

ZAMA FIELD VALIDATION TEST

Task 3 – Deliverable D10
Site Health and Safety Plan

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Cooperative Agreement No. DE-FC26-05NT42592

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2010-EERC-05-13

March 2006
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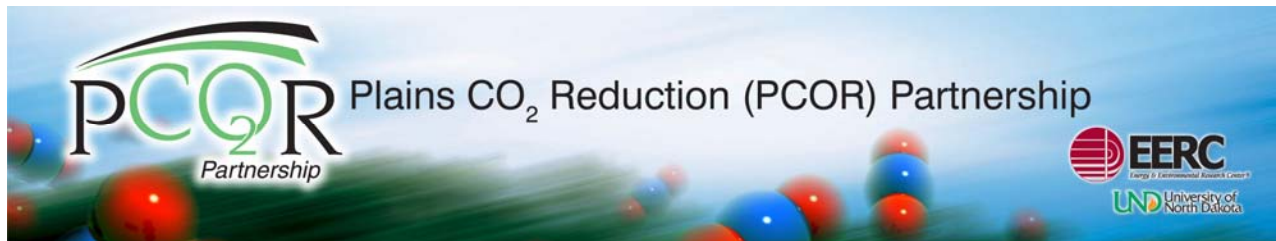
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TABLE OF CONTENTS

LIST OF TABLES	i
INTRODUCTION	1
Plan Objectives.....	1
Environmental Setting.....	2
PERSONNEL TRAINING	2
PERSONAL PROTECTIVE EQUIPMENT	3
MONITORING.....	4
Environmental Monitoring.....	4
Personnel Monitoring.....	4
STANDARD SITE OPERATING PROCEDURES.....	4
Safety Plan Responsibilities	4
Standard Safety Procedures.....	5
Documentation of Changes	5
EMERGENCY REPOSE.....	6
General Emergency Response.....	6
Emergency Response Equipment.....	6
Medical Emergency Procedures.....	6
Chemical Exposure	6
H ₂ S Exposure.....	2
Catastrophic Event Procedures.....	2
Accidents	3
Adverse Weather	3
Emergency Communication.....	4
Incident Documentation	4
Emergency Information.....	4
Zama Emergency Numbers.....	4
TAILGATE SAFETY MEETING FORM	Appendix A
SITE LOCATION MAP	Appendix B

LIST OF TABLES

1	Emergency Response Equipment and Location.....	6
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ZAMA FIELD VALIDATION TEST SITE HEALTH AND SAFETY PLAN

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INTRODUCTION

Plan Objectives

The health and safety of site personnel and the public are primary concerns during field operations at work sites. Thus a comprehensive, carefully managed, and thoroughly documented site Health and Safety Plan (HSP) is crucial for successful project completion.

The Zama field validation test will take place at an ongoing hydrocarbon recovery site operated by Apache Canada, Ltd (Apache). Therefore, Energy & Environmental Research (EERC) personnel will be subject to Apache's Emergency Response Plan (ERP).

The ERP developed by Apache Canada, Ltd., protects the health and safety of involved personnel and the environment. It describes the health and safety procedures to be implemented and followed by site personnel and subcontractors during project activities. The objective of the ERP is to ensure that safe working conditions exist at the work site. The ERP will be used as the EERC HSP.

All EERC personnel will use the Apache ERP as a field reference manual for safety, health, and emergency response procedures. The ERP will be discussed with and reviewed by all site personnel to ensure sufficient awareness of potential hazardous conditions and safety procedures.

All site activities will be conducted in a manner such that the risk of exposure to hazards is minimized. The Apache ERP includes general safe work practices, personnel protection requirements, training requirements, and environmental protection. The ERP covers safe work practices for recognized physical and chemical hazards. Additionally, details for emergency response, first-aid capabilities, and fire control are included. Information regarding personnel training, personal protective equipment, monitoring, standard site operating procedures, and emergency response in this HSP is taken in whole and in part from Apache's ERP.

