Task 1. Evaluation of the Environmental Impacts in the CO2 Capture Process

Background and goals

- To understand environmental impacts when CO2 absorbents (amine solutions) are released into the atmosphere.
- To understand existence of Nitrosamine, a class of chemical compounds including some amine derivatives, and its impact on human health.
- To draft guidelines for risk assessment by understanding the environmental load through the assessment of risks of the CO2 capture process.
- To study the impact of emissions from amine solutions on the environment and flue gas composition, and emission reduction technologies.

Details

Base Study・Risk Assessment・Drafting Guidelines

Understanding environmental load of CO2 capture process

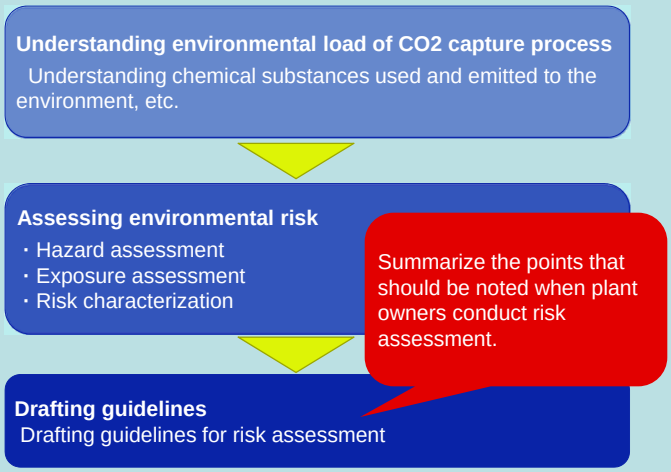
Research and examination are required regarding the environmental effects of amine solutions during the use phase and the disposal phase. For domestic and foreign CO2 capturing equipment using amine solutions, we will identify the chemical substances expected to be used and emitted to the environment, and understand the amount of their emission based on the amount of CO2 captured and the operational conditions.

Assessing environmental risk

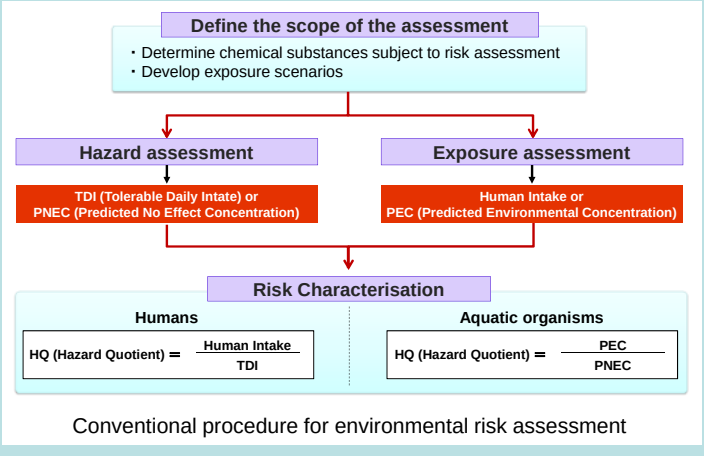
Taking into account the actual state, the evaluation of amine emissions, and the study of emission reduction methods, we will determine chemical substances subject to risk assessment, define the scope of the assessment, and examine the assessment procedure. More specifically, based on the procedure in the Chemical Substances Control Law of Japan, we will collect and assess information on hazards (hazard assessment), develop exposure scenarios and estimate the concentrations in the environment (exposure assessment), and carry out using margin of exposure and/or PEC/PNEC ratio.

Drafting guidelines

To minimize the environmental impacts of the CO2 capture process, and to encourage plant owners to construct and install CO2 capturing equipment appropriately, we will draft guidelines for environmental risk assessment.



Procedure for assessing environmental risk and drafting guidelines



Conventional procedure for environmental risk assessment

Amine Emissions and Controls, Front-End Design for Demo Plant Construction

Evaluation of amine emissions

Carry out a quantitative analysis of amine compounds emitted during the course of continuous operation of the CO2 capture process, using a pilot plant that captures the CO2 from the actual flue gas of the coal-fired Mikawa Power Plant (owned by Sigma Power Ariake in Omuta, Fukuoka).

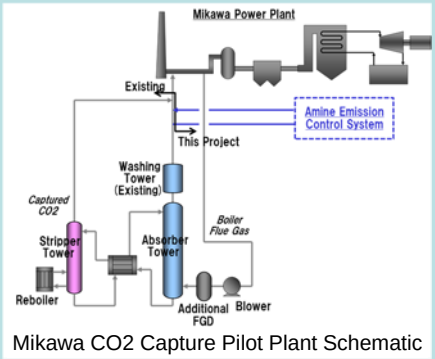
Investigation of methods to mitigate amine emissions

Utilizing available technology, construct a system at the pilot plant which enables control of amine emissions down to required levels. Here, optimal operation parameters will be investigated and mitigation performance of the amine emissions will be confirmed.

Front-end design for CO2 capture demonstration project

In order to construct and execute the demonstration facility after FY2016 (H28), front-end design of a CO2 capture facility with the capacity to capture around 1000 tons of CO2 per day or more will be performed. The present subject of this project is the Mikawa Power Plant.

Toshiba Mikawa
Post Combustion Capture Pilot Plant
（at Omuta, Fukuoka Prefecture）



Mikawa CO2 Capture Pilot Plant Schematic