.60 lb./ft.<sup>3</sup>

##### 3.2.2. Posts – General

3.2.2.1. Line posts may be either steel or treated wood as specified above, or a combination of the same, as follows:

- Steel “U”, “Y” or “T” shape 7 ft. long, 1.43 lb./ft. (9.98 lbs. each).
- Treated wood, minimum 4 inch diameter by 7 ft. long.

3.2.2.2. Terminal posts, end, corner, pull and gate posts shall be treated wood, minimum 6-in. diameter by 8 ft. long.

3.2.2.3. Braces shall be treated wood, minimum 4-in. diameter.

3.2.3. Staples shall be galvanized from No. 9 wire, 1½ in. long.

3.2.4. Barbed wire shall be 2-strand, 4-point barbed wire. Main strands shall not be smaller than No. 12½ gage steel wire and barbs of not less than No. 14 A.S.H. gage steel wire. The barbs shall be round and not over 5 in. apart. The wire shall be hot-dip galvanized and shall conform to ASTM A-121.



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3.2.5. Wire fasteners shall be from zinc-coated wire, minimum 0.120 in., in accordance with ASTM A-702 and ASTM A-641.

### 3.3. Construction

3.3.1. The fence line shall be cleared 2 ft. each side of the center line so that the fence can conform to the ground contour. The fence shall be erected as shown on the Drawings so that the finished fence is plumb, taut, true to line and grade and complete in every detail. The fence shall be 48 in. high with five lines of wire spaced approximately 10 in. apart.

3.3.2. Posts shall be set firmly so that an erect position will be maintained. A small amount of soil shall be backfilled at a time and well tamped before more backfill is added. Line posts shall extend 34 in. into the ground.

3.3.3. End posts and cornerposts shall be braced as shown on the Drawings. Corner and brace posts shall extend 40 in. into the ground. Struts and ties shall be securely fastened to the posts at the ground line and from 6 to 12 in. below the top of the posts. Struts shall be not less than 4 in. in diameter; ties shall be three double strands of wire not smaller than No. 12 gage.

3.3.4. Staples shall be driven diagonally to the grain to avoid splitting the wood. They shall be set to hold the wire securely but shall not be buried in the post. The fence shall be fastened to the post in a manner with will allow for contraction and expansion.

3.3.5. Line posts shall be spaced a maximum of 10 ft. apart and set so that the appearance of the fence will not be marred by posts at different heights and spacing.

3.3.6. Splices should be made at the brace or pull posts.

3.3.7. The fence shall be stretched to produce enough tension to cause wire to feel springy to the touch. Overstretching shall not be permitted. Wire shall not be stretched around a corner, which changes the direction of the fence line more than 45°; instead, the fence shall be cut and wired to the post.



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### 4. HOG AND BARBED WIRE FENCING

#### 4.1. Scope of Work

This Part governs all hog wire and barbed wire fencing to be installed where indicated on the Drawings.

#### 4.2. Materials

4.2.1. Barbed wire shall be 2-strand, 4-point barbed wire. Main strands shall not be smaller than No. 12½ gage steel wire and barbs of not less than No. 14 A.S.H. gage steel wire. The barbs shall be round and not over 5 in. apart. The wire shall be hot-dip galvanized and shall conform to ASTM A-121.

4.2.2. Hog wire shall be galvanized woven wire with minimum No. 9 gage top and bottom wires and minimum No. 11 gage intermediate line and stay wires complete with tension curves and shall conform to ASTM A-116.

#### 4.2.3. Posts – Specifications

4.2.3.1. Metal posts shall be steel in “Tee”, channel or “U” and “Y” shapes conforming to ASTM A-702 painted or galvanized, and complete with 5 wire fasteners per post.

4.2.3.2. Wood posts shall be pressure treated with either No. 1 creosote, minimum 8 lbs./ft.<sup>3</sup> or C.C.A. minimum 0.60 lb./ft.<sup>3</sup>

#### 4.2.4. Posts – General

4.2.4.1. Line posts may be either steel or treated wood or a combination of same as follows: Steel “U”, “Y” or “T” shape 8 ft. long - 1.43 lbs./ft. (11.44 lbs. each) complete with 5 wire fasteners (suitable for attaching wire to the posts) with each post. Treated wood, minimum 4-in. diameter by 8 ft. long.

4.2.4.2. Terminal posts, end, corner, pull and gate posts shall be treated wood minimum 6-in. diameter by 8 ft. long.

4.2.4.3. Braces shall be treated wood minimum 4-in. diameter.

4.2.5. Staples shall be galvanized, from No. 9 wire, 1½ in. long.



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4.2.6. Wire fasteners shall be from zinc-coated wire, minimum 0.120 in., in accordance with ASTM A-702 and ASTM A-641.

### 4.3. Construction

4.3.1. The fence line shall be cleared 2 ft. on each side of the center line so that the fence can conform to the ground contour. The fence shall be erected as shown on the Drawings so that the finished fence is plumb, taut, true to line and grade and complete in all details. The fence shall be 5 ft. 0 in. high with spacing or wire as shown on the Drawings.

4.3.2. Posts shall be set firmly so that an erect position will be maintained. A small amount of soil shall be backfilled at a time and well tamped before more is added. Line posts shall extend 34 in. into the ground.

4.3.3. End posts and corner posts shall be braced as shown on the drawings. Corner and brace posts shall extend 40 in. into the ground. Struts and ties shall be securely fastened to the posts at the ground line and from 6 to 12 in. below the top of the posts. Struts shall be not less than 4 in. in diameter; ties shall be 3 double strands of wire not smaller than No. 12 gage.

4.3.4. Staples shall be driven diagonally to the grain to avoid splitting the wood. They shall be set to hold the wire securely but shall not be buried in the posts. The fence shall be fastened to the post in a manner which will allow for contraction and expansion.

4.3.5. Line posts shall be spaced a maximum of 10 ft. apart and set so that the appearance of the fence will not be marred by posts of different heights and spacing.

4.3.6. Splices should be made at the brace or pull posts.

4.3.7. The fence shall be stretched to produce enough tension to cause wire to feel springy to the touch. Hog wire shall be stretched until the tension curves are about half straightened out. Overstretching shall not be permitted. Wire shall not be stretched around a corner that changes the direction of the fence line more than 45°; instead, the fence it shall be cut and wired to the post.

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# CONSTRUCTION SPECIFICATION FOR LAND PIPELINE CONSTRUCTION

Specification Title: <b>Clearing &amp; Grading</b>			
Specification No. <b>LP-04</b>	Issue Date: <b>May 27<sup>th</sup> 2005</b>	Revision Date:	Page <b>1 of 4</b>

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### 1. DEFINITIONS

For the purposes hereof, the right-of-way shall be a strip of land, width as detailed on the Drawings and the Right-of-Way Line List. All of the Contractor's operations shall be confined within such applicable widths on each respective tract as designated under the "Remarks and Special Provisions" column of the Line List and shall be controlling and binding upon the Contractor.

### 2. ONE CALL NOTIFICATION

It shall be the Contractor's responsibility to use the local area's ONE CALL system prior to commencing construction in accordance with the regional requirements. Contractor shall keep a log of date, time, contact person name, and description of conversations of all phone conversations and meetings.

### 3. CLEARING RIGHT-OF-WAY

#### 3.1. Limitations

Before clearing operations are started, the Contractor shall be familiar and comply with all special provisions included in the Company provided Right-of-Way Line List and environmental construction requirements.

#### 3.2. Brush and Timber

Brush and timber encountered on the right-of-way shall be cleared to a width not exceeding the construction right-of-way width. Large trees shall not be damaged or destroyed unless they are directly on the ditch line or they are near enough to be a menace to operation and maintenance of the pipeline. Restrictions in right-of-way agreements prohibiting the cutting or damaging of certain trees shall be made known to Contractor and Contractor shall conduct its work in such a manner as to avoid damaging these trees. Contractor will mark these trees in a manner that his own personnel will know to avoid removal or damage to the trees. Trees that will be ultimately left remaining on the right of way shall be cut or trimmed utilizing the proper tree trimming saws. Excavating equipment shall not be utilized to break off limbs and branches, therefore causing excessive damage to trees. Costs incurred by Company by the damage or removal of any trees will be reimbursed by Contractor including any punitive damages which may be assessed as a result of the unauthorized damage or removal of the tree.



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All brush, timber, stumps, overhanging limbs and slash shall be disposed of by the Contractor in accordance with all applicable permits, state and local regulations, and right-of-way Special Provisions. The Contractor shall cut merchantable timber into lengths as directed by the Company and shall neatly stack it along the right-of-way for disposition by the landowner. The Contractor shall have the right to use unmerchantable timber cut from the right-of-way as necessary to perform the Work, unless otherwise noted in the Line List Instructions or other permits.

### 3.3. Utility Poles and Related Facilities

Where telephone or utility company power poles interfere with the safe ingress and egress of vehicles and equipment during construction, the Contractor shall take appropriate action with the facility owner/operator's approval.

The Contractor shall make all necessary arrangements for the relocation and preservation of such facilities during construction, if required and with the written authorization of the utility company.

## 4. GRADING

The Contractor shall grade as necessary to mitigate the necessity of abrupt over-bends or sag-bends. Contractor shall minimize the grading where practical to prevent unnecessary disturbance and minimize work required to return the right-of-way to its original elevations, slopes, and profile as closely as practical, but consistent with minimizing abrupt over-bends and sag-bends. Graded subsoil materials shall be stockpiled so it can be returned to its original depth and location as opposed to spread along the right-of-way. The Contractor shall grub, or otherwise remove and dispose of, all stumps, roots and debris found to be in the way of construction within permanent right-of-way limits.

