PCN	DOCUMENT RELEASE AUTHORIZATION KENNEDY SPACE CENTER, NASA	PAGE 1 OF 3
97967		
ESR		REV/DATE
DIR	DRA NO. A-01FS142- 1060	SIGNATURE
EFF	TITLE Design to Replace Chilled Water Controls, Industrial Area	
EQ. LOC. KSC – SEE REMARKS		VEN CODE
SDL 81K04971		CONTRACT NNK10CA44D

DOCUMENTS

I#	PREF	DOCUMENT NUMBER	ISSUE	SIZE	SHTS	B/L NO.	SS	MODEL NUMBER	WUC
1	DR	79K38825 1-94	NEW	F	94	353.85	S1	K61-3098	S1FACAB000
						356.50	S1	K61-3784	S1FHV00000
						360.05	S1	K61-4414-15D7	S1FUCSEN00
						353.04	OC	K61-0553-01	OCFACCL000
						356.50	OC	K61-3784	OCFHV00000
						360.05	OC	K61-4414-3019	OCFUCU0000
						353.05	LO	K61-0506-01	LOFAC90000
						356.50	LO	K61-3784	LOFHV00000
						360.05	LO	K61-4414-1502	LOFUC15020
						353.05	FQ	K61-0556	FQFAC6L000
						356.50	FQ	K61-3784	FQFHV00000
						353.05	IC	K61-0504-01	ICFAC1L000
						356.50	IC	K61-3784	ICFHV00000
						360.05	IC	K61-4414-1508	ICFUC15080
						353.05	SB	K61-0560-01	SBFACXL000
						356.50	SB	K61-3784	SBFHV00000
						353.05	DI	K61-0518-01	DIFAC9L000
						356.50	DI	K61-3784	DIFHV00000
						353.05	AU	K61-0552-01	AUFAC9L000
						356.50	AU	K61-3784	AUFHV00000
						353.05	K8	K61-3427	K8FAC6L000
						500.05	K8	K61-3418	K8FHVCDC00
						360.05	K8	K61-4414-1600	K8FUC16000

TECHNICAL REMARKS

INITIAL RELEASE TO EDC

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This design removes the legacy SX-8000 Andover Control System and replaces it with a PLC, Citect SCADA based control system.

APPROVALS

TECHNICAL CONTACT	MAIL CODE	DATE	R&QA	MAIL CODE	DATE
L. Kiel, 867-3780 L. Kiel	TA-B3B	9/16/11	C. Miller	SA-E3	9/20/11
TECHNICAL P. Bennardo, 867-4553 P. Bennardo	TA-B3B	9/16/11	OTHER		
SPACE AND WEIGHT N/A			JOINT RELEASE		
PROCUREMENT PKG.			RELEASE L. Kiel, 867-3780 L. Kiel	TA-B3B	9/16/11

9-20-2011

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DOCUMENTS

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2	SP	79K38826 1-201	NEW	A	201	"	"	"	"
3	SW	79K38825	NEW	M	1	"	"	"	"
4	SW	79K38826	NEW	M	1	"	"	"	"
5	DM	KSC-TA-11326 cover, 1-341	NEW	A	342	"	"	"	"
6	SW	KSC-TA-11326	NEW	M	1	"	"	"	"
7	RD	KSC-TA-11569 cover, 1-18	NEW	A	19	"	"	"	"
8	SW	KSC-TA-11569	NEW	M	1	"	"	"	"

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1P	TA-B3D	G. Villa	DRA	SA-E3	B. Sorenson
DRA	ISC-4410	P. Nguyen			
1P	TA-B4A	T. Sizemore			
DRA	ISC-2200	B. Orrison			
1P	ISC-4300	P. Kroning			
DRA	TA-B4A	J. King			
DRA	TA-B4A	W. Martin			
DRA	ISC-4011	L. Johnson			
DRA	ISC-2200	B. Brong			
DRA	ISC-2510	M. Cressy			
DRA	TA-B4B	J. Dehler			
DRA	IHA-4100	M. McDonnell			
DRA	ISC-2020	M. Denyer			
DRA	ISC-4320	P. Kroning			
DRA	ISC-4011	T. Strasters			
DRA	ISC-4300	D. Nowicki			
DRA	ISC-4011	S. HINTZ			
DRA	IT-B	H. Yu			
DRA	ISC-1500	F. Arismendi			
DRA	ISC-1500	M. Ellet			
DRA	ISC-1500	N. Shelby			
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DRA	ISC-4220	J. Bowen			
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KSC-TA-11569

REQUIREMENTS DOCUMENT
REPLACE CHILLED WATER CONTROLS, INDUSTRIAL AREA
PCN 97967
SEPTEMBER 9, 2011

Prepared by:
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TITLE OF DOCUMENT: REQUIREMENT DOCUMENT – Replace Chilled Water Controls, Industrial Area PCN 97967

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GRAPHICAL SCREEN REQUIREMENTS
REPLACE CHILLED WATER CONTROLS, INDUSTRIAL AREA
PCN 97967

I. INTRODUCTION

General

The new PLC system shall employ graphical screens for the human machine interfaces (HMI's) installed as part of this work; the intent of this document is to establish minimum requirements and expectations of the graphics to be provided. The current DDC system has 2 levels of HMI graphics; those resident at the operator's workstation in the IACP, as well as those present at LCD "touch screens" at the majority of the building FMRP panels. For the replacement PLC system there will be a Citect-based SCADA HMI developed and located on the new servers at the IACP, and dedicated HMI color touch screens installed on the face of each PLC cabinet and the replacement manual control panel; generally similar to the existing DDC system HMI architecture. Note the HMI graphics for the IACP servers will differ significantly from the PLC panel touch screen HMI graphics.

The operations staff has grown accustomed to, and is comfortable with the existing presentation of system operational data as presented on the current HMI interfaces. Selected HMI graphical screens for both levels are provided in this document as a guide to the contractor as to the existing graphics grouping of data, formatting, informational messages, alarms, and to convey the "look and feel" of the existing system HMI interfaces. It is intended that these screens be used as a starting point for the contractor's development of the new HMI's, with the caveat that the existing screens may not currently display all of the data which is available and will be necessary to provide in the new screens; presentation of information in the existing screens is not always uniform from screen to screen but will be required to be in the new HMI graphics; certain system operating parameters will be available through more than one screen; additional screens above what are included herein are to be provided (see requirements in the drawings and specifications); and enhancement by way of additional information, alarming, and organization of the existing screens will be required.

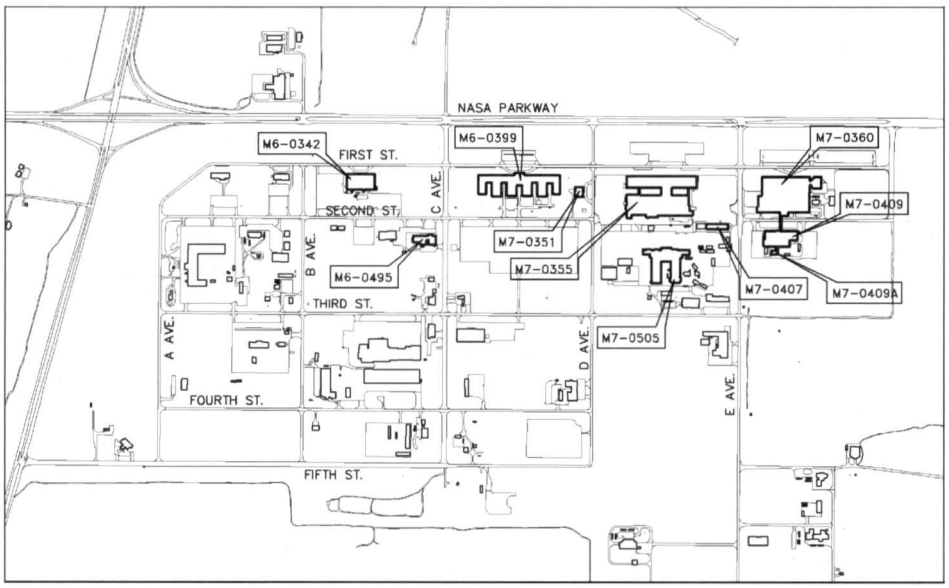
All of the graphical screens presenting text/data (sheets 2-12, 18, 19) are from the DDC system, the software version of these graphics is not compatible with the new PLC system. While currently no pictorial type graphics reside on the existing DDC system, they are present and available for the Citect-based SCADA residing at the Utility Annex, another KSC chiller plant (sheets 14-17). These pictorial graphics are not consistent with the configuration of the IACP but are provided as a guide to illustrate the minimum expectation of the system pictorial graphics to be provided. The data files for these graphics are available and will be provided to the contractor as a starting point and aide in developing the pictorial graphics for the IACP.

The initial screen will be a log-in screen. The system will allow for viewing only of screen information without log-in. There will be three (3) levels of access; the parameters which can be accessed at each level will be defined during the software development stage.

