



CANADIAN ASSOCIATION  
OF PETROLEUM PRODUCERS

## RECOMMENDED PRACTICE

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# **Recommended Practices for Sour Gas Development Planning and Proliferation Assessment**

(see EUB Bulletin 04-08)

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## Overview

Pursuant to the Energy and Utilities Board (EUB) General Bulletin G.B. 2004-08, Recommended Practices have been developed by industry respective to Sour Gas Development Planning and associated proliferation assessment.

These recommended practices are consistent with recommendations 7, 32, and 33 of the Public Safety and Sour Gas Advisory Committee.

*Sour Gas Development Plan: A plan to explore for, produce, transport and process sour gas resources from a zone or zones in an area, extending over the life of the development to depletion. The plan should portray, as best as can be done at that point in time, the ultimate well, pipelines, production facilities and infrastructure needed to deplete the pool or pools. Development plans will change in response to drilling results, production performance and economic factors. Development is generally accomplished with a number of progressive, discreet projects over the life of the pool. Plans should be updated to provide a solid basis for each project stage.*

## Objective

The underlying objective of these recommended practices is twofold. Firstly, and as primarily applicable to recommendation 7, the intent is to effectively minimise the extent to which the public is impacted by the unnecessary proliferation of sour gas related facilities. The proposed practice of assessing both operated and non operated existing infrastructure prior to development and actively coordinating with other operators where feasible is expected to mitigate the potential for such unnecessary proliferation.

Secondly, and as applicable to recommendations 32 and 33 the intent is to provide a broader range of information to appropriate stakeholders, the EUB and other area oil and gas operators on prospective company plans beyond the drilling of a given well or wells. Where information can be provided on the longer term drilling strategy, infrastructure development plans, and assessment of options to avoid unnecessary proliferation, it is recommended that such information be shared wherever practical.

The oil & gas industry will ascribe to these recommended practices so as to minimize the extent to which *sour gas development near people*<sup>1</sup> adversely

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<sup>1</sup> **\*Sour Gas Development Near People** is, for the purposes of this document, development where there are people in the emergency planning zone or adjacent to it who desire planning information and an assessment of proliferation to understand potential impacts. This would include residents and others as described in Guide 56 and would typically apply to people within the calculated Emergency Planning Zone (EPZ) or prescribed setback, whichever is greater.

impacts the public. The provision of longer range development details or available known options can be handled on a per company basis, or, where appropriate, coordinated between companies.

By providing such added information, other oil and gas operators will be better engaged in the potential for co-ordinated activity. At the same time, the provision of such to area stakeholders will enhance the company's consultation as well as stakeholder ability to react and/or respond to the company's proposal.

A Sour Gas Development Plan will normally be drawn up and maintained by a single operator and may involve varying degrees of complexity as to level of sour gas, population density, new or existing pool, new or existing infrastructure (proliferation assessment), involvement of other operators etc.

Information is provided further on in this document on Area Development Plans, which may be appropriate in certain situations involving multiple parties that are co-ordinating activities in a given area.

It is furthermore understood that the rights to the underlying Petroleum & Natural Gas are oftentimes not held by a singular operator and that companies' proprietary rights and the competitive nature of the industry may not necessarily allow for disclosure of certain details until the need for confidentiality is resolved.

## Contents

1	Sour Gas Development Planning .....	1-1
1.1	Preparation .....	1-1
1.2	Examples .....	1-2
2	Proliferation Assessment .....	2-1
3	Distribution of Information .....	3-1
4	Area Development Planning .....	4-1
4.1	Examples .....	4-2
4.2	Distribution of Area Development Plans .....	4-2
	Attachment #1 Appropriate Level of Plan Detail .....	4-3
	Attachment #2 Mapping Information Required with Sour Gas Development Plans .....	4-5
	Attachment #3 Sour Gas Development Plan Single Phase – Low Complexity - (Example) .....	4-6
	Attachment #4a Sour Gas Development Plan Phase 1 – Exploratory – (Example) .....	4-9
	Attachment #4b Sour Gas Development Plan Phase 2 – Delineation – (Example) .....	4-17
	Attachment #4c Pool Development Plan Phase 3 – Development – (Example) .....	4-23
	Attachment #5 Area Development Plan Multiple Operators – (Example) .....	4-29
	Attachment #6 Area Development Plan Multi-Sector – (Example) .....	4-36

## Figures

Figure 4-1 Non-critical Sour Single Well Example – Single Operation .....	4-8
Figure 4-2 Phase 1 – Schedule A – Pool Depiction .....	4-13
Figure 4-3 Phase 1 – Schedule B – Follow-up Locations .....	4-14
Figure 4-4 Phase 1 – Schedule C – Existing Pipeline Routes and Residences (within 30 km Radius) .....	4-15
Figure 4-5 Phase 1 – Schedule D – Existing Gas Processing Facilities with Conceptual Pipeline Corridor Routes .....	4-16
Figure 4-6 Phase 2 – Schedule A – Depiction .....	4-20
Figure 4-7 Phase 2 – Schedule B – Follow-up Locations .....	4-21
Figure 4-8 Phase 2 – Schedule C – Existing Gas Processing Facilities with Conceptual Pipeline Corridor Routes .....	4-22
Figure 4-9 Phase 3 – Schedule A – Depiction .....	4-26

Figure 4-10 Phase 3 – Schedule B – Follow-up Locations.....	4-27
Figure 4-11 Phase 3 – Schedule C – Existing Gas Processing Facilities with Conceptual Pipeline Corridor Routes.....	4-28
Figure 4-12 Area Development/Multiple Operators – Schedule A – Pool Depiction.....	4-33
Figure 4-13 Area Development/Multiple Operators – Schedule B – Pool Depiction Locations.....	4-34
Figure 4-14 Area Development/Multiple Operators – Schedule C – Follow-up Locations .....	4-35
Figure 4-15 Area Development/Multiple Operators – Schedule A – Pool Depiction.....	4-39
Figure 4-16 Area Development/Multiple Operators – Schedule B – Proposed Wells.....	4-40

## 1 Sour Gas Development Planning

As previously noted, the need for and scope of a Sour Gas Development Plan will be in situations where the industry developer is proposing the drilling of a well or installation of a pipeline, production facility, or gas plant that is deemed to be a component part of a plan to deplete a sour gas pool.

### 1.1 Preparation

The following should be addressed in sour gas development plans recognizing the scope of exploration, delineation and development phases of potential pool development as further elaborated on in this document (See Attachment #1).

- The sour gas zone or zones targeted and any other zones that may be developed that have the potential to extend the life of the development or, alter the production characteristics and the potential impact on people.
- A **project to produce sour gas**<sup>2</sup> from the pool or zone (i.e. well drilling and tie-in)
- The scope of potential development to the extent practical, at least conceptually, where the project is one element of a longer-term phased pool(s) development. The competitive nature of the industry may not allow for disclosure of certain details (i.e. mineral rights held under a broker's name until a later date when confidentiality is no longer required).
- If elements of a plan are uncertain (i.e., contingent on results of initial project work), the range of potential future development in as much detail as feasible.
- A proliferation assessment of how existing sour gas infrastructure can be used by the project (either as is or modified) and/or an explanation of why existing infrastructure cannot be used.
- A map or maps that show existing and potential sour gas related developments (proponent operated and non operated) and other land interests and uses to the extent possible.
- Where applicable, timing of the project in order to reduce conflicts between surface and sub-surface development.

Examples have been provided depicting cases of each end of the continuum of complexity which could be anticipated. It is expected that most cases will fall somewhere within this range as to level of information and resultant communication required.

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<sup>2</sup> **\*Sour Gas Project:** *An interconnected system of well/s, pipelines and other facilities necessary to produce sour gas from a zone, pool or pools that is intended to be constructed as an integrated undertaking. This includes all elements from drilling through production, transporting and field processing. A project is usually one of a number of stages in a Sour Gas Development Plan, for which an application is being made.*

The relative complexity of the plan and whether a single or multiple (i.e. 3) phase format is required will depend on the well and the characteristics of the respective area. The examples provided below portray a range of situations, Example A being the low complexity case (single phase) and Example B being the high complexity case (all 3 phases).

For illustrative purposes, radii of 15 km and 30 km are used in certain of the examples as to proximity of facilities, residences, etc. in the area and will fluctuate in size dependent on release rate calculations.

## **1.2 Examples**

### **A – Operator/Proponent**

- Level 1-2 sour gas well/existing pool/relatively unpopulated area
- Single phase plan/less complex issues

*(see Attachment #3)*

### **B – Operator/Proponent**

- critical sour gas well/new pool/populated area
- Three-phase plan/high complex issues

*(see Attachment #4a, Attachment #4b,*

*Attachment #4c)*



## 2 Proliferation Assessment

As indicated under sour gas development planning and further to industry notification requirements under Guide 56, a proliferation assessment of how existing sour gas infrastructure can be used or not should be addressed in plan development. In order to minimize the potential installation of additional sour gas infrastructure in a given area where existing infrastructure may be appropriate, the respective industry proponent should contact other operators in the respective area and assess and evaluate the use or modification and use of existing facilities and account for regional sour gas development needs in their facility designs.

Inasmuch as the use of existing facilities requires integration between parties that may be reluctant to co-operate due to competitive issues, the EUB will be available to facilitate dialogue or direct that appropriate dispute resolution be engaged. While there is no formal requirement for existing operators in a given area to co-operate with a new development, the EUB will strongly encourage such co-operation in the interest of avoiding unnecessary proliferation.

The Energy and Utilities Board's objective of minimizing the overall impacts of sour gas development does not necessarily mean that use of existing infrastructure over constructing new facilities is preferred in all circumstances. There are situations where new sour gas facilities may have lower emissions, result in less surface disturbance and/or affect fewer residents than use of existing infrastructure. In assessing proliferation, the Energy and Utilities Board recommends that developers compare these three factors in selecting appropriate development alternatives.

Proliferation requirements for sour gas plants are set out in ID 2001-03: Sulphur Recovery Guidelines for the Province of Alberta and in Guide 56: Energy Development Applications and Schedules (June 2003), Section 5.9.3.

### 3 Distribution of Information

The provision of development plans to the EUB in support of sour gas related applications near people should be preceded by distribution of the same plans to people in vicinity of the proposed activity or facility. In this respect, distribution of information should be consistent with the consultation/notification criteria noted in EUB Guide 56.

- Landowners and residents within the consultation radius should be provided the Development Planning information as part of the required consultation.
- Landowners and residents within the notification radius should be provided the Development Planning information in support of any other information provided as part of the required notification. Depending on the relative sensitivity of the proposal(s), notification may be better served to more closely resemble consultation.
- Landowners and residents outside of but in close proximity to the radius boundaries should be incorporated into the consultation or notification process as applicable.
- It is further expected that other interested parties outside of the consultation/notification radii be provided information upon request, where practical.
- Municipal authorities (i.e. County, Municipal District or Improvement District) should be provided notification or the opportunity for consultation regarding sour gas or Area Development Plan(s) in the interest of co-ordinating regional road and infrastructure requirements as well as information that may impact/affect impending or future land uses subject to municipal planning authority.
- Information as provided to landowners and residents should also be provided to the EUB Facilities Applications Department as well as the applicable EUB Field Office.

→ Present health regions / MU will add this to this section / dist. of information

## 4 Area Development Planning

In situations where one or more industry developers are active in a given area involving sour gas near people, an Area Development Plan may be appropriate and should be considered:

*AREA DEVELOPMENT PLAN: The plan of one or more operators to explore for, produce, transport and process sour gas in an area where there are significant common issues over the whole area regarding sour gas development. Such issues may include conflicts with residential or other surface development, public, safety, or environmental impacts. Area Development Plans deal with the area wide issues amongst multiple operators. Sour Gas Development Plans are still necessary to cover other localized issues and, as applicable, can be incorporated into an Area Development Plan. Operators may initiate Area Development Plans, or the EUB may be better able to identify significant area wide issues and to recommend that an Area Development Plan be required.*

The need for and scope of Area Development Plans should be considered by industry (in consultation with the EUB) for business reasons or in response to or in anticipation of community reaction. The EUB may also assess the need for area plans on a case-by-case basis where deemed appropriate, and may recommend a plan be prepared. In this respect, Area Development Plans will typically be proponent driven where more than one operator has deemed it appropriate to design a coordinated approach to area planning, such as in cases where the exploration and/or delineation phases of development are already completed by more than one operator and/or coincidental with non oil and gas related development in a given area. Alternatively, Area Development Plans may be encouraged by the EUB where it has determined that a multi-operator coordinated plan is appropriate and the respective industry operators have yet to initiate such a plan voluntarily.

Area Development Plans should be considered in the following types of situations:

- In situations where several pools are being developed in a given defined area or several sour gas operators are proposing developments that, in the EUB's view, need to be considered together and/or require coordination to minimize and mitigate impacts to the public and/or other land users.
- Where there is expansion of residential development into sour gas areas or vice versa.
- Where there is the potential for conflict between surface and sub-surface development.
- Where public safety is an issue (e.g. areas of overlapping EPZs).
- In "hot spots" or areas where there is potential for significant development and there is a high level of public concern due to competing land uses, gas field operational issues, environmental impacts, etc.

In addition to the components noted under Sour Gas Development Plans, the Area Development Plan should include the following components:

- Existing and proposed sour gas production, pipeline and processing infrastructure.
- Potential developments of two or more sour gas developers.
- Other potential land use developments and/or
- cross-sector development planning (i.e., among the oil and gas, forestry, land development sectors)

Additional requirements may be appropriate to address specific needs, and, depending on the circumstances involved, may be required by the EUB.

