

Interim Directive ID 2001-3

August 29, 2001

TO: All Oil and Gas Operators

SULPHUR RECOVERY GUIDELINES FOR THE PROVINCE OF ALBERTA

Introduction

The Alberta Energy and Utilities Board (EUB) and Alberta Environment (AENV) have completed a review of the sulphur recovery guidelines for sour gas plants in Alberta. This interim directive (ID) sets out the guidelines and provides details on how the EUB and AENV will implement the findings of the review and apply the revised sulphur recovery guidelines to sour gas plants, other upstream petroleum facilities, and downstream petroleum operations, including refineries and heavy oil and bitumen upgraders. For ease of use, a contents to the guidelines follows this introduction.

The guidelines and requirements set out in this ID become effective January 1, 2002, and replace *IL 88-13: Sulphur Recovery Guidelines—Gas Processing Operations* in its entirety.

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June 2009: Note that credit report submissions as outlined in Section 4.4.1 are now generated by the ERCB each quarter. Commencing with the April-June 2009 period, licensees are no longer required to submit the quarterly credit reports to the ERCB. Licensees are requested to review the credit report supplied by the ERCB and bring to the ERCB's attention any discrepancies in credits earned for a facility.

March 2007: Note that enforcement is according to Section 7 of this interim directive and the principles of [Directive 019: ERCB Compliance Assurance—Enforcement](#). A list of risk-assessed noncompliances is available on the Web at ERCB Home : Industry Zone : Compliance and Enforcement : Risk Assessed Noncompliance [[LINK](#)].

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1 Overview

The sulphur recovery guidelines for new sour gas plants set out in *IL 88-13: Sulphur Recovery Guidelines—Gas Processing Operations* and as described in Table 1 have been adopted as the basis for sulphur recovery and emissions reduction from

- sour gas processing plants,
- sour gas emissions at other types of upstream petroleum industry operations, and
- acid gas streams produced in downstream petroleum industry facilities, including refineries and heavy oil upgraders.

Table 1. Alberta Sulphur Recovery Guidelines

Sulphur inlet rate (tonnes/day)	% of sulphur inlet that must be recovered	
	Design sulphur recovery criteria	Calendar quarter-year sulphur recovery guidelines
1-5	70	69.7
> 5-10	90	89.7
> 10-50	96.2	95.9
> 50-2000	98.5 - 98.8 ¹	98.2 – 98.5 ²
> 2000	99.8	99.5

¹ Recovery = $98.18185 + 0.187259 \log_{10}(\text{sulphur inlet rate})$.

² Calendar quarter-year recovery = $97.88185 + 0.187259 \log_{10}(\text{sulphur inlet rate})$.

Both the EUB and AENV have regulatory responsibilities for many of the facilities covered by the sulphur recovery guidelines. Under its legislation, AENV, where warranted, may set more stringent sulphur dioxide (SO₂) emission limits for specific facilities than those resulting from the EUB's application of the sulphur recovery guidelines. Depending on unique circumstances (see Section 4.4), the EUB may also set specific sulphur recoveries that differ from Table 1 as a result of its facility applications and adjudication processes.

1.1 Definitions

Acid gas refers to a gas mixture containing predominantly hydrogen sulphide (H₂S) and carbon dioxide (CO₂) that results from the treating or “sweetening” of sour gas.

Grandfathered sour gas plants refers to facilities approved prior to 1988 that were not required to meet sulphur recovery guidelines for new sour gas plants as defined in *IL 88-13* and Table 1.

Sulphur inlet refers to the content expressed as tonnes sulphur equivalent contained in the feed stream to the processing plant. Sulphur inlet excludes sulphur contained in raw sour gas that bypasses treating processes and is pipelined to other facilities or contained in raw sour gas that is injected.

1.2 Sulphur Emission Control Assistance Program

A cost-sharing program is available under certain circumstances and provides royalty credits for 50 per cent of eligible capital and operating costs of the sulphur recovery scheme. These credits are transferable but may only be used to reduce natural gas and by-products royalties. The Sulphur Emission Control Assistance Program (SECAP) is administered by the Alberta Department of Energy (Alberta Energy).

SECAP allows for cost sharing on facilities required to recover sulphur and may also include some pipelining costs and the costs of acid gas injection facilities. Alberta Energy will assess the reasonableness of all costs in determining eligible costs. Full descriptions of SECAP and application forms are available from the Alberta Energy Gas Royalty Calculation Branch.

2 Application of the Sulphur Recovery Guidelines for New Facilities

2.1 Application to Sour Gas Plants

New sour gas processing plants must comply with the calendar quarter-year sulphur recoveries listed in Table 1 unless alternative requirements are set out as the result of a specific facility application review and approval. The sulphur recovery for sour gas processing plants must be determined based on mass (tonnes sulphur equivalent) and calculated on the following basis:

$$\text{Sulphur Recovery} = \text{Sulphur Production} / (\text{Sulphur Production} + \text{Sulphur Emissions})$$

Where:

Sulphur Production = tonnes of sulphur product and/or tonnes sulphur equivalent contained in injected sour or acid gas streams

Sulphur Emissions = tonnes sulphur equivalent contained in flared sour and acid gas streams and in the sulphur recovery unit tail gas or incinerator stack emissions

The EUB will monitor and enforce compliance with individual plant sulphur recovery requirements on a calendar quarter-year basis. For AENV's purposes, sulphur recovery and sulphur inlet rates are used in setting various SO₂ emission limits, with enforcement done through normal AENV processes.

Provisions of EUB *Guide 60: Upstream Petroleum Industry Flaring Guide*, Section 9.1, that allow case-by-case consideration of relaxation of Table 1 [requirements](#) for low sulphur inlet rate (less than 5 tonnes per day sulphur equivalent) solution gas clustering and conservation plants will continue in effect. *Guide 60* should be consulted for details in that regard.

2.2 Application to Other Upstream Petroleum Industry Facilities

Consistent with EUB *Guide 60*, Section 9, upstream petroleum facilities other than gas plants (i.e., production batteries, dehydration facilities, and compressor stations where the bulk gas stream is not sweetened) that continuously flare or incinerate sour off-gas streams are subject to the sulphur recovery guidelines listed in Table 1. Sulphur recovery requirements for these

facilities are to be determined based on the sulphur content of flared or incinerated gas streams.¹ The sulphur inlet content of the sour gas stream handled by the facility will not be used as the basis for determining sulphur recovery requirements and calculating calendar quarter-year sulphur recoveries.

The sulphur content of any gas flared or incinerated at such facilities will be included in calendar quarter-year sulphur recovery calculations, in addition to the sulphur recovery unit tail gas emissions. Sulphur will be deemed as recovered on the basis of

- actual sulphur recovered as sulphur or other process by-products,
- the sulphur content of injected sour or acid gas streams, and/or
- the sulphur content of sour gas streams recovered and recombined with the bulk gas stream.