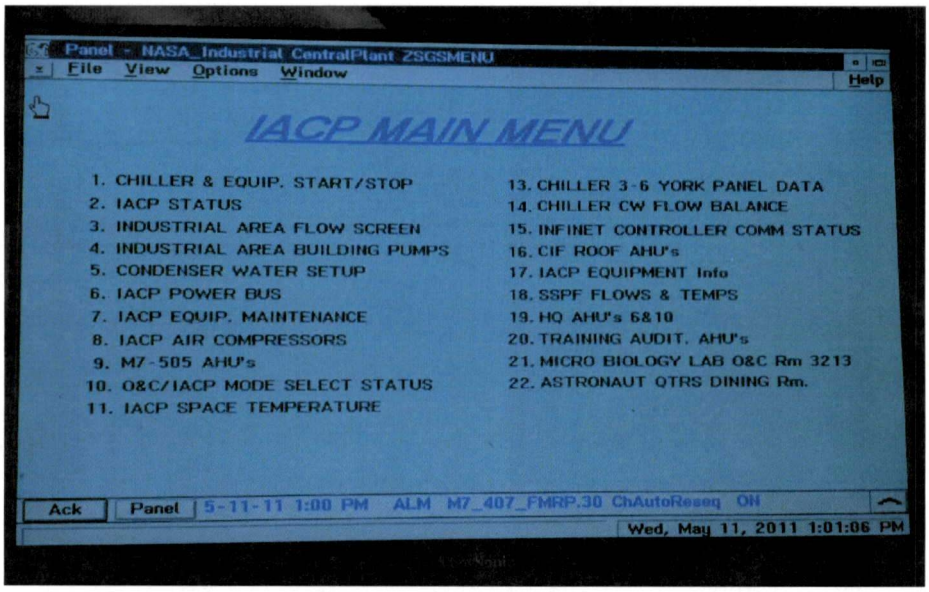
II. GRAPHICS

2.1 Citect SCADA

2.1.1 The first screen will be a pictorial representation of all of the IA buildings as depicted below. As the mouse cursor is passed over a building it will highlight, and a left-click of the mouse will index to that building's information. There is a Citect version of this screen that will be provided for further development by the contractor.

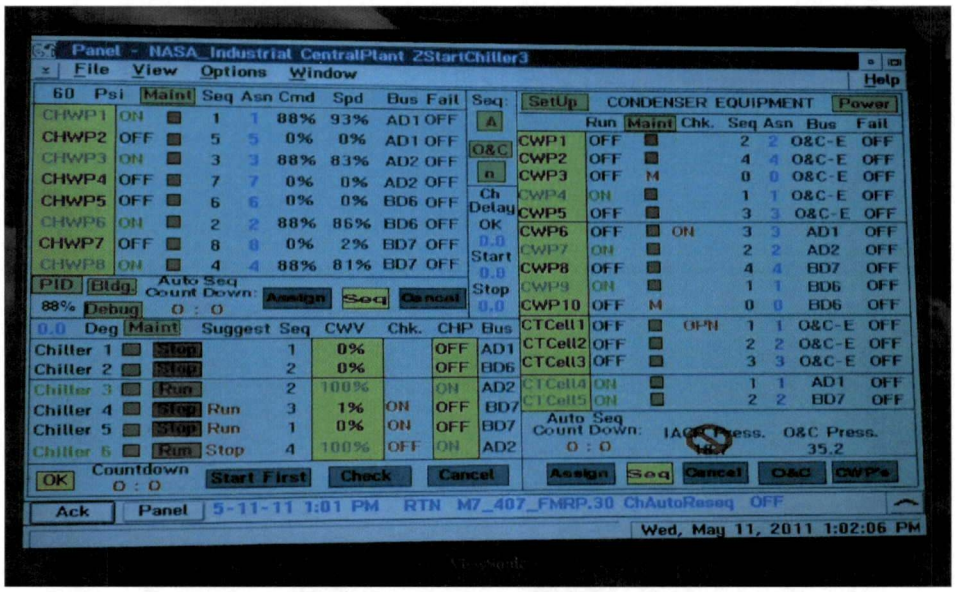


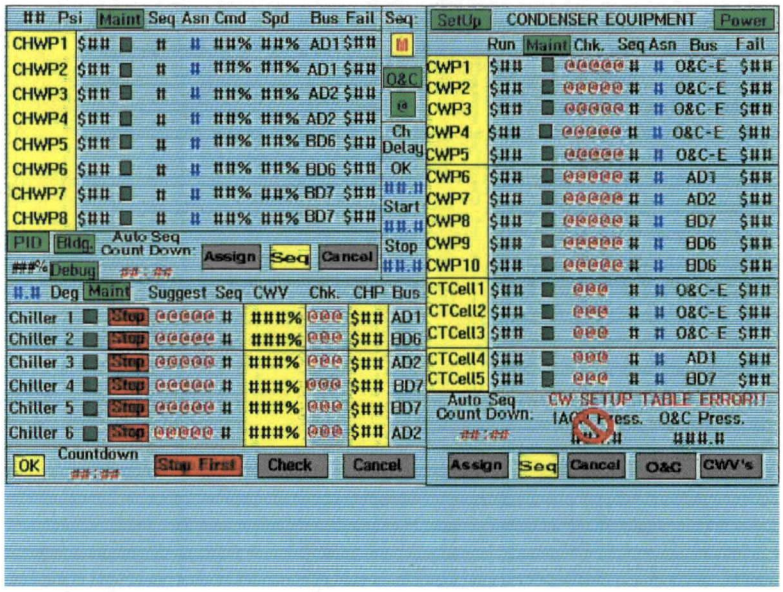
2.1.2 Clicking on the IACP will bring up a Main Menu similar to that shown below, with the exception that certain items are no longer required (9, 10, 15, 16, 19, 20, 21 & 22), and additional screens for the IACP will be accessed through this main menu. When the mouse cursor is rolled over the item/descriptor, it should highlight and a left-click will then take you to the associated graphical page.



2.1.3 Chiller and Equipment Start/Stop.

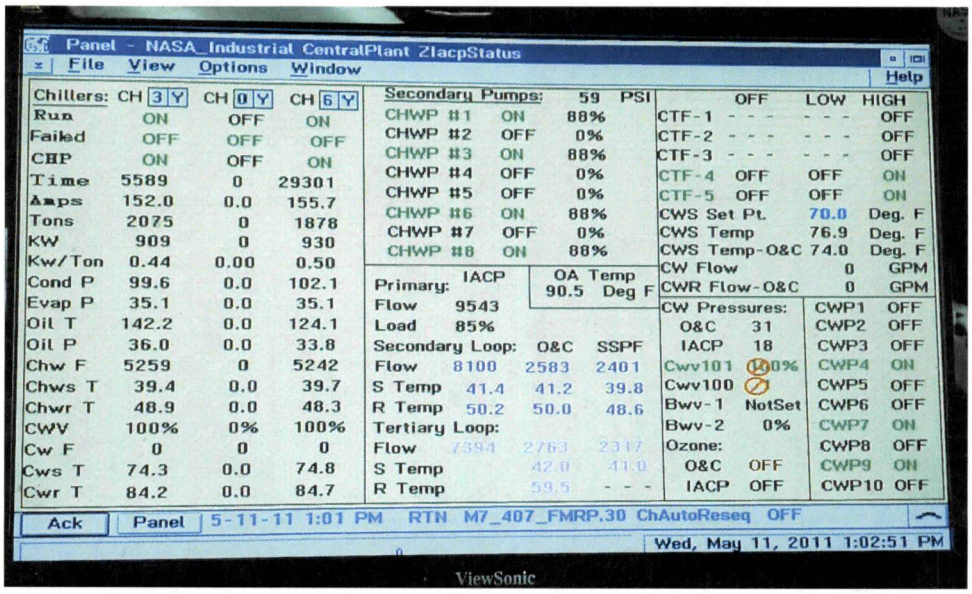
This is the main screen which allows the operators to manually control the equipment in the IACP, as well as display the status. The operators can place equipment in a maintenance state, assign sequencing numbers, and start/stop equipment from this screen. The screen is as displayed below and it is followed by a representation of some of the hidden icons that can appear on the screen depending upon the state of the equipment.