#### **4.1 Examples**

##### **A – Multiple Operators**

- sour gas well and infrastructure development/new pool or pools
- populated area

*(see*

*Attachment #5)*

##### **B – Multi-Sector**

- sour gas development coinciding with rural residential development

*(see Attachment #6)*

#### **4.2 Distribution of Area Development Plans**

While Area Development Plans may not necessarily be directly connected to sour gas related applications to the EUB, the need for distribution and sharing of the Plans to area stakeholders is consistent with the distribution of information in proponent driven Sour Gas Development plans (see Section 3). In some cases involving multi-sector development of the respective Area Development Plan, relevant stakeholders will have a part to play in formulating the Plan.

## Attachment #1

### Appropriate Level of Plan Detail

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The level of detail expected in development plans is related to the stage of development. Thus pool or Area Development Plans may be:

1. **Conceptual:** Until initial exploratory wells are drilled and evaluated, it may not be feasible to define the number of additional wells or the full scope and size of production, pipeline or processing facilities. However conceptual planning information is necessary to:
  - Assist stakeholders in understanding the range of potential wells and other facilities that may result from a successful exploration program, and the respective schedule of development and production.
  - Assist developers in identifying options for potential integration with existing sour gas infrastructure in the area and resultant avoidance of unnecessary proliferation of sour gas development.
  - Describe broad development alternatives including possible pipeline corridors and options for processing the sour gas.
  - Describe short-term testing or production plans.
2. **Delineation:** Once initial exploratory drilling has identified sour gas potential, applicants will be expected to refine the conceptual development plan. A delineation plan will:
  - Identify additional well locations and timing
  - Describe test or short-term production scenarios
  - Describe production and pipeline facility requirements including potential locations and corridors
  - Describe processing alternatives.

At this stage the EUB expects applicants to assess capabilities of existing sour gas pipeline and processing infrastructure and describe how existing sour gas infrastructure may be integrated with potential production, pipeline and processing plans.
3. **Full Development:** Once the sour gas resource has been delineated and it is intended to proceed with applications for production, pipeline and/or processing plant facilities a more detailed development plan may be required. The plans will:
  - Address how integration with existing sour gas infrastructure will be carried out to minimize overall impacts of production, pipeline and processing facilities in the area
  - Address how needs of other area operators and/or reserve owners will be considered in the design of proposed new facilities.

- As applicable, applications for development wells, pipelines and facilities may be “bundled” as an integrated sour gas prospect.
- Address coordination of roads, pipeline and utility rights of way with other users in the area (i.e. forestry, other oil and gas, municipal authorities and, land development and recreational land uses).
- Describe plans to minimize disturbances and emissions and to mitigate adverse impacts to the public and/or the environment.

Dependant on the respective situation, the content of the Sour Gas or Area Development Plan may include discussion of a range of points as drawn from the following list (some or all of these points may be included or an explanation provided as to why a given point was not discussed):

*Very important items*

1. Pool/Prospect Outline *- has to have*
2. Proposed Well/Project *- must relate to 4-5*
3. Emergency Response Plan Consideration *- must*
4. Short Term Testing/Production *- must*
5. Conceptual Follow-up Locations *- maybe*
6. Other Operator Involvement (NOTE: may be addressed independently or as a component under area infrastructure and existing facilities) *maybe*
7. Gas Well Production/Infrastructure/Facilities *must*
  - Existing *description and a map*
  - Proposed
8. Processing Plants/Facilities and Pipeline Corridors *- must*
  - Existing Plants/Facilities
  - Proposed Plants/Facilities
  - Conceptual Pipeline Corridors
9. Potential Conflict between Surface and Subsurface Development *- maybe*
10. Summary *must / contact USA*

## **Attachment #2**

### **Mapping Information Required with Sour Gas Development Plans**

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- Basic map information including:
  - Well or wells applied for
  - Road Infrastructure/Transportation Corridors
  - Oil/Gas Field Access roads
  - Facilities to transport and process produced gas
  - Existing and proposed sour gas infrastructure (of both proponent and other operators)
  - Topography and hydrology
  - Land and mineral rights ownership - subject to confidentiality
  - Depiction of pool boundaries for new exploration prospects – subject to confidentiality
  - Urban Centres
  - Residences in proximity to the proposed well/s, pipelines and processing facilities
- The following additional information may be required in sour gas and Area Development Plans:
  - The applicants understanding of the sour gas pool outline/s
  - Existing land uses (roads, residences, communities, Aboriginal Reserves and/or communities, industrial developments, recreation areas, camps, parks, Trapping Permit Areas, etc)
  - Existing energy development including all wells, pipelines and related facilities; developments of the applicant and other companies would be shown separately (proliferation policy requires all potential facilities to be identified)
  - Other potential developments of the applicant and their timing, having regard for the extent of oil and gas pools

## Attachment #3

### Sour Gas Development Plan Single Phase – Low Complexity - (Example)

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#### 1. Pool/Prospect Outline

- Requirements for exploration pool boundary depiction shall be subject to recognition of well operator (and/or partner) confidentiality concerns.
- As indicated on the attached Schedule A, the seismically defined prospect is estimated to be approximately 1 section in size.
- The target geological zone is Leduc at estimated depth of 1200 metres.

#### 2. The Proposed Well

The proposed Company/Location \_\_\_\_\_ well is a 1234 metre deep exploratory well that will test the sour gas potential of a seismically defined Leduc Reef prospect.

This will be a level 2 sour gas well, and is categorized by the AEUB as a D-57.

Subject to regulatory approval, the drilling of the well is planned for March of 2003 and will take about 90 days to drill.

If following drilling, completion then evaluation, the proposed well proves to be commercially producible, the well will be evaluated for production capability and consultation and regulatory applications will be required prior to any further development.

#### 3. Emergency Response Planning

Once the Emergency Planning Zone has been determined for the proposed location(s), each resident will be visited within the planning zone. Information will be gathered such as the number of residents, ages and any special assistance needs that might be required in the event of an emergency. Residents will be provided with information on the Company's emergency response procedures i.e. communication, sheltering, evacuation.

Information from the resident visits will be used to formulate the Company's Emergency Response Plan for all proposed development activities such as drilling, completions and production operations.



#### **4. Short Term Testing/Production**

##### **Commercial Well – Completion**

When drilling operations are concluded the well will be completed and tested to determine commercial productivity. Prior to commencement of completion and testing operations, the well will be fully encased with steel casing and cemented from bottom to top.

Completion operations are expected to take 1 week following the drilling of the well. The completion operations for this well will be with the wellhead on, except to run the production tubing with a subsurface safety valve, prior to perforating the production casing.

The well will only be flowed for a short period to remove any fluid used during completion. Flaring of gas will require a permit from the Alberta Energy and Utilities Board (Board), and must be done in compliance with Alberta Environment criteria.

#### **5. Conceptual Follow-up Locations**

- No further wells are planned at this time.

#### **6. Gas Well Production, Area Infrastructure**

##### **Production**

- If the well is successful the well would be tied into the existing \_\_\_\_ pipeline 300 meters to the North. (See diagram) The necessary acquisition and consultation requirements will be met and an application will be applied for through the AEUB. Once complete, the Company would install wellsite production facilities to permit the production of sour gas from the well.

##### **Area Infrastructure**

- There is only one pipeline available to transport this gas. If the well is successful we will be tying in to that line.

#### **7. Existing Gas Processing Facilities (Gas Plants) and Conceptual Pipeline Corridors**

##### **Existing Gas Processing Facilities**

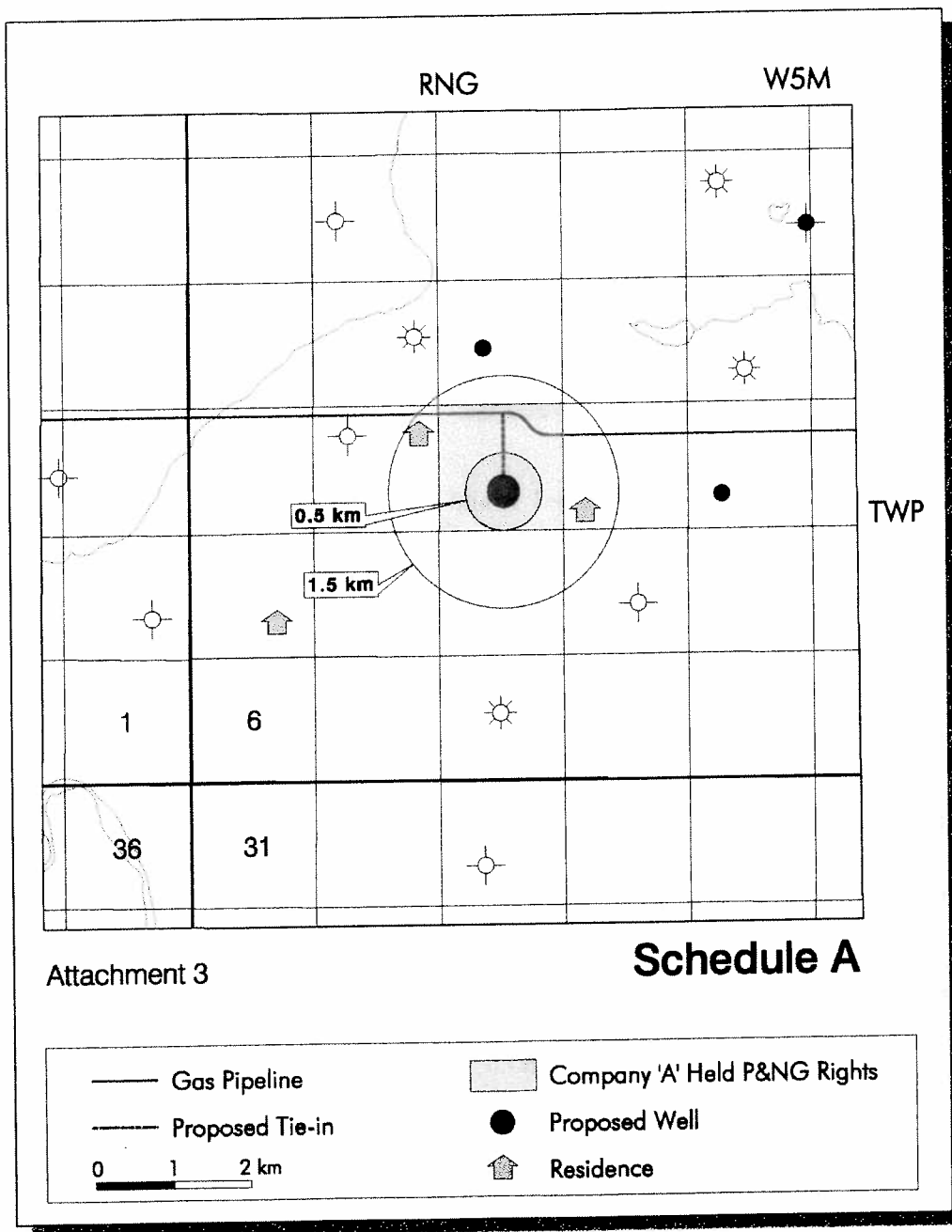
- N/A

#### **8. Summary**

\_\_\_\_\_ owns one section of mineral rights in this immediate area. We will only be drilling one well at this time. If the well is economically viable we will be constructing a pipeline to the existing infrastructure 300 meters to the north. If the play is successful we may look at further development in the future but we have no immediate plans. We will keep you informed of our intentions.

Figure 4-1 Non-critical Sour Single Well Example – Single Operation

## Single Phase / Low Complexity



**Attachment #4a**  
**Sour Gas Development Plan Phase 1 – Exploratory – (Example)**

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**1. Pool/Prospect Outline**

- Requirements for exploration pool boundary depiction shall be subject to recognition of well operator (and/or partner) confidentiality concerns.
- As indicated on the attached Schedule A, the seismically defined prospect is estimated to be approximately 18.75 x 3.5 km's in size.
- The target geological zone is a \_\_\_\_\_ structure at estimated depth of \_\_\_\_\_ metres.
- The geologic setting is similar to that of the (Company/Location) pool. As an exploratory geological prospect the probability for success is estimated at about \_\_\_\_\_ percent with potential production rates in the range of \_\_\_\_\_ to \_\_\_\_\_ million cubic feet per day (MMCFD). If gas is found, it is estimated that it would contain approximately \_\_\_\_\_% hydrogen sulphide (H<sub>2</sub>S). Potential reserves of the pool are conservatively estimated to be in the order of \_\_\_\_\_billion cubic feet (BCF) of gas *together with* \_\_\_\_\_ barrels of recoverable liquid hydrocarbons (natural gas liquids and condensate), and \_\_\_\_\_ tonnes of elemental sulphur. *OPTIONAL*

**2. The Proposed Well**

The proposed Company/Location \_\_\_\_\_ well is a \_\_\_\_\_ metre deep exploratory well that will test the sour gas potential of a seismically defined \_\_\_\_\_ prospect. The proposed well is deemed to be a Level \_\_\_\_\_ well, with an expected Emergency Planning Zone (EPZ) radius of \_\_\_\_\_ km's.

Subject to regulatory approval, the drilling of the well is planned for \_\_\_\_\_ through \_\_\_\_\_ of 200\_\_.

If following drilling, completion then evaluation, the proposed well proves to be commercially producible, the well will be evaluated for production capability and consultation and regulatory applications will be required prior to any further development.

**3. Emergency Response Planning**

Once the Emergency Planning Zone has been determined for the proposed location(s), each resident will be visited within the planning zone. Information will be gathered such as the number of residents, ages and any special assistance needs that might be required in the event of an emergency. Residents will be provided with information on the Company's emergency response procedures i.e. communication, sheltering, evacuation.

Information from the resident visits will be used to formulate the Company's Emergency Response Plan for all proposed development activities such as drilling, completions and production operations.

#### **4. Short Term Testing/Production**

##### **Commercial Well – Completion**

When drilling operations are concluded the well will be completed and tested to determine commercial productivity. Prior to commencement of completion and testing operations, the well will be fully encased with steel casing and cemented from bottom to top.

