











## NIHE HTC BSL-3 System Inspection Report

Background	NIHE Biosafety Dept. requested HTC BSL-3 facility inspection to JICA NIHE project. BioSafety Dept. provided system checklist (BSL3 NIHE System Checklist), and inspection was performed according to checklist.
Date	14 June 2021 - 17 June 2021
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Purpose	To find serious items which have to be repaired or replaced immediately.
Result	Serious item is not found. But some spare parts have to be prepared and some equipments have to repaired or replaced.
Comment	HTC was built in 2008, it past around 13 years until now. So deterioration (damage) over time is found, but system function is maintained by NIHE staff. In Japan, equipment life is said as 15 years. Of course, equipment life is affected by maintenance, load, circumstance and others. But large-scaled renovation may be needed in a few years. Large-scaled renovation needs large-scaled budget. So please start to make renovation plan. As first step, maitenance trend have to be analized based on past maintenance document. Because clear reason is needed in order to get large-scaled budget. Until then, please keep good maintenance and monitor equipment situation carefully.
Hint	Operation and Maintenance needs not a few budget. So if possble, how about using BSL-3 lab as resource? For example, rental or cooperation or training with commercial company. Its fee may generate budget.
Detail	Chilled water system See '14 June 2021' sheet. Boilers and Steam supply system Water softener system Lab (1, 2, 3, 4) and CC AHU See '15 June 2021' sheet. Cold (chilled) water supply system See '16 June 2021' sheet. Steam supply system Waste water treatment system Air supply and exhaust duct See '17 June 2021' sheet. Autoclave 2 doors BMS monitoring system Electric system






Sign	Equipment	Location	Pcs	Check	Comment
FOT	Fuel Oil Tank 	Energy Plant (outside)	1	No leakage, rust.	OK.
FST	Fuel Oil Service Tank	Energy Plant	1	It cannot be found. FST may be included in FOT.	<b>Drawing has to be revised.</b>
OPG	Oil Transfer Pump	Energy Plant	2	It cannot be found. OPG may be included in BO.	<b>Drawing has to be revised.</b>
BO	Steam Boiler 	Energy Plant	2	No abnormal heat, sound, vibration. Water supply pump of No.2 was repaired by manufacturer engineer.	OK.
SSH	Steam Header 	Energy Plant	1	No leakage, rust.	OK.
SCR	Steam condensate Receiver 	Energy Plant	2	No leakage. Tank is made by carbon steel plate, inside has rust.	Stopping rust method is, 1. To stop system and cool down. 2. To blow water. 3. To polish inside. 4. To paint heat resistant paint. <b>!Pay attention strongly to steam inflow and O2 shortage.</b>
WS	Water Softener 	Energy Plant	2	Water softener needs maintenance to supply chemical (salt) regularly, and maintenance is performed once per week, but maintenance document is not found.	OK. Maintenance document has to be saved, even if maintenance is well done.

CU	Chilling Unit	Energy Plant (outside)	2 No abnormal heat, sound, vibration. Fin on coil is clean. Design temperature of supply water is 7 degree C, actual set tempereure is 8 deg C, but not serious problem.	OK.
-	Chilled water pipe	Energy Plant	Actual temperature of supply and return chilled water can not be checked because water temperature gauges are not working well.	<b>Gauges have to be checked or repaired or relplaced.</b> If actual temperature of supply and return water are different from design temperature, 7 and 12 degree C, some problems may exist.
CWP	Chilled Water Circulation Pump	Energy Plant	2 No abnormal heat, sound, vibration.	OK.
EXT	Expansion Tank	Energy Plant	1 No leakage, rust.	OK.
CIP	Chemical Injection Pump	Energy Plant	1 No leakage. No abnormal heat, sound, vibration.	OK.