The requirements of Company's Storm Water Pollution Prevention Plan (SWPPP) will apply to all erosion control operations. Water breakers will be installed on the right of way during grading operations that will minimize erosion of the right of way. Temporary interceptor dikes will be installed immediately following initial grading on all slopes greater than 5% and adjacent to intermediate streams

When the Contractor is cutting grade along or across existing pipelines, spoil or mats shall be placed over the existing lines per the requirements of the Operating Company of the foreign pipeline.

For areas excavated by the grading operation, Contractor shall remove separately the topsoil to its actual depth and shall replace the topsoil over the backfilled area upon completion.



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### 5. DAMAGES

Contractor shall repair immediately any damage to bridges, public roads, private roads, fences, buildings or other property. Contractor is responsible for all costs and for all damages regardless of whether the work is performed in accordance with hourly rate and/or lump sum rates.

### 6. DUST CONTROL

During dry weather, when directed by the Company Representative, Contractor shall sufficiently water the right-of-way to minimize dust as necessary for air quality, welding quality, and coating application purposes.

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# CONSTRUCTION SPECIFICATION FOR LAND PIPELINE CONSTRUCTION

Specification Title: <b>Ditching</b>			
Specification No. <b>LP-05</b>	Issue Date: <b>May 27<sup>th</sup> 2005</b>	Revision Date: <b>8/24/2004</b>	Page <b>1 of 5</b>

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**1. GENERAL**

The Contractor shall employ OSHA approved equipment and methods required to keep the ditch in compliance with the line established by the Company regardless of the type of soil or rock encountered and regardless of the depth of excavation necessary. Contractor shall have a trained and certified "Competent Person" at each site that excavation activities are in progress. Daily excavation inspection reports will be prepared and maintained on site by Contractor's "Competent Person".

**2. FOREIGN LINE AND UTILITY CROSSINGS**

When Company performs preconstruction survey Company will make every effort to locate all structures (aboveground or underground) during survey and the locations of such structures identified by Company will be shown on the construction drawings. It is the responsibility of the Contractor to make regional "ONE CALL" notification and to investigate and verify the existence and location of all structures whether or not they have been identified by Company. Excavation in the vicinity of existing structures shall be carefully done by hand, by hydro vacuum, or as required by owner/operator of existing structure. The Contractor shall be responsible for the protection of and for all damage to existing utilities, pipelines, and structures. Whether Work is performed on time and material basis or lump sum contract, Contractor is responsible for all cost to repair damages to any structure.

A minimum clearance of 12 in., or as required by the owner/operator, shall be maintained from the foreign underground structure crossing.

**3. DITCH SPECIFICATIONS****3.1. Ditch Width and Depth**

3.1.1. Unless otherwise stated on the drawings or right-of-way line list, the ditch shall be a minimum of 12 in. wider than the pipe being installed for pipe diameters less than 12 in. and a minimum of 18 in. wider for pipe diameters 12 in. and greater. Pipe shall be installed at a depth as listed on Company supplied drawings and depth shall be measured from the top of the pipe to the average level of the original or restored ground on the two sides of the ditch whichever is lower.

3.1.2. Contractor may, under certain Special Right of Way conditions, be required to remove separately and conserve the topsoil (Double Ditch). Topsoil shall



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be removed to the depth specified in the scope of work. Topsoil stripping will include the ditchline and backfill area. After the trench has been backfilled, Contractor shall replace the topsoil to the satisfaction of the Company Representative.

### 3.2. Consolidated Rock

Consolidated rock is defined as rock layers where the uppermost surface exists at a higher elevation than the elevation of the top of the pipe. This condition provides protection against damage from external forces and justifies cover.

### 3.3. Ditch Grading

The bottom of the ditch shall be cut to a uniform grade so that the full width of the ditch shall be available for providing slack in the line when installed.

### 3.4. Bend Excavations

At over-bends and side-bends, the Contractor shall excavate the ditch to allow proper clearance between the inside bend of the pipe and the bottom or side of the ditch to maintain the minimum cover.

### 3.5. Rock

In all cases where rock, or any boulder larger than two inches in diameter is encountered in the bottom of the ditch, the ditch shall be evenly padded with soil, sand or other padding material approved by the Company in order to prevent the rock or boulders from coming into contact with the pipe coating.

### 3.6. Drainage Tile

3.6.1. Drain lines across the working side shall be cleaned out to ensure the tile has not been crushed or damaged by construction equipment. The Contractor shall construct the pipeline at such depth at the point of under crossing all drain tiles that no interference shall occur between the repaired section of tile and the pipeline. If drainage tile is damaged during the trenching operations, the locations shall be immediately flagged for repair. The flags shall not be removed until permanent repairs have been inspected and accepted by both the Company Representative and the landowner. Unless otherwise authorized in the line lists or by the Company Representative, temporary repairs shall be made and temporary supports

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installed to maintain serviceability of the drain tiles until the permanent repairs can be made and the tiles properly supported by compacted backfill. Repairs shall be made by cutting tiles back into undamaged sections and replacing damaged sections with tile of equal size and quality, using care to maintain previous gradient.

**4. DIKES, LEVEES, FIREWALLS**

Unless approved by the Company Representative, all dikes, levees, and firewall crossed by pipeline ditch construction shall be bored. If open cutting is approved, the Contractor shall install, maintain and reconstruct any temporary facilities necessary when cutting through existing dikes, levees, fire walls or other control devices crossed by pipeline ditch construction.

**5. SPOIL BANK****5.1. General**

The spoil bank from the ditching operations shall not be placed on any loose debris or foreign matter which might become mixed during padding and backfilling operations.

**5.2. Drainage**

The Contractor shall provide and maintain gaps or openings in the spoil bank across cultivated fields, so that excessive rains do not cause water to back up and flood cultivated sections. Extreme care shall be exercised to keep all drain ditches and water courses open and useful.

**6. TEMPORARY BRIDGES**

When the ditch is excavated through lands where livestock/wildlife is confined or through agricultural fields where the Company determines it is desirable for the landowner or tenant to have a passageway across the ditch, the Contractor shall plug the ditch or provide safe, temporary bridges for crossing the ditch and leave an opening in the spoil bank.





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### 7. EXCAVATING NEAR IN-SERVICE PIPELINES

When ditching parallel to an existing pipeline, care should be taken to leave sufficient distance and support to ensure said line does not slough off into new excavation. If parallel line is a coupled pipeline, Contractor shall obtain a safe excavation procedure from the owner/operator of the coupled pipeline. In all instances, the work should be planned such that the excavation is open a minimum amount of time.

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# CONSTRUCTION SPECIFICATION FOR LAND PIPELINE CONSTRUCTION

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## 1. GENERAL

- 1.1. Blasting for grade or ditch excavation shall be used only with the Company's written permission and after all other reasonable means of excavation have been used and are unsuccessful in achieving the required results.
- 1.2. All blasting shall be done with the Company's Representative present and with their approval on each blast.
- 1.3. Blasters shall be required to be licensed in accordance with all local, state, and federal agencies. Copies of all current licenses will be provided to the Company for review and approval prior to commencing any blasting activities.
- 1.4. Blasters shall also furnish previous work history as evidence of competency in handling explosives and performing the blasting in a safe manner.

## 2. PERMITS AND SAFETY REGULATIONS

The Contractor shall acquire and comply with all permits required for use of explosives and shall enforce all safety rules in their use. Such permits shall include transportation and storage of explosives.

## 3. BLASTING PLAN AND OPERATIONS

- 3.1. The Contractor shall furnish a detailed Blasting Plan to the Company and shall obtain the Company's approval in writing prior to loading any explosive charges. The Blasting Plan shall include the following information:
  - 3.1.1. Explosive type
  - 3.1.2. Delay types and intervals
  - 3.1.3. Initiating methods
  - 3.1.4. Delay pattern
  - 3.1.5. Maximum shot hole depth and diameter
  - 3.1.6. Maximum charge per hole
  - 3.1.7. Maximum charge per delay



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- 3.1.8. Distance to nearest aboveground structure
- 3.1.9. Distance to nearest below ground structure including buried pipelines
- 3.2. Any proposed blast shall be monitored to ensure that the peak particle velocity shall not exceed the specified maximum velocities. Maximum velocities are 4 in./second measured adjacent to an underground pipeline or any aboveground structure.
- 3.3. The frequency caused by the detonation of explosive charge shall not drop below 25 hertz without the review and approval of a blasting plan.
- 3.4. The minimum time delay between the detonation of charges shall be 8 milliseconds.
- 3.5. All blasting activity occurring within 300 ft. of a high pressure lines will require seismological surveillance (peak particle velocity and frequency) for every blast unless otherwise agreed upon following the review of the blasting plan.
- 3.6. Approval of the Blasting Plan by the Company is for safety purposes only. The Contractor shall be responsible for the accuracy or adequacy of the plan for obtaining adequate rock breakage.
- 3.7. Control shall be exercised by the Contractor to prevent damage to underground structures, such as cables, conduits and pipelines, or to springs, water wells and other water courses.
- 3.8. Blasting mats shall be used on all shots to prevent the scattering of loose rock onto adjacent property and to prevent damage to nearby structures and telephone, telegraph, or power lines. Dirt cover over the blast area may be used in lieu of mats if approved by Company's Representative.
- 3.9. Blasting shall not be done until occupants of nearby buildings, stores, residences, places of business, places of public gathering and farmers have been notified by the Contractor sufficiently in advance to protect personnel, property, and livestock.
- 3.10. All blasting operations shall be conducted during daylight hours.
- 3.11. All blasting activity occurring within 100ft. of Company facilities shall require review and approval of the blasting plan by the Company's Pipeline Services Department.



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#### 4. DISPOSAL

The Contractor shall be responsible for the disposal of all rock excavated in the blasting operation.

