§11. Consideration on History of Nuclear Fusion Research on the Basis of Historical Documents

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The collaboration of this fiscal year was focused on clarifying the history of the initial phase of CHS (Compact Helical System) project at Institute of Plasma Physics (IPP), Nagoya University. The purpose is to draw some lessons from the history. Usually in starting experimental projects ad-hoc committees are organized to discuss the guideline and to give their comments to the players, however the authors who engaged in the project from the beginning do not remember about the roles that steering committee (SC) and expert committee (EC) of IPP had played on the essential point at the start of the project. CHS is characterized by its low aspect ratio (A_p) of 5. At that time, the machines in operation had A_p of more than 10 by taking account of helical symmetry. The big project, Large Helical System (LHS, present LHD), was under design, and relations between CHS and LHS were also concerned. After a couple of years of domestic and international collaborations by taking account of the trend of helical plasma confinement, CHS was designed in 1986 and was constructed in the next fiscal year 1987. The minutes of SC and EC and those of CHS group meeting were referred to, being back in 1980. Below the chronology of 1986 is shown, when important events for the beginning of CHS came about. Notable information is found in those numbered from *1) to *14). Here, some remarks are listed in the followings. In *14 the chairman of EC expressed his opinion that CHS was the own project of IPP and had no relation with LHS. Such remarks were made rather frequently at every occasion. Then the discussion on CHS was done within IPP. In *4, the enlarged committee on planning new project in IPP that was set up in January 1986 primarily discussed helical plasma confinement from comprehensive viewpoints. The philosophical question "What is the meaning of compactness?" was given by the committee, which bewildered the players a little. Then specific issues including physics subjects on the basis of diagnostics & heating equipments and the annual plan were up to the players. Review & check committee was not organized during the lifetime of CHS.

In summary, the committees exerted almost no influence to CHS project and everything was left to CHS group's consideration. Fruitful results have been obtained in CHS. The most important point is that the project should be carried out by the players with their responsibility. Speaking in the extreme, outside committees are not necessary.

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Chronology of Early Phase of CHS

Year	Large Helical Device	Steering Committee (SC) and Expert Committee (EC) of IPP, Nagoya Univ.	Events in IPP, Nagoya Univ.	International Relations
1986		Jan. 22 85th EC *1) Jan. 24 149th SC *2) Mar. 19 86th EC *3) Apr. 10 150th SC *4)		
			May 13 "Modular Coil" for JPSJ	
	May 12 HS 打合せ	May 29～May 30 87th EC *5)	May 16 Meeting with HITACHI, subsequently with TOSHIBA and MITSUBISHI	
	July 1 1st HS WG (in Heliotron)	July 3 151st SC *6)		July 13 ～ July 20 J-US TCM (Fujiwara, Matsuoka, Todoroki, Kamimura) ORNL, U. Wisconsin
	Aug. 6 Design Team (in Heliotron)	Sept. 25～Sept. 26 88th EC *7)	About Sept. 9 beginning of CHS GM	
	Aug. 21 Design Team (in IPP)			
	Sept. 9 Design Team (in Heliotron)	Oct. 16 152nd SC *8)	Oct. 20 3rd CHS GM *9)	Oct. 17 ATF Vacuum Vessel trouble (The Oak Ridger, local newspaper in Oak Ridge)
	Sept. 24 Design Team (in IPP)	Dec. 10 HS WG (in Kyoto Univ.)	Nov. 5 enlarged committee on planning new project	Nov. 13～Nov. 20 IAEA (in Kyoto)
	Oct. 8 Design Team (in Heliotron)	Dec. 10 153rd SC *11)	Dec. 1 ～ Dec. 2 Carreras, Harris, Lyon, Rome, Shaing in IPP for discussion with CHS & LHS	Nov. 25～Nov. 28 Stellarator WS (in Kyoto) (presented by Fujiwara*10)
	Oct. 21 Design Team (in IPP)	Dec. 13 2nd HS sub. com. (in IPP) *12)	Dec. 15 8th CHS GM *13)	
	Dec. 3 Design Team (in Heliotron)	Dec. 18 ～ Dec. 19 89th EC *14)	Dec. Budget request on CHS accepted	
			Dec. 30 Meetin with HITACHI, Report on CHS from MITSUBISHI	