

WORLD BANK ENVIRONMENT, HEALTH AND SAFETY GUIDELINES¹

NATURAL GAS PIPELINE TRANSMISSION SYSTEMS

RIGHT-OF-WAY ALIGNMENT

The principal elements of World Bank policy regarding right-of-way alignment, land acquisition, compressor station siting and creation of access (e.g., roads) in otherwise inaccessible environmentally sensitive areas are summarized below. The sponsors must provide information regarding rights-of-way, their lengths, general locations and the sponsors' policies regarding alignment of these rights-of-way in relation to the following guidelines:

- a) All new rights-of-way should be aligned taking environmental factors into consideration, in a manner which will minimize to the extent possible, the need for physical alteration and the impact on sensitive natural environments, cultural resources, agricultural lands, and residential and commercial areas.
- b) Land acquisition must be carried out in accordance with World Bank resettlement guidelines which require identification and quantification of any impacts on land-based livelihood, and compensation to landowners and people relying on the land for their livelihood.
- c) Where rights-of-way are to be established through remote and currently inaccessible environmentally sensitive areas, the potential impacts on the natural environment, indigenous populations, population immigration and natural resource exploitation must be assessed and measures adopted to minimize these impacts. Typically, positive measures should be provided to control population influx to remote areas due to increased access created by the pipeline right-of-way, and to prevent associated secondary impacts.
- d) Environmental impacts of proposed projects should be minimized through such measures as visual impact considerations in siting and design, restricting right-of-way use by non-authorized persons, erosion and sediment control during and after construction, and use of low-impact maintenance procedures.

OTHER GUIDELINES SPECIFIC TO GAS PIPELINES

- a) Positive pipe corrosion control measures
- b) Program of periodic inspection and maintenance
- c) Pressure sensors connected to alarms and automatic shutdown systems.
- d) Metering system should provide continuous input/output comparison for leak detection.
- e) Adequate engineering design providing adequate protection from likely external physical forces
- f) Accurate and complete records of all inspections, leak incidents, unusual events, and safety measures taken

LIQUID EFFLUENTS

Process wastewater, domestic sewage and contaminated stormwater should be treated to meet the following specified limits before being discharged to surface waters:

pH	6 to 9
BOD ₅	50 mg/l
Oil and Grease	20 mg/l
Phenolic Compounds	100 mg/l
Total Suspended Solids	50 mg/l
Coliforms	Less than 400 MPN/100 ml (MPN - Most Probable Number)
Temperature - at the edge of a designated mixing zone	Max 5°C above ambient temperature of receiving water; max 3°C if receiving water temperature >28°C

¹ Source: The World Bank policies and guidelines, supplemented with information from OECD sources and the proposed revisions to the World Bank guidelines.

SOLID AND LIQUID WASTES

- a) Project sponsors should recycle or reclaim materials where possible.
- b) If recycling or reclaim is not practical, wastes must be disposed of in an environmentally acceptable manner and in compliance with local laws and regulations.
- c) All hazardous materials, pipeline liquids, residues, solvents, oils (including PCB-contaminated oils), and sludges from raw water, process wastewater and domestic sewage treatment systems must be disposed of in a manner to prevent the contamination of soil, groundwater and surface waters.

WORKPLACE AIR QUALITY

- a) Periodic monitoring of workplace air quality should be conducted for air contaminants relevant to employee tasks and the plant's operations.
- b) Ventilation, air contaminant control equipment, protective respiratory equipment and air quality monitoring equipment should be well maintained.
- c) Protective respiratory equipment must be used by employees when the exposure levels for welding fumes, solvents and other materials present in the workplace exceed local or internationally accepted standards, or the following threshold limit values (TLVs):

Carbon Monoxide	29 mg/m ³
Hydrogen Sulfide	14 mg/m ³
Nitrogen Dioxide	5 mg/m ³
Sulfur Dioxide	5 mg/m ³

- e) Monitors should be installed which activate an audible alarm when toxic gas concentrations exceed 1/2 the above threshold limit values.