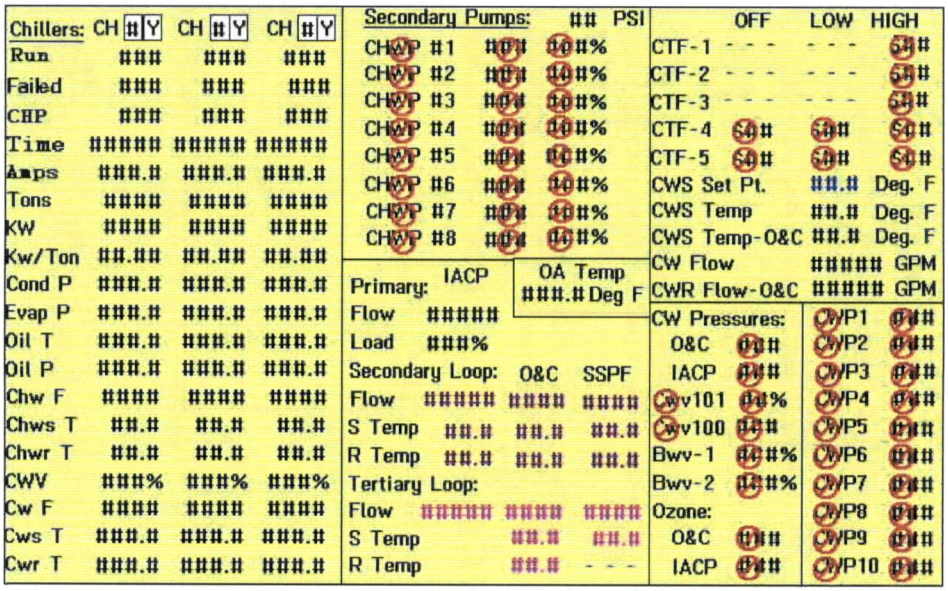




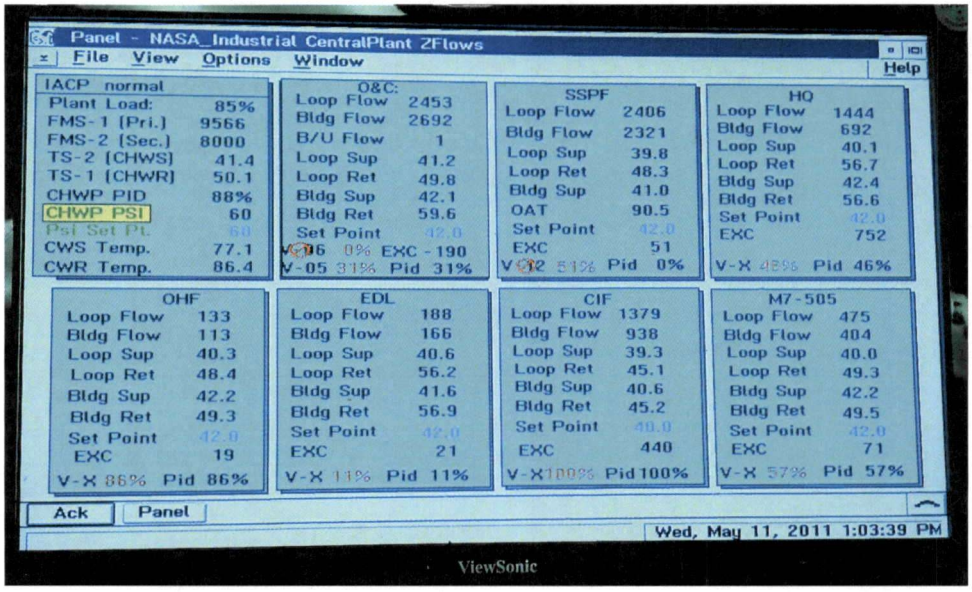
2.1.4 IACP Status

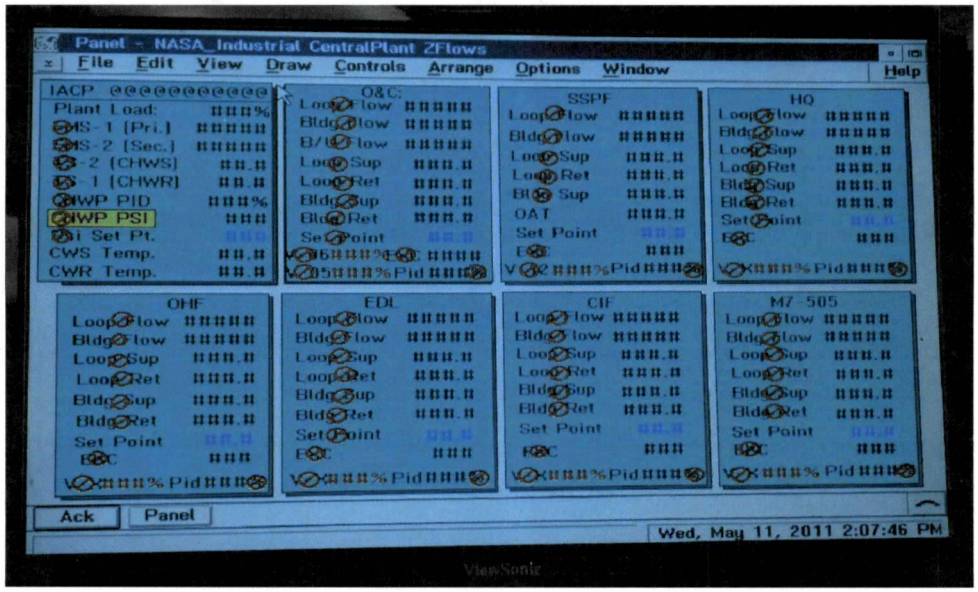
This screen provides an indication of the status of the IACP equipment. The operator is able to select the chillers to be displayed, and the screen displays all of the secondary pumps, cooling tower fans, condenser water pumps, other condenser water information (temperatures, flows, pressures), and chilled water system flows and temperatures as illustrated below, with the second screen showing the hidden icons that can populate the screen depending upon the status.





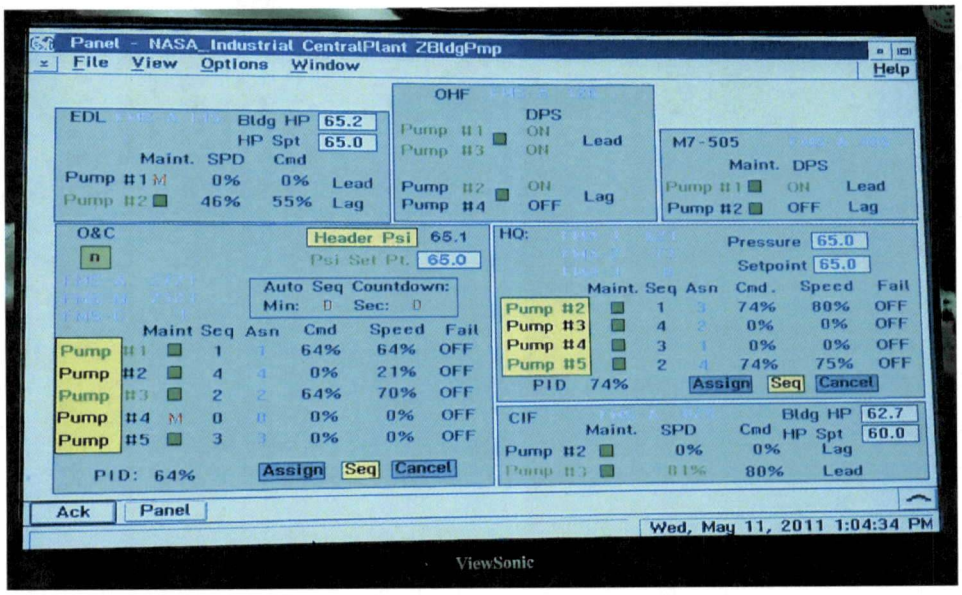
2.1.5 The screen below summarizes the chilled water flow from the IACP, the IACP condenser water temperatures, the loop and building flows to all of the connected facilities (with the exception of the Training Auditorium), supply and return temperatures for these buildings, as well as the loop control valve percentage percent open. Again, the second screen illustrates hidden icons which will display based upon the value of the parameter.

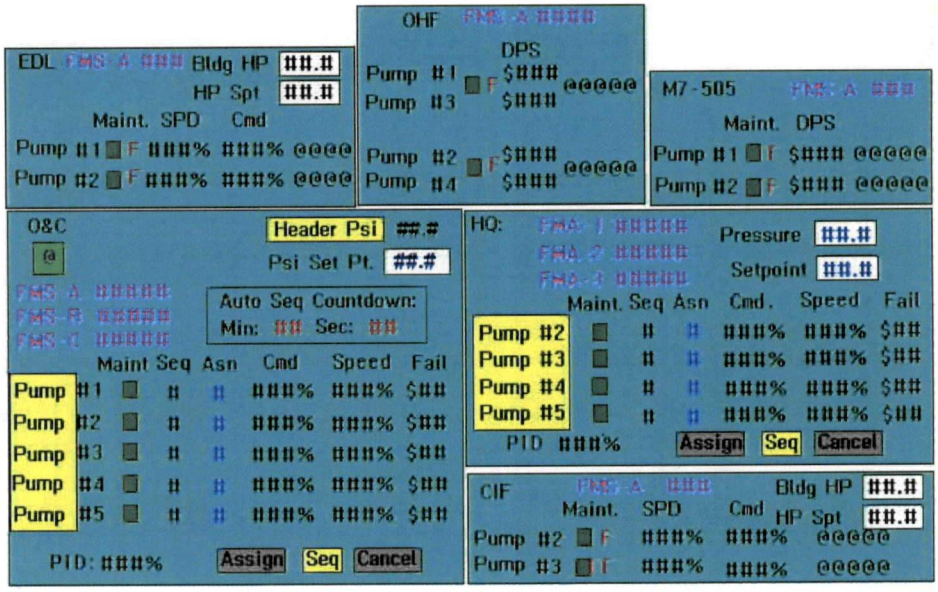




2.1.6 Building Pumps.

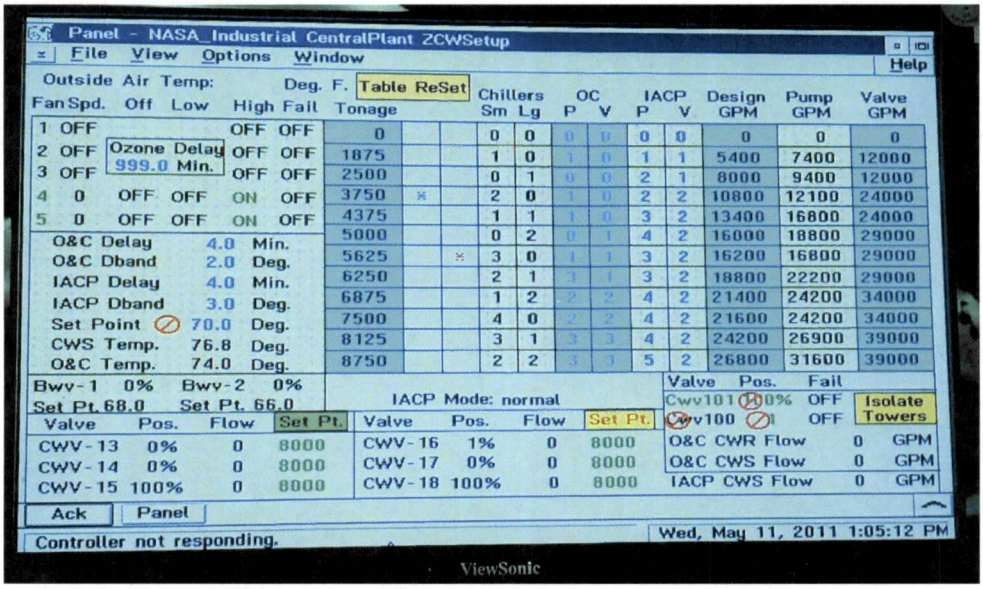
This screen summarizes the various building pumping systems in the six buildings which have pumps that will be controlled by the PLC system (TA-no pumps; SSPF-pumps not part of PLC system). This screen allows for the operator to assign maintenance status, sequencing, start/stop and displays the building flow information. For those facilities with pumps operated by VFD's,\ the pump speed, as well as the header PSI and setpoint are displayed.