#### 5. SAFETY

- 5.1. Smoking, firearms, matches, open-flame lamps and other fires, flame or heat-producing devices, and sparks shall be prohibited in or near explosive magazines or while explosives are being handled, transported, or used.
- 5.2. All explosives shall be accounted for at all times. Explosives not being used shall be kept in a locked magazine unavailable to unauthorized personnel. An inventory and use record of all explosives shall be maintained. All the above shall be done by the qualified person responsible for handling blasting operations.
- 5.3. The Contractor shall use every reasonable precaution including, but not limited to, visual and audible warning signals, flags, or barricades to ensure personnel safety.
- 5.4. Warning signs, indicating a blast area, shall be maintained at all approaches to the blast area. The warning sign lettering shall not be less than 4 in. high on a contrasting background.
- 5.5. No loaded holes shall be left unattended or unprotected. All explosives or blasting agents shall be verified as discharged prior to excavation.
- 5.6. Flagmen shall be safely stationed on all roadways which pass through the danger zone so as to stop traffic during blasting operations.

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# CONSTRUCTION SPECIFICATION FOR LAND PIPELINE CONSTRUCTION

Specification Title: <b>Pipe Stringing &amp; Material Handling</b>			
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## CONSTRUCTION SPECIFICATION FOR LAND PIPELINE CONSTRUCTION

Specification Title: <b>Pipe Stringing &amp; Material Handling</b>			
Specification No. <b>LP-07</b>	Issue Date: <b>May 27<sup>th</sup> 2005</b>	Revision Date:	Page <b>2 of 4</b>

### 1. UNLOADING AND RACKING (PIPE AND CASING)

#### 1.1. General

Unless otherwise stated in the Scope of Work, the Contractor shall unload and rack pipe and casing. The Contractor shall furnish any and all permits for unloading and hauling.

#### 1.2. Pipe yards

The Company, at its discretion, will provide storage yards. If necessary, the Contractor shall haul pipe to yards, which are not adjacent to unloading areas in accordance with this Section. The Contractor shall comply with all agreements or special provisions made by the Company with the yard owner. A Company Representative shall be present during tally. The Contractor shall cooperate and assist in obtaining a complete and accurate tally of pipe. The Company shall keep the Contractor informed about movement of pipe, and the Contractor shall unload all pipe promptly.

#### 1.3. Handling or Unloading

The Contractor shall handle all pipe with brass, aluminum or neoprene lined hooks to avoid damage to beveled ends and shall handle all thin film coated pipe with padded hooks, slings, forks, etc. Padding may be rubber, teflon, neoprene or equal to eliminate any pipe contact with truck bolsters or other hard surfaces. All hooks, padding, slings, tie-down lines, etc. shall meet with approval of the Company. Vehicles hauling coated pipe (excluding concrete coated) shall have fenders or other protection to prevent mud and rocks from being thrown upon the pipe, damaging the coating.

#### 1.4. Racking

Pipe shall be racked on padded (rubber tires, celotex board or equal) timber skids or earth berms to keep joint ends clear of the ground and out of water. Earth berms shall be covered with 10 mil polyethylene. Pipe shall not be racked more than six joints or a maximum of ten ft. in height. Bare pipe racked for longer than six months duration shall not be nested but shall have divider strips and 2 x 6 hardwood between tiers. Coated pipe shall be shipped from the mill with a minimum of three full encirclement padding strips (rubber tires, paper board or equal). These strips



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shall be left in place on the rack and during hauling or be replaced by the Contractor. Large diameter weight coated pipe shall not be stacked.

### 1.5. Clean-up

The Contractor shall dispose of all banding material and dunnage from rail cars or other carriers in a manner acceptable to the Company and clean-up the unloading area.

## 2. HAULING AND STRINGING

### 2.1. General

The Contractor shall haul and string pipe, casing and other materials to the right-of-way or work area. The Contractor shall provide all necessary trucks and equipment for the hauling and unloading of all materials

### 2.2. Stringing

The Contractor shall place pipe on skids on the right-of-way in a manner which keeps both ends free of dirt and debris. Thin film coated pipe shall require a padding strip to keep coated pipe from coming in contact with skids. The Contractor shall furnish skids. The Contractor shall furnish padding material (rubber tires, celotex board, sand filled sacks or equal). Earth berms in place of skids shall meet with approval of the Company. Gaps shall be left between adjacent lengths of pipe at suitable intervals and at well-defined trails to permit the free passage of livestock or vehicles during the time interval between stringing and other construction activities

### 2.3. Line Pipe Pups

Contractor shall utilize pipe pups a minimum of 5 diameters for 24 in. OD pipe and greater and a minimum of 10 ft. for pipe less than 24 in. OD.

### 2.4. Surplus pipe

The Contractor shall tally and haul all surplus pipe and casing to a Company designated yard and rack it as directed by the Company Representative.





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### 2.5. Unloading and Storage of Materials, Excluding Pipe, Furnished by the Company

Principal materials that are furnished by the Company will be delivered to the Contractor F.O.B. delivery points or storage lots and warehouses along the route as may be determined by the Company and shown on a "Schedule of Material Deliveries" to be furnished by the Company to the Contractor.

The Contractor shall keep the Company informed of the locations of its unloading gangs so that the Company may place Company Representative at points where the Contractor is unloading materials furnished by the Company. Upon arrival at delivery points, material shall be checked for quantity and condition by representatives of both the Contractor and the Company. The representatives making such check shall make written record of the quantity and condition of the material, and, upon completion, the record shall be signed by both parties. If material is received in a damaged condition, an inspection must be made by an agent of the carrier before unloading or removal of material and a report of the inspection prepared and forwarded to the Company. The Contractor shall unload all materials furnished by the Company promptly upon the arrival of materials at the several stations along the route of said pipeline.

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# CONSTRUCTION SPECIFICATION FOR LAND PIPELINE CONSTRUCTION

Specification Title: <b>Bending &amp; Alignment</b>			
Specification No. <b>LP-08</b>	Issue Date: <b>May 27<sup>th</sup> 2005</b>	Revision Date:	Page <b>1 of 4</b>

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**CONSTRUCTION SPECIFICATION  
FOR LAND PIPELINE CONSTRUCTION**

Specification Title: <b>Bending &amp; Alignment</b>			
Specification No. <b>LP-08</b>	Issue Date: <b>May 27<sup>th</sup> 2005</b>	Revision Date:	Page <b>2 of 4</b>

**BENDING****1.1. Field Bending****1.1.1. General**

The intent of this Specification is to require that field bends shall be made in a manner that shall minimize the distortion of the pipe and shall in no way impair its strength. Where it is necessary to bend pipe, only cold bends shall be employed. The bends shall be free from buckling, flattening, cracks or other evidence of mechanical damage. Particular care shall be taken so that egging of the pipe through the area of bend is such that the difference between the maximum and minimum diameters does not exceed 2.5 % of the nominal diameter. All bends shall meet the criteria set forth in DOT Part 192 or 195, which ever is applicable.

**1.1.2. Slack and Longitudinal Welds**

All over-bends, sags and side-bends shall be made to provide an adequate amount of slack in the pipeline.

On pipe containing a longitudinal weld, the longitudinal seam must be as near as practical to neutral axis of the bend unless the bend is made with an internal bending mandrel or the pipe is 12 in. or less in outside diameter or has a diameter-to-wall thickness ratio less than 70.

**1.1.3. Bending Machine**

Each bend shall be made using a Company approved bending machine having a full circle bending shoe with a neoprene or urethane lining to produce a smooth, symmetrical bend, unless specified otherwise by the Company.

If the pipe is internally coated, the bearing surfaces of the mandrel shall be constructed to avoid permanently marking or damaging the internal coating. No appreciable stretching or thinning of the pipe wall thickness shall be permitted.

**CONSTRUCTION SPECIFICATION  
FOR LAND PIPELINE CONSTRUCTION**

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**1.1.4. Bending Limitation**

Deflection shall be limited to a maximum of one and one-half degrees per pipe diameter measured longitudinally along the pipe. A Company accepted method of measurement shall be used by the Contractor when marking the pipe in preparation for making field bends.

**1.1.5. Tangents**

Bending shall not be allowed in a circumferential weld and not closer than 6 ft. to an open end.

**2. SWABBING AND CLOSING OPEN ENDS****2.1.1. Swabbing**

Each pipe joint shall be swabbed as necessary to remove all dirt and foreign matter from the inside of the pipe before the joints are aligned and welded. The swabbing operation shall not be carried on more than four joints ahead of the firing line welders or aligning and welding operations.

**2.1.2. Closing of Pipe Ends**

Where the line is welded in long sections by the firing line method, the ends of the long sections shall be closed and kept closed in a manner approved by the Company until the long sections are finally joined. During the laying operations, close attention shall be given to open ends to ensure a completely open and clean line free of any obstructions. All reasonable precautions shall be taken to prevent water from entering the line.

**2.1.3. Prevention of Foreign Matter in the Pipeline**

The open end of the line shall be securely closed at the end of each day's work to prevent entrance of small animals or the introduction of foreign matter of any nature and shall not be reopened until work is resumed. Any obstructions remaining in the line after the completion thereof shall be removed.



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### 3. POSITION OF LONGITUDINAL SEAM

In instances where pipe other than seamless is furnished by the Company, the longitudinal seams of such pipe shall be staggered by not more than 45°. Longitudinal weld seams shall have a minimum four-inch circumferential offset between abutting joints. Unless otherwise specified, the longitudinal seams on adjacent pipe shall be staggered, placing one approximately in the 10 o'clock position and the other approximately in them 2 o'clock position

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# WELDING MANUAL

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# WELDING MANUAL

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## 1. SCOPE

- 1.1. The purpose of the welder qualification test is to determine the ability of the welder to make sound welds using previously qualified welding procedures.
- 1.2. This is a summary of the welder qualification requirements of API 1104 with the API 1104 option of testing tensile specimens as nick break specimens.
- 1.3. Welders may be qualified using "plain" API 1104, i.e. tensile tests, with the permission of Engineering. Refer to API 1104 for the details of the required testing.
- 1.4. Refer to API 1104 for qualification of welding operators.

