Australian Standard™

Preparation of a safety and operating plan for gas networks

Originated as AG 606—1997.
Revised and redesignated AS 4568—2005.

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PREFACE

This Standard was reviewed by the Standards Australia Committee, AG-008, Gas Distribution Committee, to supersede AG 606—1997, *Code of Practice for the Preparation of a Safety and Operating Plan for Gas Networks*. The Standard is republished without technical alterations.

The intention of this Standard is to promote uniform standards of gas network operation.

The Standard has no legal standing in its own right but may acquire legal standing in either of the following circumstances

CONTENTS

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SECTION 2 NETWORK DESCRIPTION

2.1 GENERAL

The Plan should commence with an introduction. This should cover the following—

(a) scope and objectives of the Plan;

(b) references to legislation; and

(c) identification of those responsible for, and the contributors to, the preparation and maintenance of the plan.

The Plan should provide a description of the network. The descriptions specified in Clauses 2.2 to 2.6 are intended only for the identification of risks that apply to the key stakeholders, as associated with the network construction, operations and maintenance. The descriptions may be in summaries where appropriate. These summaries should make reference to detailed information available from the network operator.

2.2 PHYSICAL DESCRIPTION

Description of the network physical scale and dimensions, such as—

(a) geographical location and spread;

(b) length/size/pipe materials/operating pressures;

(c) custody transfer points affecting the safety of the system; and

(d) gas supply and pressure control systems,

should be recorded.

This information should be in summary form, including use of, or reference to, suitable maps, drawings, diagrams, lists and registers.

2.3 CODES AND STANDARDS

Description (by listing) of primary Codes and Standards of design and construction of the network, and primary Codes and Standards used for operations.

2.4 OPERATING PARAMETERS

The operating parameters are to be sufficiently detailed to allow assessment of the risks

2.6 RESOURCES

Description of the resources to safely operate and maintain the system throughout its life cycle.

These resource details may include—

(a) numbers, qualifications, experience and span of control over the necessary work force;

(b) description of other necessary resources;

(c) means to ensure that resources are monitored and maintained; and

(d) system support availability and backup provisions.

SECTION 3 DESCRIPTION OF PROVISIONS FOR SAFE NETWORK MANAGEMENT

3.1 GENERAL

The Plan should describe how the operator would provide safe network management. The operator should reach agreement with the regulatory authority on how much detail is to be provided in the Plan and how much the Plan can refer to safety processes and systems for that detail. It is intended that appropriate indicators for safety will enable the Plan to contain less detail.

The safe management of an operating gas distribution network is primarily the management of a safe and reliable gas supply and associated facilities for the duration of the operational life cycle of those assets and their disposal. This Section gives guidance on the essential elements of a Plan.

3.2 DESIGN

3.2.1 General

The Plan should describe the design principles applied to ensure that all identified hazards and risks are eliminated or reduced to as low a level as is reasonably practical during the life cycle of the network. The design requirements should include both the physical assets and the operating systems of the network.

3.2.2 Design inputs

Key inputs to the design process should include—

(a) hazard identification and review;

(b) identification of appropriate standards and/or legislative requirements;

(c) current and proposed network operating parameters; and

(d) current best practices.

3.2.3 Design process controls

Controls over the design process should include—

(a) company procedures and policies;

(b) risk reduction strategies;

(c) modelling and sizing of networks;

(d) material and component selection; and

(e) approval control.

3.2.4 Design outputs

The outputs from design should include—

(a) performance standards, both in terms of risks and operational performance;

(b) construction plans and specifications; and

(c) specific operational procedures required for safe operation.

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(c) specific operational procedures required for safe operation.

(d) communication/contact points for reporting of incidents;

(e) asset inspection patrols; and

(f) the integration of communication systems with those of third parties.

3.5.4 System maintenance

The Plan should describe how, where network safety and/or reliability depends upon the function of specific components, the network operator ensures appropriate preventative maintenance programs are established to ensure the continued effective functioning of the components.