The protection of workers and the environment is essential during implementation of field activities. Primary field activities anticipated for the EERC for this task are:



- Observation of field activities that are being conducted by Apache.
- The provisions of this HSP and Apache's ERP are mandatory to all EERC site personnel as well as subcontractors. All persons participating in the work must comply with all requirements of this HSP and Apache's ERP.

Environmental Setting

The project site is located in a rural forested area and is roughly 7.5 miles from Zama City, Alberta. It is an ongoing hydrocarbon recovery site, with oil production equipment on location and in the surrounding area. The area impacted by Apache's activities is approximately 2 acres. Classified by Alberta Environment as boreal forest, the local climate is northern Great Plains with summer temperatures to 100°F, winter temperatures to -40°F, and average precipitation 15–20 in./yr. The regional soil type is clay, with indigenous flora and fauna that are typical of boreal forest.

PERSONNEL TRAINING

A thorough understanding of the various hazards potentially encountered at the work sites and the personal protective measures needed to protect on-site personnel are the first requirements of a complete HSP.

All site personnel will attend an orientation session when first arriving at the site as well as frequent tailgate safety meetings. The purpose of these meetings is to discuss the hazards specific to the site and tasks to be performed, as well as to specify the proper level of protection for each work activity. Typical discussions at the orientation session and tailgate safety meetings include the following:

- Review – reviewing planned activities.
- Protective Clothing/Equipment – discussing all protective clothing and protective devices to be used by employees.
- Physical Hazards – addressing hazards associated with the physical work site, such as slip/trip/fall hazards, elevated locations, weak structures, overhead hazards, underground utilities, and nearby operations that could pose a hazard.
- Chemical Hazards – addressing hazards associated with the potential for exposure to gases that can occur during drilling and production of natural gas, crude oil, and petroleum products.
- Emergency Procedures – explaining proper procedures to be followed in the event of an employee injury or other nonroutine event.

- Hospital/Clinic Telephone Number, Paramedic Telephone Number, Hospital Address – recapping key emergency information. This information can be taken directly from the emergency telephone list.
- Special Equipment – indicating proper work techniques and any hazards associated with new or unfamiliar equipment.
- Identification – identifying work zones, evacuation routes, and meeting areas for the work site.
- Other – discussing any remaining safety topics pertinent to the potential hazards of the job.

Safety meetings will be conducted and documented either by the project manager or the field team leader on the Tailgate Safety Meeting form (Appendix A).

PERSONAL PROTECTIVE EQUIPMENT

No single combination of personal protective clothing and equipment (PPE) can protect field personnel from all hazards. Additionally, the use of PPE can create significant worker hazards such as heat stress; physical and psychological stress; and impaired vision, mobility, and communication. Field personnel must be prepared to upgrade their PPE if an unanticipated hazardous situation is encountered. Careful preentry planning, anticipation of worst-case conditions, and caution during field operations are imperative to an effective PPE program.

At the Zama work site, the following PPE is used by Apache personnel in the Zama Area:

- Flame-resistant clothing
- Hard hats
- Safety glasses
- Safety boots
- Gloves
- Personal H₂S monitor

Selection of equipment for personal protection for EERC personnel at the site will be based on the potential for contact with elevated airborne levels of any contaminant, as well as any physical hazard, as stipulated by the project manager. Guidelines will be adhered to, pending evaluation of site conditions. If site conditions change, the Site Manager may upgrade the level of protection after concurrence with the Project Manager. If a situation arises requiring reevaluation of the PPE, work at the site will cease until the Project Manager makes a decision. Under no circumstances will personnel work under uncertain health and safety conditions or without adequate PPE.

MONITORING

Environmental Monitoring

Apache will carry out air monitoring in the proximity of any H₂S release. All Apache locations are accessible after freeze-up by winter roads. During the summer months, Apache will dispatch personnel by helicopter to areas that are not accessible by vehicle. Personnel will carry out monitoring at the remote incident site-specific emergency planning zone by using personal handheld monitors (H₂S). Climatic conditions can also present a health hazard to site personnel. Heat or cold stress will be considered as atmospheric conditions warrant.