Completion operations are expected to take 2-3 weeks following the drilling of the well. The completion operations for this well will be with the wellhead on, except to run the production tubing with a subsurface safety valve, prior to perforating the production casing.

The well will only be flowed for a short period to remove any fluid used during completion. The gas and fluids will be flowed through a high pressure separator, with gas to flare and liquids to a low pressure vapour tight system. It is expected that flaring will take place only for 3-5 day period. Flaring of gas will require a permit from the Alberta Energy and Utilities Board (Board), and must be done in compliance with Alberta Environment criteria. During periods when gas is flared, plume tracking will be performed on a continuous basis using radio equipped mobile air monitoring units. Any exceedence of environmental criteria would result in immediate cessation of operations.

For the production phase, the well would have a Production Facility Emergency Response Plan developed to ensure public safety. The requirements of all applicable regulatory authorities, including Alberta Environment would be met.

The Company would again be required to personally consult with area residents and landowners prior to making a new application to the Board for a Production Facility Permit.

#### **5. Conceptual Follow-up Locations**

- It is estimated that to properly deplete the prospective reservoir, a range of \_\_\_\_ wells are expected to be drilled at this time. Depending on reservoir characteristics (i.e. pressure/porosity), up to \_\_\_\_ wells could conceivably be drilled.
- As indicated on the attached Schedule B, and subject to the results of the drilling of the proposed well, follow-up wells at this time are estimated to be drilled at the north and south ends of the theoretical pool.

## 6. Gas Well Production, Area Infrastructure

### Production

- Provided the well is a success and economic to tie-in, the Company would make application to the Board for a pipeline and production facility permit, but only after additional community consultation regarding the facility and thorough assessment of production facility and pipeline routing options. Once complete, the Company would install wellsite production facilities to permit the production of sour gas from the well. Such surface facilities would consist of a wellhead, an emergency shutdown valve, a line heater, a flarestack (which would be used only during maintenance and emergency operations) a small radio telemetry unit building, and 3-300 litre chemical treatment tanks (all situated within a containment tank). Subsurface facilities would include an additional emergency shutdown valve. There would be no continuous sour gas emissions from the well.

### Area Infrastructure

- As indicated on the attached Schedule C, existing sour gas infrastructure within a 15km radius of the proposed well is minimal. In the event of a successful initial well and follow-up locations, pipeline routes would be new and would be delineated subject to the direction of tie-in to an appropriate gas processing facility. Wherever feasible, paralleling of existing right-of-ways will be optimized.

## 7. Existing Gas Processing Facilities (Gas Plants) and Conceptual Pipeline Corridors

### Existing Gas Processing Facilities

- Three options currently exist for the processing of gas from the proposed well/pool. The following existing sour gas plants have been identified within a 30 km radius as further shown on the attached Schedule D.

#### Company/Plant Location A - \_\_\_\_\_ (location)

- Approximately 23.8 kms of pipeline would be required. The plant has \_\_\_\_\_ million cubic feet per day of licensed spare capacity for gas and \_\_\_\_\_ tonnes per day of sulphur capacity. Licensed sulphur recovery is \_\_\_\_\_%.

#### Company/Plant Location B - \_\_\_\_\_ (location)

- Approximately 15 kms of pipeline would be required. The plant has \_\_\_\_\_ million cubic feet per day of licensed spare capacity for gas and \_\_\_\_\_ tonnes per day of sulphur capacity. Licensed sulphur recovery is \_\_\_\_\_%.

#### Company/Plant Location C - \_\_\_\_\_ (location)

- Approximately 27.4 kms of pipeline would be required. The plant has \_\_\_\_\_ million cubic feet per day of licensed spare capacity for gas and \_\_\_\_\_ tonnes per day of sulphur capacity. Licensed sulphur recovery is \_\_\_\_\_%.

Conceptual Pipeline Routing options (depicted as Corridors, 5 kms in width to allow for variation in routing due to residences, topography, etc.) are also shown on the attached

Schedule D. Subject to well results and eventual determination of preferred processing alternative, the final route selection will be determined in consultation with affected property owners, municipal authorities and others, as appropriate.

**8. Other Operator Involvement**

- As noted under Area Infrastructure, there is minimal existing infrastructure in the vicinity of the proposed well. The holders of P&NG Rights other than our own within or in proximity to the anticipated pool is not actively planning any development at this time. Other facility operators in the broader area have been identified and contacted as to gas plant processing capability and, as well as results become known, further discussions will be undertaken.

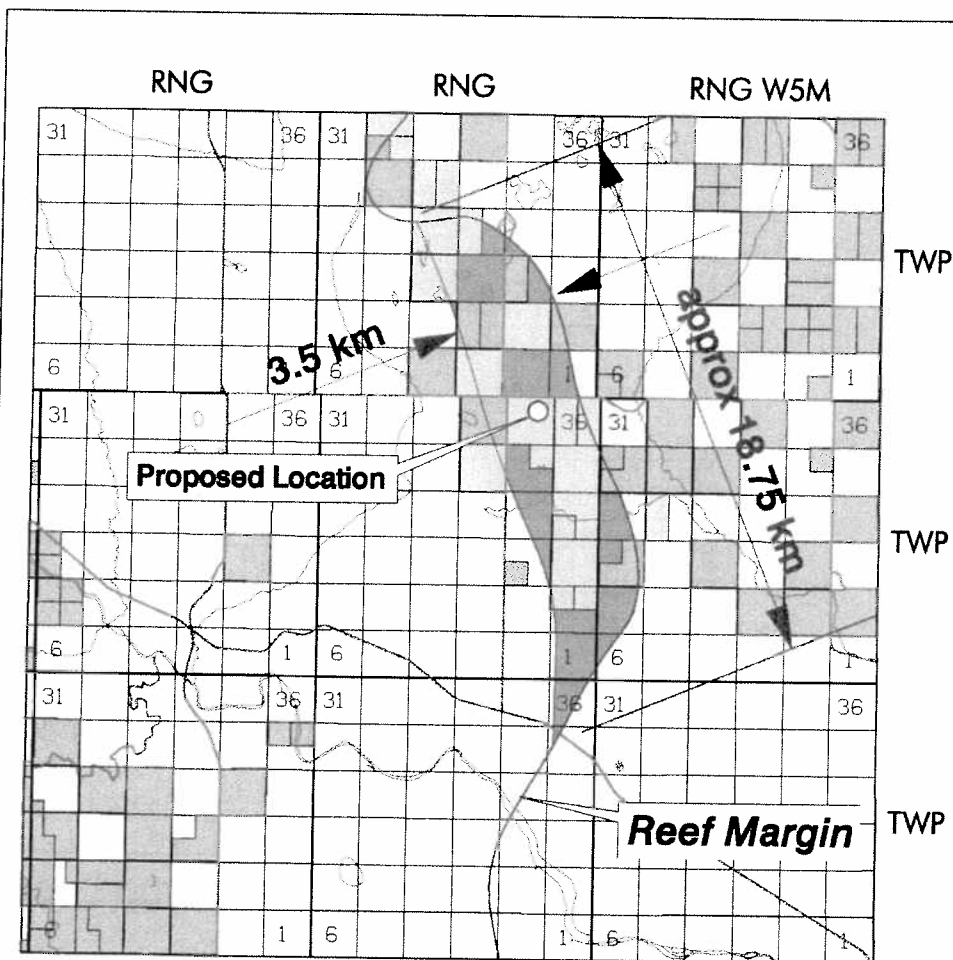
**9. Summary**

- Subject to required regulatory approvals, the proposed well will be drilled and completed. Subject to results, follow-up wells may be proposed and, subject to ensuing land acquisition and consultation and regulatory approval, greater certainty of pool outline and development strategy will become evident. The Company will endeavour to keep the affected public and other appropriate stakeholders apprised of progress in the planning process as it unfolds.

Figure 4-2 Phase 1 – Schedule A – Pool Depiction

*Requirements for exploration pool boundary depiction shall be subject to recognition of well operator (and/or partner) confidentiality concerns.*

## Phase 1 - Exploratory / Conceptual



### Schedule A - Pool Depiction

0 5 10 km

Attachment 4A

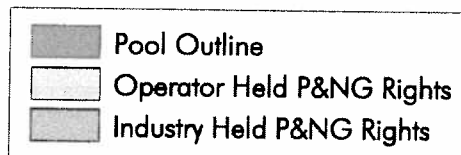


Figure 4-3 Phase 1 – Schedule B – Follow-up Locations

*Requirements for exploration pool boundary depiction shall be subject to recognition of well operators (and/or partner) confidentiality concerns.*

## Phase 1 - Exploratory / Conceptual

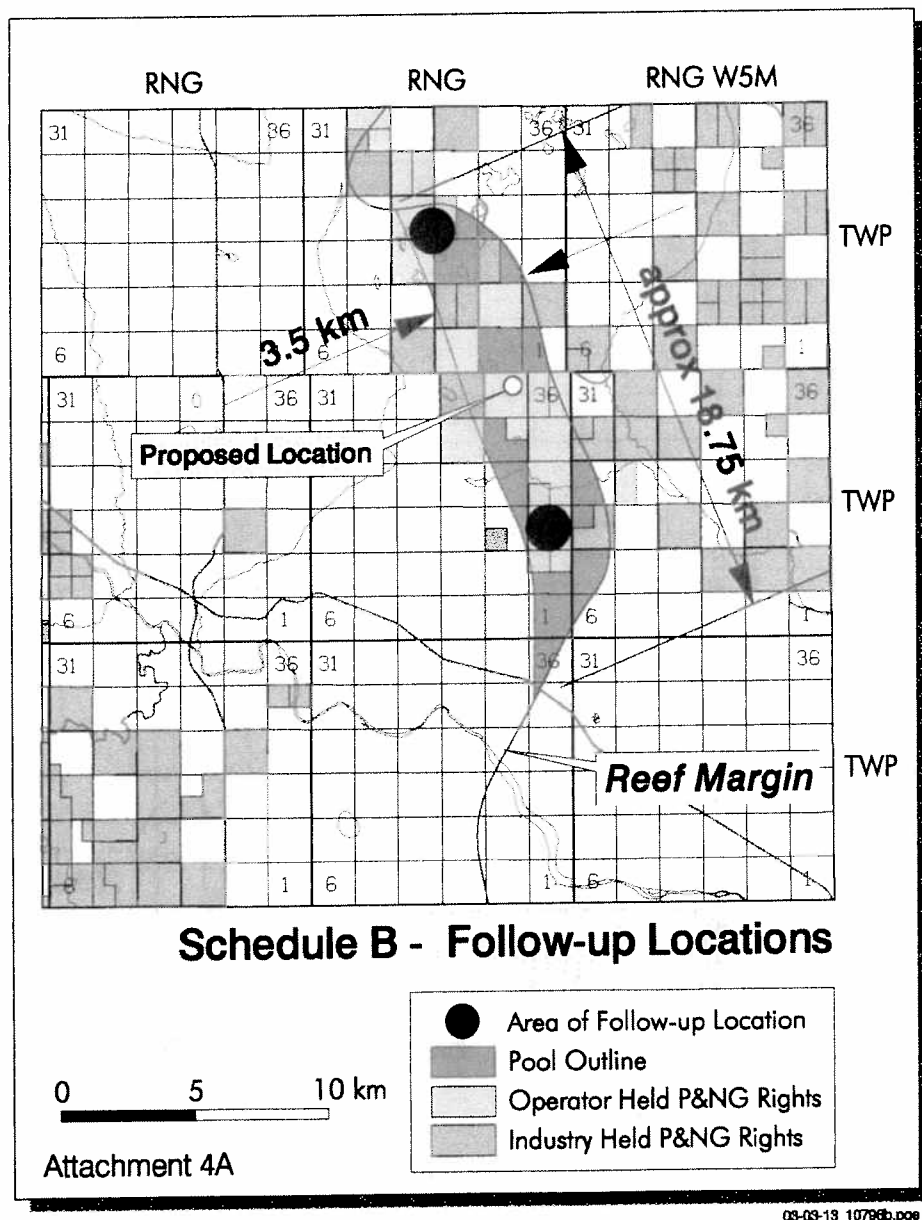
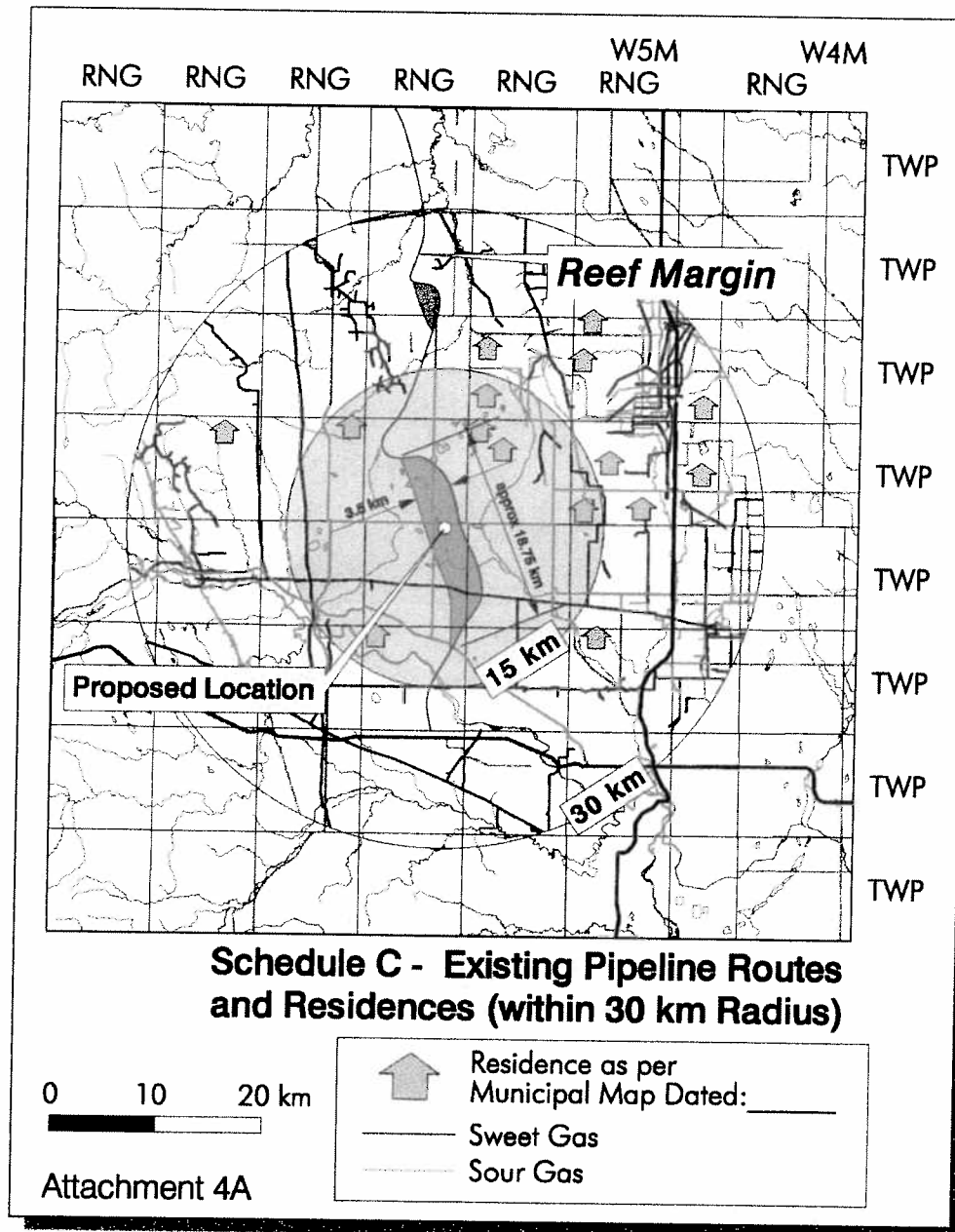




