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blue text:

recommendation of the OECD *Guiding Principles for Chemical Accidents Prevention, Preparedness and Response*

red text:

new or more detailed recommendation of the UNECE discussion paper



I. Principles

A. General Principles

6. The pipeline operator has primary responsibility for the safety of its systems and to take all measures necessary to prevent accidents especially those with transboundary impact. Furthermore in case of accidents all measures should be taken to limit the consequences for man and the environment.
7. An important role remains for governments in providing leadership, and in creating and maintaining administrative frameworks to facilitate the development of the transportation infrastructure, including pipelines.
8. Regulatory approaches concerning pipeline safety in UNECE countries differ significantly, ranging from more prescriptive to more goal setting approaches. However, although different approaches may be adopted, industry appears to have similar safety practices in different countries since the importance of maintaining the integrity of pipeline networks is commonly recognized.



B. Specific Principles

9. Any release of substances hazardous to waters should be avoided. Pipelines for the transport of substances and preparations hazardous to water should be designed and operated as to prevent any release.
10. Leaks have to be recognized in a quick and reliable way. Leaks from any part of a facility, which has contact with substances hazardous to water must be recognizable in a quick and reliable way.
11. The safe operation has to be ensured permanently. The operator of a pipeline should implement a management system to develop and maintain the integrity of the pipelines. The integrity of pipelines should be maintained through adequate maintenance, inspection and monitoring, and sound management.
12. Measures in case of accidents have to be taken. Internal and external emergency plans should be established and regularly updated. In these plans all measures necessary to prevent accidents and to limit their consequences for man and the environment should be described.



B. Specific Principles

13. Land-use planning and risk assessments should be considered. Land-use planning considerations and risk assessments should be taken into account both in the routing of new pipelines (e.g. to limit proximity to populated areas and water catchment areas to the extent possible), and in decisions concerning proposals for new developments/building in the vicinity of existing pipelines.
14. The risk of third-party interference should be reduced. Industry responsible for pipelines should review and, as necessary, develop and implement systems to reduce third-party interference, as this is a cause of accidents, including their transboundary effects.
15. The sharing of information should be improved. In order to facilitate learning from experience, industry responsible for pipelines (as well as public authorities and other stakeholders) should improve sharing of information on improving safety of pipelines and on accidents/near-miss cases.



II. Recommendations

A. UNECE-Parties

16. Parties should adopt policies for the safe transport of hazardous substances in pipelines, aimed at the prevention of water pollution and the limitation of accidental consequences for man and the environment.
17. National legislation should be clear, enforceable and consistent among different countries i.e. to facilitate transboundary activities such as the development and implementation of emergency plans. Industry and governments should cooperate and communicate in developing and implementing legislation.
18. Parties should establish a system of permitting in order to assure that pipelines are designed and constructed in safe way. Competent authorities should be designated and made responsible for the permitting process.



II. Recommendations

B. Competent Authorities

19. Competent authorities should carry out the permitting process including environmental impact assessment.
20. Competent authorities should organize a system of inspections, or other measures of control in order to ensure that operators meet requirements. Independent certified expert organizations could be involved.
21. Competent authorities should ensure that, operators of pipelines:
 - (a) Draw up internal emergency plans; and
 - (b) Supplies the authorities, designated for that purpose, the necessary information to enable them to draw up external emergency plans.



B. Competent Authorities

22. Competent authorities should draw up external emergency plans for the measures to be taken in the surroundings of pipelines.
23. Competent authorities should ensure that external emergency plans are put into effect without delay when:
 - (a) An accident with transboundary effects occurs, or
 - (b) An uncontrolled event occurs which by its nature could reasonably be expected to lead to transboundary effects.
24. Competent authorities may require the operator to provide any additional information necessary to allow the authority fully to assess the possibility of a transboundary accident and to determine the scope of possible increased probability and/or aggravation of transboundary accidents, and to enable the preparation of a local emergency plan.
25. Competent authorities should ensure that internal emergency plans are reviewed, tested, and where necessary revised and updated by the operators at suitable intervals.



II. Recommendations

C. Operators

26. Pipelines for transporting hazardous substances should be designed, constructed, operated, maintained and monitored so as to reduce the frequency of accidents and to mitigate the consequences of accidents that do occur.
27. Pipelines should be designed, constructed and operated consistent with recognized national and international codes, standards, and guidelines, as well as company specifications.
28. Consideration should be given to various aspects which could have an impact on the safety of a pipeline including, e.g. design and stress factors, material quality, wall thickness, depth of burial, external impact protection, markings, route selection and monitoring.
29. Comparative risk assessments should be undertaken in order to choose from among different materials and other options.



C. Operators

30. The operator should:
- (a) Draw up a document establishing a Pipeline Management System (PMS) to ensure that it is properly implemented. The PMS should be designed to guarantee a high level of protection for man and the environment;
 - (b) Demonstrate to the competent authority that the PMS has been put into effect;
 - (c) Establish performance measures for monitoring the PMS; and
 - (d) Make the document setting out the description of the PMS including the associated performance measures available to the competent authority.
31. The operators should take into account the technical and organizational aspects listed in the annex to these guidelines/good practices.