Sign	Equipment	Location	Pcs	Check	Comment
AHU P3L1	Air Handling Unit for Lab1 	HTC (4F)	1	No abnormal heat, sound, vibration. Coil is clean. Steam trap was maintained. PD: Filter pressure difference = 160Pa TS: Supply chilled water temp. = 12 degree C TR: Return chilled water temp. = 18 degree C	OK. But TS and TR have to be checked.
AHU P3L2	Air Handling Unit for Lab2 	HTC (4F)	1	No abnormal heat, sound, vibration. Coil is clean. Steam trap was maintained. PD= 140Pa TS= 15 degree C TR= 17 degree C	OK. But TS and TR have to be checked.
AHU P3L3	Air Handling Unit for Lab3 	HTC	1	No abnormal heat, sound, vibration. Coil is clean. Steam trap was maintained. PD= 150Pa TS= 14 degree C TR= 16 degree C Steam leakage because of control valve, but it is repaired soon.	OK. But TS and TR have to be checked.
AHU P3L4	Air Handling Unit for Lab4 	HTC (4F)	1	No abnormal heat, sound, vibration. Coil is clean. Filter pressure gauge does not work well, tube may be disconnected, but not serious problem. TS= 14 degree C TR= 16 degree C	OK. But TS and TR have to be checked.
AHU CC	Air Handling Unit for Corridor 	HTC (4F)	1	No abnormal heat, sound, vibration. Coil is clean. Steam trap was maintained. PD= 70Pa TS= 14 degree C TR= 17 degree C	OK. But TS and TR have to be checked.

Sign	Equipment	Location	Pcs	Check	Comment
BO	Steam Boiler/ Pipe	Energy Plant	-	<p>Steam pipes of No.1 and 2 were replaced partially because of leakage.</p> <p>Heat isolation cover at bottom of chimney is damaged, but not serious problem.</p>	OK.
SSH	Steam Header/ Pipe	Energy Plant	-	<p>Heat isolation of steam trap unit at bottom of steam header is damaged, but not serious problem.</p>	OK.
SCR	Steam condensate Receiver/ Pipe	Energy Plant	-	<p>Water supply control valve was repaired. Valve did not close, water continued to flow in tank, over flow water flow out from funnel to floor.</p>	OK.
CU	Chilling Unit/ Pipe	Energy Plant (outside)	-	<p>No leakage.</p> <p>Pipes between energy plant and HTC cannot be inspected, because of installed in trench.</p>	OK.
-	Chilled water/ Pipe	Energy Plant	-	<p>Water temperature gauges is removed, and thermometer are installed, both temperature are almost same.</p> <p>In case of supply chilled water, temperature is 12 degree C, and chiller indicator is 8 degree C.</p> <p>Both location is near.</p>	<p>Temperature difference of 4 degree C cannot be explained by distance. It may be explained by gap between gauge and protector pipe is not filled by a kind of grease.</p>

CWP	Chilled Water Circulation Pump/ Pipe	Energy Plant	-	Heat isolation on pump head is damaged, but not serious problem.	OK.
-	Chilled water/ Pipe	Energy Plant	-	Heat insulation shrank. Such a shrink is seen in anywhere.	If heat insulation is replaced, not shrink type is better.
AHU P3L2	Air Handling Unit for Lab2/ Pipe	HTC	-	Condensation water from chilled water pipe is falling on floor. Heat insulation on chilled water pipe shrank also.	Heat insulation has to be repaired.
-	Waste Water Treatment system/ Tank	HTC (BF)	2	No leakage, rust. One tank is empty and another (right side in photo) tank full.	OK. Full tank had better to be treated. It is good trial and training for treatment.
-	Waste Water Treatment system/ Chemical Tank	HTC (BF)	6	Empty. Chemicals have to be installed, if needed. Chemical concentration is shown on tanks, it is easy-understanding.	OK.