Compliance with sulphur recovery requirements will be monitored and enforced on a calendar quarter-year basis. Facilities with sulphur emissions greater than 1 tonne/day that are not required to submit EUB S-30 reports must maintain daily sulphur balance records and calendar quarter-year recovery calculations. These records must be available for inspection or audit at the request of EUB staff. Failure to maintain sulphur balance records will be considered a major noncompliance.

The EUB encourages the conservation and use of gas produced with in situ heavy oil and bitumen recovery projects. In situations where the conserved gas contains small quantities of H₂S and other sulphur compounds (less than 5 tonnes/day sulphur equivalent), relaxation of the sulphur recovery requirements will be considered on a case-by-case basis. The criteria outlined in *Guide 60*, Section 9.1, as appropriate, will apply in such situations.

2.3 Application to Upgraders, Refineries, and Other Industrial Facilities

The sulphur recovery guidelines listed in Table 1 apply to the acid gas streams generated in industrial and downstream petroleum industry facilities (including refineries and heavy oil upgraders), unless alternative requirements are set out for a specific facility as the result of a related application review and approval.

¹ For example: A pipeline dehydration facility with a sour gas sulphur inlet rate of 100 tonnes/day flares a low-pressure sour water flash gas stream containing 2 tonnes/day. After dehydration the sour gas is pipelined to a gas plant for processing. In this case the sulphur recovery requirements for the dehydrator facility would apply to the 2 tonnes/day flare stream and, on a calendar quarter-year basis, 69.7 per cent of the sulphur in the flare gas stream must be recovered.

Sulphur recovery will be calculated on the following basis:

$$\text{Sulphur Recovery} = \text{Sulphur Production} / (\text{Sulphur Production} + \text{Sulphur Emissions})$$

Where:

Sulphur Production = tonnes of sulphur product recovered from acid gas streams and/or tonnes sulphur equivalent contained in injected sour or acid gas streams

Sulphur Emissions = tonnes sulphur equivalent contained in flared acid gas streams and in the sulphur recovery unit tail gas emissions

The sulphur recovery guidelines do not apply to SO₂ contained in flue gas emissions from facilities that burn coal or coke as a fuel. Thus, sulphur by-products from flue gas desulphurization (FGD) processes would not typically be accounted for in acid gas sulphur recovery determinations.

In cases where sulphur recovery unit tail gas is routed to the FGD, sulphur recovery efficiency calculations may include prorated FGD sulphur products and emissions.

In recognition of the complexity inherent in industrial and downstream petroleum industry operations, an allowance for infrequent periods of lower recovery to facilitate maintenance activities on sulphur recovery units or tail-gas cleanup units may be accepted.

Depending on the sulphur content of refinery or upgrader acid gas streams, emission control processes typically used include a primary sulphur recovery unit (SRU) with a tail gas cleanup unit (TGCU). TGCUs are usually required to achieve higher recoveries required for sulphur processing rates greater than 50 tonnes/day. AENV approval processes will take into account periodic sulphur recovery unit equipment outages on the following basis:

- SRU processes must incorporate redundant equipment to accommodate partial outages while continuing to process produced acid gas.
- SO₂ emission limits in AENV approvals will be set both on the basis of combined operation of the SRU and the TGCU and on the basis of the SRU with the TGCU bypassed or otherwise out of service.
- The amount of time that the TGCU may be bypassed will be set on a facility-specific basis as part of the AENV approval process.
- Attainment of overall sulphur recovery levels will be achieved by using longer-term rolling averages (e.g., 90 or 365 day) on all SO₂ emission sources. The averages will be based on the sulphur recovery expected when both the SRU and TGCU are operational.

In cases where the EUB specifies sulphur recovery from acid gas streams in its approvals, the following provisions address periodic partial maintenance outages of sulphur recovery units:

- For periods when sulphur recovery is below the approved value, an allowance of up to 0.75 per cent may be applied in any one calendar quarter-year.

- The sum of allowances used in a rolling five-year period must not exceed 0.0375 times the number of calendar quarter-year periods when sulphur recovery has met or been better than approval requirements.

Operators must maintain records of sulphur balances, calendar quarter-year sulphur recovery, and the amount of time the TGCU is bypassed. In the event that approved emission limits or TGCU bypass hours are exceeded in any period, operators must submit a report to AENV giving reasons for the exceedances and an explanation of measures to be taken to prevent recurrence in addition to any immediate reporting requirements.

3 Application of the Sulphur Recovery Guidelines to “Grandfathered” Approvals

3.1 Grandfathered Sour Gas Plants

As of January 1, 2002, sour gas plants with approved sulphur recoveries less than the calendar quarter-year values given in Table 1 (grandfathered approvals) are required to increase sulphur recovery, unless plant capacity use meets the criteria for continued grandfathering. A complete list of grandfathered sour gas plants, related baseline capacities, and grandfathered sulphur recovery efficiencies are given in Appendix 1.

Sour gas plants with grandfathered sulphur recovery approvals operating in declining gas supply situations will be permitted to continue operations without upgrading sulphur recovery until January 1, 2017, on the following basis:

- 1) Grandfathered sour gas plant approvals may continue in effect provided that sulphur inlet rates are declining at least 7.5 per cent per year according to the following relationship:
 - between January 1, 2002, and December 31, 2004,
maximum grandfathered capacity = baseline capacity
 - between January 1, 2005, and December 31, 2016,
maximum grandfathered capacity = baseline capacity $\times 0.925^{(\text{year} - 2001)}$

The **maximum grandfathered capacity** is defined as the maximum average sulphur inlet (tonnes/day) permitted in any calendar quarter-year for facilities where sulphur recoveries stipulated in related EUB approvals do not meet Table 1 guidelines. The maximum grandfathered capacity will not be less than 1 tonne/day, as the sulphur recovery guidelines do not apply to lesser sulphur inlet rates.

The **baseline capacity** is defined as the annual average daily sulphur inlet (tonnes/day) for the calendar year 1999. Baseline capacities for grandfathered sour gas plants are provided in Appendix 1: Grandfathered Sour Gas Plant Approvals.

- 2) Grandfathered sour gas plants approved to flare acid gas (i.e., that do not have any sulphur recovery capability) operating at average calendar quarter-year sulphur inlet rates in excess of the maximum grandfathered capacity must comply with the Table 1 guidelines by January 1, 2005.

- 3) Effective January 1, 2002, grandfathered sour gas plants that propose to operate at average calendar quarter-year sulphur inlet rates greater than 125 per cent of baseline capacity must comply with Table 1 sulphur recovery guidelines. “Blended sulphur recovery,” as described in item 4 below, does **not** apply to plants that plan to operate in excess of 125 per cent of the baseline capacity. Enhanced sulphur recovery performance credits (see Section 4.4) may not be used to meet sulphur recovery requirements for plants with calendar quarter-year sulphur inlet rates greater than 125 per cent of the baseline.

