Public Acceptance of CCS in Nagaoka Project

Indonesia – Japan CCS Workshop

22nd Feb. 2011

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Outline

1. Introduction of INPEX
2. Overview of Nagaoka CO_2 Storage Project
3. Public Acceptance of Oil & Gas Activities in Nagaoka Area
4. Public Acceptance of CCS in Nagaoka Project
5. Summary

INPEX - Overview

1966 NOSOPEX established

1967 NOSOPEX was renamed to INPEX

1970 Attaka Discovery with Unocal (now Chevron) in 1970

1972 Bekapai Discovery with CFP (now Total) in 1972

1974 Handil Discovery with CFP in 1974

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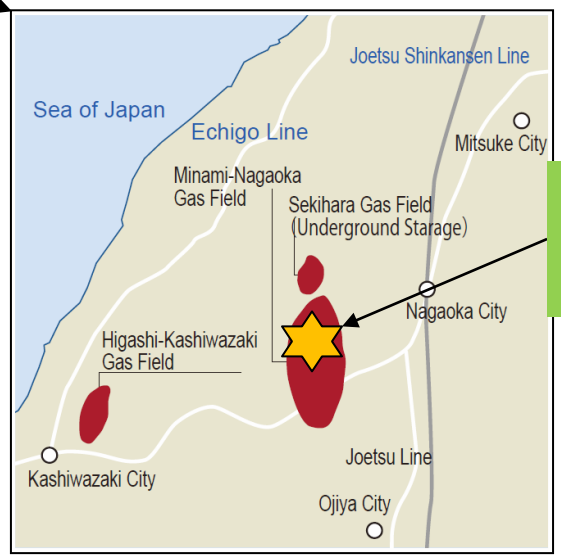
2000 Abadi Discovery in 2000