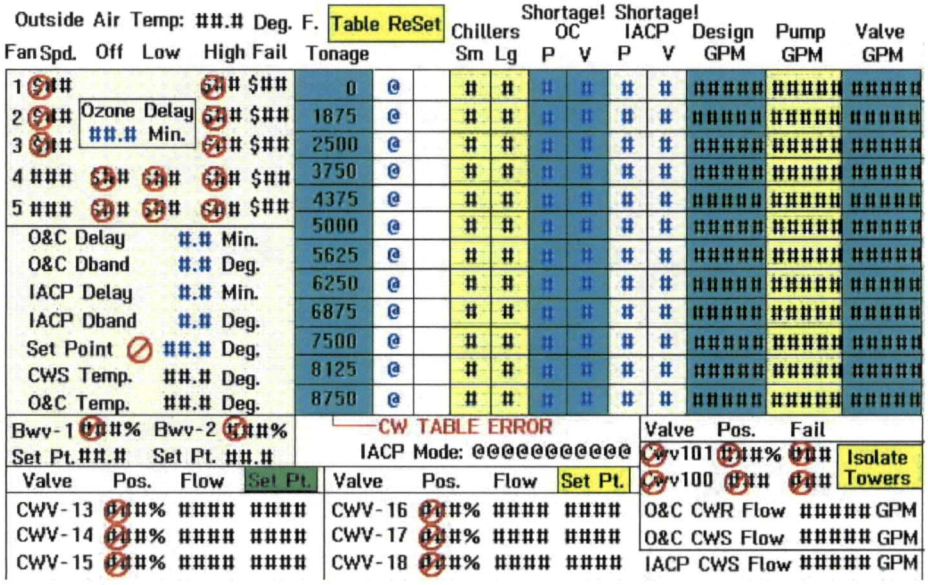




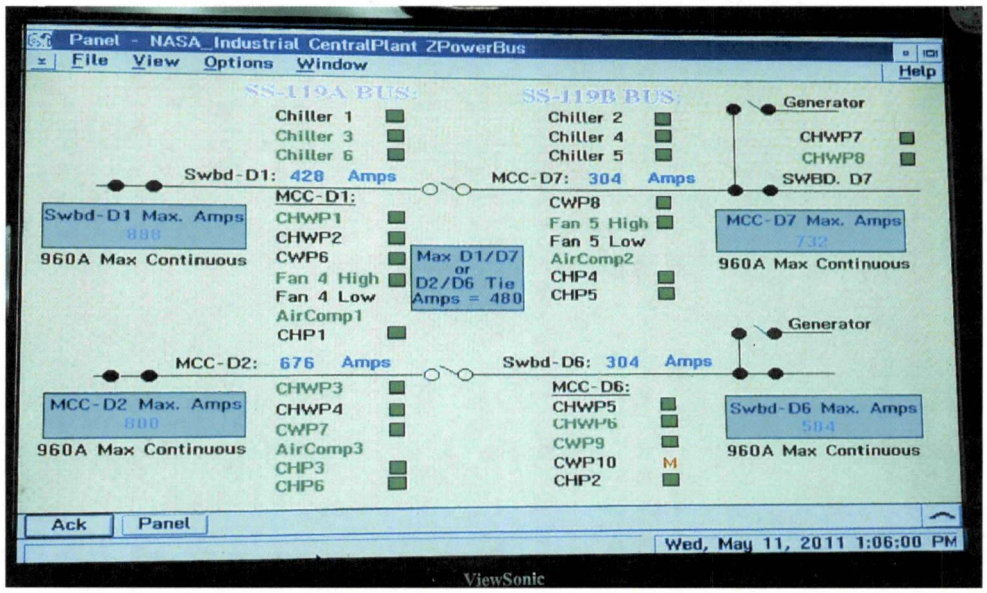
2.1.7 Condenser Water Set-Up

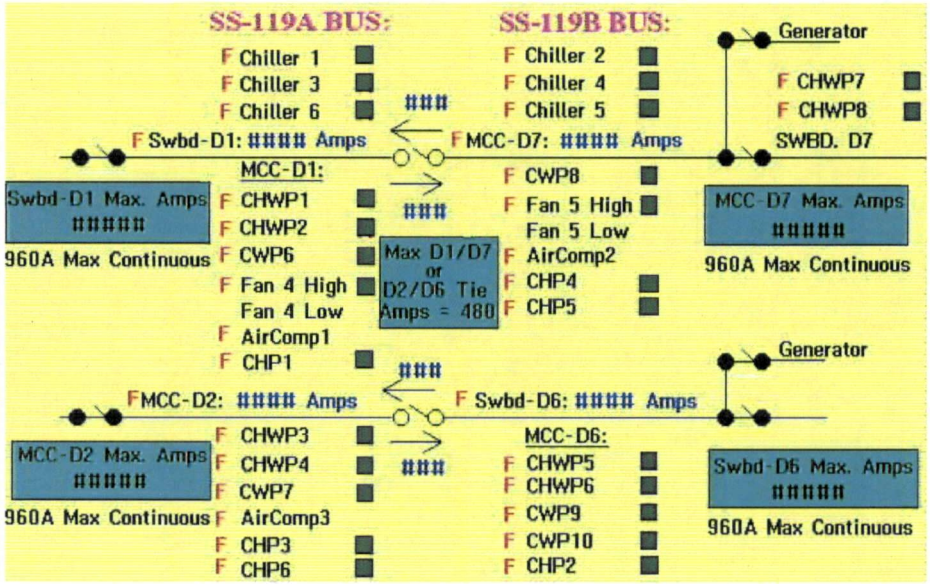
This screen allows the operator to select the cooling tower configuration associated with the chiller lineup which is in operation. In addition, it shows the cooling tower parameters including flows, valve positions, delays and deadbands.





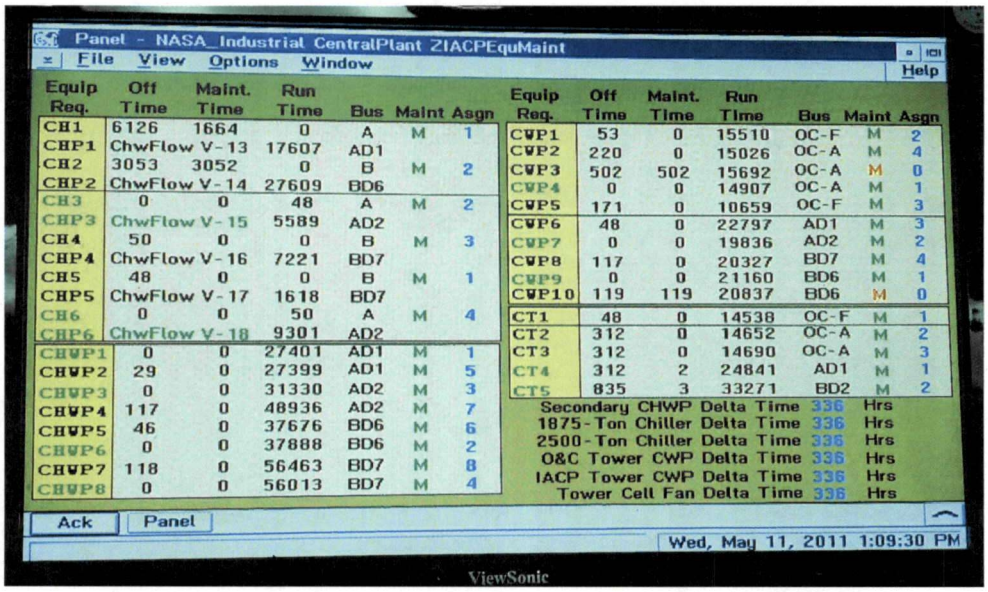
2.1.8 This screen is a graphical representation of the electrical bus loading indicating the equipment which is active, as well as an approximated bus amperage based upon the full-load amps of the assigned equipment. Under the new design the actual loads on SS119 Bus A and Bus B will be measured; however the remaining equipment loads will still be estimated.