Operators must notify the EUB Applications Branch and AENV specifying the maximum daily raw gas inlet rate, the maximum daily sulphur inlet rate in tonnes/day, and the calendar quarter-year sulphur recovery rate that will appear in the revised plant approval. If the plant is capable of meeting the sulphur recovery guidelines without significant modification, if the maximum raw gas inlet and sulphur inlet rates are not greater than the existing plant approval values, and if the calendar quarter-year sulphur recovery complies with Table 1, the EUB will amend the plant approval accordingly without formal application. With respect to AENV operating approvals, as there is no change in activity or equipment modifications, the SO₂ emission limits will be adjusted at the time of approval renewal or at a time and in a manner agreed to after consultation with AENV regional staff.

- 4) Between January 1, 2002, and December 31, 2011, grandfathered sulphur recovery gas plants with average calendar quarter-year sulphur inlet rates greater than maximum grandfathered capacity but less than 125 per cent of baseline capacity must meet a “blended sulphur recovery” requirement according to the following relationship. The formula is based on the requirement that sulphur inlet in excess of the maximum grandfathered capacity must be processed to recoveries listed in Table 1. Note that enhanced sulphur recovery performance incentive credits may be used to meet sulphur recoveries that are higher than grandfathered approvals (see Section 4.4).

$$SR_{\min} = ([\text{Inlet}_{\text{GFC}} \times SR_{\text{Approval}}] + [(\text{Inlet}_{\text{Actual}} - \text{Inlet}_{\text{GFC}}) \times SR_{\text{New}}]) / \text{Inlet}_{\text{Actual}}$$

Where:

SR_{\min} = calendar quarter-year **blended** sulphur recovery requirement (%)

$\text{Inlet}_{\text{GFC}}$ = maximum grandfathered capacity (tonnes/day)
= baseline capacity $\times 0.925^{(\text{year} - 2001)}$

SR_{Approval} = calendar quarter-year sulphur recovery specified in the grandfathered sour gas plant approval (%)

$\text{Inlet}_{\text{Actual}}$ = actual average calendar quarter-year sulphur inlet (tonnes/day)

SR_{New} = calendar quarter-year sulphur recovery specified in Table 1 that is applicable for $\text{Inlet}_{\text{Actual}}$ or the grandfathered sour gas plant approval recovery, whichever is greater (%)

Grandfathered acid gas flaring plants that propose to operate at rates in excess of the maximum grandfathered capacity must meet Table 1 recovery levels for the total sulphur inlet. Blended sulphur recovery provisions do not apply to acid gas flaring plants.

- 5) Effective January 1, 2012, plants operating at average calendar quarter-year sulphur inlet rates greater than the maximum grandfathered capacity must comply with Table 1 sulphur recoveries.
- 6) All sulphur recovery grandfathering ends effective December 31, 2016.

The limitations on grandfathered sulphur recovery facilities are illustrated in Figure 1. Performance credits noted in Figure 1 are explained in Section 4.4.

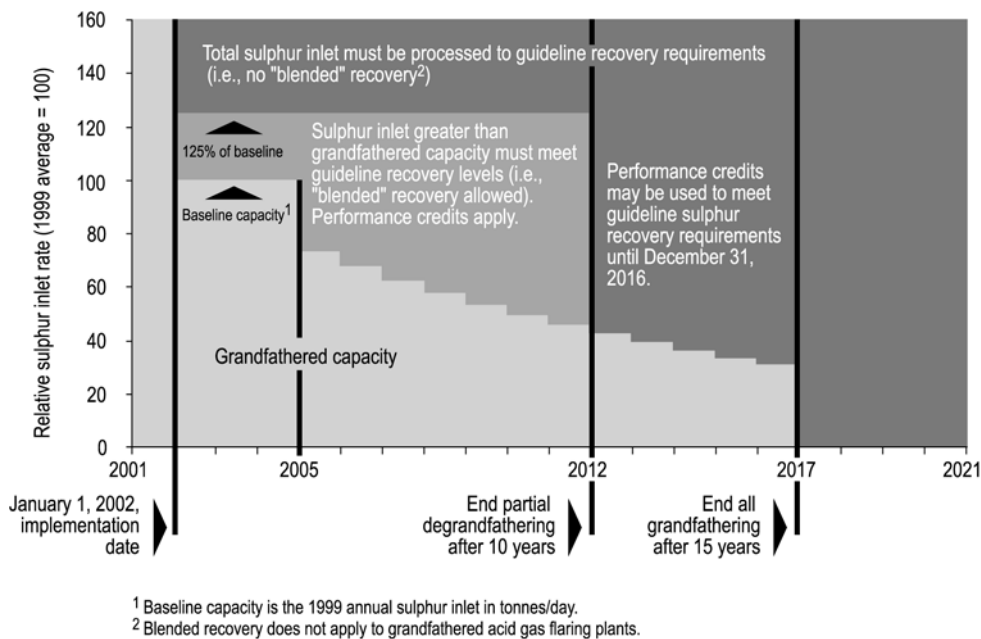


Figure 1. Limitations on grandfathered sour gas plant approvals

3.2 Application Requirements Related to Grandfathered Sour Gas Plants

Prior to January 1, 2005, operators of grandfathered sour gas plants must notify the EUB Applications Branch and AENV in writing of their intentions for the plant.

- If the operator intends to change sulphur recovery to comply with the sulphur recovery guidelines (to degrandfather), the notification must specify the maximum daily raw gas inlet rate, the maximum daily sulphur inlet rate in tonnes/day, and the calendar quarter-year sulphur recovery rate as a percent of sulphur inlet that will appear in the revised plant approval. Provided that the maximum daily raw gas inlet and sulphur inlet rates are not greater than the existing plant approval values and provided that the calendar quarter-year sulphur recovery complies with Table 1, the EUB will amend the plant approval accordingly without formal application. With respect to AENV operating approvals, if there is no change in activity or equipment modification, the SO₂ emission limits will be adjusted at the time of

approval renewal or at a time and in a manner agreed to after consultation with AENV regional staff.

- If the operator intends to continue the grandfathered status of the plant, notice to that effect must be provided to the EUB and AENV. In the event that operators fail to provide notice, the EUB will assume that the intention is to continue grandfathering. In such cases, the EUB will monitor and enforce the blended sulphur recovery and sulphur inlet limitations for the plant on a calendar quarter-year basis. AENV will work with the EUB in this regard.

In situations where it is proposed to increase approved capacities or install significant new facilities, this ID does not waive the approval application requirements set out in *EUB Guide 56: Energy Development Application Guide* or *EUB Guide 65: Resources Applications for Conventional Oil and Gas Reservoirs*. (*Guide 65* is relevant for acid gas injection scheme applications.)

EUB applications related to sulphur recovery must be submitted for

- new acid gas injection schemes,
- increases to the maximum daily raw gas inlet or sulphur inlet rates stipulated in existing gas plant approvals,
- change to lower approved sulphur recovery levels,²
- significant³ additions to or modification of plant process systems,
- change in facility category/type (e.g., from D to E or in the case of acid gas injection from E to D),
- addition of compression, including acid gas injection compressors, and
- after January 1, 2005, increases of grandfathered sour gas plant sulphur inlet rates above 125 per cent of the baseline capacity.

