

## As-built measurement of the in-pool structure for the installation of In-Pile Test Section in HANARO

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### 1. Introduction

Fuel Test Loop (FTL) is designed at the operation condition of power reactor such as high temperature, high pressure and neutron flux etc. As the design of the FTL has been completed, purchasing and manufacturing hardware are underway at present. Installation of the facility is going to do during reactor shutdown period in 2006.[1] This paper describes the preparation of measurement and as-built measurement about in pool structure.

### 2. Preparation of measurement

A work bench sat on the top of the chimney has been designed and manufactured to easily access the structure such as IVA(IPS Vessel Assembly), In-pool piping and piping support. One side of a work bench is held tight on the box beam while the other side of it is sat on top of the chimney.(see Figure 1) Fuel was moved at spent fuel storage for periodical inspection and reactor pool water was drained to come down water level from 12 m to 5 m for as-built measurement of the In pool structure. Except the work bench, pool bridges and X-Y table installed on H-beam at pool top are used for the measurement.



Figure 1 Work bench sat on the top of the chimney

### 3 As-built measurement of the In-pool structure

#### 3.1 Position Measurement of Irradiation hole (IR 1)

There were laid 2 H- beam, 2 pool bridges, 1 X-Y table and work bench IR 1 irradiation hole in pool. X-Y table minor axis was installed inclining 30° from east and west direction to watch direction on X-Y table work bench. Figure 2 is measurement equipment established with this.

Bind center plumb of 74 mm made of aluminum by  $\varnothing 0.8$  mm wire and fixed holder by bolt to X-Y table after do so that wire may pass holder. Center plumb

was inserted in irradiation hole in chimney take slowly. At this time, Center plumb was confirmed to tips and was located on the center by X-Y table. At inserting process irradiation hole, location inserted to irradiation hole without that center plumb tips is the center IR1 irradiation hole. Figure 3 is center plumb inserted in irradiation hole in chimney.



Figure 2 The measuring equipments installed on pool

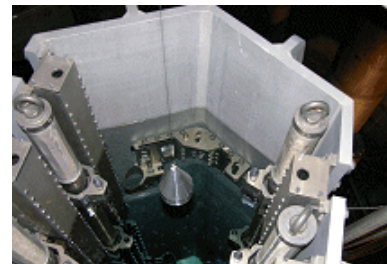


Figure 3 Center plumb in chimney

#### 3.2 Distance measurement

Distance from irradiation hole to box beam is important in FTL IPS piping work and piping support establishment, because IVA assembled test fuel is installed independently of design size.[2] Fix basis bracket on chimney for measure this distance. Set center field which to wire that fall in center of irradiation hole on plate basis bracket was set. Put up rule prop on canal and basis bracket and fix rule prop's center by vertical plumb that drop reference edge from and basis bracket center. Rule prop was fit into horizontal level as regulating rule prop's level by bolt assembled to rule prop put to canal. Put rule on rule prop and measure the distance to box beam from wire that fall to irradiation hole. IR center-line was marking with front and top box beam surface. And plane figure were measured of front and top surface at box beam. Figure 4 is setting basis bracket, rule prop and measurement devices to measure distance from IR 1 irradiation hole to box beam.

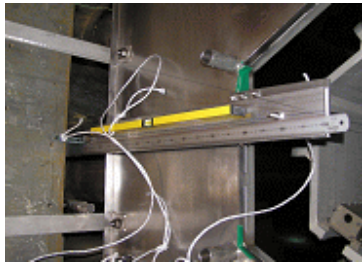


Figure 4 Distance measurement from irradiation hole to box beam

From the flow tube spider episode floor basis bracket distance was measured after do marking standing height bar to irradiation hole. There was measured distance of from the spider floor to the chimney top, and distance from the chimney top and bottom of box beam.

#### 4. Measurement Result

It was measured from irradiation hole to box beam in bottom 902 mm and in top 904.5 mm to welding structure. The north of level between box beam itself South-North is 4 mm higher than the south in South-North center-line. Box beam both of level between east and west is 2 mm higher than center. Slant between east and west of front surface box beam the west than the east southward 4 mm make off. The result is same with Table 2.

Height bar heights that measure from the flow tube spider episode floor to basis bracket were 4,797 mm. The distance was grasped that distances are 4.398 mm from spider to chimney top and 740 mm from chimney top to box beam through this. Displayed distance measurement result to Figure 5.

Table 1 The distance from irradiation hole to box beam, and box beam slant

Definition	Explanation	Coordinates		
		X(abs)	Y(abs)	Z(abs)
O1	Floor center of IR spider $\Phi 14$ hole	0	0	0
O2	X-Y basis point of basis bracket top	0	0	4782.8
O3	X-Y basis point of basis bracket top of south-nouth	0	0	4795
N_top	A Crossing of X-axis and of north end point of box beam top	904.5	0	5122
S_top	A Crossing of X-axis and of south end point of box beam top	1157.5	0	5118
N_bot	A Crossing of X-axis and of north end point of box beam bottom	902	0	*
N_top Position	Relative position of N_top standardize O3	904.5	0	327
S_top Position	Relative position of S_top standardize O3	1157.5	0	323
Horizontal Slant of Box beam	Horizontal Slant of standardize N_top	*	-650	2
		*	-200	0
		*	250	0
		*	700	2
East-West Slant of Box beam	East-West Slant of standardize N_bottom	3.4	-550	
		-0.5	350	*

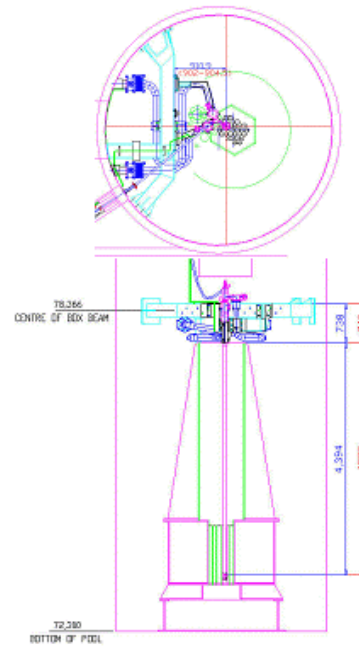


Figure 5 The distance measurement result

#### 5. Conclusion

As-built of the in pool structure for FTL was measured during shutdown period for 2005 reactor periodic inspection. We have measured the distance from center of IR 1 irradiation hole to box beam, box beam itself horizontal slant, tilt between east and west of box beam length direction, the distance from spider to chimney and the distance from chimney top to box beam top etc. We have understood the difference between design size and actual size needed in construction work. There are judged to be possible precise manufacture of in-pool piping and piping support, shorten construction work period and construction according to this. Also, dose rate was measured during measurement period and could grasp the concept about worker's safety during construction work.[3]

#### REFERENCES

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