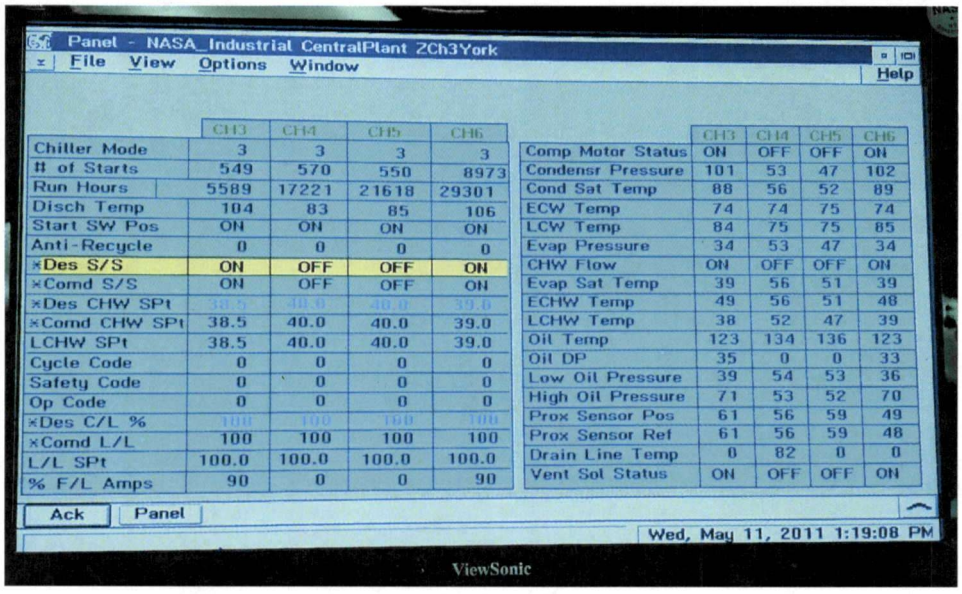


2.1.9 Equipment Maintenance

This screen is a summary of all of the major IACP equipment summarizing the run-time plus assignment, sequencing assignment, as well as the maintenance status. This screen has the ability to define the time frame where the run-time status will be evaluated for re-sequencing (assigned at 336-hours).

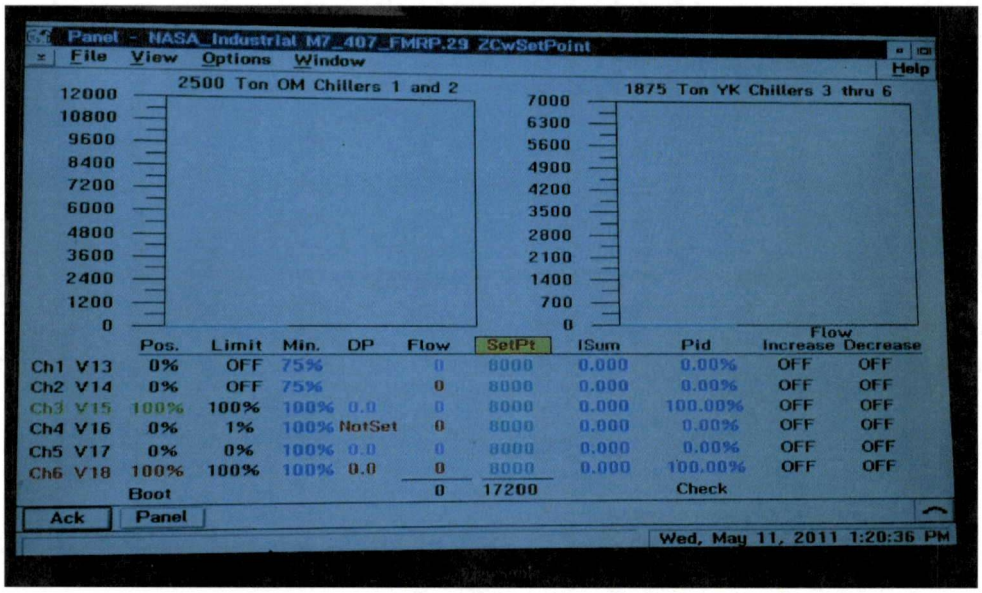


2.1.10 This screen illustrates data available through a serial connection to the "small" York chillers CH-3 thru CH-6. While this screen illustrates stop/start capabilities through the serial connection, under the revised PLC design, the start/stop capability will be a discrete PLC digital output with the summary screen displaying the status of that PLC output, the remaining information will be made available and displayed through a gateway and Ethernet connection. Under this design Ethernet connections will also be provided for Chillers 1 & 2, and the available information differs; a separate screen should be provided for those two (2) machines. The chiller data is listed on drawing 79K38825.



2.1.11 Chiller Condenser Water Flow Status

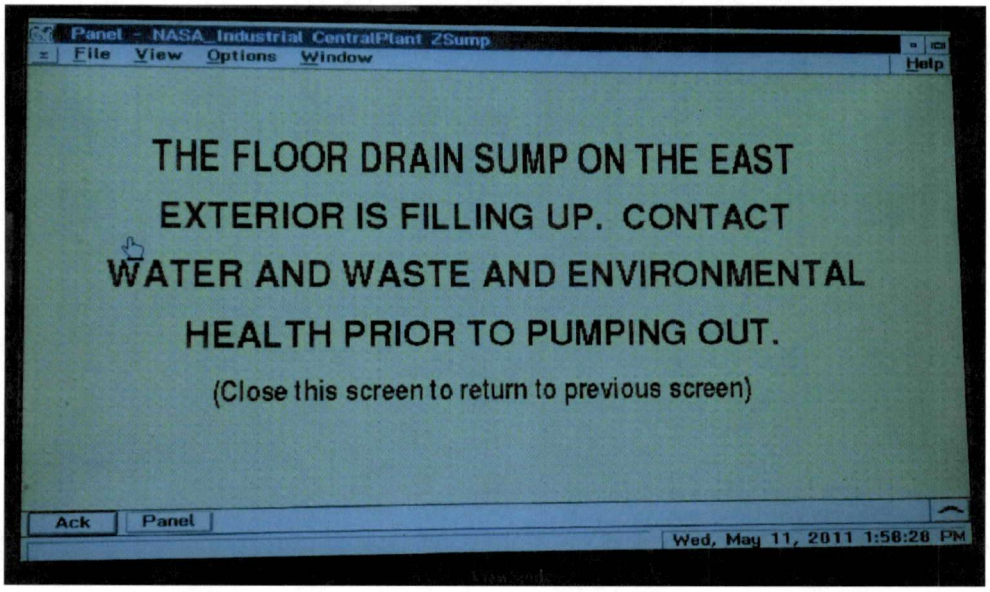
This screen shows the sum of the condenser water flow rate for the two (2) large 2,500 ton chillers and separately for the smaller 1,875 ton chillers. It also includes the status of the chillers condenser water valves and control parameters (currently inoperable because the flow meters are disconnected).



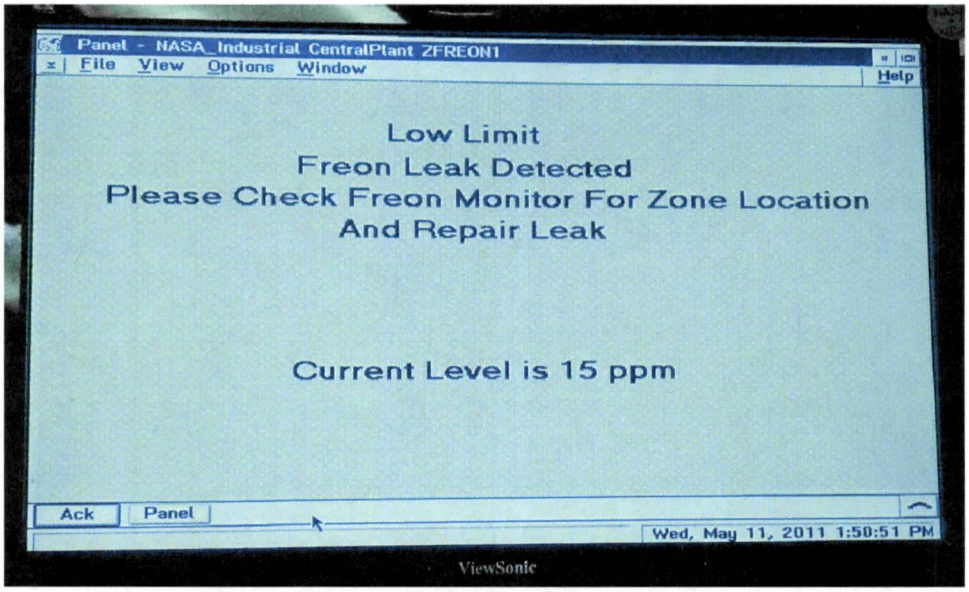
2.1.12 Miscellaneous IACP Equipment

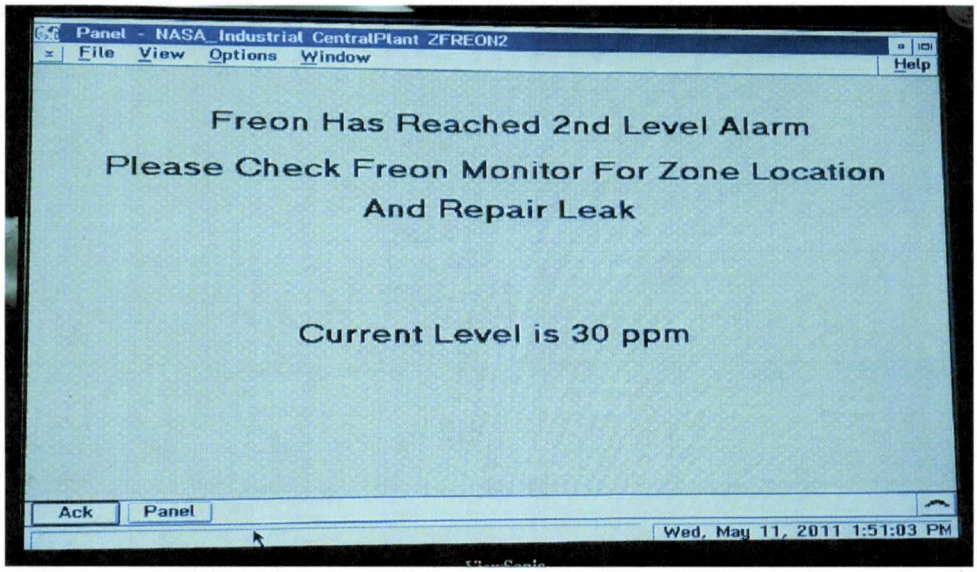
There will be multiple sub-screens contained under this main menu heading, the contents of which shall be coordinated with the available I/O and are generally self-explanatory.