Figure 4-4 Phase 1 – Schedule C – Existing Pipeline Routes and Residences (within 30 km Radius)

*Requirement for exploration pool boundary depiction shall be subject to recognition of well operator (and/or partner) confidentiality concerns.*

## Phase 1 - Exploratory / Conceptual

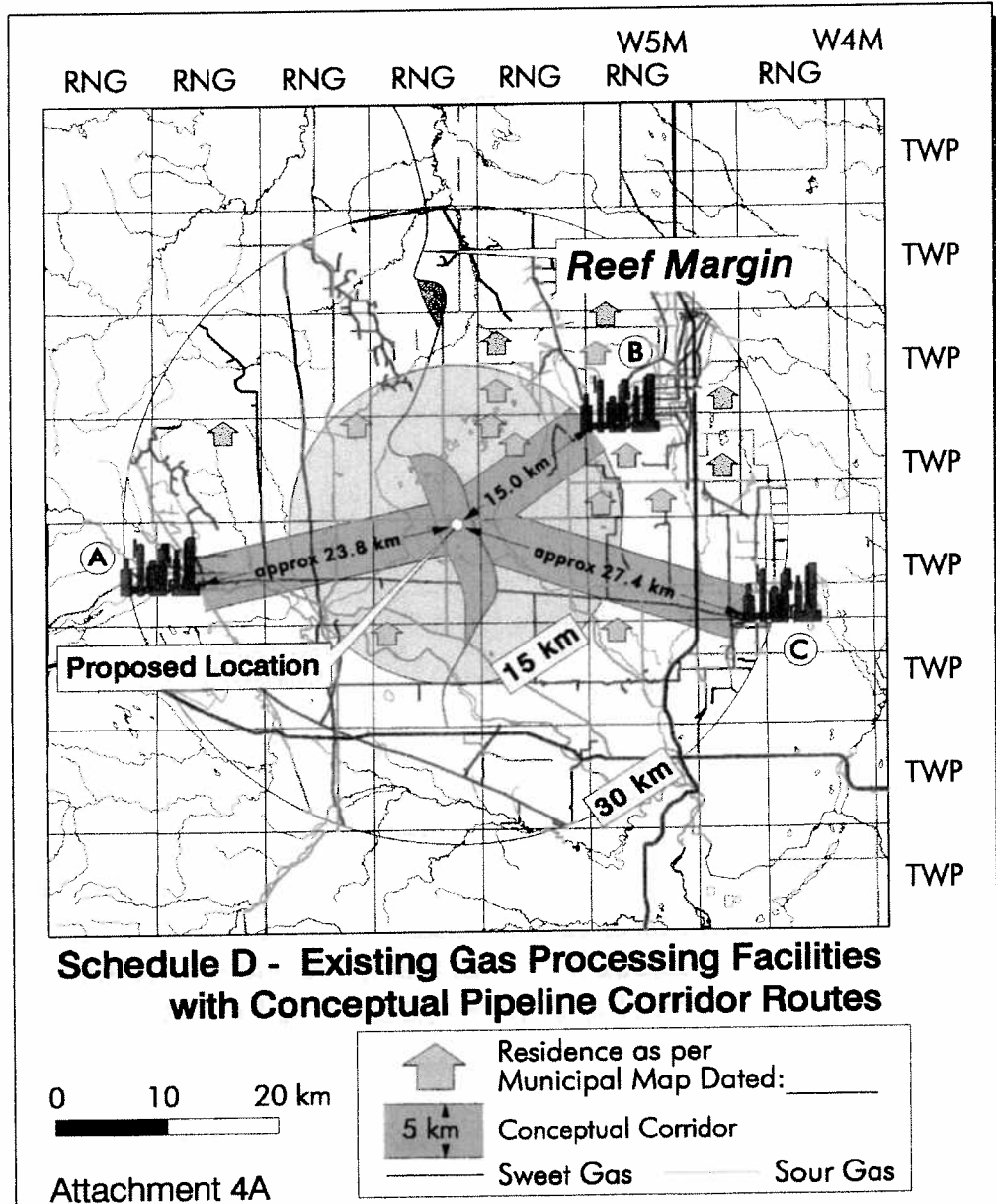


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Figure 4-5 Phase 1 – Schedule D – Existing Gas Processing Facilities with Conceptual Pipeline Corridor Routes

*Requirement for exploration pool boundary depiction shall be subject to recognition of well operator (and/or partner) confidentiality concerns*

## Phase 1 - Exploratory / Conceptual



**Attachment #4b**  
**Sour Gas Development Plan Phase 2 – Delineation – (Example)**

---

**1. Introduction**

Further to the Phase 1 – Exploratory Pool Development Plan previously submitted, the exploratory sour gas well located at \_\_\_\_\_ was successfully completed. The H<sub>2</sub>S concentration of the well was confirmed at \_\_\_\_\_%, with production rate at \_\_\_\_\_ MMCFD.

**2. Pool Prospect Outline**

As indicated on the attached Schedule A, the pool has been further defined by the results of the \_\_\_\_\_ well and is now estimated to be approximately 15x4.5 kms in size and reserves are estimated to be in the range of \_\_\_\_\_ billion cubic feet (BCF) of gas, \_\_\_\_\_ barrels of associated liquids and \_\_\_\_\_ tonnes of elemental sulphur. As further wells are drilled to better delineate the pool size and configuration, the respective mapping will be adjusted accordingly. At this time, it is estimated that at full development, the production rate from the pool should be in the range of \_\_\_\_\_ to \_\_\_\_\_ MMCFD.

**3. Proposed Delineation Wells**

The Company is proposing to drill three additional Level \_\_\_\_\_ wells within the bounds of the estimated pool over the next 18-24 months in order to properly delineate the pool.

The locations of these wells have been tentatively established within the referenced sections and as indicated on the attached Schedule B.

Section _____	Township _____	Range _____	W _____	M _____
Section _____	Township _____	Range _____	W _____	M _____
Section _____	Township _____	Range _____	W _____	M _____

Specific surface and bottom hole co-ordinates are being discussed with respective surface landowners so as to optimize the probability of success and minimize any potential impact on the respective property.

**4. Emergency Response Planning**

Once the Emergency Planning Zone has been determined for the proposed location(s), each resident will be visited within the planning zone. Information will be gathered such as the number of residents, ages and any special assistance needs that might be required in the event of an emergency. Residents will be provided with information on the Company's emergency response procedures i.e. communication, sheltering, evacuation.

Information from the resident visits will be used to formulate the Company's Emergency Response Plan for all proposed development activities such as drilling, completions and production operations.

## **5. Short Term Testing**

As indicated in the Phase 1 – Exploratory Pool Development Plan, when drilling operations are concluded and in the event that one or more of the referenced delineation wells are deemed to be potentially productive, they will be completed and tested consistent with procedures followed in the case of the initial exploratory well. Prior to commencement of completion and testing operations, the respective well will be fully encased with steel casing cemented in place.

The completion operations for the respective wells will be with the wellhead on, except to run the production tubing with a subsurface safety valve, prior to perforating the production casing.

Each well will only be flowed for a short period to remove any fluid used during completion. The gas and fluids will be flowed through a high pressure separator, with gas to flare and liquids to a low pressure vapour tight system. It is expected that flaring will take place only for 3-5 day period. Flaring of gas will require a permit from the Alberta Energy and Utilities Board (Board), and must be done in compliance with Alberta Environment criteria. During periods when gas is flared, plume tracking will be performed on a continuous basis using radio equipped mobile air monitoring units. Any exceedence of environmental criteria would result in immediate cessation of operations.

## **6. Potential Development Wells**

Once the pool/area of interest has been fully delineated, it is now anticipated that an additional \_ - \_ wells could be drilled over the life of the pool to optimize the reservoir potential. This is slightly more optimistic but relatively consistent with the assumptions stated in the Phase 1 – Exploratory Pool Development Plan, wherein it was noted that up to 10 wells could conceivably be drilled.

## **7. Gas Well Production, Area Infrastructure**

### **Production**

The Company proposes to wait until at least two additional wells are deemed commercially productive before installing field production facilities, gathering system and pipeline tie-in to an existing sour gas processing facility.

In addition to the surface facilities required at each wellsite, it is now anticipated that one wellsite will be expanded to facilitate a central facility within the field to collect the gas for tie-in to an area gas processing facility. Minimization of impact on the public will be considered when the location of the central facility is selected.

Wellsite facilities will be consistent with the description in the conceptual plan for the initial well located at \_\_\_\_\_ (copy attached). The infield gathering pipelines will be designed to transport 'wet' sour gas to the central facility described above. These pipelines will be designed for Level 1 status to reduce the impact on the community.

## **8. Existing Gas Processing Facilities (Gas Plants) and Conceptual Pipeline Corridors**

### **Existing Gas Processing Facilities**

Further to the locations of existing gas processing facilities noted on Schedule C to the Phase 1 – Exploratory Pool Development Plan, the referenced Schedule has been revised to delete Option C, which was not equipped to handle the additional volumes of gas.

The Company currently proposes to process the gas from the pool at the \_\_\_\_\_ Plant (Option A) located in the \_\_\_\_\_ 1/4 of \_\_\_\_\_, approximately 23.8 kms west of the discovery well. The alternative of processing the gas at the \_\_\_\_\_ Plant (Option B) is being left open at this time as discussions are still on-going as to the potential for acid gas re-injection as opposed to sulphur extraction.

The proposed gas plant tie-in line is anticipated to be a Level 3 pipeline \_\_\_\_\_ cm in diameter. In accordance with EUB Information Letter 81-3 this pipeline will establish a setback of 100 metres in either direction for residential development, 500 metres of unrestricted country development (8 residences per quarter section) and 1.5 kilometres for urban development. Preliminary route selection is included on the attached map. It is being designed with consideration of existing infrastructure, proposed area development, environmental issues, cultural sensitivities, etc. and will be subject to revision as public consultation proceeds.