2006 INPEX and TEIKOKU established INPEX Holdings Inc.

2008 Three companies merged to form INPEX Corp.

FY2000－2007 TEIKOKU had been engaged in Nagaoka RITE Project

INPEX – Domestic E&P Activities

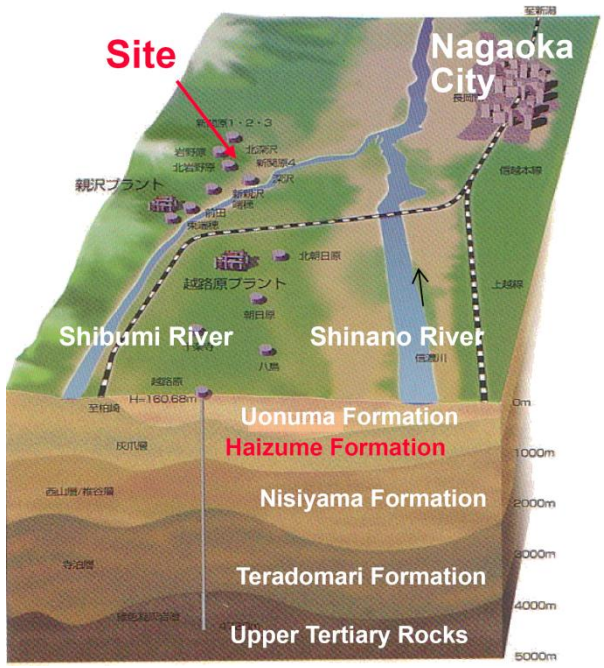


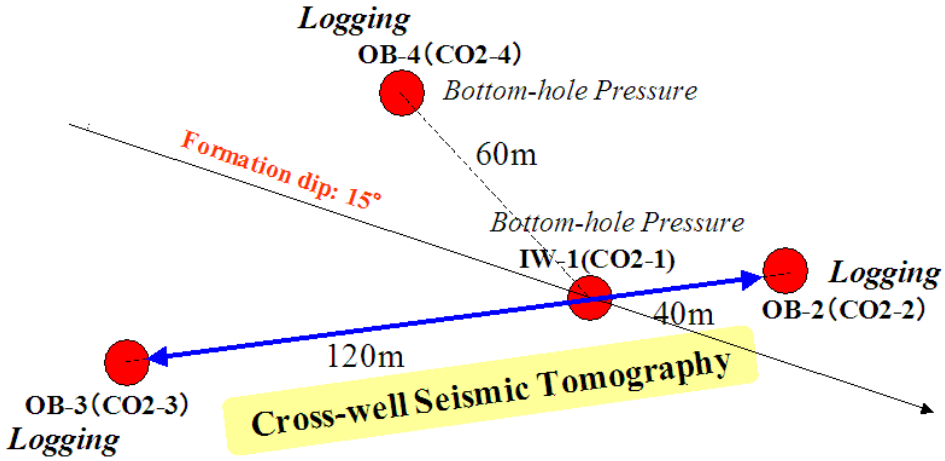
RITE Project

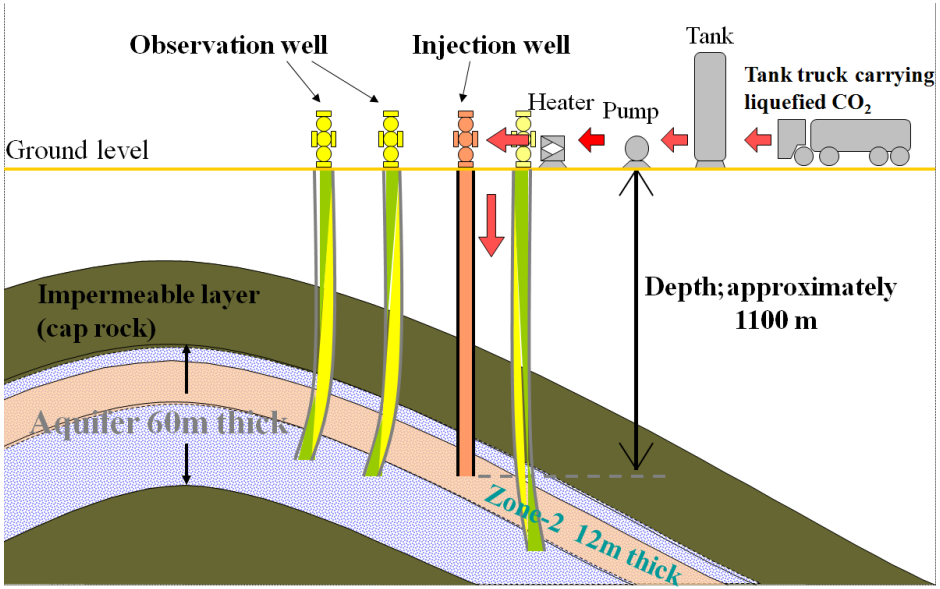
- Minami-Nagaoka Gas Field (1984～)
  Largest gas field in Japan
- Higashi-Kashiwazaki Gas Field (1973～)
- Kubiki Gas Field (1959～)
- Sekihara Gas Field (1966～)
  Underground Gas Storage (1968～)
- Gas Pipeline Network
  1,400 km from Nagaoka to Tokyo area

Overview : Nagaoka CO_2 Storage Project

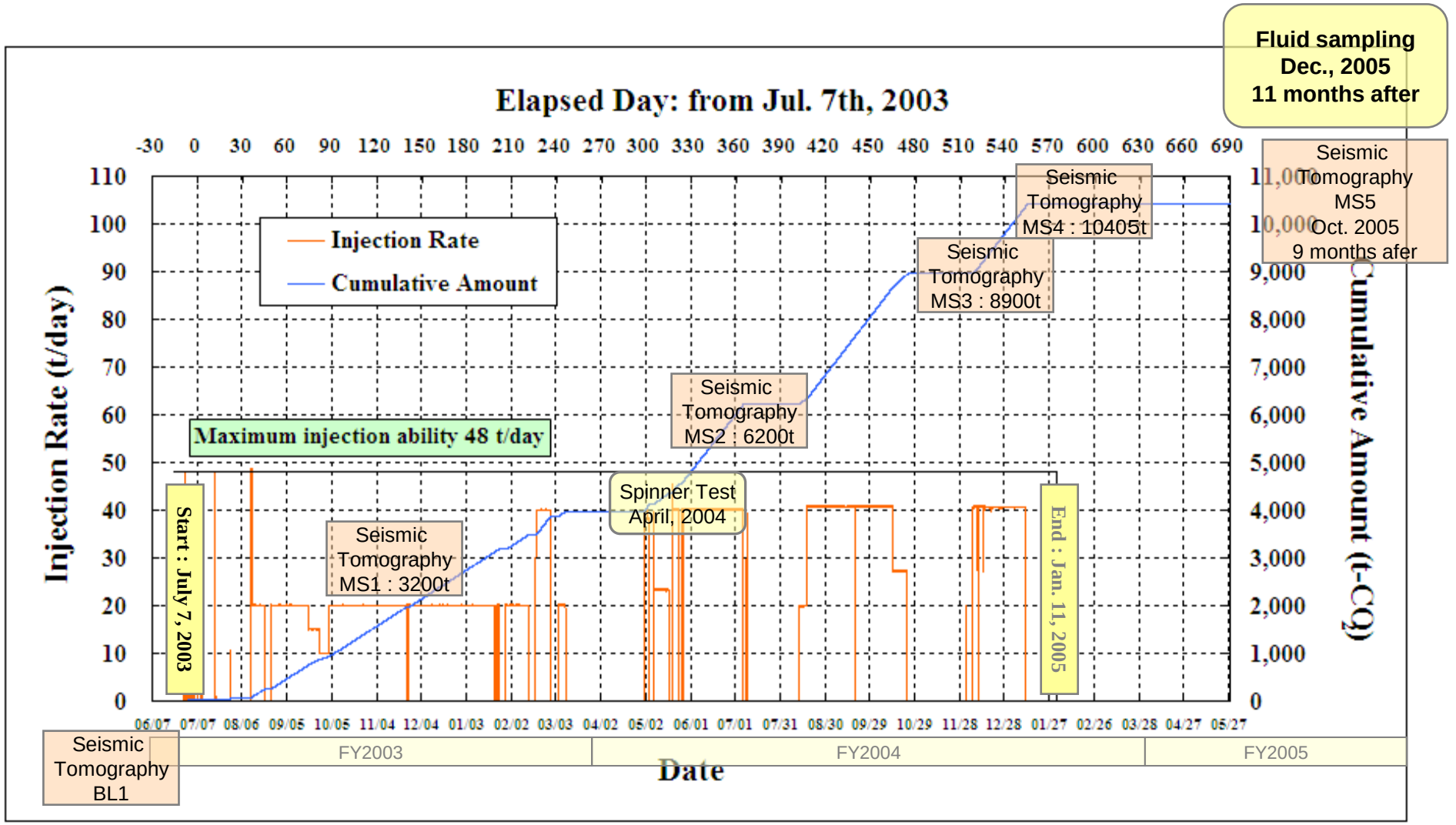
- Project Owner : RITE
- Storage site: Minami-Nagaoka Gas Field (INPEX)
- Shallow sandstone aquifer
- Depth 1,100m
- Injection :2003.Jul～2005.Jan（18months）
- Injection Rate : 20~40t /day
- Cum. Injection : 10,400t
- Injection Conditions
  - Well head 7 MPa (1000psi), 35℃
  - Bottom Hole 12 MPa (1700psi) , 48℃







