COVID-19 infection prevention measures in 2-D land seismic survey, Niigata, JAPAN

Introduction

COVID-19 has gone worldwide since early 2020. In JAPAN, the first infection wave arrived in April 2020 with the daily maximum number of positive cases reaching about 720, and the second wave in July to August was more than double the scale from the first wave. After the second infection wave was settled down, INPEX CORPORATION and MITSUBISHI GAS CHEMICAL COMPANY, INC. had assessed the Japanese COVID-19 infection circumstance where the next wave might be possible and decided to conduct new 2-D land seismic survey in November and December 2020 with necessary infection prevention measures that were corresponding to the guidelines (e.g. Basic Policies for Novel Coronavirus Disease Control by the government, 2020) and regulations by the Japanese government and local organization of the survey area.

The survey area is located in Niigata Prefecture where several oil and gas fields exist, and close to the residential area as shown in Figure 1. The survey was carried out by Japanese seismic service company (JGI, INC.) and about 50 on-site crews were engaged. In this situation, if the on-site crew is infected with COVID-19, it may not only hinder the seismic survey but also spread the infection into the local residents. So, we had made careful consideration about the necessary on-site prevention measures and decision rules before starting the survey.

![Figure 1: Seismic operation of this survey in residential area.](image)

Requirements to start survey

As a prerequisite for starting the survey, we confirmed following two conditions were cleared; first, the COVID-19 status in the survey area is not serious comparing to the hotspots in JAPAN, and second, the residents and local governments accept conducting the survey. Furthermore, we discussed elaborately with JGI prior to the survey in consideration of social situation about the business activities under COVID-19 spreading.

Regarding the first condition, we referred the “state of emergency” announced by the government on each prefecture as an index of seriousness area in order to judge the severity of COVID-19 infection in the survey area. The state of emergency was announced in all parts of JAPAN during the first infection wave from March to April, and after that, the infection status had settled down in JAPAN and the state of emergency had been lifted in all areas when we started the survey. As for the second condition, we
had intermittently explained the survey contents to local governments and residents for five months before the survey start and obtained their understanding of seismic data acquisition. Because two pre-required conditions were satisfied as above, we finally decided to carry out this survey while following the basic infection prevention measures set by the government.

**On-site infection prevention measures and effects**

We conducted our original two types of on-site infection prevention measures as “Enclosure” and “Separation” in addition to the basic prevention measures by the Japanese government. Enclosure measures aim to prevent coronavirus from entering inside of the survey site by minimizing on-site crews contact with the outside. Separation measures are risk diversification of infection spreading by dividing crews into small groups. These measures are purposed to prevent coronavirus from spreading to crews as well as residents and to calmly handle a situation without survey suspension in case crews are suspected infection.

Firstly, we requested that all crews understand and strictly adhere the basic infection prevention measures by the Japanese government, such as frequent washing and sanitizing hands and wearing face masks or face guards. Also, we asked crews to report their body temperature and health condition from 14 days before entering the survey site until demobilizing every day.

Secondary, about the “Enclosure”, in principle, we did not change on-site crews after mobilizing, and they stayed at the survey area until demobilizing, including holiday. In particular, we banned on-site crews from going to and coming from where were announced the “state of emergency” or where were “Stage IV” areas set by the government as COVID-19 infection indicators. “Stage IV” areas are defined by the number of infected people per 100,000 population in over the past seven days being 25 or more (e.g. Press Conference by the government, 2020). If on-site crews had to move to those areas, they were required to prove negative by PCR test before entering the survey area. As shown in Figure 2, during the survey period, Hokkaido from November 13th, Osaka from November 22nd, and Tokyo from December 14th became “Stage IV” areas, so in principle, we banned on-site crews from going to and coming from these areas and requested PCR test when they had to move to or come from these areas.

![Figure 2 Number of new COVID-19 infections per 100,000 population in each prefecture JAPAN related to this survey (added to website of Sapporo Medical University).](image-url)
Lastly, as “Separation” measures, in order to reduce the physical contacts among on-site crews as much as possible, we avoided face-to-face meetings, kept enough space between desks and chairs in the site-office, and installed the additional on-site QC rooms (a temporary house and an office vehicle). Regarding meetings, we used to gather all crews at the site-office and hold the tool box meeting every day, but this time only party chief and team leaders participated the meeting at the site-office and the contents were shared to other crews by each leader. In terms of on-site data QC, conventionally we had used one small truck in which vibrator control system, recording server and monitoring system were introduced, because land seismic surveys in JAPAN are often conducted in mountain area or narrow farm roads and available space is limited. In this vehicle, vibrator operation and acquired data checking were conducted by 3 to 4 crews including both INPEX and JGI overcrowdely. In this survey, as shown in Figure 3, we installed additional temporary house and an office vehicle next to JGI truck and separated the data QC personnel from JGI truck by building the remote QC environment.

In addition to these infection prevention measures, we deployed a PCR test kit at the survey site in case on-site crew suspected COVID-19, and prepared emergency contact system and procedure that can determine whether unwell person was positive or negative within 2 days.

In this way, as a result of thoroughly infection prevention measures, we succeeded in completing the survey as originally planned without any infected person.

![Figure 3] Vibration control and on-site data QC environment. (a) Conventional, (b) This survey.

**Conclusion**

We carried out 2-D land seismic survey in Niigata, JAPAN over 52 days from November to December 2020. Because this survey was under concern about the third wave of COVID-19 infection, we decided whether to start the survey by clearly setting criteria in advance. Moreover, not to infect on-
site crews, we took original infection prevention measures such as “Enclosure” and “Separation”, in addition to basic prevention measures set by the Japanese government. Furthermore, in preparation for COVID-19 positive or suspected case from on-site crew, we made a procedure that could deal it promptly. As a result, we completed all planned acquisition without COVID-19 infected person. It can be said that this result was not only due to our contents of infection countermeasures, but also all crews understood these contents and adhered to these countermeasures.

For the time being, company might be required some COVID-19 infection prevention measures following the guidelines set by the government in each country as well as the local situation. It is also quite important that all crews understand and adhere those countermeasures during the survey. Of course, the COVID-19 vaccination for on-site crews shall become a mandatory as one of the most important countermeasures.

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References


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