3.5.5 Change management

The Plan should describe how the management of changes (e.g., technical, procedural and personnel) to safety processes and systems is achieved and should demonstrate the use of risk management principles to validate the effectiveness of the changes and to minimize any detrimental impact or consequences upon other systems.

3.5.6 Documented work practices

The Plan should describe, where network safety and reliability depends upon uniform or repeatable performance or defined work practices, how those work practices should be documented. The documentation should be to a level of detail that enables critical elements to be identified for communication and control.

3.5.7 Emergency response

The Plan should describe how the operator establishes and maintains an emergency plan for implementation in the event of facility failures, accidents or other emergencies. These plans should be developed in order to mitigate the consequences of the failure, accident or emergency.

All relevant operating and maintenance personnel should be competent and trained to carry out their responsibilities in the event of an emergency.

The emergency plan(s) should include the readiness of personnel, equipment materials and communication systems, access to necessary information, co-ordination with emergency services and organizations and liaison with customers and local communities.

Where appropriate, emergency event rehearsals and exercises (involving all relevant third parties) should be used for process validation, training and for maintaining readiness or response.

3.5.8 Gas specification and characteristics

The Plan should describe how the network operator establishes and maintains a specification for the quality composition of the gas to be distributed through the network, and ensure its suitability for safe and reliable use in the proposed application/s. The network operator should establish a control system to ensure that the gas is not supplied to unsuitable appliances and installations.

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TABLE 3.1

EXAMPLES OF MONITORING REQUIRED AT EACH PHASE

Risk management	Safety and reliability indicators
Design	Design assumptions
Construction and commissioning	Test conformance
Network operations and maintenance	Supply indicators Gas quality Leakage Third-party activity Emergency response Protective systems

3.9 AUDITS

The Plan should describe auditing to verify compliance with the Plan. For the purpose of this clause, audits mean measurement of actual performance against specified performance parameters. Audits are generally conducted in addition to monitoring activities, usually by persons who are independent in regard to direct involvement with the particular operation or process.

Audits should evaluate whether the management of procedures and safety—

(a) has been implemented;

(b) is used as intended by the network operator; and

(c) produces the desired safety and reliability result.

The scope of the audits over time should cover all phases of network life cycle and all safety critical processes. The results from audits should be evaluated against the relevant principles within formal risk assessment to identify if improvement or enhancements are warranted.

SECTION 4 FORMAL SAFETY ASSESSMENT

4.1 GENERAL

The Plan should describe how the network operator ensures that risk management is a continuous process at all stages throughout the life cycle of a distribution network. The primary principle in managing risk is to achieve acceptable risk criteria and to reduce the risks to As Low As Reasonably Practicable (ALARP).

In order to identify the risks associated with the network, specifically potential high risks, a formal safety assessment shall be carried out. For each system or process identified by the formal safety assessment as critical to control the risk, the operator shall—

(a) identify those procedures, information links, skills and internal and external authorities/responsibilities required for the system to operate effectively;

(b) provide the resources and arrangements required to maintain system readiness and effectiveness; and

(c) utilize a process of monitoring and review of system performance to ensure that the system continues to operate as designed.

Clauses 4.2 through to 4.4 describe the key elements considered essential for a formal safety assessment and for monitoring hazards and risks. Further details are available in AS/NZS 4360.

Figure 4.1 illustrates the risk management process.

4.2 HAZARD IDENTIFICATION

This requires the formal identification of all significant network hazards to people working on, within the influence of, or dependent on, the operation of the distribution network. Tables A1, A2 and A3 provide a model for identification of such hazards. It is the responsibility of the operator of the network to ensure that all the relevant hazards of that particular network are identified.

4.3 HAZARD AND RISK ASSESSMENT

An assessment should be made of all of the identified hazards so as to determine the impact and/or consequences of them.

This assessment may be carried out using qualitative or quantitative techniques as appropriate. The results of hazard and risk assessment should be used to identify and rank major risk contributors. Risk management strategies include prevention, protection and mitigation activities. Risk reduction strategies should be set for all significant risks. Appendix A gives typical strategies.