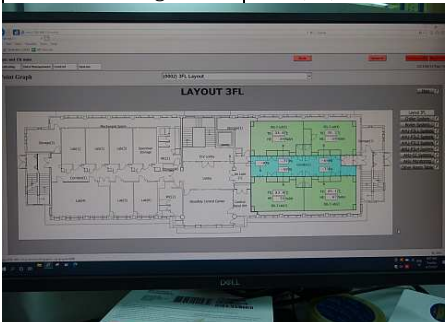

<p>- Waste Water Treatment system/ Supply fan</p> 	<p>HTC (BF)</p>	<p>2 No abnormal heat, sound, vibration.</p>	<p>OK.</p>
<p>- Waste Water Treatment system/ Supply air filter</p> 	<p>HTC (BF)</p>	<p>1 Not dirty.</p>	<p>OK.</p>
<p>- Waste Water Treatment system/ Supply air heater</p> 	<p>HTC (BF)</p>	<p>1 No abnormal heat, sound, vibration. Including own fan.</p>	<p>OK. Exhaust heater has function to dehumidify exhaust air in order to prevent exhaust air filter from being filled by moisture.</p>
<p>- Waste Water Treatment system/ Exhaust air filter</p> 	<p>HTC (BF)</p>	<p>1 HEPA filter and Pre filter in casing are damaged by water.</p>	<p><b>Filters have to be replaced, and casing has to be dried and cleaned.</b></p>
<p>- Waste Water Treatment system/ Exhaust air fan</p> 	<p>HTC (BF)</p>	<p>1 No abnormal heat, sound, vibration.</p>	<p>OK.</p>

-	Waste Water Treatment Room/ Exhaust fan	HTC (BF)	1 No abnormal heat, sound, vibration.	OK. Room ventilation system is not included in drawing. Drawing have to be added.
-	Waste Water Treatment Room/ Exhaust filter	HTC (BF)	1 Not dirty.	OK.





Sign	Equipment	Location	Pcs	Check	Comment
FE-P3L1	Exhaust air fan for Lab1	HTC (4F)	2	No abnormal heat, sound, vibration, belt swaying.	OK.
FE-P3L1	Exhaust air fan for Lab1 BSC	HTC (4F)	2	No abnormal heat, sound, vibration, belt swaying.	OK.
FE-P3L2	Exhaust air fan for Lab2	HTC (4F)	2	No abnormal heat, sound, vibration, belt swaying.	OK.
FE-P3L2-SC	Exhaust air fan for Lab2 BSC	HTC (4F)	2	No abnormal heat, sound, vibration, belt swaying in No.2. Also no vibration, belt swaying, but heat, sound a little in No.1.	OK. But pay attention. If one fan stops, another fan can back-up.
FE-P3L3	Exhaust air fan for Lab3	HTC (4F)	2	No abnormal heat, sound, vibration, belt swaying.	OK.
FE-P3L3	Exhaust air fan for Lab3 BSC	HTC (4F)	2	No abnormal heat, sound, vibration, belt swaying.	OK.
FE-P3L4	Exhaust air fan for Lab4	HTC (4F)	2	No abnormal heat, sound, vibration, belt swaying.	OK.
FE-P3L4	Exhaust air fan for Lab4 BSC	HTC (4F)	2	No abnormal heat, sound, vibration, belt swaying.	OK.
FE-CC	Exhaust air fan for corridor	HTC (4F)	1	No abnormal heat, sound, vibration, belt swaying.	OK. Above fans are 2 pcs, but this fan is only 1 pc, so no back-up. Also fan belt is 1 pc, so at least spare belt has to be prepared.
-	Air supply and exhaust duct	HTC (3F)	-	No condensation water, damage.	OK.
-	Autoclave 2 doors	HTC (3F)	4	Autoclave for Lab4 cannot work because of temperature sensor broken.	Temperature sensor have to be repaired or replaced. This sensor is a kind of RTD: Resistance Temperature Detector, and Pt100 type. 'Pt100' shows that it is made by Pt: Platinum, and its resistance is 100 ohm at 0 degree C. Pt100 is classified by JIS-C1604, so all 'Pt100' product has compatibility.

-	Autoclave 2 doors	HTC (3F) 	4 User's manual is not found. Maintenance is performed without manual. But manual can show more detail information.	Manual have to be prepared. Autoclave model type is Sakura FLD-B09WP3T. Soon manual, drawing, parts list was provided by Sakura, although Japanese language version.
-	BMS Monitoring	HTC (3F) 	1 Air conditioning equipments and their parameters in HTC are shown on display, and parameters can be changed and stored on display. It is very convenient.	Equipments in energy plant and waste water treatment room are not included. All equipments had better to be included, however its cost may be expensive.
-	Electric cabinet	HTC, Energy Plant 	10 or more Some lumps on electric cabinet is not working. But not serious problem.	Lumps have to be replaced. It is better to install LED type, if possible. LED life is said as 40000hrs (4.5 years).