## 2. PRELIMINARY

- 2.1. The qualification of welders shall be conducted in the presence of the welding inspector.
- 2.2. No welder whose qualification is based on nondestructive testing may weld compressor station pipe and components.
- 2.3. It is preferred that all welders shall qualify by destructive testing.

NOTE: Due to concerns that welders qualified by nondestructive testing might inadvertently be used to weld in compressor stations, welders qualifying by nondestructive testing must qualify for each job unless approved by Engineering.

- 2.4. API 1104 allows for both single qualification and multiple qualification. It is up to the welding inspector to determine how the welders are qualified.
  - 2.4.1. Any welder who may reasonably be expected to weld on a variety of pipe sizes are strongly encouraged to be multiple qualified. Welding procedures ETC-A221A and ETC-A221A-F may be used on 12" OD, 0.250" minimum wall, to multiple qualify for all cellulosic welding. Welding procedures ETC-A223A and ETC-A223A-F may be used on 12" OD, 0.250" minimum wall, to multiple qualify for all low-hydrogen welding. Use all four procedures to multiple qualify a welder to weld on all pipe sizes with any of the Company shielded metal arc welding procedures, including the use of weld procedures that use both low-hydrogen and cellulosic electrodes to complete a single weld.
- 2.5. Before starting the qualification test, the welder shall be allowed reasonable time to adjust the welding equipment used in the test. The welder shall use the same welding techniques



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and proceed at the same speed which will be used if the welder passes the qualification test and is permitted to do production welding.

### 3. SINGLE QUALIFICATION

- 3.1. For single qualification, a welder shall make a test weld using a qualified welding procedure to join pipe nipples or segments of pipe nipples. When segments of pipe nipples are used, they shall be supported so that typical flat, vertical, and overhead welds are produced.
  - 3.1.1. The welder shall make a butt weld in the fixed position with the axis of the pipe either in the horizontal plane, in the vertical plane, or inclined from the horizontal plane at an angle not exceeding 45 degrees.
  - 3.1.2. The preferred minimum diameter for welder qualification is 6-5/8 inches (168.3 mm) diameter. This provides a sufficient amount of weld for examination to evaluate the welder's ability and allows this test to apply towards future multiple qualification of the welder.
  - 3.1.3. A welder making a single-qualification test for branch connections, fillet welds, or other similar configurations, shall follow the specific procedure specification.
  - 3.1.4. The weld shall be acceptable if it meets the requirements of Paragraph 5 and either Paragraph 6 (preferred choice) or Paragraph 7 (not allowed for compressor station work).
- 3.2. A welder who has successfully completed the qualification test described in Paragraph 3.1 shall be qualified within the limits of the essential variables described below. If any of these essential variables are changed, the welder using the new procedure shall be re-qualified.
  - 3.2.1. A change from one welding process to any other welding process or combination of welding processes;
  - 3.2.2. A change in the direction of welding from vertical uphill to vertical downhill or vice versa;
  - 3.2.3. A change of filler metal classification from either of Group 1 or 2 to Group 3, or from Group 3 to either Group 1 or 2, as shown in Table 1;
  - 3.2.4. A change in diameter group from one group to another group. These groups, in outside diameter in inches (mm), are:
    - 3.2.4.1. Under 2-3/8 (60.3);
    - 3.2.4.2. From 2-3/8 to 12-3/4 (60.3 to 323.8), inclusive; and





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3.2.4.3. Over 12-3/4 (323.8).

3.2.5. A change in nominal pipe wall thickness from one group to another group. Wall thickness groups in inches (mm) are:

3.2.5.1. Less than 3/16 (4.78);

3.2.5.2. From 3/16 to 3/4 (4.78 to 19.05), inclusive; and

3.2.5.3. Over 3/4 (19.05).

3.2.6. A change in position other than that already qualified for (for example: a change from rolled to fixed, or a change from vertical to horizontal or vice versa). A welder who successfully passes a butt weld qualification test in the fixed position with the axis inclined 45 degrees from the horizontal plane shall be qualified to do butt welds in all positions.

3.2.7. A change in the joint design (for example: the elimination of a backing strip or a change from V-bevel to U-bevel).

#### **4. MULTIPLE QUALIFICATION**

- 4.1. For multiple qualification, a welder shall successfully complete the two tests described as follows, using qualified procedures:
- 4.2. The welder shall first make a butt weld in the fixed position with the axis of the pipe either in the horizontal plane or inclined from the horizontal plane at an angle not exceeding 45 degrees. This butt weld shall be made on pipe having a diameter of at least 6-5/8 inches (168.3 mm) and a wall thickness of at least 1/4 inch (6.35 mm) without a backing strip.
- 4.3. The butt weld shall be acceptable if it meets the requirements of Paragraph 5 and either Paragraph 6 (preferred choice) or Paragraph 7 (not allowed for compressor station work).
- 4.4. For the second test, the welder shall lay out, cut, fit, and weld a full-size, branch-on-pipe connection. This test shall be made with pipe of at least 6-5/8 inches (168.3 mm) diameter and nominal wall thickness of at least 1/4 inch (6.35 mm). A full-size hole shall be cut in the run.
  - 4.4.1. The weld shall be made with the run pipe axis in the horizontal position, and the branch pipe axis extending vertically downward from the run.
  - 4.4.2. The finished weld shall exhibit a neat uniform workmanlike appearance.



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4.4.3. The weld must exhibit complete penetration around the entire circumference. Completed root beads shall not contain any burn-through exceeding 1/4 inch (6.35 mm). The sum of the maximum dimensions of separate unrepaired burn-through in any continuous 12 inch (304.8 mm) length of weld shall not exceed 1/2 inch (12.7 mm).

4.4.4. The fillet weld shall be acceptable if it meets the requirements of Paragraph 6.

4.5. A welder who has successfully completed the butt weld qualification test on pipe having a diameter of 12-3/4 inches (323.8 mm) or larger and a full size branch connection weld on pipe 12-3/4 inches (323.8 mm) or larger in diameter shall be qualified to weld in all positions, on all wall thicknesses, joint designs, fittings, and on all pipe diameters. A welder who has successfully completed the butt weld and branch connection requirements on pipe less than 12-3/4 inches (323.8 mm) in diameter shall be considered qualified to weld in all positions, on all wall thicknesses, joint designs, fittings, and on all pipe diameters equal to or less than that which the welder used in the qualification tests. If any of the following essential variables are changed in a welding procedure specification, the welder using the new procedure shall be re-qualified.

4.5.1. A change from one welding process to any other welding process or combination of welding processes.

4.5.2. A change in the direction of welding from vertical uphill to vertical downhill or vice versa.

4.5.3. A change of filler metal classification from Group 1 or 2 to Group 3, or from Group 3 to Group 1 or 2 (see Table 1).

## 5. VISUAL EXAMINATION OF A QUALIFICATION WELD

5.1. **WARNING:** These visual examination requirements are different than those for a production weld. They are also different than those for the branch weld made as part of a multiple qualification test.

5.2. For a qualification test weld to meet the requirements for visual examination, the weld must be free of cracks, inadequate penetration, un-repaired burn through, and other defects, and must present a neat, workmanlike appearance.

5.3. Undercutting adjacent to the final bead on the outside of the pipe shall not exceed 1/32 inch (0.79 mm) in depth or 12.5 percent of the pipe wall thickness, whichever is smaller, and there shall not be more than 2 inches (50.8 mm) of undercutting in any continuous 12 inch (304.8 mm) length of weld.

5.4. When automatic or semiautomatic welding is used, filler wire protruding into the inside of the pipe shall be held to a minimum.



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- 5.5. Failure to meet the requirements of this paragraph shall be adequate cause to eliminate additional testing.

## 6. DESTRUCTIVE TESTING

- 6.1. To test butt welds, specimens shall be cut from each test weld. If the test weld is a complete circumferential weld then the locations from which the specimens should be removed are shown in Figure 1. If the test weld consists of segments of pipe nipples, an approximately equal number of specimens shall be removed from each segment. The total number of specimens and the tests to which each shall be submitted are shown in Table 2.
- 6.2. The specimens shall be air-cooled to ambient temperature before testing.
- 6.3. For pipe 1-5/16 inch (33.4 mm) and smaller, one full pipe section specimen may be substituted for the root bend and nick break specimens.
- 6.4. The procedure for the nick break testing of butt welds is as follows:
- 6.4.1. The specimens (Figure 4) shall be approximately 9 inches (230 mm) long and 1 inch (25 mm) wide, and they may be machine cut or oxygen cut. They shall be notched with a hacksaw on each side of the center of the weld and each notch shall be approximately 1/8 inch (3.18 mm) deep.
- 6.4.2. Nick break specimens prepared in this manner from welds made with certain automatic and semiautomatic processes may fail through the pipe instead of the weld. When previous testing experience indicates failures through the pipe are to be expected, the external reinforcement may be notched to a depth not to exceed 1/16 inch (1.59 mm) measured from the original weld surface.
- 6.4.3. The specimens shall be broken by pulling in a tensile machine, by supporting the ends and striking the center, or by supporting one end and striking the other end with a hammer. The exposed area of the fracture shall be at least 3/4 inch (19.0 mm) wide.
- 6.4.4. The dimensions of the discontinuities shall be measured as shown in Figure 5.
- 6.4.5. The exposed surfaces of each specimen shall show complete penetration and fusion.
- 6.4.6. The combined area of all gas pockets shall not exceed 2% of the exposed nick break fracture area with the greatest dimension of any gas pocket not to exceed 1/16 inch (1.59 mm).
- 6.4.7. Slag inclusions shall not be more than 1/32 inch (0.8 mm) in depth nor 1/8 inch (3.18 mm) or one-half the nominal wall thickness in length, whichever is shorter.