4.4 MONITORING AND REVIEW OF HAZARDS AND RISKS

Performance indicators should be established and systems for monitoring and reporting should be put in place for all relevant identified hazards. The indicators should be specifically described in the Plan. Appendix B provides model indicators for guidance, but the network operator should ensure that the most appropriate indicators for the particular network are established.

A process for regular management review of performance indicators should be implemented.

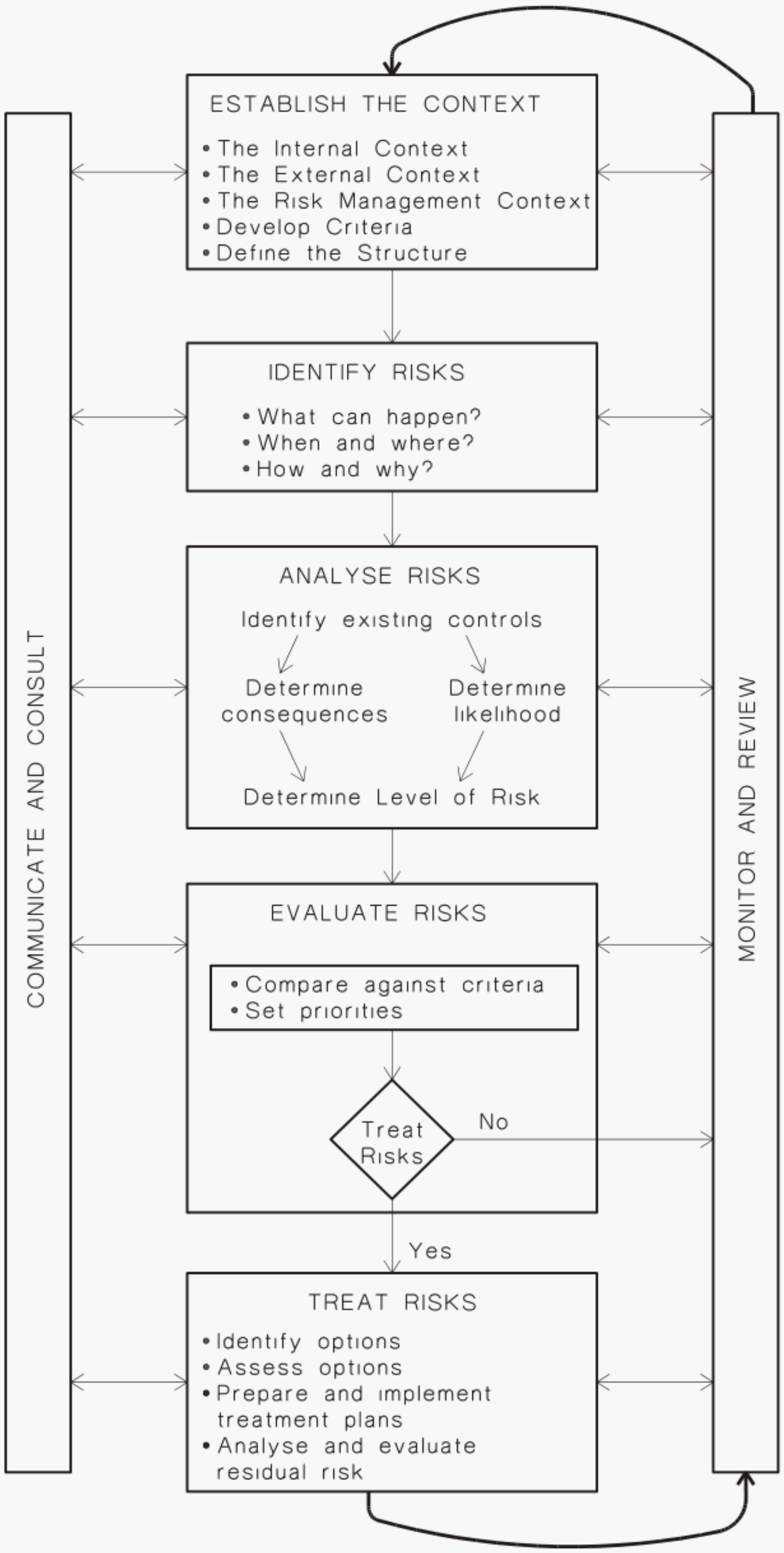

FIGURE 4.1 RISK MANAGEMENT PROCESS
(extract from AS/NZS 4360)