## **9. Other Operator Involvement**

As noted under "Existing Gas Processing Facilities" (Item #7)

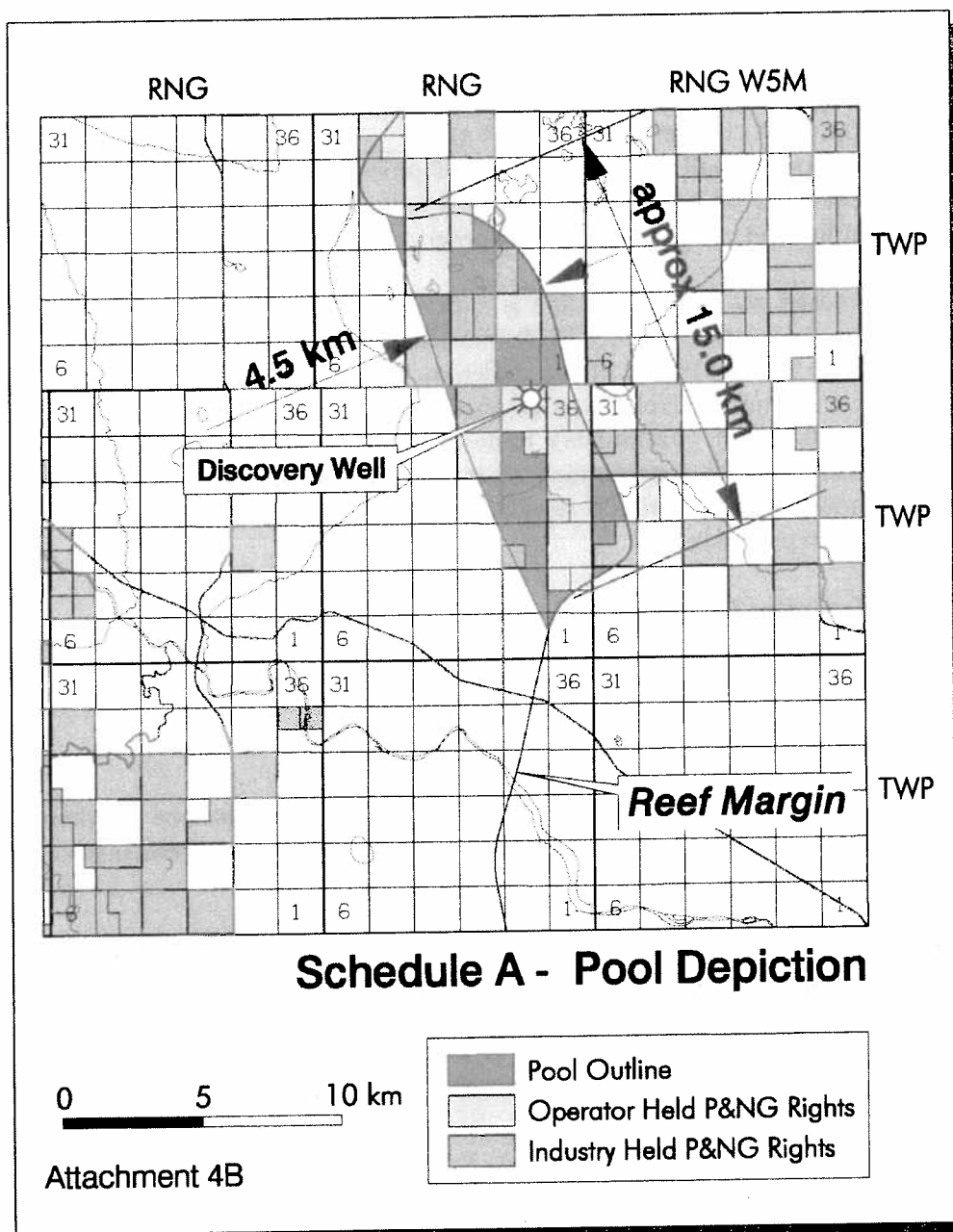
## **10. Summary**

The discovery well was drilled and completed with the assistance of Alternative Dispute Resolution facilitated through the EUB in the case of 3 affected residents/stakeholders with concerns regarding the well and potential field development.

Subject to required regulatory approvals and on-going community consultation, the referenced delineation wells will be drilled and completed. Subject to results, the locations of the pool development wells will be selected, the gathering system and field facilities will be proposed and the final selection of processing facility should be verified. The Company will work with the community to finalize pool development plans as these proposals are better defined.

Figure 4-6 Phase 2 – Schedule A – Depiction

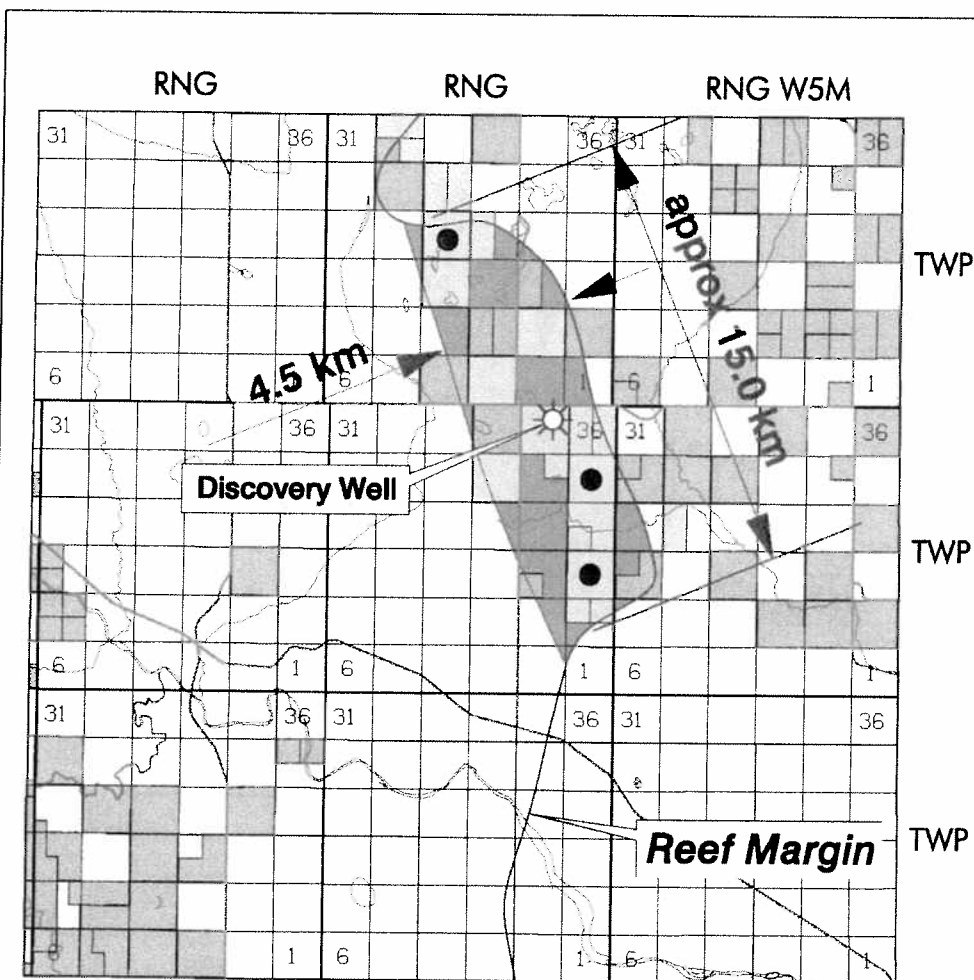
## Phase 2 - Delineation



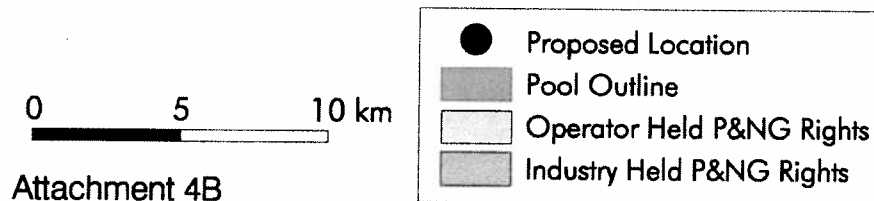
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Figure 4-7 Phase 2 – Schedule B – Follow-up Locations

## Phase 2 - Delineation



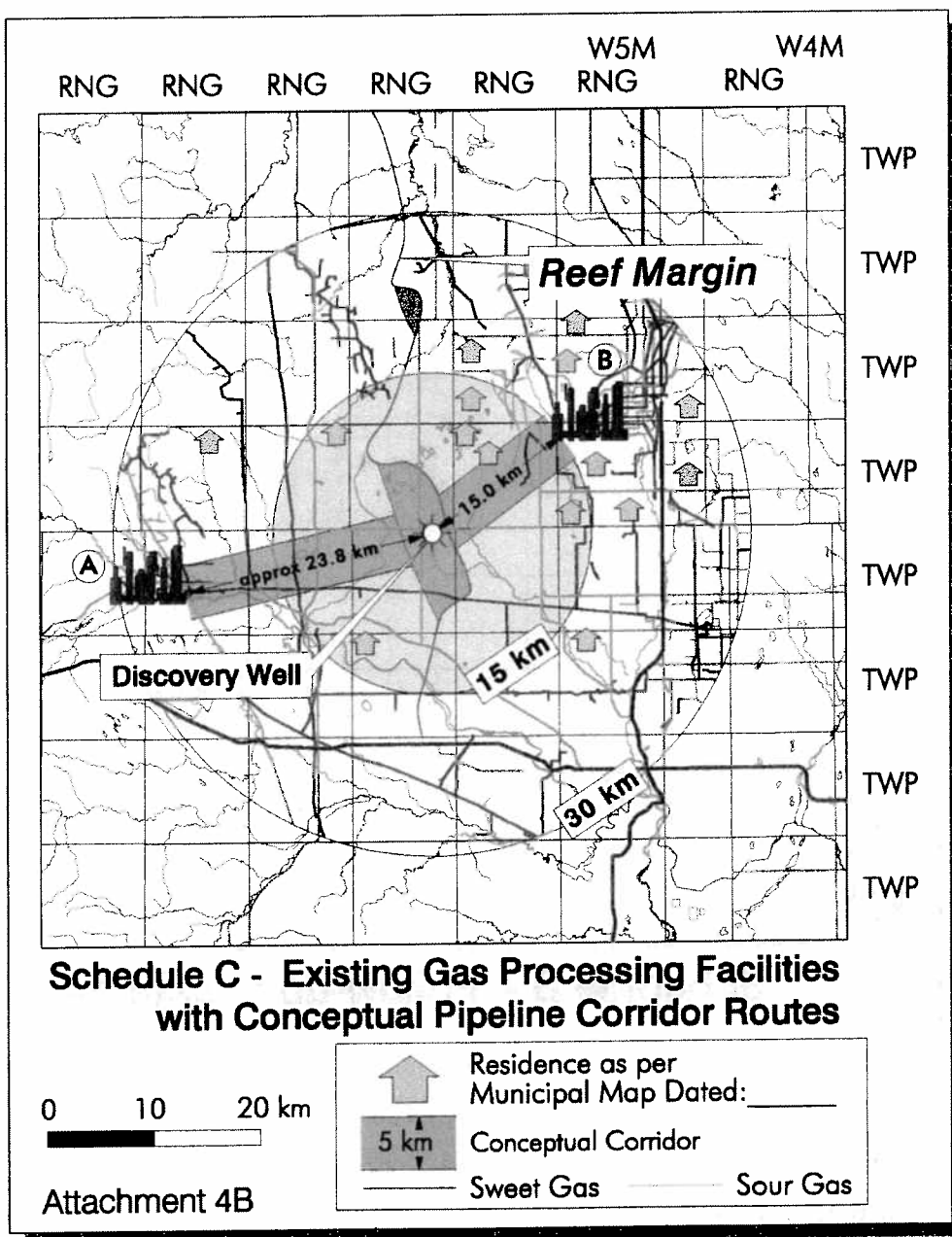
## Schedule B - Follow-up Locations



Attachment 4B

Figure 4-8 Phase 2 – Schedule C – Existing Gas Processing Facilities with Conceptual Pipeline Corridor Routes

## Phase 2 - Delineation





**Attachment #4c**  
**Pool Development Plan Phase 3 – Development – (Example)**

---

**1. Introduction**

Further to the Phase 1 – Exploratory Pool Development Plan previously submitted, the exploratory sour gas well located at \_\_\_\_\_ was successfully completed. The H<sub>2</sub>S concentration of the well was confirmed at \_\_\_\_\_%, with production rate at \_\_\_\_\_ MMCFD.

Further to the Phase 2 – Delineation Pool Development Plan, two of the three delineation wells located at \_\_\_\_\_ and \_\_\_\_\_ were successfully completed. The third well located at \_\_\_\_\_ was D&A.

**2. Pool Prospect Outline**

As indicated on the attached Schedule “A”, the pool has been further defined by the results of the referenced wells and is now estimated to be approximately 13x4.5 kms in size and reserves are estimated to be in the range of \_\_\_\_\_ billion cubic feet (BCF) of gas, \_\_\_\_\_ barrels of associated liquids and \_\_\_\_\_ tonnes of elemental sulphur. It is now expected that an additional six (6) wells will be required to optimize the deliverability of the pool. At this time, it is estimated that at full development, the production rate from the pool should be in the range of \_\_\_\_\_ to \_\_\_\_\_ MMCFD.

**3. Proposed Development Wells**

The Company is proposing to drill six additional Level \_\_\_\_\_ wells within the bounds of the pool over the next 3-4 years in order to produce the estimated reserves noted above.

The locations of these wells have been tentatively established within the referenced sections and as indicated on the attached Schedule B.

Section _____	Township _____	Range _____	W _____	M _____
Section _____	Township _____	Range _____	W _____	M _____
Section _____	Township _____	Range _____	W _____	M _____
Section _____	Township _____	Range _____	W _____	M _____
Section _____	Township _____	Range _____	W _____	M _____
Section _____	Township _____	Range _____	W _____	M _____

Specific surface and bottom hole co-ordinates are being discussed with respective surface landowners so as to optimize the probability of success and minimize any potential impact on the respective property.

#### **4. Emergency Response Planning**

Once the Emergency Planning Zone has been determined for the proposed location(s), each resident will be visited within the planning zone. Information will be gathered such as the number of residents, ages and any special assistance needs that might be required in the event of an emergency. Residents will be provided with information on the Company's emergency response procedures i.e. communication, sheltering, evacuation.

Information from the resident visits will be used to formulate the Company's Emergency Response Plan for all proposed development activities such as drilling, completions and production operations.

#### **5. Short Term Testing**

As indicated in the Phase 1 and 2 – Exploratory and Delineation Pool Development Plans, when drilling operations are concluded and in the event that one or more of the referenced development wells are deemed to be potentially productive, they will be completed and tested consistent with procedures followed in the case of the previously drilled wells. Prior to commencement of completion and testing operations, the respective well will be fully encased with steel casing cemented in place.

The completion operations for the respective wells will be with the wellhead on, except to run the production tubing with a subsurface safety valve, prior to perforating the production casing.

Each well will only be flowed for a short period to remove any fluid used during completion. The gas and fluids will be flowed through a high pressure separator, with gas to flare and liquids to a low pressure vapour tight system. It is expected that flaring will take place only for 3-5 day period. Flaring of gas will require a permit from the Alberta Energy and Utilities Board (Board), and must be done in compliance with Alberta Environment criteria. During periods when gas is flared, plume tracking will be performed on a continuous basis using radio equipped mobile air monitoring units. Any exceedence of environmental criteria would result in immediate cessation of operations.