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6.4.8. There shall be at least 1/2 inch (12.7 mm) of sound weld metal between adjacent slag inclusions.

6.4.9. If any specimen shows discontinuities exceeding those allowed above, the welder shall be disqualified.

6.4.10. Fisheyes, as defined in AWS A3.0, are not cause for rejection.

6.5. The procedure for the bend testing of butt welds is as follows:

6.5.1. The root and face bend specimens (Figure 6) shall be approximately 9 inches (230 mm) long by 1 inch (25 mm) wide and the long edges should be rounded. They may be machine cut or oxygen cut. The cover and root bead reinforcement shall be removed flush with the surface of the specimen. These surfaces shall be smooth and any scratches which exist shall be light and transverse to the weld.

6.5.2. The side bend specimens (Figure 7) shall be approximately 9 inches (230 mm) long by 1/2 inch (12.7 mm) wide and the long edges should be rounded. They shall be machine cut or they may be oxygen cut to approximately a 3/4 inch (19.0 mm) width and then machined or ground to the 1/2 inch (12.7 mm) width. The sides shall be smooth and parallel. The cover and root bead reinforcements shall be removed flush with the surfaces of the specimen.

6.5.3. The specimens shall be bent in a guided bend test jig similar to that shown in Figure 8. Each specimen shall be placed on the die with the weld at mid-span. Face bend specimens shall be placed with the face of the weld directed toward the gap. Root bend specimens shall be placed with the root of the weld directed toward the gap. Side bend specimens shall be placed with the face of the weld at 90 degrees to the gap. The plunger shall be forced into the gap until the curvature of the specimen is approximately U-shaped.

6.5.4. Each specimen subjected to the bend test shall meet the following requirements:

6.5.4.1. The bend test shall be considered acceptable if no crack or other defect exceeding 1/8 inch (3.18 mm) or one-half the nominal thickness, whichever is smaller, in any direction is present in the weld, or between the weld and the fusion zone after bending.

6.5.4.2. Cracks which originate along the edges of the specimen during testing and which are less than 1/4 inch (6.4 mm) measured in any direction shall not be cause for rejection unless obvious defects are observed.

6.5.5. Welds in high test pipe may not bend the full U-shape. These shall be considered acceptable if the specimens which crack are broken apart and their exposed surfaces meet the requirements of the nick break test.



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- 6.5.6. The evaluation allowed by 6.5.5 shall be allowed only if the welding inspector is satisfied that the cracking is due to the pipe and not the welder.
- 6.5.7. Should one of the bend test specimens fail to meet these requirements and, in the opinion of the welding inspector, the lack of penetration observed is not representative of the weld, the test specimen may be replaced by an additional specimen cut adjacent to the one that failed. The welder shall be disqualified if the additional specimen also shows defects exceeding the specified limits.
- 6.5.8. If any specimen shows defects exceeding those above, the welder shall be disqualified.
- 6.6. The procedure for the tensile testing of butt welds in pipe 1-5/16 inch (33.4 mm) and smaller is as follows:
- 6.6.1. Tensile test specimens shall be broken under tensile load. The tensile strength is not required to be determined for welder qualification.
- 6.6.2. If the full section specimen breaks in the weld or at the junction of the weld and the parent metal and fail to meet the requirements for soundness set forth in the nick break test, the welder shall be disqualified.
- 6.7. The procedure for testing of fillet welds is as follows:
- 6.7.1. The locations from which the specimens are to be removed are shown in Figure 2. The specimens shall be air-cooled to ambient temperature before testing.
- 6.7.2. The specimens shall be prepared as shown in Figure 3. They may be machine cut or oxygen cut. They shall be sufficiently long so that they can be broken in the weld.
- 6.7.3. For pipe under 2-3/8 inches (60.3 mm) in diameter, it may be necessary to make two test welds to obtain the required number of test specimens. The specimens shall be air-cooled to ambient temperature prior to testing.
- 6.7.4. The specimens shall be broken by supporting both ends of the specimen and striking the center or by supporting one end and striking the other. The specimens shall be broken so that the root of the weld is subjected to the greater strain.
- 6.7.5. Each specimen shall meet the following requirements:
- 6.7.5.1. The exposed surfaces of the specimen shall show complete penetration.
- 6.7.5.2. The combined area of all gas pockets shall not exceed 2% of the exposed nick break fracture area with the greatest dimension of any gas pocket not to exceed 1/16 inch (1.59 mm)



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6.7.5.3. Slag inclusions shall not be greater than 1/32 inch (0.8 mm) in depth, or 1/8 inch (3.18 mm) or one-half the nominal wall thickness of the thinner member in length, whichever is the smaller, and shall be separated by at least 1/2 inch (12.7 mm) of sound metal (see Figure 5).

## 7. QUALIFICATION BY RADIOGRAPHY (BUTT WELDS ONLY)

WARNING: This option is not allowed by DOT for welding to be performed, either in the field or in a shop, on compressor station piping or components.

7.1. The procedures and requirements for the radiographic inspection of test welds shall be as follows:

7.1.1. Radiographs shall be made of each of the test welds. The welder shall be disqualified if any of his test welds do not meet the radiographic acceptance standards contained in API Standard 1104 .

7.1.2. Radiographic inspection shall not be used for the purpose of locating sound areas or areas containing discontinuities and subsequently making tests of such areas to qualify or disqualify a welder.

## 8. RETESTING

8.1. If, in the mutual opinion of the welding inspector and contractor representatives, failure of a welder to pass the qualification test was because of unavoidable conditions or conditions beyond his control, such a welder may be given a second opportunity to qualify.

8.2. Welders who fail to qualify shall not be allowed to test again for 6 months without submitting proof of subsequent welder training acceptable to the Manager of Laboratory Services.

## 9. RECORDS

9.1. A record shall be made of the tests given to each welder and of the detailed results of each test, whether pass or fail.

9.2. The welder test records are to be submitted to the Welding/NDE/Material Testing Group.



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**TABLE 1****FILLER METAL GROUPS**

Group	AWS Specification	Electrode	Flux
1	A5.1	E6010, E6011	
	A5.5	E7010, E7011	
2	A5.5	E8010, E8011	
3	A5.1 or A5.5	E7015, E7016, E7018	
	A5.5	E8015, E8016, E8018	
4	A5.17	EL8	P6XZ
		EL8K	F6X0
		EL12	F6X2
		EM5K	F7XZ
		EM12K	F7X0
		EM13K	F7X2
		EM15K	
5	A5.18	ER70S-2	
6	A5.18	ER70S-6	
7	A5.28	ER80S-D2	
8	A5.2	RG60	
	A5.2	RG65	

**NOTES:**

1. Other electrodes, filler metals and fluxes may be used but shall require separate procedure qualification.
2. Any combination of flux and electrode in Group 4 may be used to qualify a procedure. The combination shall be identified by its complete AWS Classification Number such as, F71-EL12 or F62-EM12K. Only substitutions which result in the same AWS Classification Number are permitted without re-qualification.
3. A shielding gas is to be used with electrodes in Groups 5, 6, and 7.



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Title <b>Welder Qualification to API 1104</b>		

**TABLE 2****BUTT WELDS****TYPE AND NUMBER OF TEST SPECIMENS FOR WELDER QUALIFICATION  
TEST AND FOR DESTRUCTIVE TESTING OF PRODUCTION WELDS**

Pipe Size, Outside  Diameter - In Inches (mm)	Number of Specimens per Welder				
	Nick Break	Root Bend	Face Bend	Side Bend	Total
	Wall Thickness - 1/2 inch (12.7 mm) and Under				
Under 2-3/8 (60.3)	2	2	0	0	4*
2-3/8 (60.3) to 4-1/2 (114.3) inclusive	2	2	0	0	4
Over 4-1/2 (114.3) to 12-3/4 (323.8) inclusive	4	2	0	0	6
Over 12-3/4 (323.8)	8	2	2	0	12
	Wall Thickness - Over 1/2 inch (12.7 mm)				
4-1/2 (114.3) and smaller	2	0	0	2	4
Over 4-1/2 (114.3) to 12-3/4 (323.8) inclusive	4	0	0	2	6
Over 12-3/4 (323.8)	8	0	0	4	12

\* For pipe 1-5/16 inches (33.4 mm) and smaller, obtain from two welds or use one full-pipe section tensile specimen.