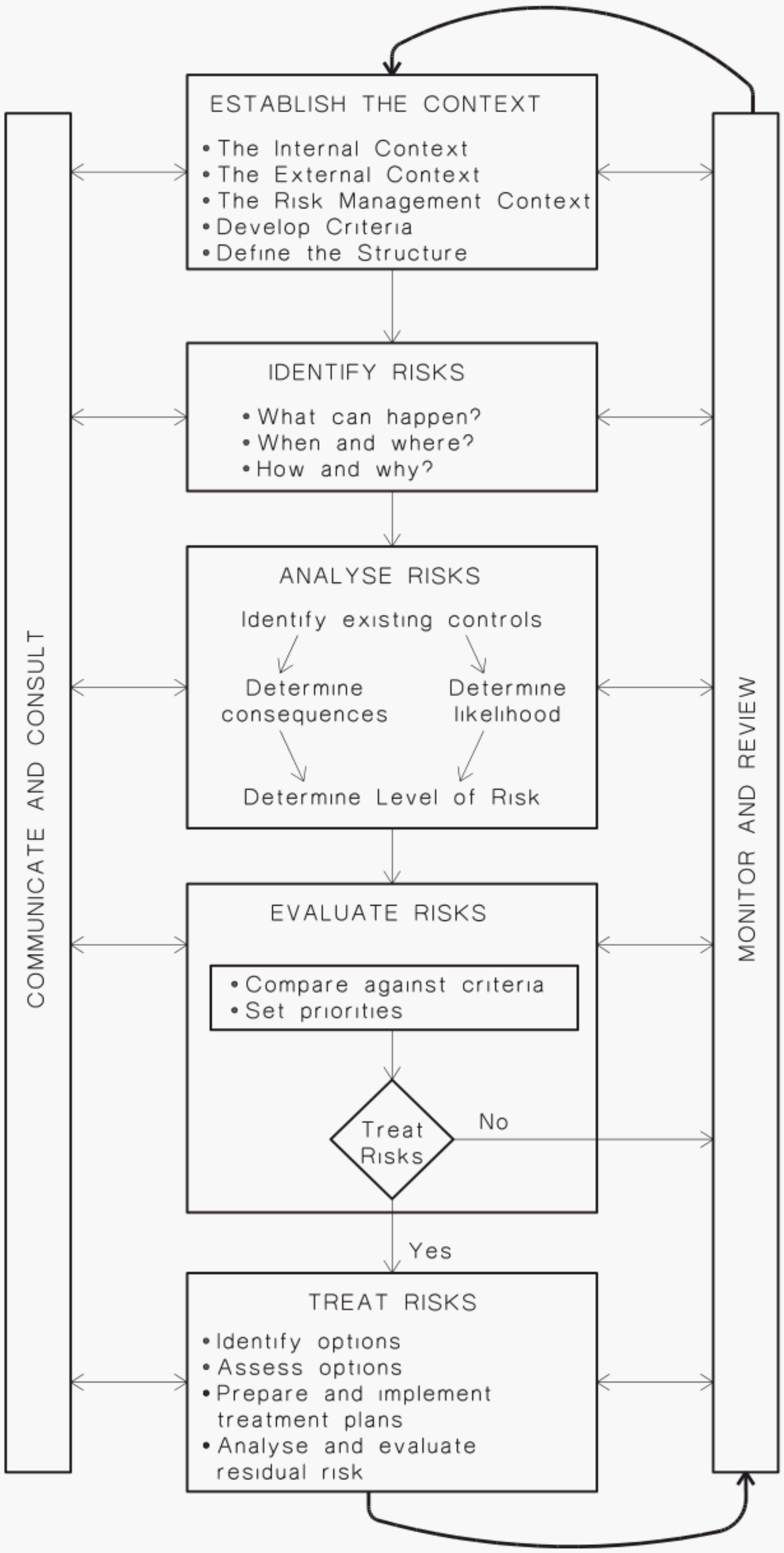

FIGURE 4.1 RISK MANAGEMENT PROCESS
(extract from AS/NZS 4360)

TABLE A1 (*continued*)

Event/Cause	Typical risk reduction strategies		
	Prevention	**Protection**	**Mitigation**
Venting/purging	–Avoid through design	–Procedures and standards to minimize ignition, accumulation, hazard –Corrective action	–System monitoring (pressure, flow and leakage) and control –Emergency response –Isolation systems –Contact and communication system –Separation –Odourant
Corrosion	–CP system –Coatings –Material –Monitoring systems	–Corrective action –System of classification and operational modification –System review (relationships with special groups)	
Materials and components degradation (age influence)	–Type testing/approval –Design life –Monitoring program for environment and performance –Location identification	–Corrective action –System of classification and operational modification	
Pipe damage from other probable sources	–Application of design standards to minimize –Influence other authorities	–Corrective action –System of classification and operational modification –System review (relationships with special groups)	
External loads	–Design –Monitoring	–Corrective action –System of classification and operational modification	
Design faults	–Standards and procedures –Capability of designer –Verification (fit for purpose) –Special case (engineering risk assessment) –Best practice (review)	–Corrective action –System of classification and operational modification	

TABLE A2
SUPPLY RELIABILITY AND SAFETY HAZARDS

Event/Cause	Typical risk reduction strategies		
	Prevention	Protection	Mitigation
Gas composition (quality)	–Gas purchasing/acceptance specification/agreement –Construction and operating standards and practices (prevent water, dust getting into supply)	–Sampling/monitoring –Filtering/traps –Control systems	Response systems and procedures
