

# §1. Report of Operational Results of an Access Control System Developed for LHD Controlled Area

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We started practical use of the access-control system at the same time when the plasma experiment using the large helical device (LHD) was started. Afterwards, we have had several years experience of operating the system. Based on the experience obtained at the point of respective years, we improved the system year and year. After these improvements, the system is preferably developed, although some problems we have to settle in the future are remained yet. In the following, we intend to summarize recent operational results.

Table 1 shows the access frequencies as operational results obtained from 1999 to 2002. The term of "access" means a pair of entrance and exit the LHD controlled area in this study. In Table 1 an annual sum totals of access frequency were from 9000 to 15000 around 12000 times, and averages of the access frequency a day were also from 110 to 150 around 130 times. The maximum access frequency a day of these four years was 611 times observed in 2001.

Table 1 Access frequency

Fiscal year	Annual sum Total	Average (per day)	Maximum (per day)
1999	12260	114	486
2000	10193	132	452
2001	15305	154	611
2002	9167	124	372

Because a plasma experiment was carried out over the autumn or the winter from the summer recent four years, the LHD controlled area was set up in the same period and the access control system was operated to monitor human going in and out the LHD controlled area. We examined all the personnel access data during these years and could summarize as shown in Figs. 1, 2, and 3. In Fig.1, a numeral shown along X-axis shows progress days from the experiment start and the access frequency in each day is plotted as a function of the progress days. Similarly, Figs.2 and 3 show distribution of access frequency in every day of week and that in every time (hour) of day.

As read from Fig.1, the access frequency was as a whole less than 200 times a day, although some data were larger than 300 times, especially those data recorded in 30-50 progress days of 2001 (plotted by open circle). We examined an experiment performed in those days 2001, and found that some trouble had happened with vacuum. The access data in Fig.1 reflect the experimental situation that many workers frequently entered and exited the LHD controlled area for maintenance of recovering the trouble. In

Fig. 2, we can see dependence of access frequency on day of week. At the beginning and the end of week (Sun, Mon and Sat), low access frequency is observed. In the contrariety this, the higher access frequency is seen for middle three days of week (Tue, Wed and Thu). This means that active plasma experiments were carried out and most frequent access arose on the middle three days. Figure 3 shows dependence of access frequency on time of day, and clarifies the tendency that high frequent access was done at both time zones corresponding to the beginning and the end of an experiment. More than 50% of access in a day was done around both the time zones. These accesses might be recorded by preparation and after-adjustment works for experiments in the time zones.

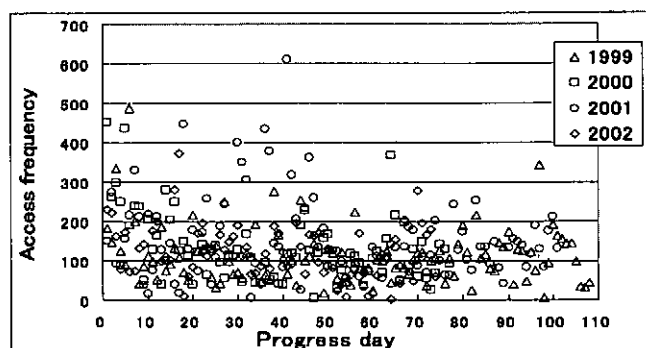


Fig.1 Access frequency in each progress day from experiment start.

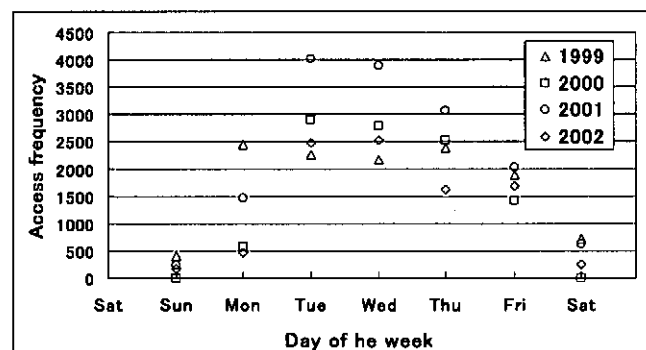


Fig.2 Dependence of access frequency on day of week

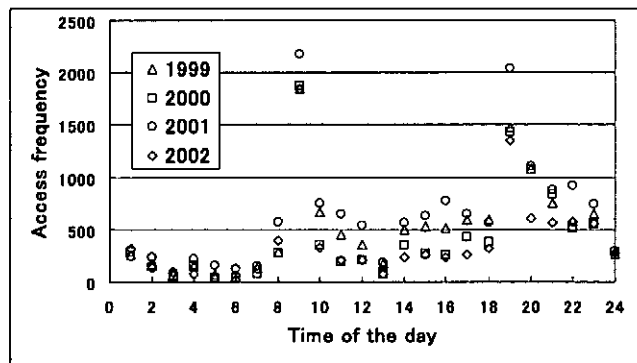


Fig.3 Dependence of access frequency on time of day