For approvals issued by AENV, a specific amendment application for sulphur recovery is required only if plant modifications are necessary. The application would be comprehensive in nature (i.e., must address air, water, and soil issues) and must be in place before construction begins. AENV application processes require public notice and should be discussed with AENV regional approvals staff.

If no physical equipment changes or modifications are required, AENV will adjust approval SO₂ emission limits during the regular approval renewal process. Procedures and protocols for approval renewal will follow normal AENV processes or will be adjusted at a time and in a manner agreed to after consultation with AENV regional staff.

² Such applications will be considered in situations where sulphur inlet rates have substantially declined relative to original plant designs and where proposed sulphur recoveries comply with Table 1 at the reduced maximum sulphur inlet rate.

³ For the purposes of this ID, significant modifications include the addition of systems that may result in off-site impacts, such as new noise sources (e.g., air-fin coolers or compressors) or new emission point sources (e.g., major direct-fired process heaters). Significant modifications exclude the addition of new reaction vessels (i.e., catalyst beds), heat exchangers, and process control equipment, as well as related piping modifications where potential noise or emission impacts are insignificant.

3.3 Other Upstream Petroleum Industry Facilities

Subject to the conditions noted in Section 2.2, upstream petroleum industry facilities other than sour gas processing plants approved prior to January 1, 2000 (the effective date of *Guide 60*) must comply with the sulphur recovery guidelines on the same basis and time frame as established for grandfathered sour gas plants in Section 3.1 (i.e., facilities flaring acid or sour gas must comply with Table 1 by January 1, 2005, unless throughput is declining at greater than 7.5 per cent per year).

3.4 Industrial and Downstream Petroleum Industry Facilities

Recent approvals for heavy oil and bitumen upgraders in Alberta are consistent with the sulphur recovery guidelines.

Requirements for upgrading sulphur recovery to comply with the guidelines at other industrial and refining facilities have been determined on a sector-specific review basis with AENV. Any facility operator that remains unclear about the application of this ID to its operations should consult directly with AENV regional staff.

4 Variance of Guidelines and Enhanced Performance Credits

Operators may apply for variance in guideline sulphur recovery levels or on how the guidelines are applied to specific situations. Variance will be considered for technical reasons and in other situations where alternative approaches may be in the public interest in achieving the intent of this ID. Section 4.4 describes an enhanced performance emission credit program for grandfathered sour gas plants.

4.1 Applications for Variance from Sulphur Recovery Guidelines

An operator who believes that a variance from the minimum recovery levels in Table 1 is warranted must submit a nonroutine *Guide 56* facilities application to that effect. The EUB and, if applicable, AENV will consider these applications if

- 1) the theoretical recovery capabilities (e.g., on the basis of Claus reaction equilibrium) are less than guideline values due to low acid gas H₂S content, having regard for the feasibility of implementing selective sweetening and/or acid gas enrichment processes;
- 2) acid gas injection is not technically or economically feasible due to lack of a suitable reservoir within a reasonable distance; or
- 3) sulphur recovery upgrading or tie-in costs to other plants are not economically justified in terms of potential revenues from remaining reserves. (In such cases, applicants must provide documentation on the expected remaining plant life and the economic evaluation of alternatives with the application.)

Any EUB and, if applicable, AENV approvals involving exceptions to the sulphur recovery guidelines, including the revised requirements for grandfathered gas plants, will be limited to

five years, with potential for renewal upon application. EUB renewal applications must be submitted as nonroutine *Guide 56* facilities applications.

4.2 Nonroutine Applications for Local Area Emissions Offset Arrangements

The EUB and AENV recognize that in some situations it may be appropriate to regulate overall sulphur recovery from a grouping of facilities within a local area, as opposed to requiring each individual facility to meet the sulphur recovery guidelines. In some situations, it may be more economic to exceed recovery guidelines at one facility in order to offset lower-than-guideline recoveries at another plant. The EUB and AENV will consider nonroutine applications for local sulphur recovery offsets on a case-by-case basis subject to the following criteria:

- 1) Overall sulphur recovery must be at least equivalent to the situation that would exist if all facilities involved individually met the calendar quarter-year sulphur recovery levels in Table 1. Calendar quarter-year reports will be required to verify compliance.
- 2) The offset arrangement may only involve facilities within a reasonable local airshed. The applicant must demonstrate, using methodologies acceptable to AENV, that predicted ambient air SO₂ concentrations and acid deposition for receptors (e.g., residential locations) near the participating facilities will be similar under the offset arrangement to impacts predicted if all facilities individually met the guidelines in Table 1.
- 3) The public in the vicinity of each of the facilities proposed for inclusion in the offset arrangement must be consulted. The information provided to the public must include an explanation of the offset program and explain the alternative involving individual upgrading of facilities to achieve compliance with guidelines. *Guide 56* notification distances appropriate to the classification of each facility must be used. The application must provide information on any objections to the proposed offset program.
- 4) If approval is granted for the offset arrangement, each of the participating facilities will be relicensed and treated jointly with respect to compliance with sulphur recovery requirements. The approval will designate one operator responsible for submission of a calendar quarter-year report for the offset arrangement that summarizes performance of the plants involved with respect to the offset approvals. Situation-specific approval conditions will be developed as appropriate to the offset arrangement proposed by the applicants.

Applications to the EUB Applications Branch for offset arrangements may be made as nonroutine *Guide 56* facilities applications.

4.3 Consolidation of Sour Gas Plants

The EUB and AENV believe that public and environmental benefits will result from the consolidation of sour gas processing from facilities with no or lower sulphur recovery into existing plants with higher recovery levels. It is recognized, however, that the limitations on grandfathered sour gas plant capacity use may discourage consolidation. Therefore, the following measures facilitate consolidation of grandfathered and non-sulphur recovery sour gas plants:

- 1) When one or more sour gas plants are shut down and related raw gas production is connected to an existing grandfathered sulphur recovery sour gas plant, the baseline capacity for that plant can be increased by the baseline values for the plants that have been consolidated up to the approved maximum sulphur inlet rate for that plant.
- 2) It is expected that production would typically be consolidated to the facility with the highest sulphur recovery. In situations where production is consolidated to a plant that intends to operate under a grandfathered sulphur recovery approval, the highest grandfathered sulphur recovery requirement of the plants being consolidated must be applied.
- 3) The limitations on grandfathered sulphur recovery as described in Section 3.1 will apply on the basis of the combined baseline capacity and item 2 above.

Applications to the EUB Applications Branch for consolidation may be required, depending on the facility modifications or changes in category/type (refer to Section 3.2 and *Guide 56* for application requirements).