Personnel Monitoring

Personnel monitoring shall commence when the ambient environmental temperature exceeds 90°F or falls below 40°F. If site conditions warrant, personal H₂S monitors are available for EERC personnel and are used by Apache personnel.

STANDARD SITE OPERATING PROCEDURES

Research activities conducted for this field validation test will require yearly site visits by EERC personnel. During this time, exposure to H₂S may occur. All workers visiting the site or working on-site will be trained under the Apache ERP. All workers exposed to H₂S and extreme temperatures are doing so as part of the regular day-to-day operation of an ongoing oil production facility and will be following safety procedures set forth in the ERP. The ERP will be discussed with and reviewed by all site personnel to ensure sufficient awareness of potential hazardous conditions and safety procedures.

Safety Plan Responsibilities

The Site Manager will ensure that each member of the field team is aware of all components of this HSP as well as Apache's ERP and is responsible to:

- Instruct all workers on safety procedures at the work site.
- Control entry and exit from the site.
- Observe the work party for signs of stress or illness and remove affected individuals from work.
- Monitor on-site conditions.
- Ensure all personnel working on-site are informed of emergency procedures, evacuation routes, and emergency telephone numbers.
- Ensure a map to the hospital is available.

- Coordinate emergency medical care notification procedure.
- Characterize the site and alert field personnel to the presence of tripping hazards, barriers, ditches, trenches, or hollows.

Standard Safety Procedures

Awareness of potential hazards and establishment of guidelines to control site hazards is a major component of any HSP. The following requirements are implemented to protect the health and safety of field workers and will be discussed in the tailgate safety meetings:

- All personnel must comply with established safety procedures as discussed in this section and in the Apache ERP. Any staff member who does not comply with safety policy, as established by the Project Manager, will be immediately dismissed from the site.
- All field personnel shall be required to review site information and work procedures for:
 - Expected hazards.
 - Location of telephones and emergency equipment.
 - Emergency medical information including hospital location.
 - Level(s) of personal protection required.
- Drugs (other than prescription, nonnarcotic drugs) will not be taken by personnel where the potential for contact with toxic substances exists, unless specifically approved by a physician. Alcoholic beverage intake is prohibited during the workday. Illegal drug intake is prohibited under any circumstances.
- Routine and emergency evacuation procedures will be planned and reviewed prior to personnel going on-site.
- Work areas have been established based on prevailing site conditions and are subject to change if site conditions change.

Documentation of Changes

Conditions in the field are sometimes different than those anticipated when this HSP and Apache's ERP were developed. Those conditions impacting health and safety, or raising concerns, which require changes to these plans, will be approved by the Program Director and documented.

EMERGENCY RESPONSE

General Emergency Response

A copy of this HSP will be available on-site at all times. All accidents/incidents and near-miss incidents shall be reported to the Program Manager and Site Manager immediately. Emergency notification numbers will be provided. First-aid or other actions shall be administered in situations where those rendering assistance are not placed in danger. In the event of an explosion, fire, or other hazardous event, work activities shall cease, and all personnel shall evacuate the area using predesignated evacuation routes and meeting areas. Evacuation shall proceed upwind of the work area to the designated meeting area.

Emergency Response Equipment

Safety equipment is documented and regularly inspected so that equipment is readily available with minimum chance of failure. Self-contained breathing apparatus is available at the Zama Gas Plant Complex and in all field trucks. Drills with safety equipment, including practical self-contained breathing apparatus, are conducted every 3 months. Table 1 lists the major safety/emergency response equipment and location.

Medical Emergency Procedures

Medical emergencies are described as situations that present a significant threat to the health of personnel. These can result from accidents, chemical exposures, heat stress, cold stress, and contact with poisonous plants, animals, or insects. Medical emergencies must be dealt with immediately and proper care administered. This may be in the form of first aid and/or emergency hospitalization.