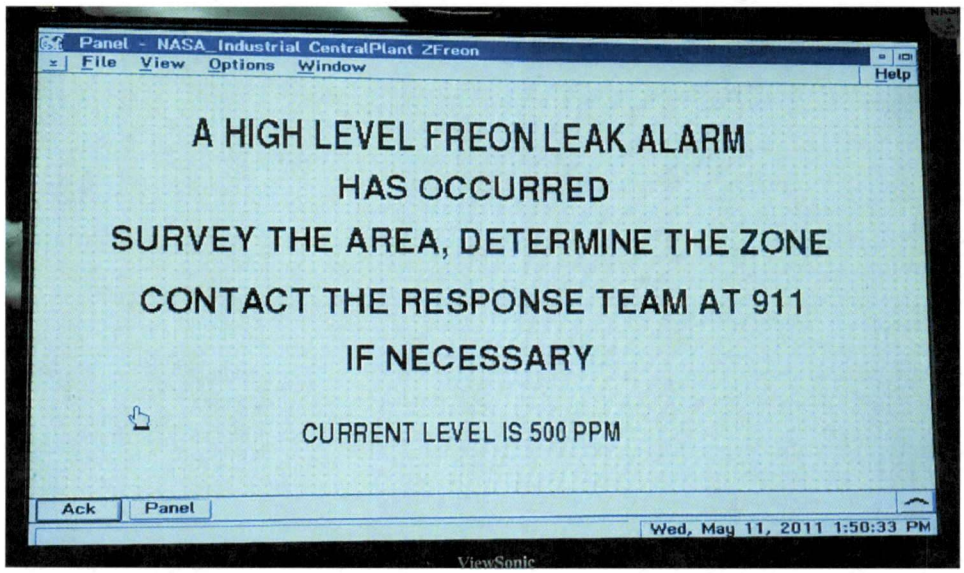
2.1.12.1 Floor Drain Sump



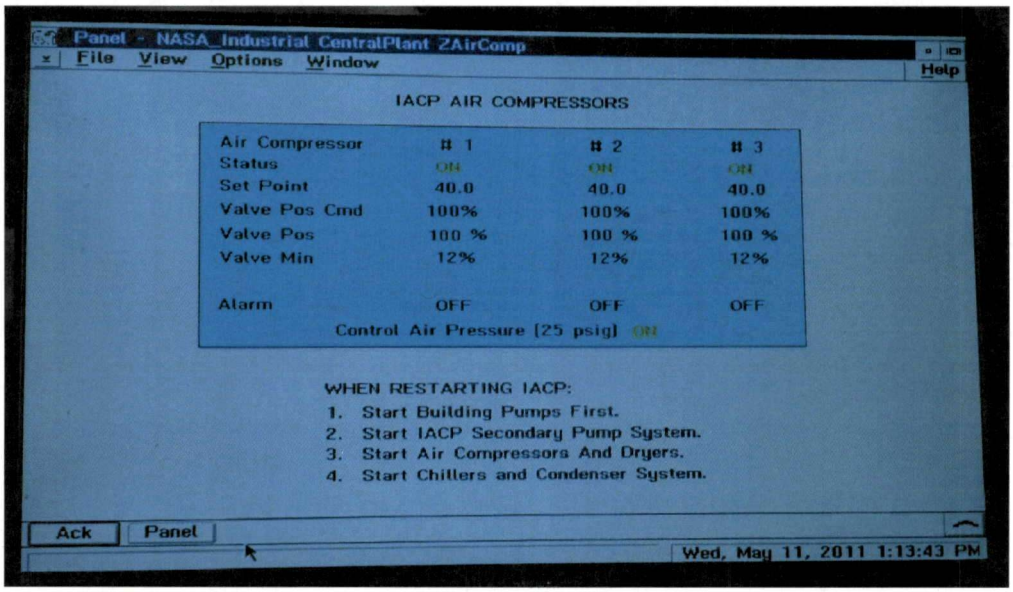
2.1.12.2 Refrigerant Monitor



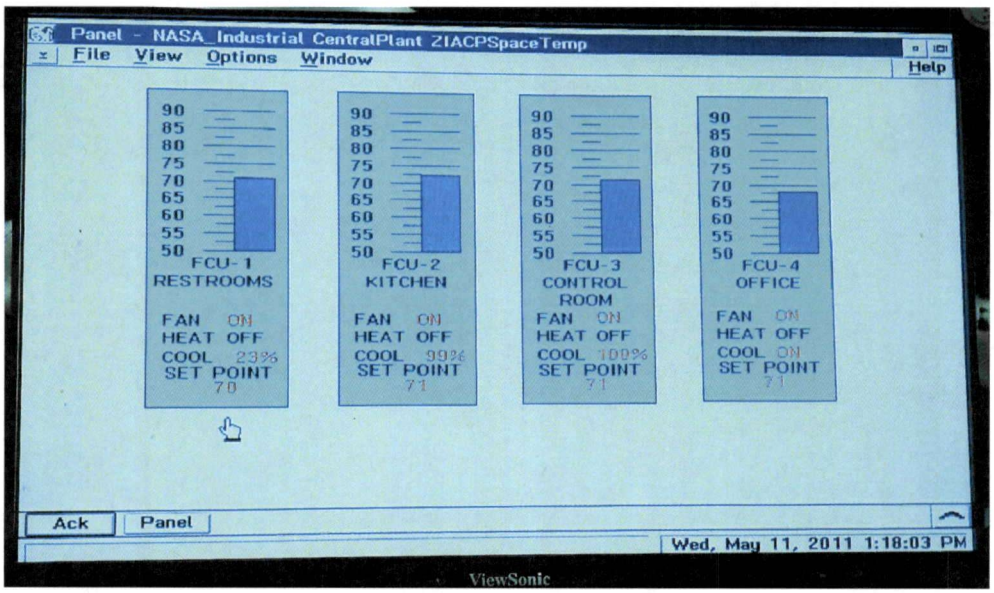




2.1.12.3 Air Compressor Alarm

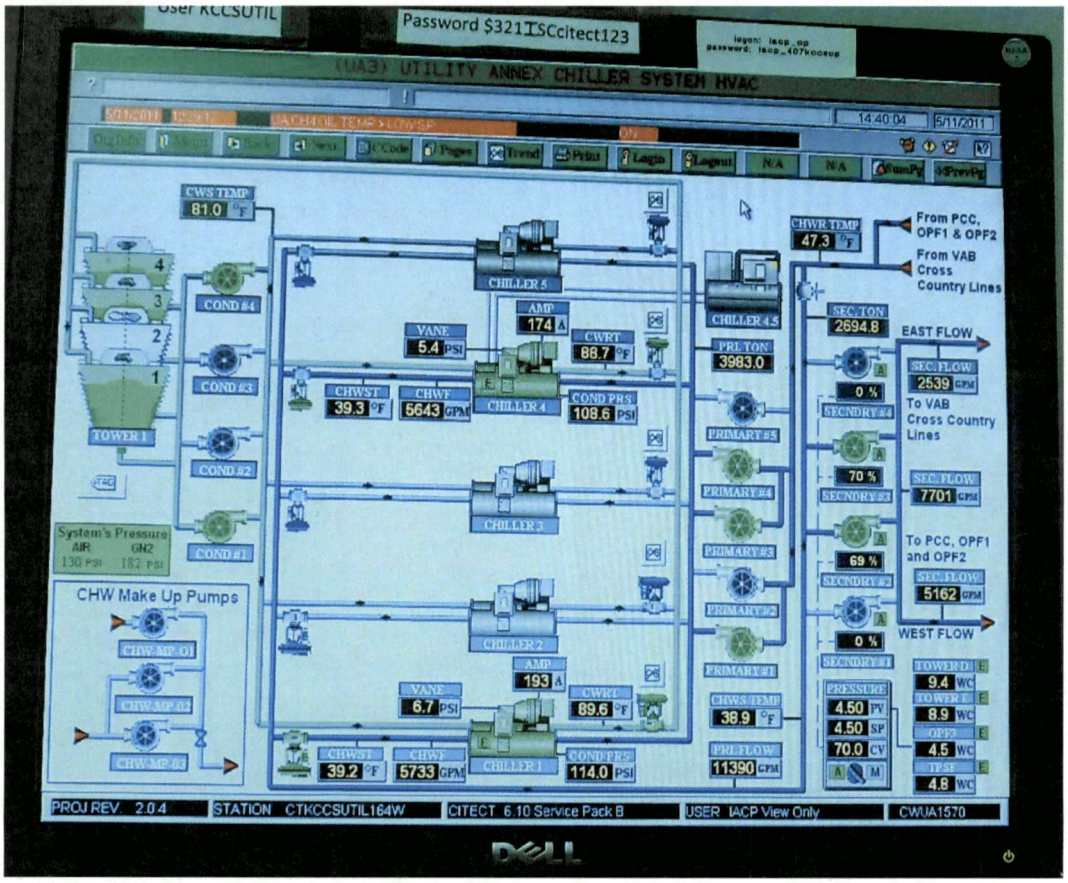


2.1.12.4 Fan Coil Unit Status



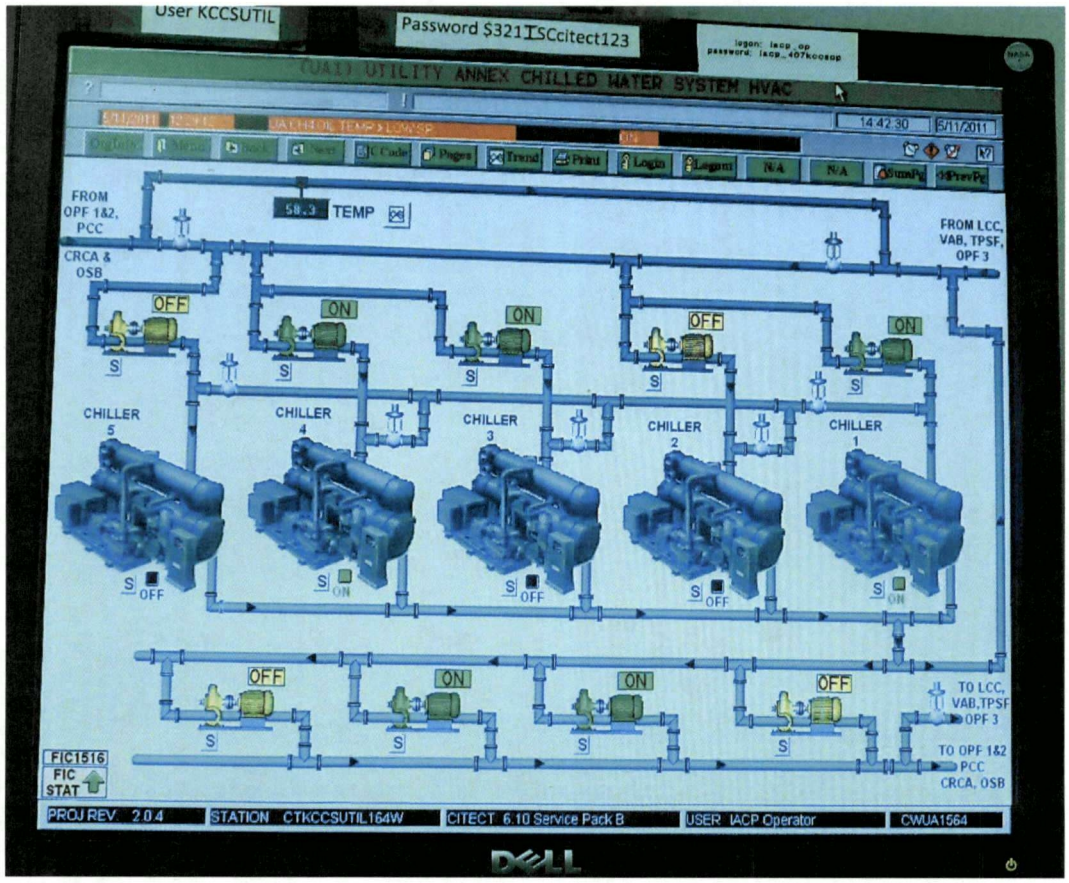
2.1.13 Pictorial Graphics

2.1.13.1 A pictorial graphical representation of the entire IACP system will be presented in the first graphic similar to the one shown below for the Utility