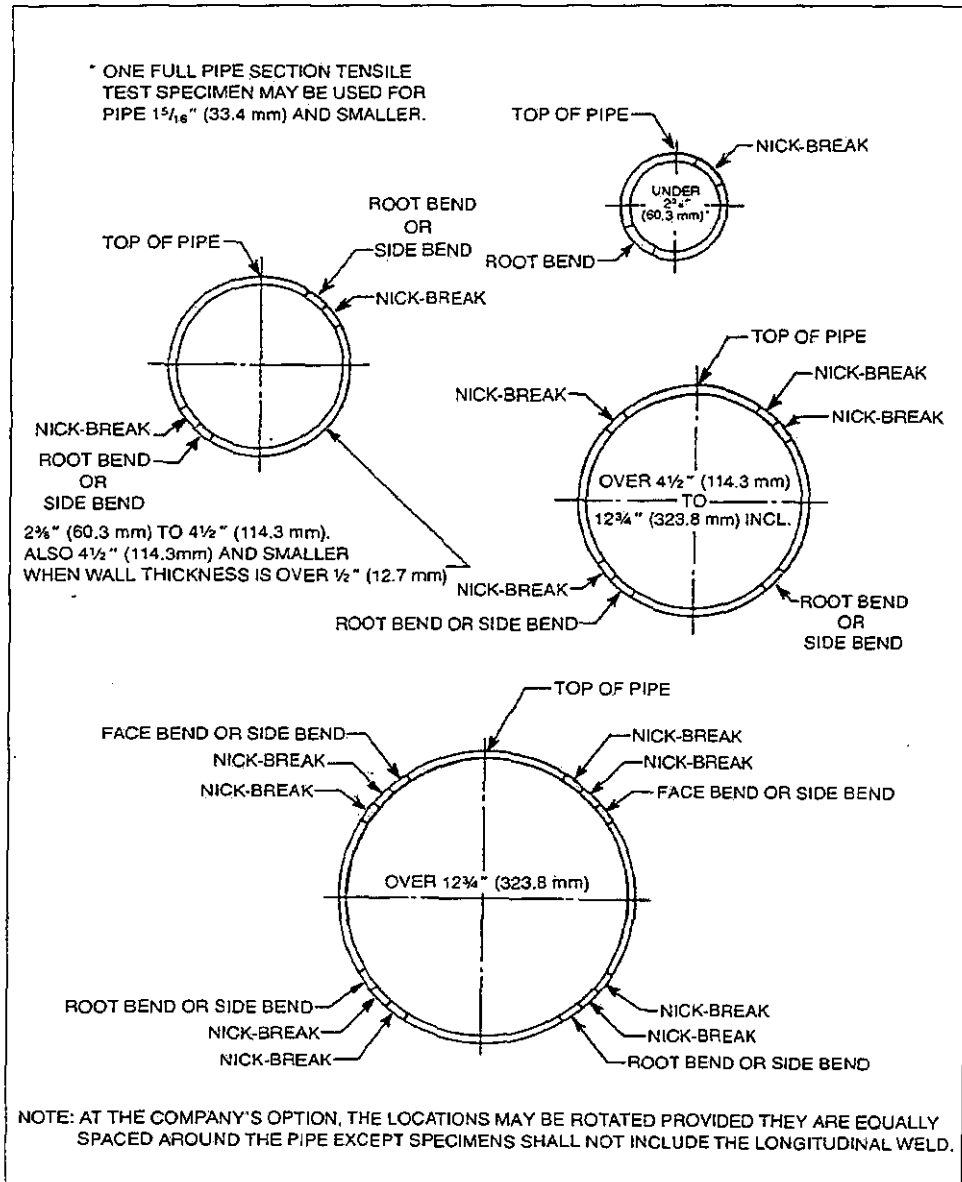




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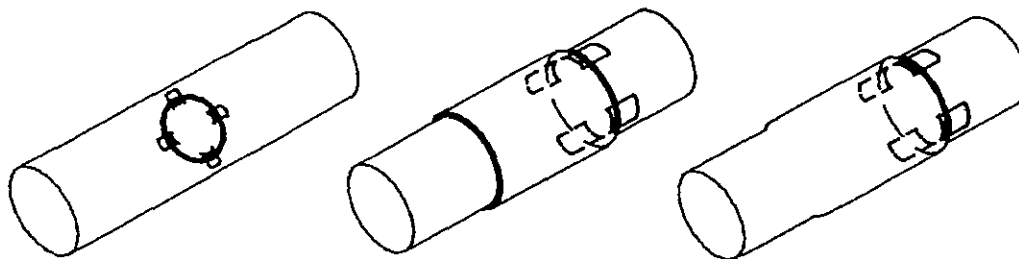
FIGURE 1

## LOCATION OF TEST SPECIMENS - BUTT WELD WELDER QUALIFICATION TEST WELD





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**FIGURE 2****LOCATION OF NICK BREAK SPECIMENS****FILLET WELDS PROCEDURE AND WELDER QUALIFICATION TEST WELDS**

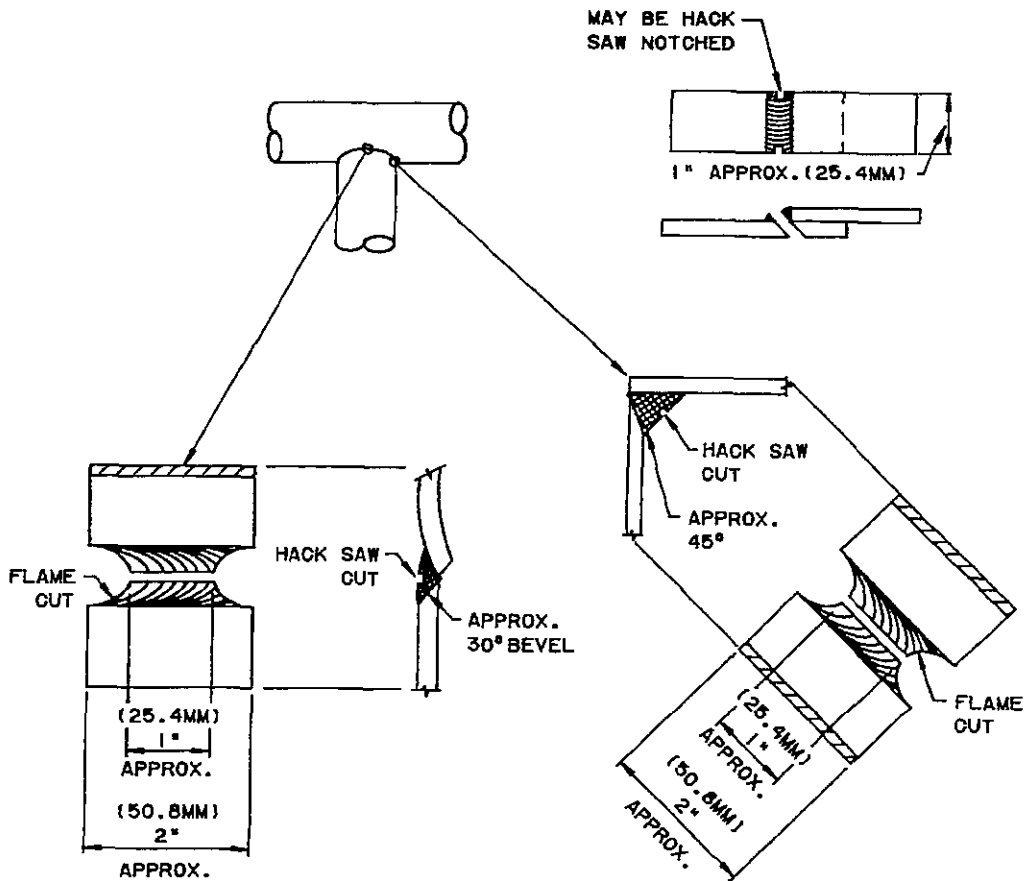
2 3/8" (60.3MM) AND LARGER  
FOR JOINTS UNDER 2 3/8" CUT NICK-BREAK SPECIMENS FROM THE SAME GENERAL  
LOCATION BUT REMOVE TWO SPECIMENS FROM EACH OF TWO TEST WELDS.  
NOTE: THE COMPANY MAY REQUIRE ADDITIONAL SPECIMENS TO BE TAKEN.



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FIGURE 3

## LOCATION AND PREPARATION OF FILLET WELD SPECIMENS



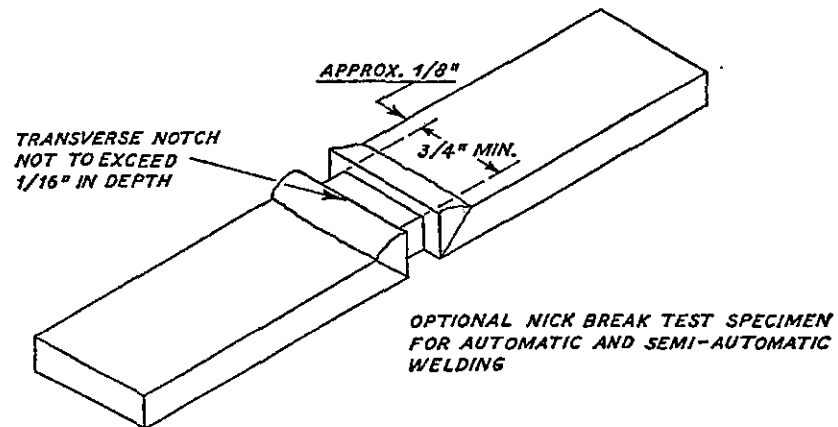
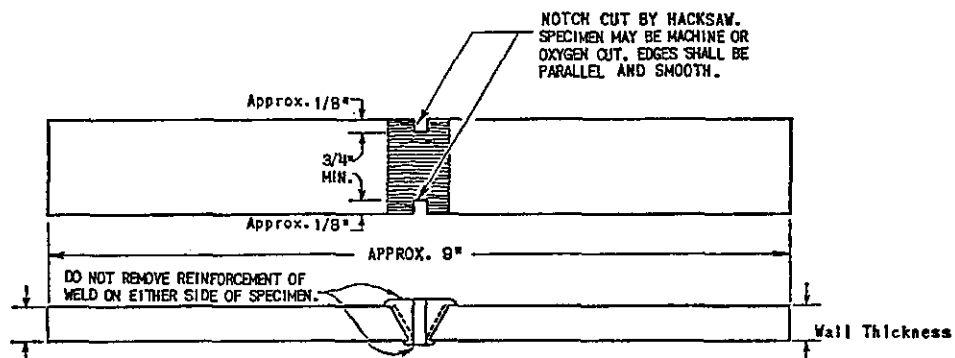
LOCATION OF NICK-BREAK TEST SPECIMENS - FILLET WELDS PROCEDURE AND WELDER QUALIFICATION TEST WELDS INCLUDING SIZE TO SIZE BRANCH CONNECTION WELDER QUALIFICATION TEST.