(Optional – Consideration being given to in-line clean-up and testing, dependent on circumstances and practicality.)

#### **6. Gas Well Production, Area Infrastructure**

##### **Production**

The Company proposes to install field production facilities on each of the three existing wells as well as on the six additional development wells, subject to the successful drilling and completion of each of them.

In addition to the surface facilities required at each wellsite, a central facility (gas battery) is being proposed at \_\_\_\_\_, abutting the existing \_\_\_\_\_ wellsite, where the gas will be gathered for pipeline tie-in to an existing area gas plant.

Wellsite facilities will be consistent with the description in the conceptual plan for the initial well located at \_\_\_\_\_ (copy attached). The infield gathering pipelines is being designed to transport 'wet' sour gas to the central facility described above. These pipelines are being designed for Level 1 status to reduce the impact on the community.

## **7. Existing Gas Processing Facilities (Gas Plants) and Conceptual Pipeline Corridors**

### **Existing Gas Processing Facilities**

As indicated on the attached Schedule C the optional gas processing facilities in the area have been shown as Option A and B. Subject to on-going route selection and discussions with area residents, it has been determined that due to the greater population concentration between the central facility within the pool area and the gas plant Option B, routing of a tie-in pipeline is not feasible. As such, a route has been tentatively determined for pipeline tie-in to gas plant Option A, located in the \_\_\_\_ 1/4 of \_\_\_\_\_ approximately 23 km's west of the central facility.

The proposed gas plant tie-in line is anticipated to be a Level 3 pipeline \_\_\_\_\_ cm in diameter. In accordance with EUB Information Letter 81-3 this pipeline will establish a setback of 100 metres in either direction for residential development, 500 metres of unrestricted country development (8 residences per quarter section) and 1.5 kilometres for urban development. Preliminary route selection is included on the attached map. It is being designed with consideration of existing infrastructure, proposed area development, environmental issues, cultural sensitivities, etc. and will be subject to revision as public consultation proceeds.

## **8. Other Operator Involvement**

As noted under "Existing Gas Processing Facilities" (Item #6)

## **9. Summary**

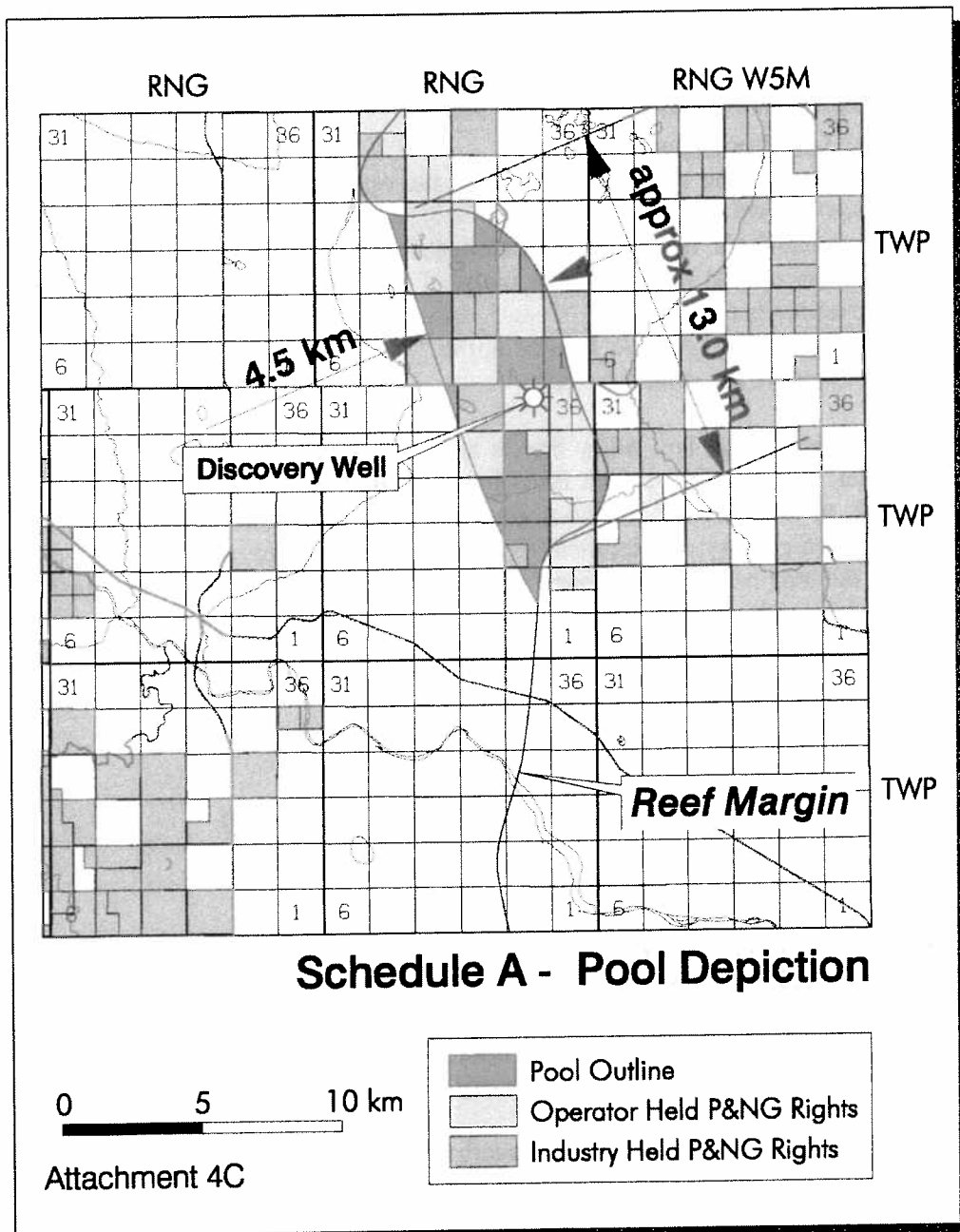
The discovery well located at \_\_\_\_\_ was followed up by 3 delineation wells of which two were successful.

In order to adequately develop the field and optimize production from the reservoir, an additional six wells are deemed necessary.

The applications for these wells together with area pipeline infrastructure and related facility applications, will be applied for as a project submission.

Figure 4-9 Phase 3 – Schedule A – Depiction

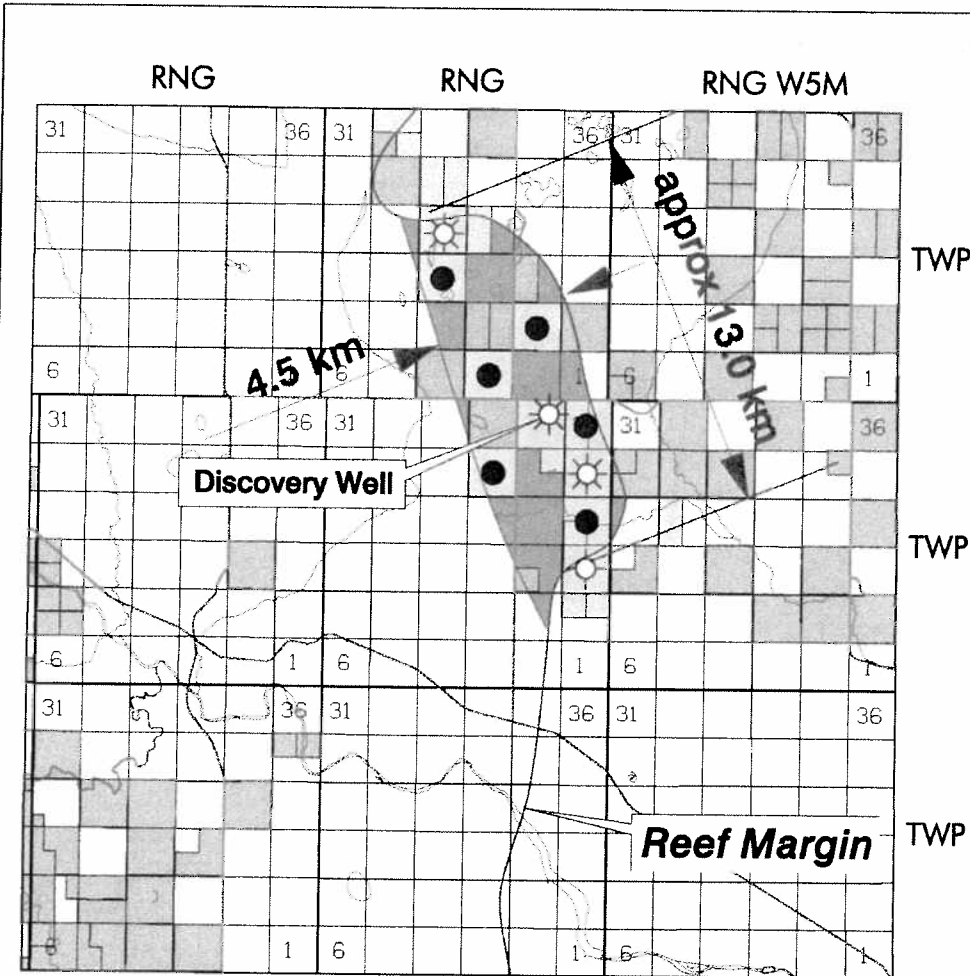
## Phase 3 - Development



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Figure 4-10 Phase 3 – Schedule B – Follow-up Locations

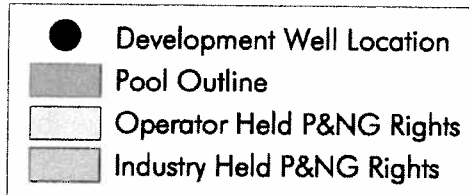
## Phase 3 - Development



### Schedule B - Follow-up Locations

0 5 10 km

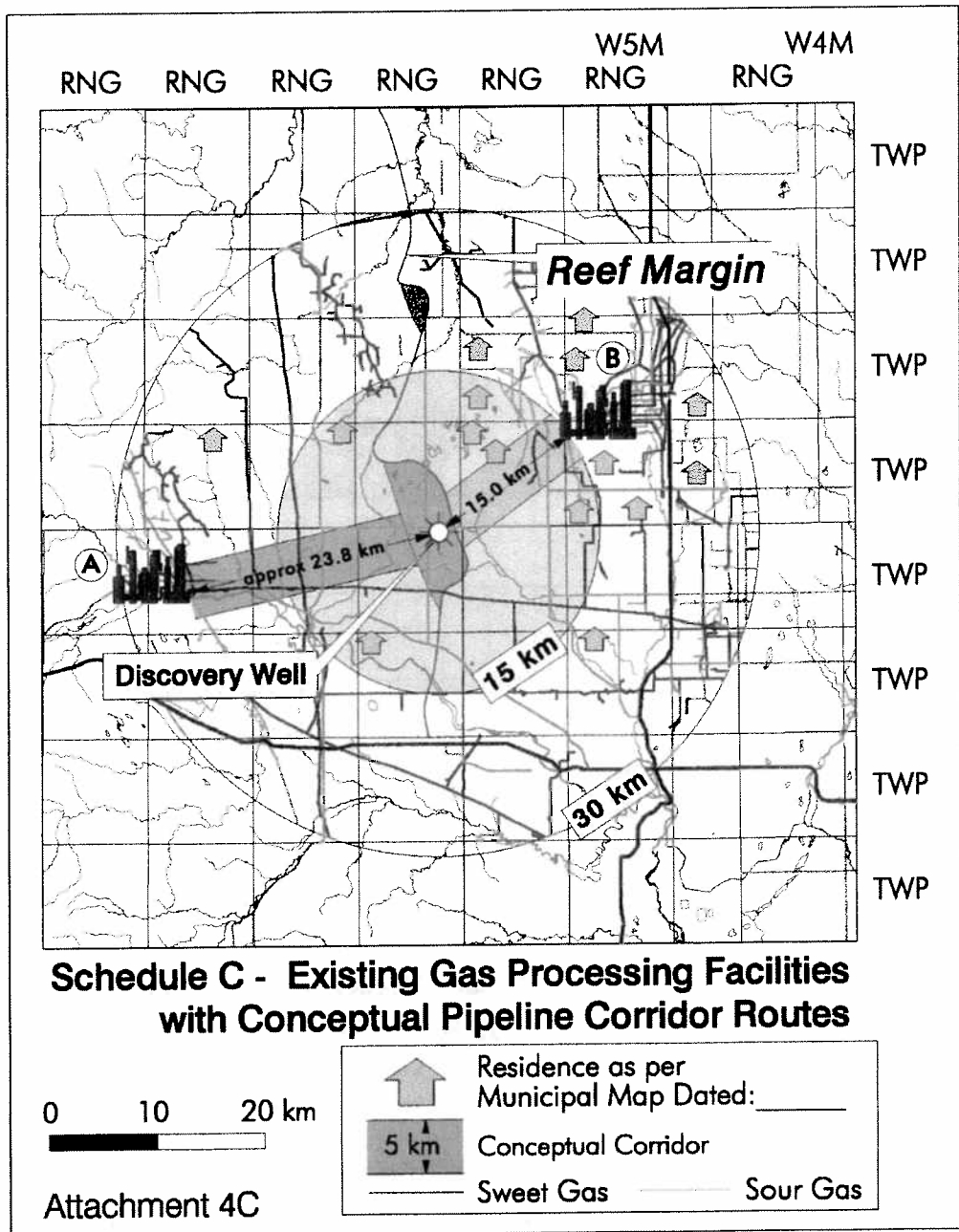
Attachment 4C



03-03-13 107861.pgs

Figure 4-11 Phase 3 – Schedule C – Existing Gas Processing Facilities with Conceptual Pipeline Corridor Routes

## Phase 3 - Development



**Attachment #5**  
**Area Development Plan Multiple Operators – (Example)**

---

**1. Introduction**

Further to the Sour Gas Development Plan previously submitted by Company A, the exploratory well and subsequent delineation wells were successfully completed. Company A co-ordinated its activities as appropriate with Company B. Based upon the currently known size of the pool and the nature of impending residential development in the area, Company A is currently working closely with Company B to provide for an Area Development Plan involving joint planning and co-operation from this point forward.