ANNEX

Technical and Organizational Aspects

I. Design and Construction



I. Design and Construction

A. Materials

- Pipelines should be constructed with the most suitable materials available to ensure their integrity initially and throughout their lifecycle. Appropriate safety technology should be used such as automatic shutdown systems (in the event of a leak or accident) or safety release systems;
- With pipelines for carrying combustible materials and with above-ground pipelines which are not protected against the effects of flames, the material must be sufficiently resistant to the effects of flames;
- Proof of the suitability of the materials used should be furnished;
- The pipe sections should be tested under standard conditions;
- The most unfavorable operating conditions, e.g. also breakdowns, are to be taken into consideration.



B. Calculation

- The safety of the pipeline should be demonstrated by a calculation assuming the worst operating condition scenario including breakdowns and external additional loads;
- The highest and lowest internal pressures as well as the pressure gradients for the most unfavourable operating case should be calculated for the entire length of the pipeline taking the transporting capacity, the physical properties of the transported medium as well as the route profile into consideration;
- The static, dynamic and thermal additional loads to which the pipeline can be subjected, e.g. stress from soil and traffic loads or the effects of terrain, should also be determined. Additional loading is, for example, loads from soil cover and traffic acting on pipe crown, longitudinal stresses from impeded thermal expansion in stations, stresses due to vibrations in the vicinity of pumps;
- Furthermore, the influence of pressure surges should be considered during the dimensioning and design of the pipeline.



C. Piggability

- **Pipelines, with the exception of short laterals and stations, should be piggable for inspection purposes**

D. Corrosion Protection

- **External corrosion: Underground pipelines should be protected by a suitable coating and by cathodic corrosion protection and above-ground pipelines by a suitable paint layer or coating; and**
- **Internal corrosion: If there is a possibility of internal corrosion, appropriate protective measures should be taken. Otherwise proof should be furnished that there is no hazard of internal corrosion.**



E. Fire and explosion protection

- Pipelines should be constructed, manufactured and equipped as well as maintained and operated so that the safety of employees and third parties is ensured, in particular their safety against the risk of fire and explosion.



F. Safety equipment

- Pipelines should be equipped with the facilities necessary for safe operation which must in particular ensure that:
 - The operating pressures can be continuously measured and independently recorded;
 - As far as necessary from the safety point of view, the operating temperatures can be continuously measured and independently recorded;
 - Inadmissible internal pressures and inadmissible temperatures cannot occur during operation and breaks between transportation;
 - The volume of dangerous substances which can escape during an incident / accident can be limited;
 - Losses during stationary and instationary operation can be detected and the point of damage rapidly located; and
 - Liquid escaping from operating facilities (e.g. pump, measuring, valve stations) can be collected.
- Proof of the suitability of safety equipment for the operating functions in question should be furnished.



G. Height of covering

- The height of the covering of buried pipelines should be adapted to suit local requirements to minimize the possibility of external interference

H. Marking

- The route of the pipeline and its equipment should be marked in a suitable way.



I. Performance and test of construction work

- Tests should be carried out on the construction, welding and laying work during the laying of the pipeline by competent supervisory staff and by independent experts. In particular, a sufficient number of non-destructive tests should be performed on the welds to assess the proper performance of the welding work. In areas with high protection requirements, all welds should be tested;
- Before the pipeline is commissioned, a strength and tightness test should be performed or witnessed and certified by an independent expert;
- A function test of the safety equipment as well should be witnessed and certified by an independent expert; and
- An independent expert can only issue the final acceptance document after it has been proven, that the pipeline has been constructed and can be operated in accordance with the notification/permit.



II. Pipeline Management System

The safety management system should include the part of the general management system, which includes the organizational structure, responsibilities, practices, procedures and resources for determining and implementing the accident prevention policy.

The following issues should be addressed by the safety management system:

- **Organizational and personnel:** The roles and responsibilities of personnel involved in the management of hazards at all levels in the organization. The identification of training needs of such personnel and the provision of the training so identified. The involvement of employees and, where appropriate subcontractors;
- **Identification and evaluation of transboundary hazards:** adoption and implementation of procedures for systematically identifying transboundary hazards arising from normal and abnormal operation and the assessment of their likelihood and severity;



II. Pipeline Management System

- Operational control: adoption and implementation of procedures and instructions for safe operation, including maintenance, of plant, processes and equipment;
- Management of change: adoption and implementation of procedures for planning modifications to, or the design of new installations, processes or storage facilities;
- Management of change: adoption and implementation of procedures for planning modifications to, or the design of new installations, processes or storage facilities;
- Planning of emergencies: adoption and implementation of procedures to identify foreseeable emergencies by systematic analysis and to prepare, test and review emergency plans to respond to such emergencies;



II. Pipeline Management System

- Monitoring performance: adoption and implementation of procedures for the ongoing assessment of compliance with the objectives set by the operator's accident prevention policy and safety management system, and the mechanism for investigation and taking corrective action in case of non-compliance. The procedures should cover the operator's system for reporting accidents or near misses, particularly those involving failure of protective measures, and their investigation and follow-up on the basis of lessons learnt; and
- Audit and review: adoption and implementation of procedures for periodic systematic assessment of the effectiveness and suitability of the safety management system; the documented review of performance of the safety management system and its updating by senior management.