Supply quality (delivery and pressure) Key public risks—over pressure, combustible air/gas mixture	–Supply specification –Design criteria/ methodology/ modelling –Validation/capacity –Monitoring –Load management –Preventative (maintenance of siphons, regulators)	–Load management (emergency) –Backup supplies or systems –Relief/protection system	

TABLE A3
DECOMMISSIONING HAZARDS

Event/Cause	Typical risk reduction strategies		
	Prevention	Protection	Mitigation
Explosion	–Purge –Removal	Corrective action	Response systems and procedures
Ground subsidence	–Removal –Cathodic protection –Filling –Monitor		
Water flood/damage	–Breaks/drains		
Residual pollutants	–Procedures –Sealing –Locations		
Conduit for hazardous materials	–Sealing –Separation –Monitor		

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Conduit for hazardous materials	–Sealing –Separation –Monitor		

APPENDIX C
REFERENCED DOCUMENTS
(Normative)

AS	
1697	Installation and maintenance of steel pipe systems for gas
2885	Pipelines—Gas and liquid petroleum
2885.1	Part 1: Design and construction
2885.2	Part 2: Welding
2885.3	Part 3: Operation and maintenance
3723	Installation and maintenance of plastics pipe systems for gas
4645	Gas distribution network management
5601	Gas installations
AS/NZS	
1596	Storage and handling of LP Gas
4360	Risk management

NOTES

NOTES

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International Involvement

Standards Australia is responsible for ensuring that the Australian viewpoint is considered in the formulation of international Standards and that the latest international experience is incorporated in national Standards. This role is vital in assisting local industry to compete in international markets. Standards Australia represents Australia at both ISO (The International Organization for Standardization) and the International Electrotechnical Commission (IEC).

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