4.4 Enhanced Sulphur Recovery Performance Incentive for Grandfathered Sour Gas Plants

The EUB and AENV believe that the sulphur recovery requirements represent minimum expectations and that it is in the public interest for operators of sour gas plants to implement continuous improvement programs to reduce emissions. Particularly in the case of grandfathered sour gas plants, operators are encouraged to take cost-effective measures early to enhance sulphur recovery beyond the minimum requirements discussed in Section 3.1. The EUB will recognize enhanced recovery performance and facilitate flexibility in how grandfathered sour gas plants meet increased sulphur recovery requirements on the following basis:

- 1) Operators of grandfathered sour gas plants will earn bankable sulphur emissions reduction credits for recovery performance that exceeds requirements described in Section 3.1 provided that the minimum sulphur recovery specified in the plant approval is met. The emission reduction credits will be determined for each calendar quarter-year as follows:

$$\text{Credit}_Q = \text{Inlet}_{Q\text{Actual}} \times (\text{SR}_{\text{Actual}} - \text{SR}_{\text{min}}) / 100$$

Where:

Credit_Q	= sulphur emission reduction credits earned in a calendar quarter-year (tonnes sulphur)
$\text{Inlet}_{Q\text{Actual}}$	= actual total calendar quarter-year sulphur inlet (tonnes)
$\text{SR}_{\text{Actual}}$	= actual calendar quarter-year sulphur recovery (%)
SR_{min}	= minimum required sulphur recovery for the calendar quarter-year ⁴ (%)

⁴ The minimum applicable sulphur recovery will be not less than the value specified in the plant approval. If the plant sulphur inlet rate exceeds the maximum grandfathered capacity, then the minimum recovery requirement will be the blended sulphur recovery defined in Section 3.1.

- 2) Operators of grandfathered sour gas plants may apply the credits to meet increased sulphur recovery requirements, as explained in Section 3.1. Each 1 tonne of emission reduction credit may be applied as the equivalent of 1 tonne of sulphur recovery. Credits are not transferable from the plant in which they were earned. Credits will be deducted from the prior balance for the plant in any calendar quarter-year when $Credit_Q$, determined by the equation given in item 1 above, has a negative value.
- 3) Credits must be earned before they may be applied. The EUB will consider operators in noncompliance if grandfathered plants fail to meet the sulphur recovery requirements defined in Section 3.1 and if emission credit balances are insufficient to offset the excess sulphur emissions in any calendar quarter-year.
- 4) Actual calendar quarter-year sulphur recoveries must at least comply with the values specified in grandfathered sour gas plant approvals. Failure to meet minimum sulphur recovery levels specified in grandfathered sour gas plant approvals will result in EUB enforcement actions, as described in Section 7, regardless of the plant credit balance.
- 5) Effective January 1, 2017, credits may no longer be used to meet minimum sulphur recovery requirements for grandfathered sour gas plants.

4.4.1 Credit Reporting Requirements for Grandfathered Sour Gas Plants

Participation in the sulphur recovery performance incentive program is optional. Operators that choose to participate will be subject to additional reporting requirements as follows:

- 1) Operators must attach the Sulphur Emission Performance Credit Report Form in Appendix 2 to the S-30 Monthly Gas Processing Plant Sulphur Balance Report for the last month of the calendar quarter-year (i.e., the credit report must be attached to the March, June, September, and December S-30 reports). Operators must provide details of the credit calculations, credits used or earned, and credits accumulated to date on the Sulphur Emission Performance Credit Report Form. Credits earned or used are calculated as defined in Section 4.4.
- 2) Credits must be claimed by the 18th day of the month following the last production month of each calendar quarter-year.

Sulphur emission performance credits may be claimed starting with the calendar quarter-year commencing October 1, 2001. Operators that choose to opt into the program must submit the first Sulphur Emission Performance Credit Report Form on the 18th of January 2002 (for the October-December 2001 production period).

- 3) Operators of grandfathered sour gas plants may choose to begin reporting credits on a go-forward basis at any future date. However, reports may not be filed retroactively for prior periods of time.
- 4) Once reports have been submitted for a plant, they will be required from that time forward until December 31, 2016, or until the plant is degrandfathered or shut down.

5 Evaluation of Grandfathering Phase-Out

The EUB and AENV expect improved sulphur recovery over the period that grandfathering is phased out to result from the requirements described in Sections 3.1 and 4.4, which provide operators with flexibility and performance incentives. The EUB will monitor the sulphur recovery of the grandfathered sour gas plants and will prepare an annual summary report on industry performance resulting from the implementation of this ID. This summary report will be available to industry and the public.

With AENV, the EUB will conduct a multistakeholder review of industry performance in improving sulphur recovery at grandfathered plants in the second half of 2005. This review will assess the effectiveness of the enhanced sulphur recovery performance incentive program relative to more prescriptive recovery improvement approaches. The EUB and AENV are prepared to review the sulphur recovery requirements for grandfathered sour gas plants if the review finds that elements of this ID are not effective.

6 Sour Gas Facility Proliferation

To preclude the unnecessary development of new sour gas processing plants, applicants must vigorously explore and assess all existing facilities in the area that afford technically viable alternatives, regardless of ownership or interest, prior to applying for approval to construct a new sour gas plant. The assessment must thoroughly evaluate the feasibility of upgrading existing facilities and/or forging commercial partnerships with related operators. Operators of existing sour gas processing plants are expected to cooperate in the assessment of alternatives, including the evaluation of upgrading existing facilities to accommodate additional sour gas volumes. **Applicants must consult and involve local residents in their evaluation of alternatives.** It is expected that applicants will assess, compare, and document the following as a minimum:

- surface disturbance impacts of a new plant project with potential impacts of incremental pipelines and other facilities required to use existing facilities;⁵
- overall air emissions (SO₂, NO_x, CO₂) of alternatives and estimated contribution to cumulative impacts in terms of acid deposition rates and ambient concentrations;
- public proximity to alternative facilities and relative health and safety risk concerns;
- views of local stakeholders regarding the alternatives under consideration; and
- estimates of future local oil and gas development and the impacts such development may have on the viability of the options examined.

In particular, applicants must clearly demonstrate to the EUB that any proposed new sour gas plant within 15 kilometres of an existing sour gas processing plant is justified in terms of social and environmental effects. Figure 2 summarizes the process for evaluating alternatives. It is recognized that there will be situations where construction of new sour gas processing plants

⁵ The EUB would find it useful to see tabular comparisons of the areas affected by emergency planning zones (EPZs), the number of residents affected by EPZs, the land area affected by setbacks, and the areas of new surface disturbances. The surface disturbance comparison should address relative impacts on natural and environmentally sensitive areas, as well as on local surface and groundwater bodies.