**2. Pool Prospect Outline**

As indicated on the attached Schedule A, the pool has been further defined by the results of the referenced wells and is now estimated to be approximately 13x4.5 kms in size and reserves are estimated to be in the range of \_\_\_\_\_ billion cubic feet (BCF) of gas, \_\_\_\_\_ barrels of associated liquids and \_\_\_\_\_ tonnes of elemental sulphur. It is now expected that an additional \_\_\_\_\_ wells will be required to optimize the deliverability of the pool. At this time, it is estimated that a full development, the production rate from the pool should be in the range of \_\_\_\_\_ to \_\_\_\_\_ MMCFD.

Inasmuch as Company B's existing area sour gas operations as indicated on Schedule B are producing from the \_\_\_\_\_ formation and Company A's proposed wells will be drilled to \_\_\_\_\_ formation, opportunity will exist for joint use of certain existing wellsites with minor enlargement as required.

**3. Proposed Delineation Wells**

Company A is proposing to drill six wells within the bounds of the pool over the next 3-4 years in order to produce the estimated reserves noted above.

The locations of these wells have been tentatively established within the referenced sections and as indicated on the attached Schedule C. Those locations noted with an asterisk are proposed to jointly use existing Company B lease sites and directionally drill where proximity allows.

Section _____	Township _____	Range _____	W _____	M _____
Section _____	Township _____	Range _____	W _____	M _____
Section _____	Township _____	Range _____	W _____	M _____
Section _____	Township _____	Range _____	W _____	M _____
*Section _____	Township _____	Range _____	W _____	M _____
*Section _____	Township _____	Range _____	W _____	M _____

Specific surface and bottom hole co-ordinates are being discussed with respective surface landowners so as to optimize the probability of success and minimize any potential impact on the respective property.

In addition, discussion with Company B have indicated that it proposes to drill two additional wells at the opposite end of its pool from where Company A's pool is deemed to exist. Tentative locations for the referenced Company B wells are located in Section \_\_\_\_\_ Township \_\_\_\_\_ Range \_\_\_\_\_ W\_\_M and Section \_\_\_\_\_ Township \_\_\_\_\_ Range \_\_\_\_\_ W\_\_M (as also indicated on Schedule B).

#### **4. Emergency Response Planning**

Once the Emergency Planning Zone has been determined for the proposed location(s), each resident will be visited within the planning zone. Information will be gathered such as the number of residents, ages and any special assistance needs that might be required in the event of an emergency. Residents will be provided with information on the Company's emergency response procedures i.e. communication, sheltering, evacuation.

Information from the resident visits will be used to formulate the Company's Emergency Response Plan for all proposed development activities such as drilling, completions and production operations.

#### **5. Short Term Testing**

As indicated in the Company A Sour Gas Development Plan, when drilling operations are concluded and in the event that one or more of the referenced development wells are deemed to be potentially productive, they will be completed and tested consistent with procedures followed in the case of the previously drilled wells. Prior to commencement of completion and testing operations, the respective well will be fully encased with steel casing cemented in place.

The completion operations for the respective wells will be with the wellhead on, except to run the production tubing with a subsurface safety valve, prior to perforating the production casing.

Each well will only be flowed for a short period to remove any fluid used during completion. The gas and fluids will be flowed through a high-pressure separator, with gas to flare and liquids to a low pressure vapour tight system. It is expected that flaring will take place only for 3-5 day period. Flaring of gas will require a permit from the Alberta Energy and Utilities Board (Board), and must be done in compliance with Alberta Environment criteria. During periods when gas is flared, plume tracking will be performed on a continuous basis using radio equipped mobile air monitoring units. Any exceedance of environmental criteria would result in immediate cessation of operations.



(Optional – Consideration being given to in-line clean-up and testing, dependent on circumstances and practicality.)

**6. Gas Well Production, Area Infrastructure, Other Operators**

**Production**

The Company proposes to install field production facilities on each of the three existing wells as well as on the six additional development wells, subject to the successful drilling and completion of each of them.

In addition to the surface facilities required at each wellsite, a central facility (gas battery) is being proposed at Company B's, existing \_\_\_\_\_ wellsite, where the gas will be gathered for pipeline tie-in to Company B's area gas plant. This location has been proposed after consideration of potential surface impact and discussions with Company B who have agreed that the facility should be able to accommodate their gathering needs. Company B has agreed to upgrade the facility to accommodate for Company A's additional volumes of gas.

Wellsite facilities will be consistent with the description in the sour gas development plan for the initial well located at \_\_\_\_\_ (copy attached). The infield gathering pipelines will be designed to transport 'wet' sour gas to the central facility described above. These pipelines will be designed for Level 1 status with appropriate ESD system to reduce the impact on the community.

**7. Existing Gas Processing Facilities (Gas Plants) and Conceptual Pipeline Corridors**

**Existing Gas Processing Facilities**

As indicated on the attached Schedule D the gas processing facilities in the area are operated by Company B. As such, a route has been tentatively determined for pipeline tie-in to Company B's gas plant, located in the \_\_\_\_\_  $\frac{1}{4}$  of \_\_\_\_\_ approximately \_\_\_\_ kms \_\_\_\_\_ of the central facility, noted above.

**8. Summary**

The discovery well located at \_\_\_\_\_ was followed up by three delineation wells of which two were successful.

In order to adequately develop the field and optimize production from the reservoir, an additional six wells were deemed necessary.

The applications for these wells together with area pipeline infrastructure and related facility applications, will be applied for as a project submission. It is our understanding at this time that Company B will be applying for their well licenses and pipeline permits as project submissions as well.

Co-ordination and co-operation between Company A and B has proven to be worthwhile by both minimizing surface impacts, optimizing the use of existing facilities and the resultant cost benefit to both companies.

Figure 4-12 Area Development/Multiple Operators – Schedule A – Pool Depiction

## Area Development / Multiple Operators

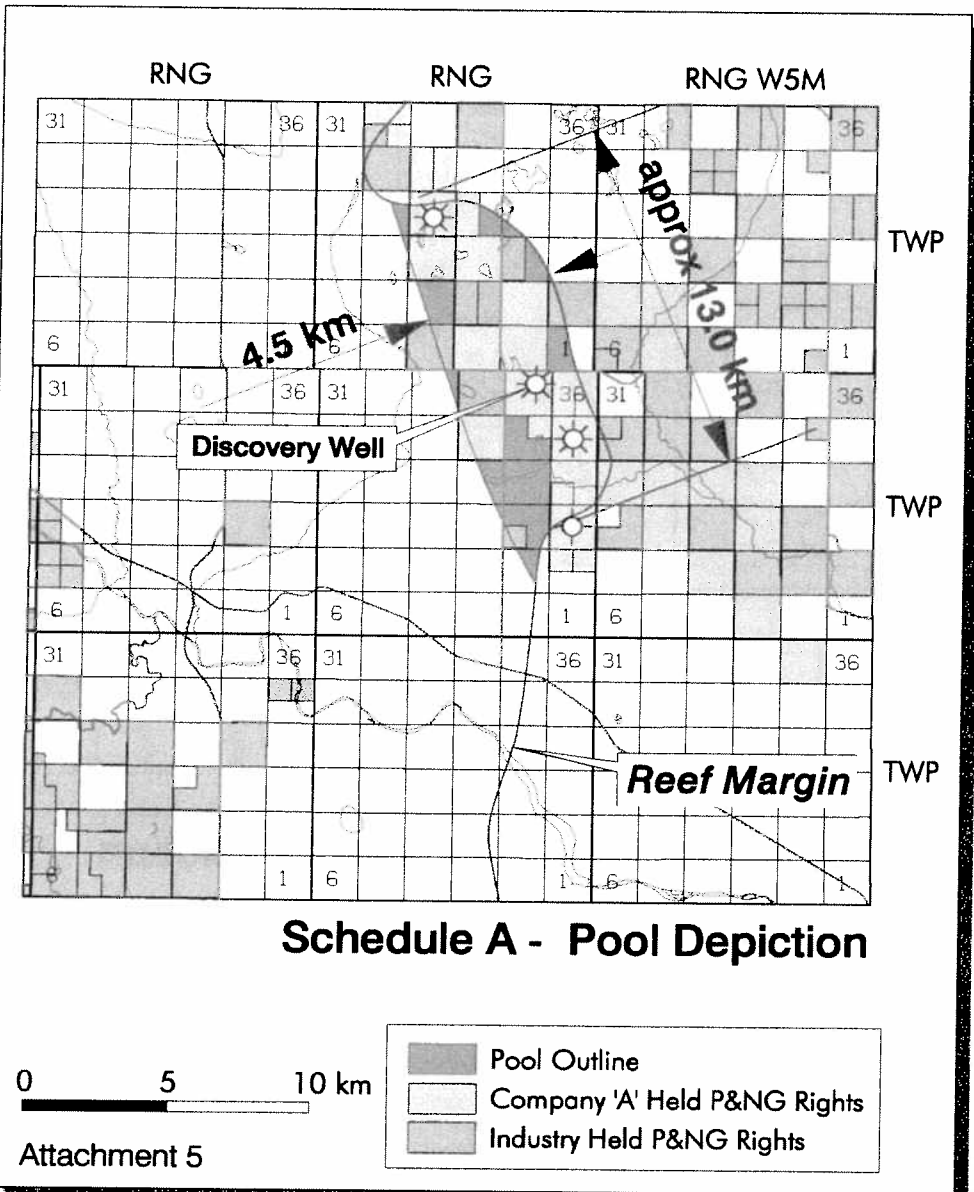


Figure 4-13 Area Development/Multiple Operators – Schedule B – Pool Depiction Locations