Annex located at the north end of the KSC complex. Clicking on any component of this diagram should enable the system to go into a deeper level and display additional information as to that component and/or system which cannot be represented on a single screen.



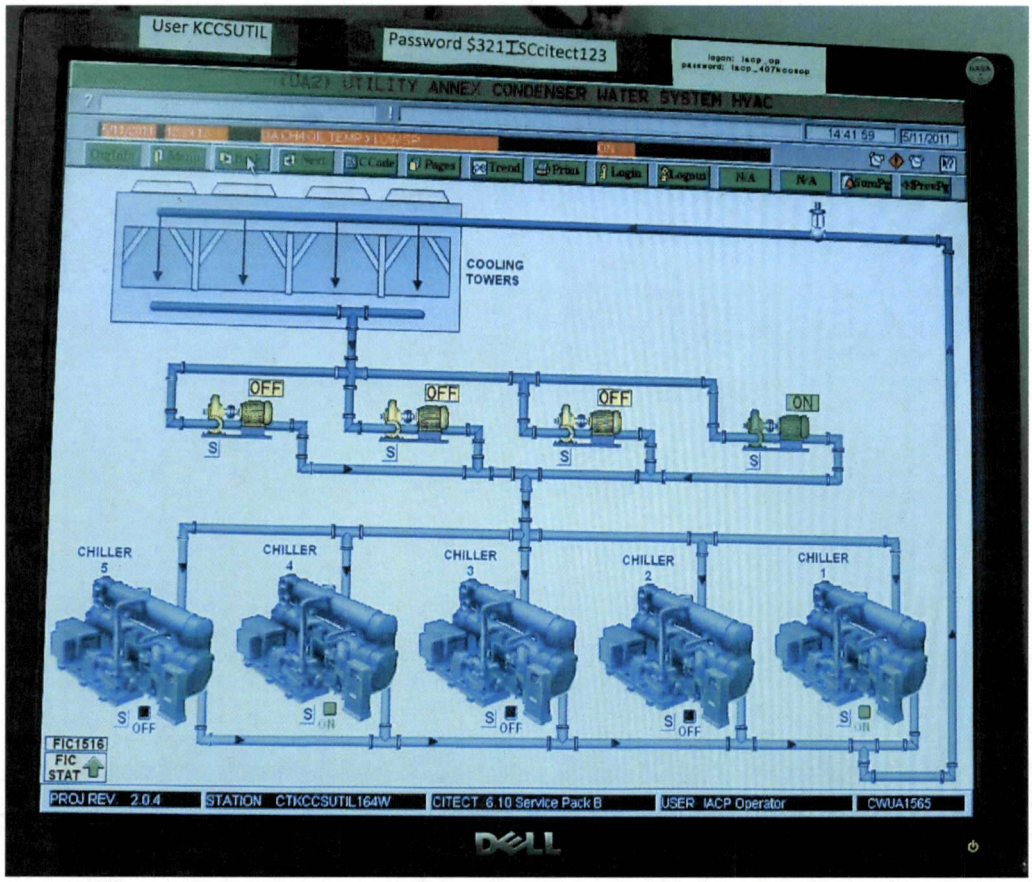
2.1.13.2 Chilled Water System

A separate graphic of the chilled water system shall be provided which can have additional detail as opposed to the overall system graphic due to the reduction of equipment.