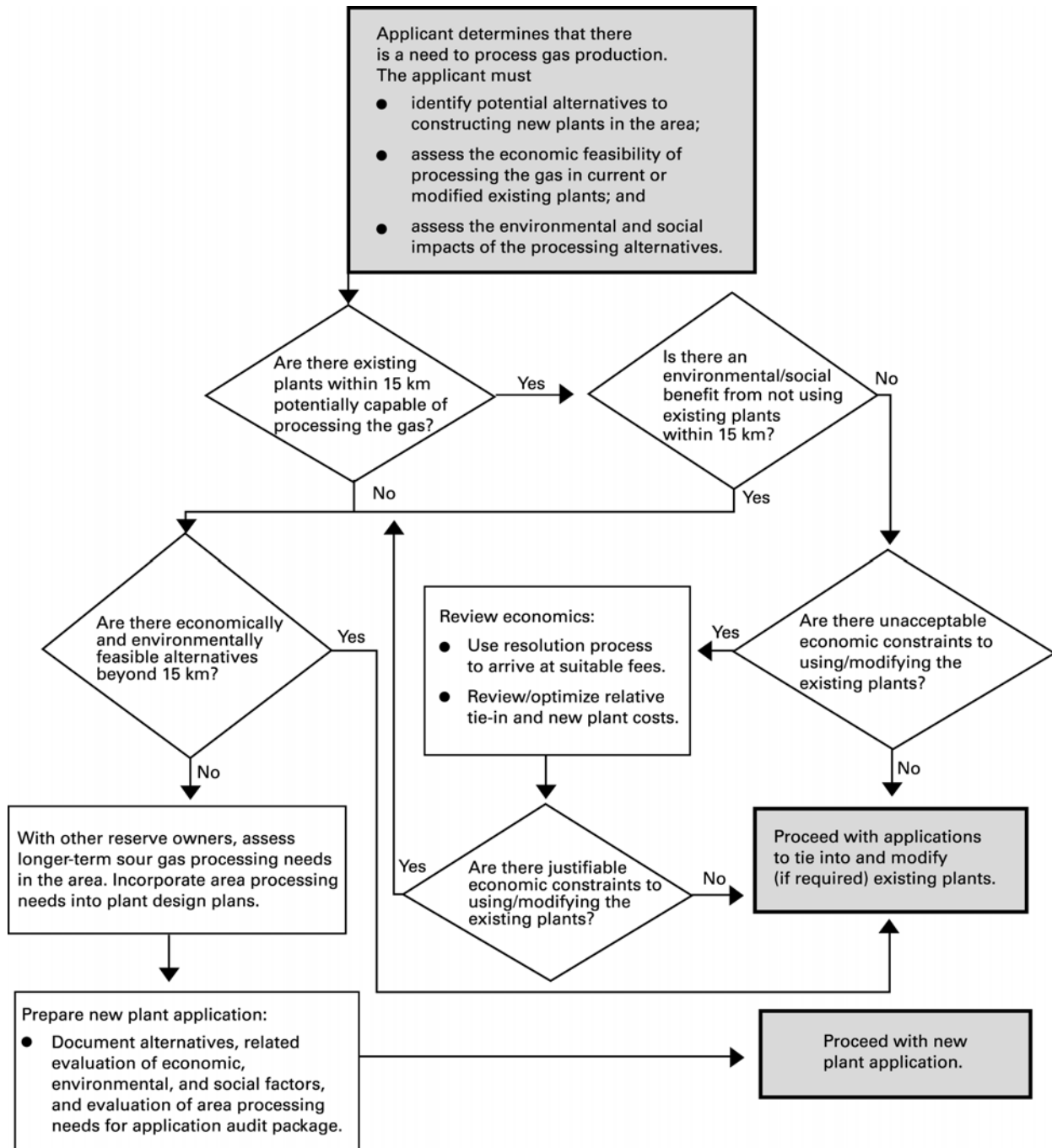


Figure 2. Plant proliferation assessment process

will be more acceptable from an environmental and public impact standpoint than construction of lengthy sour gas pipelines and related facilities necessary to connect to existing processing plants.

Applicants must contact other reserve operators in the area, assess longer-term gas processing needs, and account for regional processing needs in the design of proposed new sour gas plants. As a minimum, the area to be assessed must be consistent with industry notification requirements for sour gas plants, as described in *Guide 56*.

If the primary rationale for establishing a new facility is related to economic considerations, including processing fees or inability to obtain firm capacity access, applicants must include supporting information in their applications to the EUB. The EUB may not consider high fees for using existing or modified facilities as an acceptable justification of new sour gas plants. In such situations, the EUB has processes for dispute resolution and EUB legislation provides for the review of facility processing fees.

In addition to documentation of the comparison of alternatives, applicants must demonstrate that they formally contacted operators of existing sour gas plants regarding capacity, feasibility, and costs of using existing plants as alternatives to the proposed project. Related documentation should support the applicant's conclusions regarding capacities and the feasibility of using or modifying the plants. Information on the assessment of alternatives must be submitted to the EUB as part of the *Guide 56* facility application audit package for proposed new sour gas plants.

7 Enforcement

The following enforcement actions will be undertaken on plants that fail to meet requirements relating to sulphur recovery and sulphur inlet rates. Actions described in Section 7.1.1 were in effect prior to the date of this document, while Sections 7.2.1 and 7.2.2 will be enforced as of the dates specified below. The EUB will also be increasing its surveillance of existing requirements referred to in Section 7.1.2.

The EUB expects that the measurement difference between the sulphur inlet and sulphur outlet on the S-30 report should be no more than 5 per cent of the sulphur inlet. Stack emissions measurement accuracy must comply with applicable codes issued by AENV.

7.1 Rules Applying to All Sour Gas Processing Plants with Sulphur Inlets Greater than 1 tonne/day

This section applies to all sour gas plants with sulphur recovery processes.

7.1.1 Failure to Meet the Approved Calendar Quarter-Year Sulphur Recovery Efficiency

- 1) If the minimum sulphur recovery specified in a facility approval is not met in any calendar quarter-year, the operator must file with the EUB Operations Group, Production Operations Section, a letter describing the causes of the noncompliance and explaining what actions will be taken to ensure that requirements are met in future quarters.
- 2) If the minimum sulphur recovery specified in the facility approval is not met for another calendar quarter-year period in the next 12-month period, the operator must notify the EUB Operations Group, Production Operations Section. EUB staff will meet with the operator's senior operating and technical personnel to review operations and actions taken to correct the noncompliance. In addition, the EUB will notify the operator that failure to meet the approved sulphur recovery levels for another calendar quarter-year in the next 12-month period will result in a 30 per cent reduction in the raw gas inlet for a period of 90 days or suspension of the plant approval.

7.1.2 Exceeding Approved Maximum Daily Sulphur Inlet Rate

- 1) If the maximum daily sulphur inlet rate specified in the facility approval is exceeded for one or more days in any calendar quarter-year, the operator must file with the EUB Operations Group, Production Operations Section, a letter describing the causes of the noncompliance and explaining what actions will be taken to ensure that future exceedances do not occur.
- 2) If the maximum daily sulphur inlet rate is exceeded in another month in a 12-month period, the operator must notify the EUB Operations Group, Production Operations Section. EUB staff will meet with the operator's senior operating and technical personnel to review operations and actions taken to correct the noncompliance. In addition, the EUB will notify the operator that if the maximum daily sulphur inlet capacity is exceeded for one or more days in another calendar quarter-year in the next 12-month period, enforcement may result in a 30 per cent reduction in the raw gas inlet for a period of 90 days or a suspension of the plant approval.