Injection and Monitoring



Public Acceptance of Oil & Gas Activities

Example : Gas well testing at Minami-Nagaoka Gas Field :

The flare can be observed from residential areas surrounding the field.

Public Notice / Acceptance in advance : Essential for Oil / Gas Activities

INPEX's PA activities for Oil & Gas Business

Principal PA activities

- Notice & explanation of major activity plans (drillings / well services, well testing, construction & major repair / maintenance of facilities / pipelines etc.) to Stakeholders (central / regional authorities, local government, local societies / residents, land owners, etc.)
- Approvals under Japanese Laws (Mining Law, etc) from Authorities.
- Acceptance among local societies / residents : essential.
- Detailed explanation / Q&A for each activity, when necessary to obtain PA.

Natural Gas Plant

Gas Trunk Line over a river

Lorry transportation of NGL

PA of CCS in Nagaoka Project

RITE and INPEX collaborated for Nagaoka Project to obtain PA

- RITE as Owner, and INPEX as Operator , collaborated successfully to acquire PA from local government and local societies.
- No major PA obstacle during the operation period (FY2000 – 05)

  FY 2000 Drilling 1 Injector
  2001 Drilling 2 Observation wells
  2002 Drilling 1 Observation well
  2003 Facility Construction, Injection & Monitoring started
  2004 Injection & Monitoring continued
  2005 Injection terminated, Monitoring continued to FY2007
- Backgroud….
  - Small scale CO_2 storage
  - Local people's familiarity with oil & gas activities in Nagaoka area
  - Close similarity between oil & gas activities and CO_2 storage
  - General acceptance of R&D for global warming mitigation measures

PA of CCS in Nagaoka Project

- Two major earthquakes struck Nagaoka area, one in Oct. 2004, and the other in July 2007.
- After the second earthquake, some local residents suspected these earthquakes might be triggered by our underground activities (gas extraction, hydraulic fracturing or CO_2 injection, etc.).
- Careful investigation of vast seismicity records by a team of dedicated seismologists revealed there is no indication of interaction between the earthquakes and our underground activities.
- However, local government requested RITE and INPEX not to reopen the CO_2 injection operation until the groundless suspicion should be completely wiped away.
- INPEX, collaborating with RITE, will continue the CO_2 monitoring for CCS PA and R&D purposes, and also endeavor to obtain further PA for our oil and gas activities.

Summary

- Public Acceptance is essential for CCS project, especially for under-ground storage in populated areas.
- Many CCS project plans over the world might be canceled, delayed or reconsidered because of PA obstacles.
- In case of RITE Nagaoka Project, PA was not a serious hurdle during the operating phase. Local society's familiarity with oil and gas industry and the similarity of CO_2 storage with oil & gas activities were among its reasons.
- Oil and gas rich areas like Nagaoka are one of the most favorable candidates for CO_2 storage project, not only because of a lot of geological data being already available but the PA acquisition processes might be easier.
- CCS-EOR, if applicable in such an oil rich area, is one of the strongest drivers of CCS. Unfortunately, Nagaoka area is not the case.

Summary

- Oil and gas industry can therefore assist many CCS projects not only by providing its technical data, knowledge and expertise, but by supporting PA development processes if necessary.
- Two damaging earthquakes, one during the injection period and the other during the monitoring period, struck Nagaoka are and cast groundless doubts on relationship between the earthquakes and the underground activities. In countries like Japan or Indonesia with high seismic activities, careful consideration of earthquakes might become an important issue for PA in CCS project.