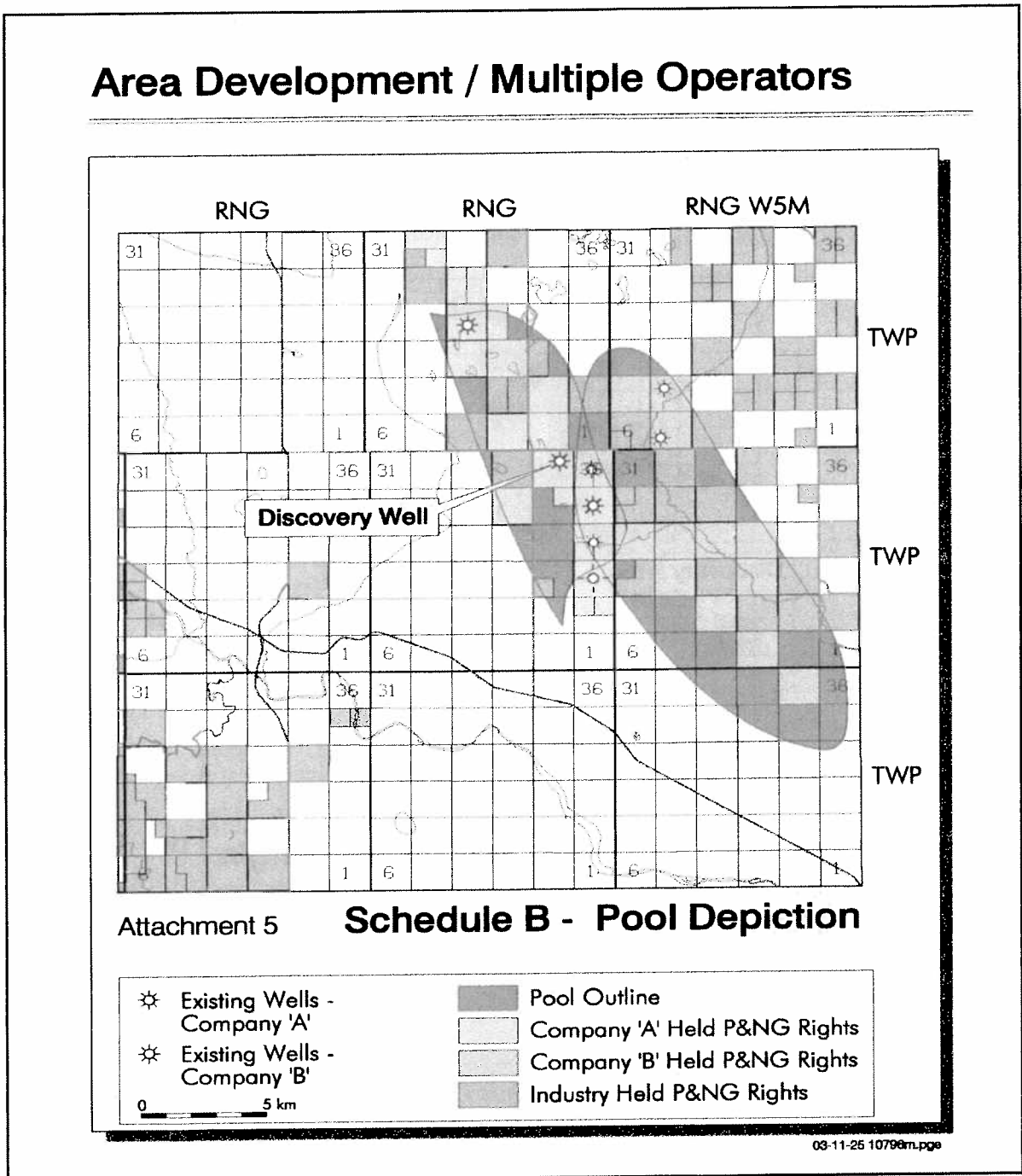
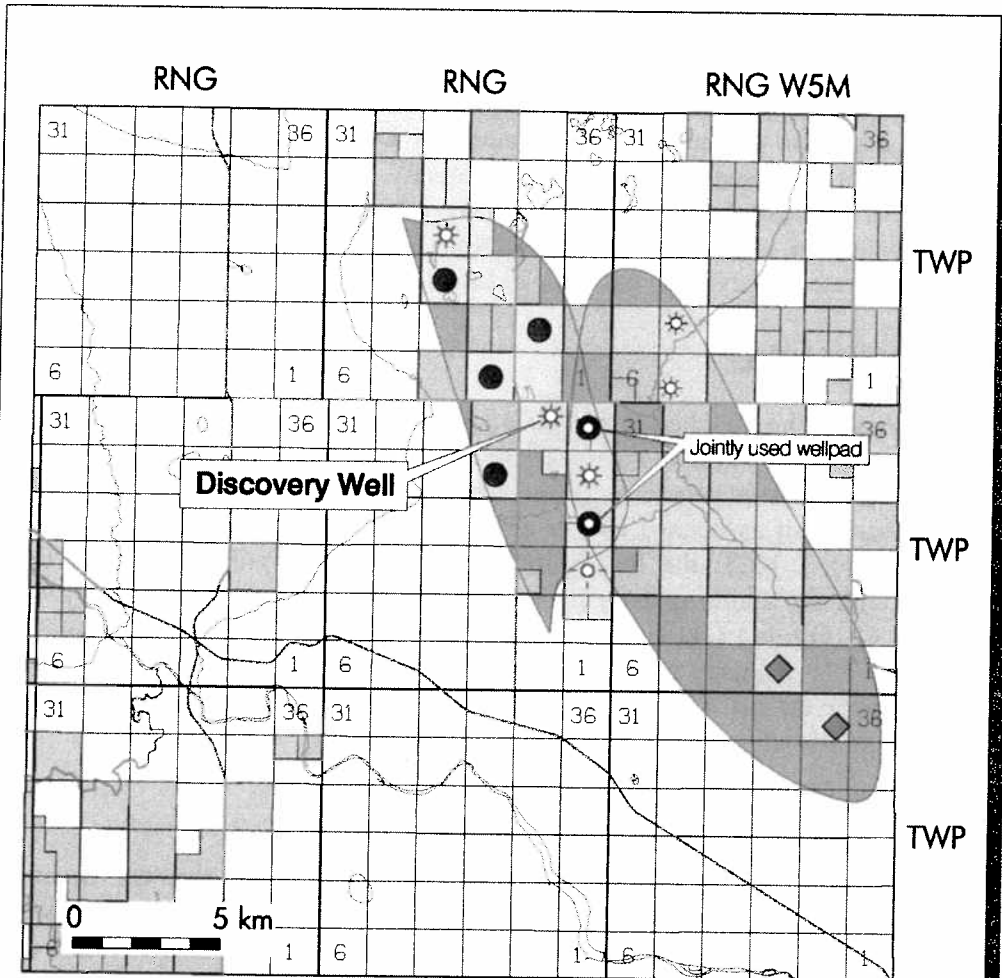
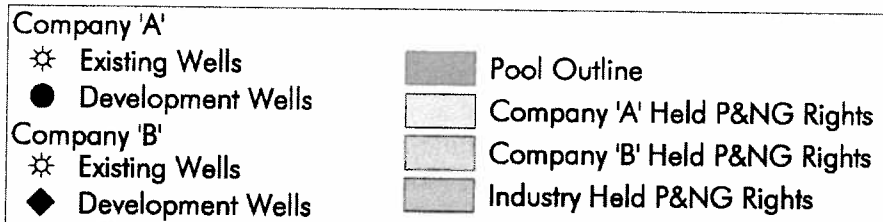


Figure 4-14 Area Development/Multiple Operators – Schedule C – Follow-up Locations

## Area Development / Multiple Operators



### Attach. 5 Schedule C - Follow-up Locations



## **Attachment #6**

### **Area Development Plan Multi-Sector – (Example)**

---

#### **1. Introduction**

Oil and Gas Company A has an existing sour gas development operation in a rural area in west central Alberta bordering on a lake front area entailing a rural residential community. Oil and Gas Company A is planning an enhanced recovery scheme whereby additional wells will be drilled and tied into existing area infrastructure. The known sour gas pool underlies a portion of the lake and Residential Developer B has applied for municipal approval for a proposed development on property along the lake frontage. Oil and Gas Company A and Residential Developer B have worked together in establishing an Area Development Plan, also including one additional oil and gas operator in the respective area, who also operates the existing gas plan 20 kms further west.

#### **2. Pool Prospect Outline**

As indicated on the attached Schedule A, the respective sour gas pool is estimated to be approximately 5 x 10 kms in size overlapping 18 sections in Twp. \_\_\_\_, Rge \_\_\_\_ W5M. Gas reserves are estimated to be in the range of \_\_\_\_\_ billion cubic feet (BCF) with \_\_\_\_\_ barrels of associated liquids and \_\_\_\_\_ tonnes of elemental sulphur. Oil and Gas Company A holds the Petroleum & Natural Gas Rights underlying 12 of the 18 sections, with the rights underlying the remaining sections being held by Oil and Gas Company C. Oil and Gas Company A expects that for optimum pool depletion, up to 5 additional wells will need to be drilled on sections with pre-existing gas wells. In order to position the required wells so as to avoid unnecessarily impeding area residential development, use of existing wellsites will be optimized.

#### **3. Proposed Recovery Wells**

Oil and Gas Company A is proposing to drill 5 additional wells into the existing pool over the next 3 years in order to produce the estimated reserves noted above. The well locations have been tentatively determined so as to not negatively affect residential development along the lake frontage underlain by the pool. Oil and Gas Company A has agreed with area residents and Residential Development Company B to twin existing wellsites on lands not abutting the lake frontage and to install one multi-well pad site on public forested land at the north end of the lake. In addition, one existing well located within 1km of the proposed residential subdivisions will be abandoned by Oil and Gas Company A at such time as residential development is initiated as per municipally approved development plan (expected to be in approximately 4 years time), due to greater deliverability for the central and north end of the pool. The wellsite locations as described herein are further delineated on the attached Schedule B. In addition, discussions with Oil and Gas Company C have resulted in agreement to follow the precedent set by Oil and Gas Company A in any

potential future plans on their part to further develop the lands upon which they hold the underlying Petroleum and Natural Gas Rights.

#### **4. Emergency Response Planning**

Once the Emergency Planning Zone has been determined for the proposed location(s), each resident will be visited within the planning zone. Information will be gathered such as the number of residents, ages and any special assistance needs that might be required in the event of an emergency. Residents will be provided with information on the Company's emergency response procedures i.e. communication, sheltering, evacuation.

Information from the resident visits will be used to formulate the Company's Emergency Response Plan for all proposed development activities such as drilling, completions and production operations.

#### **5. Short Term Testing**

When drilling operations are concluded the wells will be completed and tested to determine commercial productivity. Prior to commencement of completion and testing operations, the wells will be fully encased with steel casing and cemented from bottom to top.

Completion operations are expected to take 2-3 weeks following the drilling of the wells. The completion operations for these wells will be with the wellhead on, except to run the production tubing with a subsurface safety valve, prior to perforating the production casing.

The wells will only be flowed for a short period to remove any fluid used during completion. The gas and fluids will be flowed through a high pressure separator, with gas to flare and liquids to a low pressure vapour tight system. It is expected that flaring will take place only for 3-5 day period. Flaring of gas will require a permit from the Alberta Energy and Utilities Board (Board), and must be done in compliance with Alberta Environment criteria. During periods when gas is flared, plume tracking will be performed on a continuous basis using radio equipped mobile air monitoring units. Any exceedence of environmental criteria would result in immediate cessation of operations.

(Optional – Consideration being given to in-line clean-up and testing, dependent on circumstances and practicality.)

#### **6. Conceptual Follow-up Locations**

As agreed upon between the Oil and Gas Company A, area residents and Residential Development Company B, there will be no further development of the respective pool after the drilling of those wells noted above. As such, there will be no follow-up locations.

## **7. Gas Well Production, Area Infrastructure**

Oil and Gas Company A proposes to install field production facilities on each of the five additional wells, subject to the successful drilling and completion of each of them.

In addition to the surface facilities required at each wellsite, an upgrade is proposed to the existing Company A compressor site located in the NW \_\_\_\_\_. The five new wells are proposed to be tied into the referenced compressor by a combination of both existing and new pipeline(s), with the new pipelines paralleling existing right-of-ways. The required gathering system will be built to Level 2 sour gas specifications with allowance being made for installation of additional Emergency Shutdown Valves at such future date as area residential development requires pipelines to be changed to Level 1 status.

## **8. Existing Gas Processing Facilities (Gas Plants) and Conceptual Pipeline Corridors**

As indicated on the attached Schedule B, the gas currently pipelined from Oil and Gas Company A's compressor site in \_\_\_\_\_ is processed at Oil and Gas Company C's gas plant approximately 20 kms further west on Crown land in the \_\_\_\_\_ ¼ of Section \_\_\_\_\_. Additional gas volumes will be processed there as well with the existing pipeline corridor being twinned to allow for the additional volumes of gas.

## **9. Summary**

Oil and Gas Company A's proposed additional sour gas development is being co-ordinated with area rural residential development by Residential Development Company B in such a way that both proponents are able to meet their development goals without adversely impacting each other. Further co-operation with Oil and Gas Company C as to processing of the gas at its existing gas plant as well as compliance with the precedents set by Oil and Gas Company A in the area covered by this plan has allowed for an integrated and mutually beneficial approach to co-ordinated surface/subsurface development.



Figure 4-15 Area Development/Multiple Operators – Schedule A – Pool Depiction

## Area Development / Multi-Sector

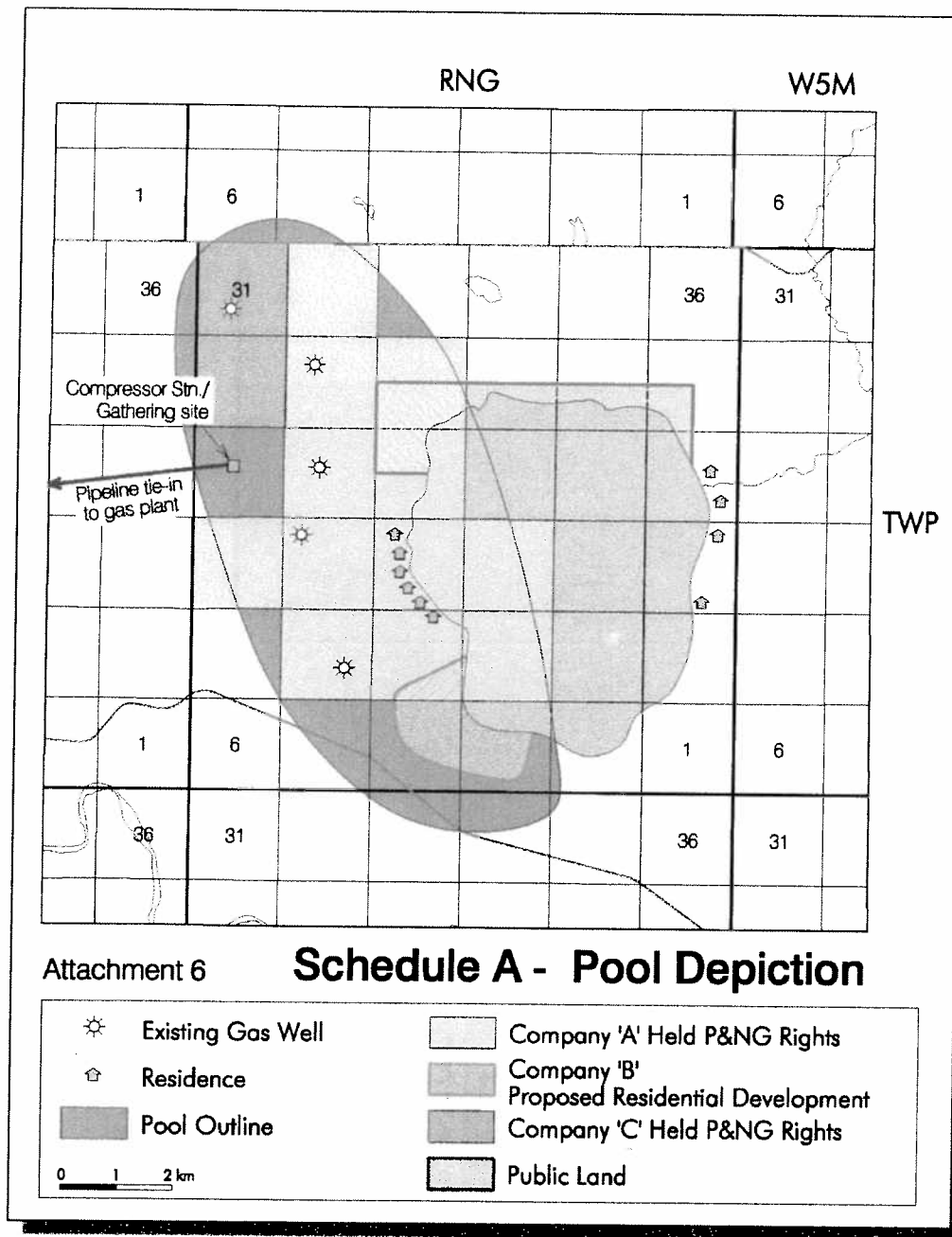


Figure 4-16 Area Development/Multiple Operators – Schedule B – Proposed Wells

## Area Development / Multi-Sector