7.2 Rules Applying to Grandfathered Sour Gas Processing Plants with Approved Sulphur Inlets Greater than 1 tonne/day

This section applies only to grandfathered sour gas plants with sulphur recovery processes.

7.2.1 Exceeding 125 Per Cent Baseline Sulphur Inlet Commencing January 1, 2002

Effective January 1, 2002, grandfathered gas plants that do not meet sulphur recovery levels as described in Section 3.1 must not exceed 125 per cent of the baseline capacity in any calendar quarter-year. Grandfathered gas plants exceeding 125 per cent of the baseline sulphur inlet on a calendar quarter-year basis starting January 1, 2002, will be subject to the following:

- 1) If the calendar quarter-year daily average sulphur inlet exceeds 125 per cent of the baseline, the operator must file with the EUB Operations Group, Production Operations Section, a letter describing the causes of the noncompliance and explaining what actions will be taken to ensure that future exceedances do not occur.
- 2) If the calendar quarter-year daily average sulphur inlet exceeds 125 per cent of the baseline in another calendar quarter-year in a 24-month period, the operator must notify the EUB Operations Group, Production Operations Section. EUB staff will meet with the operator's senior operating and technical personnel to review operations and actions taken to correct the noncompliance. In addition, the EUB will notify the operator that if the sulphur inlet exceeds 125 per cent of the baseline for another calendar quarter-year in the next 24-month period, it will result in a 30 per cent reduction in raw gas inlet for a period of 90 days and may result in a suspension of the plant approval or a requirement that the plant install facilities to comply with Table 1 sulphur recoveries within a specified time period.

Effective January 1, 2012, grandfathered plants must not exceed the maximum grandfathered capacity unless sulphur recoveries comply with Table 1. The enforcement provisions of this subsection will apply to noncompliance with maximum grandfathered capacity exceedances after January 1, 2012.

7.2.2 Failure to Maintain Credit Balance

Sulphur emission performance credits must be earned before they are used. Commencing January 1, 2002, grandfathered sour gas sulphur recovery plants having a negative credit balance at the end of any calendar quarter-year will be subject to the following:

- 1) If there is a negative credit balance at the end of the calendar quarter-year, the operator must file with the EUB Operations Group, Production Operations Section, a letter describing the causes of the noncompliance and explaining what actions will be taken to ensure that negative credit balances will not be incurred in the future.

In situations where grandfathered sour gas sulphur recovery plants do not have sufficient credits, operators must not exceed the maximum grandfathered capacity or such other sulphur inlet rate that the plant is fully capable of operating in compliance with the recovery requirements described in Section 3.1. If on investigation it is determined that the operator knowingly operated under conditions that generated a negative balance, the EUB may escalate enforcement as described in item 2.

- 2) If a plant has a negative credit balance at the end of a second calendar quarter-year in a 12-month period, the operator must notify the EUB Operations Group, Production Operations Section. EUB staff will meet with the operator's senior operating and technical personnel to review operations and actions taken to correct the noncompliance. In addition, EUB staff will advise the operator that another negative credit balance at the end of a calendar quarter-year will result in a 30 per cent reduction in raw gas inlet for a period of 90 days or a suspension of the plant approval.
- 3) If a plant has a negative credit balance at the end of another calendar quarter-year in a 12-month period, the plant will lose its grandfathered status and not be allowed to operate in excess of the applicable maximum grandfathered capacity until the plant is degrandfathered (i.e., modifications are installed so that the plant will comply with Table 1 sulphur recoveries).

7.3 AENV Enforcement

All incidents of noncompliance with approval conditions (e.g., exceedance of SO₂ emission limits) and all contraventions of the Alberta Environmental Protection and Enhancement Act and regulations will lead, where appropriate, to an investigation. That investigation may lead to any number of enforcement responses, including remedial measures, such as environmental protection orders, for the proactive prevention of environmental problems; administrative actions to deter and punish offenders, including warning letters, administrative penalties, and enforcement orders; and prosecutions for the most serious offences.

Appendix 1: Grandfathered sour gas plant approvals

Plant	Operator	Plant code	Current approved ("grandfathered") sulphur recovery efficiency	Guideline recovery for approved sulphur inlet	Approved sulphur inlet (tonnes/day)	Baseline capacity 1999 sulphur inlet (tonnes/day)
Brazeau R.	Keyspan	1108	92.1%	98.3%	119.70	67.3
Brazeau R.	Keyspan	1121	93.5%	95.9%	49.80	38.2
Burnt Timber	Shell	1131	96.5%	98.4%	560.00	412.4
Caroline 1-11	BP Canada	1374	92.0%	95.9%	11.30	5.0
Caroline 4-20	BP Canada	1104	85.0%	89.7%	9.83	6.8
Carstairs	Anderson	1020	90.0%	98.2%	72.20	9.5
Crossfield	Wascana/Nexen	1050	98.0%	98.5%	1,730.10	414.6
Edson	Talisman	1084	97.9%	98.4%	350.00	220.9
Gold Creek	Rio-Alto	1129	97.0%	98.3%	100.00	64.1
Jumping Pound	Shell	1037	96.2%	98.4%	619.00	472.1
Kaybob S. 1 & 2	BP Canada	1107	98.4%	98.5%	1,107.70	540.6
Kaybob S. 3	Chevron	1144	98.1%	99.5%	3,629.70	1,009.6
Lone Pine Ck.	Mobil	1139	98.0%	98.3%	165.40	129.5
Minnehik B. L.	Penn West	1047	95.6%	95.9%	39.70	22.0
Okotoks	Compton	1530	98.3% annual	98.4%	586.60	263.4
Redwater	Imperial	1028	Fluctuating	95.9%	12.20	3.1
Rosevear (North)	Suncor	1206	94.6%	98.3%	115.80	25.4
Rosevear (South)	Suncor	1268	95.6%	98.3%	171.00	50.6
Simonette	Suncor	1113	96.5%	98.3%	120.00	92.3
Strachan	Husky	1141	98.1%	99.5%	4,660.50	2,301.8
Strachan	Keyspan	1133	98.1%	98.4%	971.10	264.9
Sturgeon Lk.	Burlington	1112	94.0%	98.3%	104.20	40.6
Teepee	Talisman	1296	92.0%	95.9%	25.00	17.5
Waterton	Shell	1056	98.7%	99.5%	3,148.00	2,099.6
Wildcat Hills	Petro-Canada	1054	97.5%	98.3%	287.50	181.3
Wimborne	Anderson	1081	95.5%	98.3%	235.00	182.1
Windfall	BP Canada	1034	98.3%	98.5%	1,356.10	777.6
Zama	Apache	1219	92.0%	98.2%	80.30	24.5