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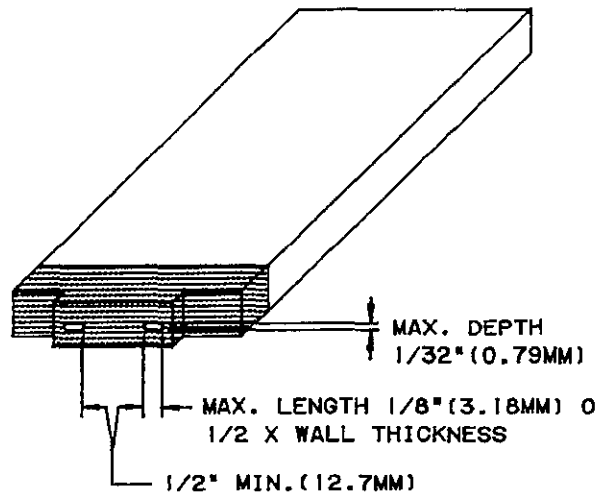
FIGURE 4

## NICK BREAK TEST SPECIMEN





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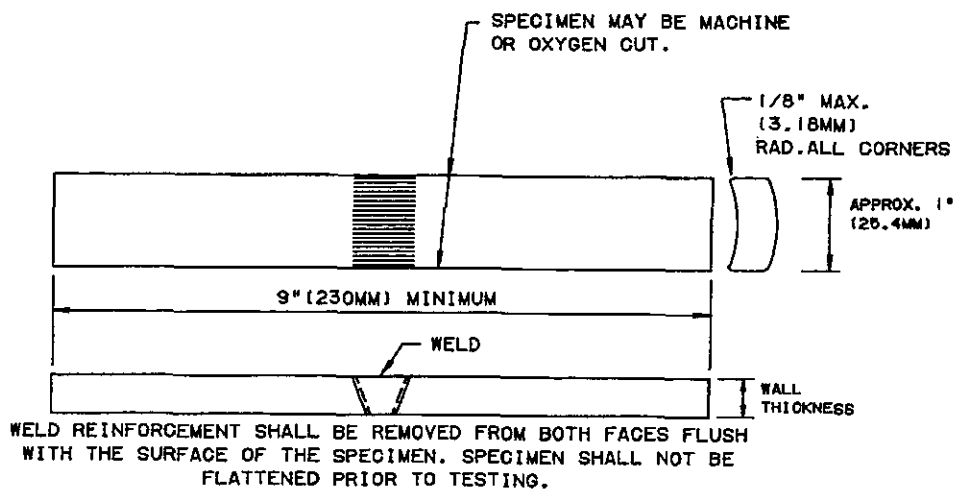
**FIGURE 5****DIMENSIONS OF DISCONTINUITIES IN WELD SPECIMENS**



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FIGURE 6

## ROOT BEND AND FACE BEND TEST SPECIMEN



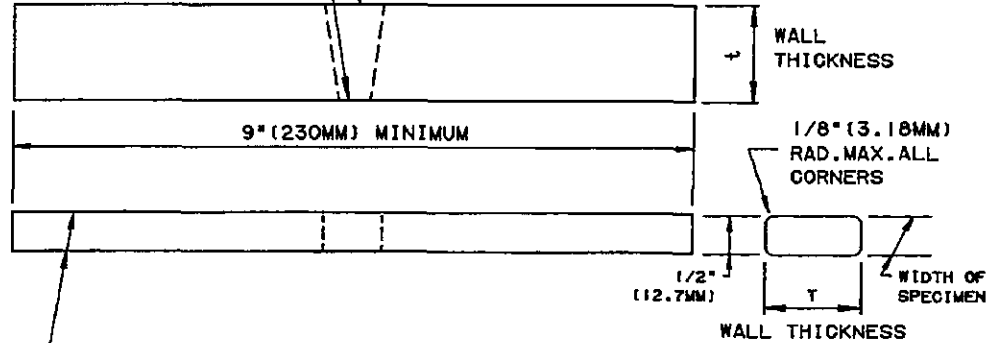


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FIGURE 7

## SIDE BEND TEST SPECIMEN

WELD REINFORCEMENT SHALL  
BE REMOVED FROM BOTH FACES  
WITH THE SURFACE OF SPECIMEN.



SPECIMENS MAY BE MACHINE CUT TO 1/2 INCH (12.7MM) WIDTH OR THEY MAY BE OXYGEN CUT TO APPROXIMATELY 3/4 INCH (19.0MM) WIDE AND THEN 1/8 INCH (3.18MM) REMOVED BY MACHINE OR GRINDING. CUT SURFACES SHALL BE SMOOTH AND PARALLEL.



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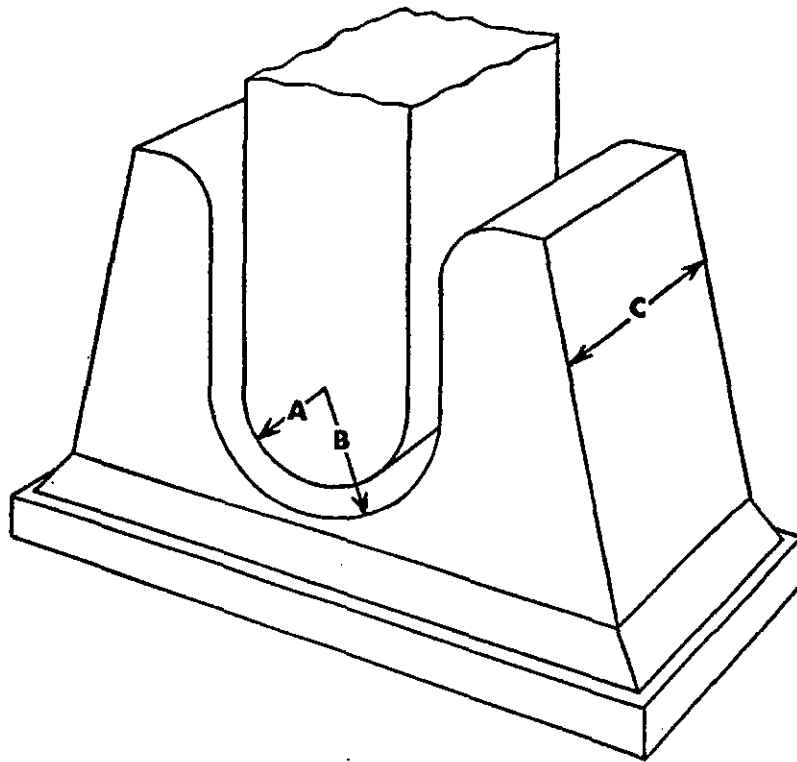
FIGURE 8

## JIG FOR GUIDED BEND TESTS

Radius of Plunger **A** =  $1\frac{3}{4}$  inches

Radius of Die **B** =  $2\frac{5}{16}$  inches

Width of Die **C** = 2 inches





## Procedure Selection Guideline

Normal Service E-XX16 or E-XX18 Electrodes - dry

To achieve the low hydrogen potential E-XX16 or 18 electrodes must be used directly from a freshly opened can or have been put in a baking oven directly after opening the can and maintained at an appropriate temperature.

Hydrogen potential  $\leq 4\text{ml}/100\text{g}$

Procedure Variation	Application									Procedure Variation
	0.5" Wall Thickness and Less						Greater than 0.5" Wall Thickness			
	Fast Weld Cooling Rate - Thermal Severity I			Slow Weld Cooling Rate - Thermal Severity II						
	CE $\leq$ 0.35	CE $\leq$ 0.42	CE $\leq$ 0.50	CE $\leq$ 0.35	CE $\leq$ 0.42	CE $\leq$ 0.50	CE $\leq$ 0.35	CE $\leq$ 0.42	CE $\leq$ 0.50	
A (15kJ/in)	✓			✓	✓					A (15kJ/in)
B (25kJ/in)	✓			✓	✓	✓	✓			B (25kJ/in)
E (25 kJ/in + 200F Preheat)	X			X	X	X	X	X	X	E (25 kJ/in + 200F Preheat)
C (40 kJ/in)	✓	✓		✓	✓	✓	✓	✓	✓	C (40 kJ/in)
D1 (Temper Bead)	✓	✓	✓	✓	✓	✓	✓	✓	✓	D1 (Temper Bead)

## Color code guideline

Conventional welding technology, additional heat input control is not needed

Conventional welding technology, welder training needed to maintain minimum heat input

Conventional welding technology, welder training needed to maintain minimum heat input - preheat required which may not be possible

Special welder training required to achieve required heat input or use of special techniques