2.1.13.3 Condenser Water System

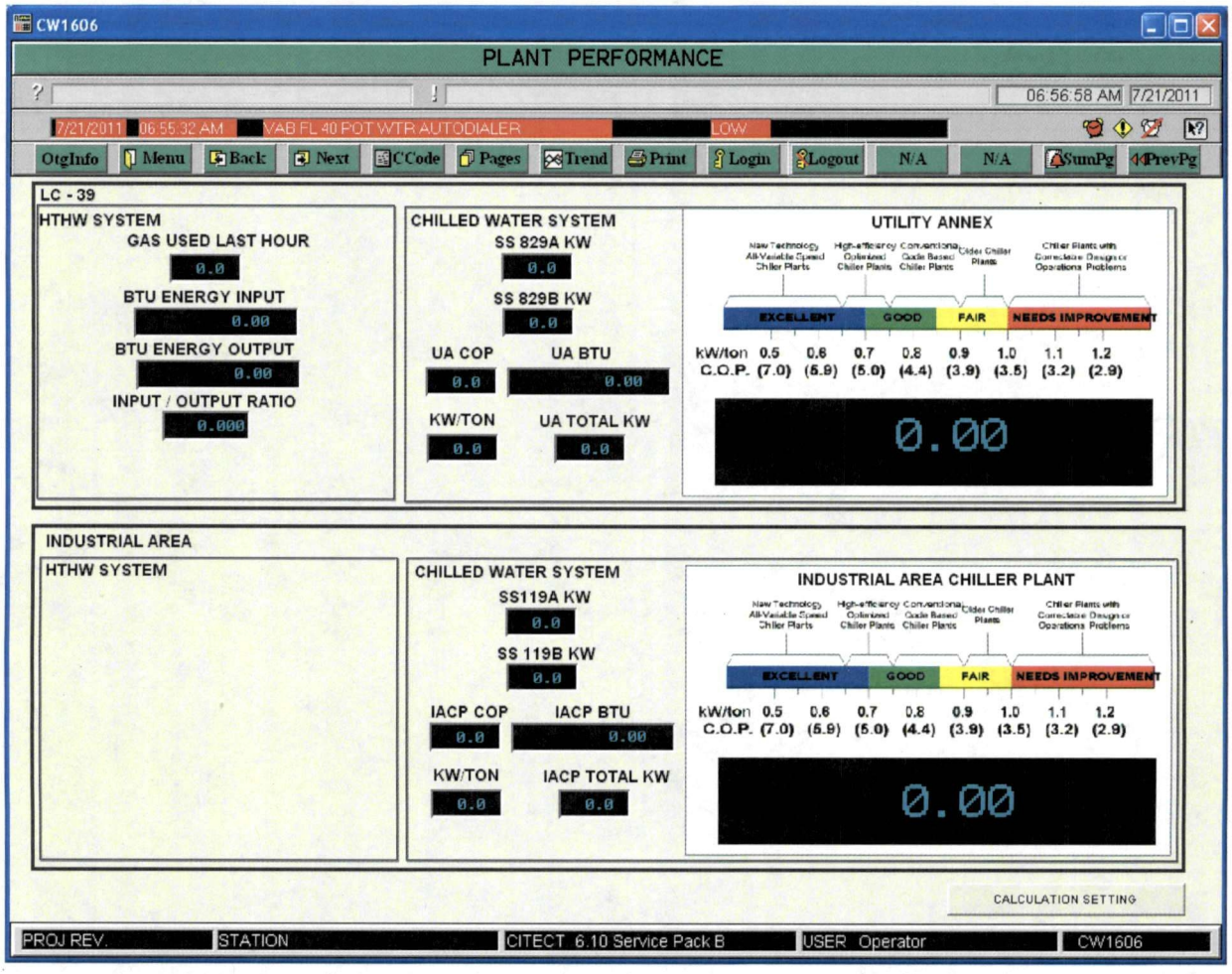
Similar to the above, provide a schematic of the entire condenser water system and related equipment.



2.1.14 Clicking on any of the other buildings on the Site Screen under 2.1.1 will bring up the relevant flow data and building pump data (as applicable) for that particular building as generally presented in screens 2.1.5 and 2.1.6.

2.1.15 Plant Performance Screen

A screen will be developed to calculate the overall plant coefficient of performance (COP). It will display the chilled water system output, based upon either the primary or secondary loop energy output as determined during checkout/commissioning, energy input and calculated COP. It will display the chiller KW/Ton for each machine which is on-line. The display shall allow for a display of real-time energy use, averaged energy use, trend logged energy over daily, monthly and yearly intervals. It should show the best COP for the last 24 hours, month and year with the date and time it was attained. The Citect based screen illustrated below will be provided as a basis for the development of this screen; no HW system or LC-39 data will be included

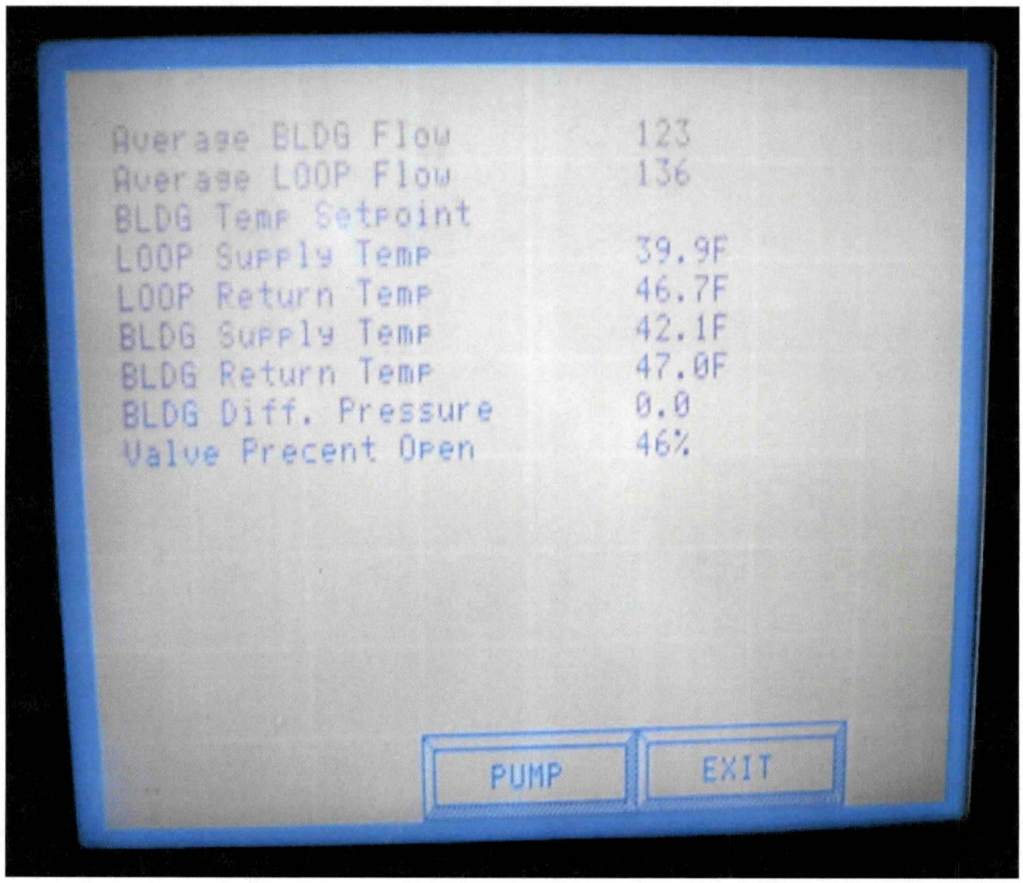


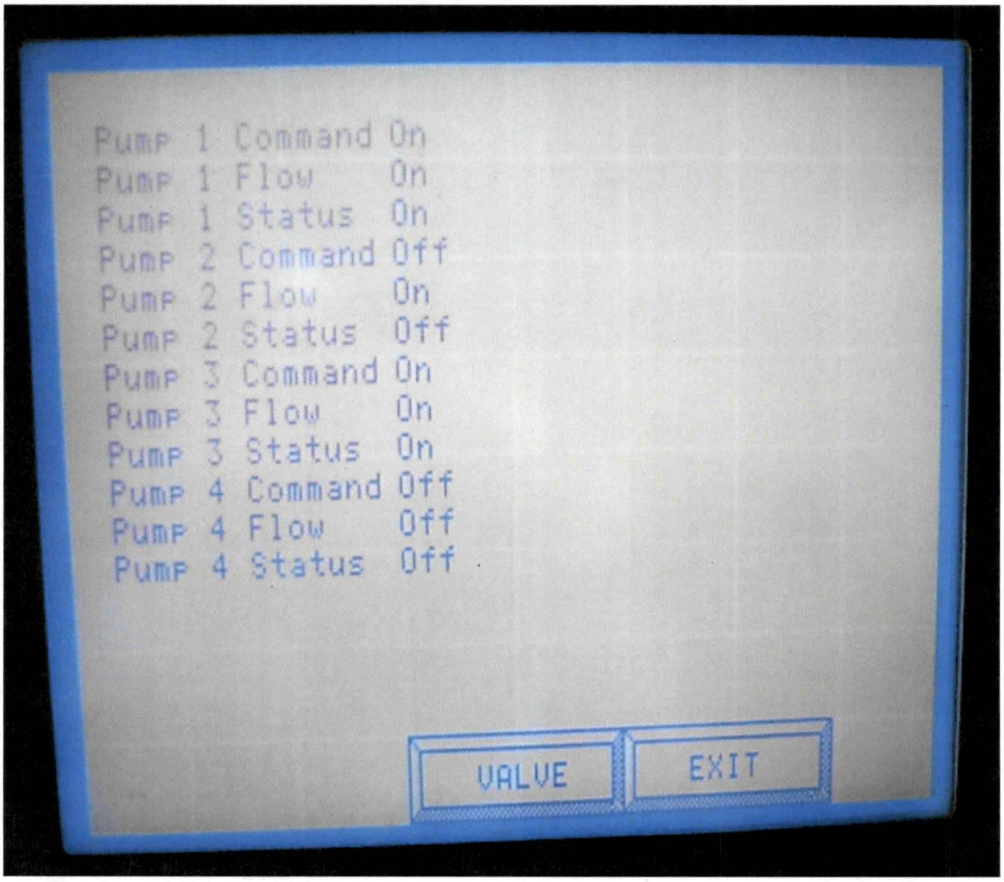
2.2 PLC Touch Screen HMI's

Each PLC will have an HMI color touch screen that will provide a graphical display of the I/O of that PLC. Following are examples of the existing DDC panel touch screens located in a typical building. Screens will also be required for the PLC's located in the IACP; figure at least one (1) screen for each system (CHW, CW), major piece of equipment (CH, CT), and group of equipment (pumps) and any auxiliary equipment (fan coil units, air compressors, refrigerant monitors, etc.) for the I/O associated with the particular IACP PLC.

2.2.1 Loop – Building Interface

This screen illustrates the chilled water parameters (flows and temperatures) at the chilled water loop and building interface, as well as properties associated with the loop control valve.



2.2.2 Building Pumps

This display would summarize the building pump I/O including VFD parameters as applicable. The example below is for the OHF which has four (4) constant volume pumps.