Table A1-2: Grandfathered acid gas flaring gas plants, as of January 2001					
Plant	Operator	Plant code	Guideline recovery for approved sulphur	Approved sulphur inlet	Baseline capacity 1999 sulphur inlet
			inlet	(tonnes/day)	(tonnes/day)
Ansell	Rio Alto	1417	69.7%	1.40	1.3
Bantry	AltaGas	1114	69.7%	1.00	1.0
Bellshill Lake	Viking Energy	1280	89.7%	5.77	3.8
Big Bend	CNRL	1293	69.7%	1.46	1.0
Bigoray	PennWest	1138	69.7%	2.96	1.8
Bittern Lake	CNRL	1124	69.7%	2.48	1.0
Boundary Lake S	PennWest	1202	69.7%	2.20	1.1
Boundary Lake S	Talisman	1024	69.7%	1.90	1.0
Carson Creek	Mobil	1062	69.7%	1.00	1.0
Enchant	Northstar	1039	69.7%	1.25	1.0
Forestburg	Signalta	1365	69.7%	4.50	4.0
Greencourt	CNRL	1127	89.7%	5.08	1.3
Harmattan-Elkton	Anderson	1083	69.7%	1.60	1.0
Judy Creek	Pengrowth	1069	69.7%	3.60	2.7
Kaybob	Petro-Canada	1058	89.7%	5.15	1.0
Killam	AltaGas	1510	69.7%	4.75	2.2
Leduc-Woodbend	Imperial	1023	69.7%	1.01	1.0
Little Bow	Gulf	1150	69.7%	1.60	1.2
Retlaw	Northstar	1191	69.7%	2.40	1.7
Spirit River	Pioneer	1560	69.7%	2.60	1.0
Strome	CNRL	1179	69.7%	3.40	1.6
Sylvan Lake	NAL Resources	1070	69.7%	1.85	1.0
Virginia Hills	Apache	1135	89.7%	9.80	5.2
Vulcan	Gulf	1100	69.7%	4.90	2.7
West Drumheller	Vintage	1109	69.7%	2.99	1.1
Whitcourt	Petro-Canada	1115	89.7%	7.50	3.5
Wilson Creek	Imperial	1399	69.7%	1.68	1.0
Wilson Creek	Petro-Canada	1096	69.7%	*	2.3

* Degrandfathered as of November 30, 2001.

Appendix 2: Sulphur Emission Performance Credit Report Form (next page)

Plant Name _____
Operator _____

Location

LSD	SEC	TWP	RGE	W	M

Specify Quarter

PLANT CODE	YEAR	(Jan-Mar, Apr-Jun, Jul-Sep, Oct-Dec)

If this is the first Monthly Credit Report being submitted for this plant check here

Compliance Summary	Yes		No	
	Calendar quarter-year sulphur recovery meets minimum approval requirements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sulphur inlet rates are in compliance with maximum approved daily/design rates.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Calendar quarter-year sulphur inlet less than 125% of baseline capacity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emission credit balance at end of calendar quarter-year is positive.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

S-30 Data Summary	Month 1	Month 2	Month 3	Quarterly Total (t/quarter)	Quarterly Total (t/day)	Inlet _{Actual} (t/d)	Note
Sulphur Inlet (tonnes)	_____	_____	_____	<input type="text"/>	<input type="text"/>		Note 1
Sulphur Outlet (tonnes)	_____	_____	_____				Note 2
% Difference	_____	_____	_____				Note 3
Actual calendar quarter-year sulphur recovery				<input type="text"/> %	Minimum approved sulphur recovery (SR _{Approval})	<input type="text"/> %	Note 4

- Notes:
- 1 Sulphur content of sour gas inlet to plant processes (excludes raw sour gas bypassed to injection or other plants).
 - 2 Sum of sulphur content of produced sulphur, acid gas injected, sour and acid gas flared and sulphur recovery unit tail gas.
 - 3 Difference must be within 5% for each month. If it is outside this range, provide an explanation about what steps are being taken to ensure that this range is met for the next reporting quarter (attach explanation if more room is needed).
 - 4 It is a noncompliance if actual calendar quarter-year sulphur recovery is less than SR_{Approval}. Provide reasons for such noncompliance and describe measures being taken to prevent recurrence.

Comments: _____

Minimum Sulphur Recovery Determination

Inlet _{GFC}	<input type="text"/> t/d	= Maximum Grandfathered Capacity (tonnes/day) = Baseline Capacity x 0.925 ^(Year - 2001)	Note 5
SR _{Approval}	<input type="text"/> %	= calendar quarter-year sulphur recovery specified in the grandfathered approval (%)	
Inlet _{Actual}	<input type="text"/> t/d	= average calendar quarter-year inlet sulphur (tonnes/day)	
SR _{New}	<input type="text"/> %	= calendar quarter-year sulphur recovery specified in Table 1 that is applicable for Inlet _{Actual} (%)	
SR _{min}	<input type="text"/> %	= ((Inlet _{GFC} x SR _{Approval}) + ((Inlet _{Actual} - Inlet _{GFC}) x SR _{New})) / Inlet _{Actual} = calendar quarter-year blended sulphur recovery requirement (%)	Note 6

Notes:

- 5 The Baseline Capacity for each plant and sulphur recovery specified in the grandfathered approvals can be found in ID 2001-3: Sulphur Recovery Guidelines for the Province of Alberta.
- 6 The blended sulphur recovery requirement is equal to the grandfathered approval for sulphur inlet rates that are less than the Maximum Grandfathered Capacity.

Enhanced Sulphur Recovery Performance Incentive Credit Calculation

Previous Credits = Credit Balance from Previous Calendar Quarter-Year Credit Report	<input type="text"/> tonnes	
Emission Credits = (Current Quarterly SR - Blended SR) * Quarterly Total Sulphur Inlet (tonnes per quarter)	<input type="text"/> tonnes	Note 7
$\text{Credit}_Q = \text{Inlet}_{Q\text{Actual}} \times (\text{SR}_{\text{Actual}} - \text{SR}_{\text{min}}) / 100$		
Where: Credit _Q = sulphur emission reduction credits earned in a calendar quarter-year (tonnes sulphur) Inlet _{QActual} = actual total calendar quarter-year inlet sulphur (tonnes) SR _{Actual} = actual calendar quarter-year sulphur recovery (%) SR _{min} = as defined above		

Credit Balance = Previous Credits + Emission Credits for Current Quarter	<input type="text"/> tonnes	Note 8
Notes: 7 A positive value indicates credits earned for enhanced performance relative to minimum requirements. A negative value indicates performance less than target recovery to be deducted from previous credit balance. 8 Note that if the credit balance is negative, the operator must provide a detailed explanation of how the operator will work to gain a positive credit balance for the next quarter. All operators that have a negative credit balance will be subject to escalating enforcement action, as given in ID 2001-3.		

Contact Name _____ Telephone _____
Signature _____ Date _____