Severely injured personnel are to be transported to a hospital via ambulance or state vehicle. A map showing the location of the nearest hospital will be provided.

Chemical Exposure

In the event of personnel exposure, skin contact, inhalation, or ingestion, the following procedures shall be followed:

- Skin Contact. Wash and rinse affected area thoroughly with copious amounts of soap and water, then provide appropriate medical attention if required. Eyes should be rinsed for a minimum of 15 minutes following chemical contamination.
- Inhalation. Move to an area of fresh air and, if necessary, decontaminate and transport to hospital.
- Ingestion. Decontaminate and transport to hospital.
- Puncture Wound or Laceration. Decontaminate and transport to hospital for professional medical attention.

Table 1. Emergency Response Equipment and Location

Location	Equipment	Quantity
Emergency Response Gas Plant Vehicle	First aid kit	1
	Stretcher	1
	Two-way radio	1
	Cellular telephone	1
Emergency Response 3-10 Battery Vehicle	First aid kit	1
	Stretcher	1
	Two-way radio	1
	Cellular telephone	1
Field Operator Trucks	30-lb fire extinguisher	1
	First aid kit	1
	Two-way radio	1
	Self-contained breathing apparatus	1

H₂S Exposure

In the event of personnel exposure to H₂S, the following procedures shall be followed:

- Immediately remove the victim from further exposure. Designated rescuers must wear properly fitting, positive-pressure self-contained breathing apparatus (SCBA) and other required safety equipment appropriate to the work site.
- If the worker is not breathing, apply cardiopulmonary resuscitation in the nearest safe area.
- Remove contaminated clothing, but keep the individual warm.
- Keep conscious individuals at rest.
- Be aware of possible accompanying injuries (e.g., the victim may have fallen when he/she were overcome) and treat the person accordingly.
- If the victim's eyes are red and painful, flush with large amounts of clean water for at least 15 minutes.
- Ensure the worker receives medical care as soon as possible. The worker must not be allowed to return to work or other activities.

Catastrophic Event Procedures

In the event of an emergency situation, such as fire, explosion, significant release of contaminants, etc., the Site Manager will:

- Cease all work activities and notify all site personnel indicating the initiation of evacuation procedures.
- All personnel will evacuate and assemble in a predesignated safe area. The evacuation will proceed in a direction directly opposite and upwind of the critically affected area.
- Conduct a head count of the assembled workers and ensure any injured individuals receive first aid.
- Notify the following parties as appropriate:
 - Fire department
 - Ambulance
 - Hospital
 - EERC Site Manager
 - Project Manager

Accidents

Accidents can result from various hazards on a site. These hazards can include tripping, catching, or cutting and may be associated with debris on-site or heavy equipment. Injuries may include the following:

- Broken bones
- Burns
- Sprains
- Puncture wounds
- Electrical shock
- Cut by contaminated or uncontaminated materials
- Snake or insect bites

Any accident involving site workers or other on-site personnel should be handled in the same manner as a medical emergency.

Adverse Weather

In the event of adverse weather, the Site Manager will determine if work can continue without compromising the health and safety of site personnel. Some of the items to be considered prior to determining if work should continue are as follows:

- Heavy rainfall or hail
- Potential for heat or cold stress
- Tornadoes
- Limited visibility
- Electrical storms
- Potential for accidents

Emergency Communication

Site communication is to be established prior to beginning operations. Both primary and backup systems are to be used—primarily being verbal, with the backup consisting of emergency signals such as hand signals, horns, flashlights, etc.

The following standard hand signals are used when verbal communication is impaired:

Signal	Meaning
Hand Gripping Throat	Out of air, cannot breathe
Grip Partner's Wrist	Leave area immediately
Hands On Top of Head	Need assistance
Thumbs Up	OK, I'm all right, I understand
Thumbs Down	No, negative

Incident Documentation

All injuries, vehicle accidents, and “near miss” incidents must be reported and investigated promptly to determine the root cause of the incident and to prescribe corrective action.