As part of the safety management system the operator should monitor the operation of the pipeline continually and keep the registered data.



III. Emergency Planning

Emergency plans should be established, reviewed, tested, and where necessary revised and updated by the operators (internal plans) and by the authorities (external plans) at suitable intervals. The review should take into account changes of the pipelines concerned or within the emergency services concerned, new technical knowledge, and knowledge concerning the response to accidents. In particular the emergency plans have to be established according to the provisions of the joint river bodies.



III. Emergency Planning

The emergency plans should be established with the objectives of:

- Containing and controlling incidents so as to minimize the effects, and to limit damage to man, the environment and property;
- Implementing the measures necessary to protect man and the environment from the effects of transboundary accidents;
- Communicating the necessary information to the public and to the services or authorities concerned in the area; and
- Providing for the restoration and clean up of the environment following a transboundary accident.



III. Emergency Planning

Emergency plans should be reviewed, tested, and where necessary revised and updated at suitable intervals. The review shall take into account changes of the pipelines concerned or within the emergency services concerned, new technical knowledge, and knowledge concerning the response to transboundary accidents.

Emergency plans should be coordinated between operators and competent authorities as well as fire brigades and other disaster control units.



A. Internal emergency planning

Internal emergency plans should at least include:

- Names or positions of persons authorised to set emergency procedures in motion and the person in charge of and coordinating the on-site mitigation action;
- Name or position of the person with responsibility for liaising with the authority responsible for the external emergency plan;
- For foreseeable conditions or events which could be significant in bringing about an accident, a description of the action which should be taken to control the conditions or events and to limit their consequences, including a description of the safety equipment and the resources available;



A. Internal emergency planning - continuing

- Arrangement for limiting the risks to persons on site including how warnings are to be given and the actions persons are expected to take on receipt of a warning;
- Arrangements for providing early warning of the incident to the authority responsible for setting the external emergency plan in motion, the type of information which should be contained in an initial warning and the arrangements for the provision of more detailed information as it becomes available;
- Arrangements for training staff in the duties they will be expected to perform, and where necessary coordinating this with emergency services; and
- Arrangements for providing assistance to neighbouring countries according to the UNECE Industrial Accident Notification System.



B. External emergency planning

It should be ensured that the external emergency plans are drawn up in consultation with the public liable to be affected by a transboundary accident originating from a pipeline.

External emergency plans should at least include:

- Names or positions of persons authorised to set emergency procedures in motion and of persons authorised to take charge of and coordinate action;
- Arrangements for receiving early warning of incidents, and alert and call-out procedures;
- Arrangements for coordinating resources necessary to implement the external emergency plan;
- Arrangements for providing assistance with mitigation action;



B. External emergency planning - continuing

- Arrangements for providing assistance with mitigation action;
- Arrangements for off-site mitigation action;
- Lists/maps of sensible areas and objects;
- List of available trouble-shooters;

- Arrangements for providing the public with specific information relating to the accident and the behaviour which it should adopt; and

- Arrangements for informing the emergency services of neighbouring countries in the event of an accident with possible transboundary consequences according to the UNECE Industrial Accident Notification System.



IV. Inspection

The pipeline should be inspected and maintained regularly. Reliable trained staff may only carry out maintenance work on a pipeline.

Inspections or other control measures should be sufficient for a planned and systematic examination of the systems being employed for pipelines, whether of a technical, organisational or managerial nature, so as to ensure in particular that:



IV. Inspection

- The operator can demonstrate that he has developed appropriate performance measures to monitor the Pipeline Management System (PMS);
- The operator can demonstrate that he has taken appropriate measures to prevent transboundary accidents;
- The operator can demonstrate that he has provided appropriate means for limiting the consequences of transboundary accidents; and
- Any data and information submitted, adequately reflects the conditions of the pipeline(s).



IV. Inspection

Important regular inspection and maintenance work is for example:

- Continual recording of the data relevant for plant safety and their evaluation;
- Walking surveys / air surveillance of the route at regular intervals;
- Examination of all equipment serving the safe operation of the pipeline at regular intervals;
- Monitoring of the effectiveness of cathodic corrosion protection;
- Special surveillance measures in mining areas; and
- Regular inspection of pipeline condition (detection of any corrosion, minimum wall thickness, cracks, laminations, dents, folds).



IV. Inspection

An independent expert at regular intervals should inspect the pipeline as far as required by the notification/permit.

These inspections are to cover in particular the proper functioning of the equipment important for pipeline safety, the proper condition and the tightness of the pipeline.



Thank You