Unacceptable risk of cracking in weld or HAZ - select alternate procedure



SMAW/Cellulosic/Butt/Weld (.6010/E8010)									
< .188	NONE								
.188-.750	ETC	ET 221A	SMAW	Butt	X42	0.375	12.750	E6010/E8010	Good For all Grades, all Diameters, and for a thickness of up to .750 wall.
	ETC	ET 221B	SMAW	Butt	X56	0.375	12.750	E6010/E8010	
	ETC	ET 321B	SMAW	Butt	X60	0.375	16.000	E6010/E8010	
	HPL	11-5P-70+	SMAW	Butt	X70	0.568	26.000	E6010/E8010	
	HPL	13-5P-70+	SMAW	Butt	X70	0.300	30.000	E6010/E8010	
	ETC	ET 321C-2	SMAW	Butt	X65	0.375	30.000	E6010/E8010	
Over .750	ETC	ETC-A212A-GB	SMAW	Butt	X65	0.900	12.750	E6010/E8010	
	ETC	ETC-A212A-X65	SMAW	Butt	X65	0.900	12.750	E6010/E8010	
SMAW/Cellulosic/Butt/Welds (E8010)									
< .188	NONE								
.188-.750	ETC	ET 221C	SMAW	Butt	X65	0.312	12.750	E8010	Need X42 Qualified.
	ETC	ET 221D	SMAW	Butt	X70	0.250	12.750	E8010	
	ETC	ET 321C	SMAW	Butt	X65	0.260	16.000	E8010	
	ETC	ET 321-D	SMAW	Butt	X70	0.250	16.000	E8010	
	HPL	1104-60	SMAW	Butt	X60	0.312	30.000	E8010	
	HPL	1104-150	SMAW	Butt	X70	0.358	30.000	E8010	
Over .750	HPL	FGT1104-001	SMAW	Butt	X70	0.300	30.000	E8010	
SMAW/Cellulosic/Butt/Welds (E7010)									
< .188	NONE								
.188-.750	NONE								
Over .750	HPL	IX-3	SMAW	Butt	X52	1.125	30.000	E7010	
SMAW/Cellulosic/Fillet/Welds (E6010/E8010)									
< .188	NONE								
.188-.750	ETC	ET 221A-F	SMAW	Fillet	X42	0.375	12.750	E6010/E8010	Need X60 and X65 Qualified.
	ETC	ET 221B-F	SMAW	Fillet	X56	0.375	12.750	E6010/E8010	
	HPL	FGT1104-003	SMAW	Fillet	X70	0.315	22.000	E6010/E8010	
Over .750	NONE								
SMAW/Cellulosic/Fillet/Welds (E8010)									
< .188	NONE								
.188-.750	HPL	EPOC-03	SMAW	Fillet	X52	0.312	12.750	E8010	Need X42 and X60 Qualified
	ETC	ET 221C-F	SMAW	Fillet	X65	0.312	12.750	E8010	
	ETC	ET 221D-F	SMAW	Fillet	X70	0.250	12.750	E8010	
Over .750	NONE								
SMAW/Cellulosic/Low Hydrogen/Butt/Welds (E6010/E7018)									
< .188	NONE								
.188-.750	ETC	ET 223A	SMAW	Butt	X52	0.312	12.750	E6010/E7018	
Over .750	NONE								
SMAW/Cellulosic/Low Hydrogen/Butt/Welds (E6010/E8018)									
< .188	NONE								
.188-.750	HPL	NB99	SMAW	Butt	X42	0.375	12.750	E8010/E8018	
	HPL	NB96	SMAW	Butt	X60	0.312	30.000	E8010/E8018	

Over .750	NONE								
SMAW Cellulosic/Low Hydrogen Fillet Welds (E6010/E7018)									
< .188	NONE								
.188-.750	ETC	ET 223A-F	SMAW	Fillet	X52	0.312	12.750	E6010/E7018	
Over .750	NONE								
SMAW Low Hydrogen Butt Welds (E7018)									
.188-.750	ETC	ETC-A13A-X42	SMAW	Fillet	X42	0.375	12.750	E7016/E7018	Need X42, X60, X65, X70 Qualified.
	ETC	ETC-A13A-X60	SMAW	Fillet	X60	0.375	12.750	E7016/E7018	
Over .750	NONE								
SMAW Low Hydrogen Fillet Welds (E7018)									
.188-.750	ETC	ETC-A13A-X42F	SMAW	Fillet	X42	0.375	12.750	E7016/E7018	
	ETC	ETC-A13A-X60F	SMAW	Fillet	X60	0.375	12.750	E7016/E7018	
	ETC	ETC-A13A-X65F	SMAW	Fillet	X65	0.312	24.000	E7016/E7018	
	HPL	EPOC-01	SMAW	Fillet	X52	0.281	12.750	E7018	Need X42, X60, X65, X70 Qualified.
Over .750	NONE								



ENERGY TRANSFER

**WELDING PROCEDURE SPECIFICATION**  
 BASED ON API 1104

**Procedure ETC-A112A Date: 05/19/2005 ESSENTIAL VARIABLES**

Process (Manual, Semiautomatic/SMAW, GMAW, etc.)	Manual SMAW
Material Grade (yield in psi)	Low alloy steel
42,000 and Less	X
Over 42,000 to 60,000	X
65,000	X
70,000	X
80,000	
Diameter Group (inches)	
Under 2-3/8	X
2-3/8 to 12-3/4	X
Over 12-3/4	X
Wall Thickness Group (inches)	
Up to 3/4 (.000 to .750)	X
Over 3/4 and Less Than 1 1/4 (.750 to <1.250)	
1 1/4 and Over (1.250 and Over)	
Position	Fixed – horizontal and vertical pipe axis
Filler Metal Classification	E6010 & E8010, see Welding Manual for approved brands
Current Type and Polarity	DC reverse polarity (pipe negative)
Joint Design	See sketch
Max. Time Between End of Root and Start of 2nd Bead	5 minutes, 4 minutes for grades X60 and greater
Direction for Vertical Welding	Vertical down
Shielding Gas and Flow Rate	none
Shielding Flux (Type and Size)	none
Speed of Travel (Range in/min)	6-13 in/min
Alignment	1/16" max. high-low unless due to dimensional differences

**MINIMUM PRACTICES (Welding Inspector May Require More Restrictive Practices)**

Line-Up Clamp (Internal, External or None)	internal or external clamps
Removal of Line-Up Clamp (Percent of root pass completed)	50% min.
Number of Welders	For pipe 14"OD and larger, two or more for both the root pass and the hot pass.
Deposited Thickness Per pass	1/8" max.
Cleaning (Hand or Power Tools)	Prior to welding grind or wire brush 1/2" back on ID and OD; remove all slag or flux after each pass
Max. Time Between End of Hot Pass and Start of Other Passes	Unlimited
Preheat (Methods, Min. Temp, etc.)	Propane burner or other method approved by welding inspector
Pipe	300F for grades X60 and higher
Valves, Flanges, and Fittings	300F for grades X60 and higher
Min. Temp.	40F or higher as needed to keep dry
Post-heat (Methods, Temp., etc.)	none required
Min. Temp.	

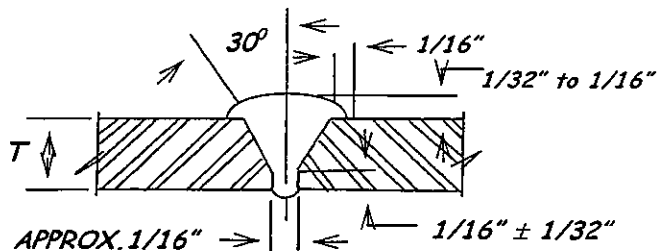
**ELECTRICAL CHARACTERISTICS**

ELECTRODE SIZE	VOLTS (RANGE)	AMPS (RANGE)
1/8" E6010	18-38	90-130
5/32" E6010	18-38	90-175
1/8" E8010	18-38	90-130
5/32" E8010	18-38	120-180
3/16" E8010	18-38	140-220

**BEAD SEQUENCE**

BEAD	ELECTRODE
RP	E6010
HP	E8010
Fill	E8010
Cap	E8010

**JOINT DESIGN SKETCH**



REMARKS: Number of beads will vary with wall thickness.

Arc striking (arc burn) on the base metal is prohibited.

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**WELDING PROCEDURE SPECIFICATION**  
 BASED ON API 1104

**Procedure ETC-A112A-F Date: 05/19/2005**

**ESSENTIAL VARIABLES**

Process (Manual, Semiautomatic/SMAW, GMAW, etc.)	Manual SMAW	
Material Grade (yield in psi)	Low alloy steel	Carrier Pipe
42,000 and Less	X	X
Over 42,000 to 60,000	X	X
65,000	X	X
70,000	X	X
80,000		
Diameter Group (inches)	Branch/Fillet	Carrier Pipe
Under 2-3/8	X	X
2-3/8 to 12-3/4	X	X
Over 12-3/4	X	X
Wall Thickness Group (inches)		
Up to 3/4 (.000 to .750)	X	
Over 3/4 and Less Than 1 1/4 (.750 to <1.250)		
1 1/4 and Over (1.250 and Over)		
Position	Fixed	
Filler Metal Classification	E6010 & E8010, see Welding Manual for approved brands	
Current Type and Polarity	DC reverse polarity (pipe negative)	
Joint Design	See sketch	
Max. Time Between End of Root and Start of 2nd Bead	5 minutes	
Direction for Vertical Welding	Vertical down	
Shielding Gas and Flow Rate	none	
Shielding Flux (Type and Size)	none	
Speed of Travel (Range in/min)	6-13 in/min	

**MINIMUM PRACTICES (Welding Inspector May Require More Restrictive Practices)**

Line-Up Clamp (Internal, External or None)	none required
Removal of Line-Up Clamp (Percent of root pass completed)	When clamps are used, 50% min.
Number of Welders	One or more
Deposited Thickness Per pass	1/8" max.
Cleaning (Hand or Power Tools)	Prior to welding grind or wire brush 1/2" back on ID and OD; remove all slag or flux after each pass
Max. Time Between End of Hot Pass and Start of Other Passes	Unlimited
Preheat (Methods, Min. Temp, etc.)	Propane burner or other method approved by welding inspector
Pipe	200F for grades X65 and higher
Valves, Flanges, and Fittings	300F for grades X65 and higher
Min. Temp.	40F or higher as needed to keep dry
Post-heat (Methods, Temp., etc.)	none required
Min. Temp.	

**ELECTRICAL CHARACTERISTICS**

ELECTRODE SIZE	VOLTS (RANGE)	AMPS (RANGE)
1/8" E6010	18-38	90-130
5/32" E6010	18-38	90-175
1/8" E8010	18-38	90-130
5/32" E8010	18-38	120-180
3/16" E8010	18-38	140-220

**BEAD SEQUENCE**

BEAD	ELECTRODE
RP	1/8" or 5/32" E6010
HP	1/8" or 5/32" E8010
Fill	5/32" or 3/16" E8010
Cap	5/32" or 3/16" E8010

**REMARKS**

Number of beads will vary with wall thickness.  
 Arc striking (arc burn) on the base metal is prohibited.  
 $W = 3/8 B$  (but not less than 1/4");  $N = 1/16"$  to  $3/16"$   
 $L$  (min.) = 1/2 W (but not less the 1/4")  
 If  $W > T$ , taper  $W$  as shown to approximately equal  $T$ .

**JOINT DESIGN SKETCH**