Emergency Information

The emergency planning area encompasses the Zama Road, Zama City Alternate Evacuation Route, Gas Plant Complex Access Road, Back Road to Apache Gas Plant Complex, Old Esso Road, Shekilie Road, and the South Zama Lake Access Road. The Zama Road and all roads or streets within the Zama City corporate limits are administered by the Municipal District of Mackenzie No. 23. During **any level of emergency**, Apache must determine if any of these roads are inside the site-specific emergency planning zone. Apache will contact the Municipal District of Mackenzie No. 23 and the Assumption or High-Level Royal Canadian Mounted Police Detachments if the roads administered by the Municipal District of Mackenzie No. 23 are inside the site-specific emergency planning zone.

Zama Emergency Numbers

Apache Canada Ltd. (24-hour emergency number) Canadawide	1-888-829-3449
24-hour Emergency Number	1-780-683-8011
Daytime Only	1-780-683-8000
Fax	1-780-683-2251

APPENDIX A

TAILGATE SAFETY MEETING FORM

TAILGATE SAFETY MEETING

Company _____
Date _____ Time _____ Job Number _____
Customer/Site Name _____ Address _____
Specific Location _____
Type of Work _____
Chemicals Used _____

SAFETY TOPICS PRESENTED

Protective Clothing/Equipment _____
Chemical Hazards _____
Physical Hazards _____
Emergency Procedures _____
Hospital/Clinic _____ Phone (____) _____
Hospital Address _____
Special Equipment _____
Other _____

ATTENDEES

Name Printed	Signature

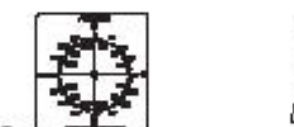
Meeting Conducted by: (print and sign)

Site Manager: _____

APPENDIX B

SITE LOCATION MAP





NOTES:

- 1. LINE 1000 OF FORM 990-BLANKED IN 1991
- 2. LINE 1000 OF FORM 990-BLANKED IN 1991
- 3. LINE 1000 OF FORM 990-BLANKED IN 1991
- 4. LINE 1000 OF FORM 990-BLANKED IN 1991

IN 1991:

- 1. LINE 1000 OF FORM 990-BLANKED IN 1991
- 2. LINE 1000 OF FORM 990-BLANKED IN 1991

FROM 1991 TO 1991:

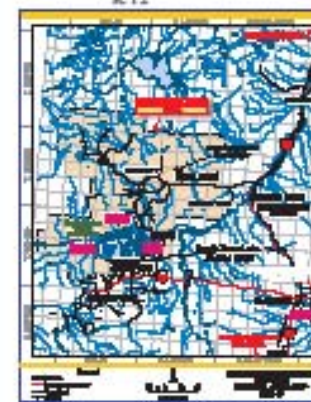
- 1. LINE 1000 OF FORM 990-BLANKED IN 1991
- 2. LINE 1000 OF FORM 990-BLANKED IN 1991

IN 1991 TO 1991:

- 1. LINE 1000 OF FORM 990-BLANKED IN 1991
- 2. LINE 1000 OF FORM 990-BLANKED IN 1991

IN 1991 TO 1991:

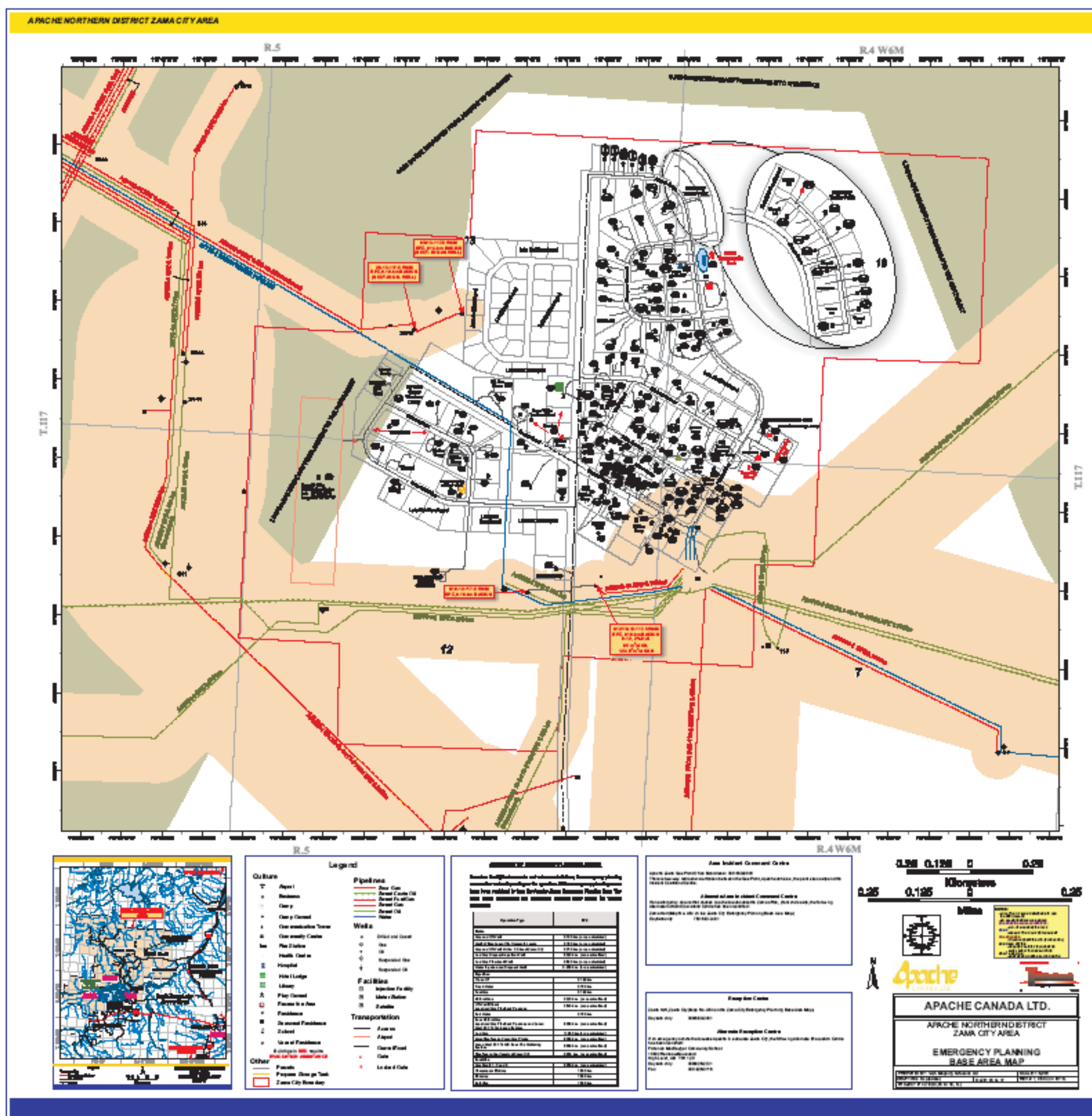
- 1. LINE 1000 OF FORM 990-BLANKED IN 1991
- 2. LINE 1000 OF FORM 990-BLANKED IN 1991

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File options: Can be
 Download (from City Map Web Service) (Download (using map) (Download (using map))
 Register only / (Download only)
File name: Example: Can be
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- **Key Point:** Components of Market Failure and Public Goods/Externalities are:
 - **Public Goods:** Goods that are non-excludable and non-rivalrous, meaning that one person's consumption does not reduce the amount available to others.
 - **Externalities:** Costs or benefits that are not reflected in the market price of a good or service.
 - **Market Failure:** A situation where the free market fails to allocate resources efficiently.

[illegible]



Apache Northern District – Zama City Area