WORKPLACE NOISE

- a) Feasible administrative and engineering controls, including sound-insulated equipment and control rooms should be employed to reduce the average noise level in normal work areas.
- b) Plant equipment should be well maintained to minimize noise levels.
- c) Personnel must use hearing protection when exposed to noise levels above 85 dBA.

WORK IN CONFINED SPACES

- a) Prior to entry and occupancy, all confined spaces (e.g., tanks, sumps, vessels, sewers, excavations) must be tested for the presence of toxic, flammable and explosive gases or vapors, and for the lack of oxygen.
- b) Adequate ventilation must be provided before entry and during occupancy of these spaces.
- c) Personnel must use air-supplied respirators when working in confined spaces which may become contaminated or deficient in oxygen during the period of occupancy.
- d) Observers/assistants must be stationed outside of confined spaces to provide emergency assistance, if necessary, to personnel working inside these areas.

HAZARDOUS MATERIAL HANDLING AND STORAGE

- a) All hazardous (reactive, flammable, radioactive, corrosive and toxic) materials must be stored in clearly labeled containers or vessels.
- b) Storage and handling of hazardous materials must be in accordance with local regulations, and appropriate to their hazard characteristics.
- c) Fire prevention systems and secondary containment should be provided for storage facilities, where necessary or required by regulation, to prevent fires or the release of hazardous materials to the environment.

HEALTH - GENERAL

- a) Sanitary facilities should be well equipped with supplies (e.g., protective creams) and employees should be encouraged to wash frequently, particularly those exposed to dust, chemicals or pathogens.
- b) Ventilation systems should be provided to control work area temperatures and humidity.
- c) Personnel required to work in areas of high temperature and/or high humidity should be allowed to take frequent breaks away from these areas.
- d) Pre-employment and periodic medical examinations should be conducted for all personnel, and specific surveillance programs instituted for personnel potentially exposed to toxic or radioactive substances.

SAFETY - GENERAL

- a) Shield guards or guard railings should be installed at all belts, pulleys, gears and other moving parts.
- b) Elevated platforms and walkways, and stairways and ramps should be equipped with handrails, toeboards and non-slip surfaces.
- c) Electrical equipment should be grounded, well insulated and conform with applicable codes.
- d) Personnel should use special footwear, masks and clothing for work in areas with high dust levels or contaminated with hazardous materials.
- e) For work near molten or high temperature materials, employees should be provided with non-slip footwear, gloves, safety glasses, helmets, face protection, leggings and other necessary protective equipment.
- f) Eye protection should be worn by personnel when in areas where there is a risk of flying chips or sparks, or where intense light is generated.
- g) Personnel should wear protective clothing and goggles when in areas where corrosive materials are stored or processed.
- h) Emergency eyewash and showers should be installed in areas containing corrosive materials.
- i) A safety program should be established for construction and maintenance work.
- j) A fire prevention and fire safety program should be implemented and include regular drills.

TRAINING

- a) Employees should be trained on the hazards, precautions and procedures for the safe storage, handling and use of all potentially harmful materials relevant to each employee's task and work area.
- b) Training should incorporate information from the Material Safety Data Sheets (MSDSs) for potentially harmful materials.
- c) Personnel should be trained in environmental, health and safety matters including accident prevention, safe lifting practices, the use of MSDSs, safe chemical handling practices, and proper control and maintenance of equipment and facilities.
- d) Training also should include emergency response, including the location and proper use of emergency equipment, use of personal protective equipment, procedures for raising the alarm and notifying emergency response teams, and proper response actions for each foreseeable emergency situation.

RECORD KEEPING AND REPORTING

- a) The sponsor should maintain records of significant environmental matters, including monitoring data, accidents and occupational illnesses, and spills, fires and other emergencies.
- b) This information should be reviewed and evaluated to improve the effectiveness of the environmental, health and safety program.
- c) An annual summary of the above information should be provided to MIGA.