To : Chemical Engineering 434 Date : January 14, 2009

From : D. C. Drown

Subject : Double Pipe Heat Exchanger Assignment Details

The objectives for doing this experiment were defined in the Jan. 15 memo, this memo's purpose is to provide guidance on how to achieve those objectives. As a result of UI facilities condemning all the steam lines in BEL a few years ago, the heat exchanger system was moved from 3rd floor to the 2nd floor and reinstalled connected to a new steam supply pipe near the distillation column. Steam pressure supply problems then led to plumbing modifications. Thus you are the first class to run the heat exchangers in the revised configuration and you are the start-up shakedown crew to certify acceptable operation of the exchangers.

The department has two double pipe heat exchanger test units with interchangeable tube bundles. **All units have the same design sizing specifications**. Each group will test two of the tube bundles. The attached sketches diagram the construction and **previous plumbing** installation = improvement recommendation modifications were recently implemented and are not reflected on the attached diagrams. [note – these diagrams are for your background information showing how it was previously set up and you should develop your own diagrams documenting the current plumbing installation]

Determine the water outlet temperature as a function of flow rate for the units operating at constant steam pressures (assigned on back) between 3 PSIG and 15 PSIG. The water flow rate should cover as wide a range as the ***actual operating*** equipment will allow. If practical, attempt to operate in the laminar, as well as turbulent water flow regions.

Each group is to prepare a purely calculated plot of outlet temperature as a function of gallons per minute water flow for the units operating at the specified steam pressure. Cold flow pre-testing the actual obtainable flow rates so that the design predictions can cover the appropriate range of cooling water flows is suggested. Also use your calculation algorithm to predict the steam pressure needed to achieve the assigned outlet temperature at the specified flowrate.

This plot must contain at least six (6) or more flowrate points. The plot is to be accompanied by a tabulated result sheet of selected flow rates and calculated values. This must also include a clear step by step description of your calculation procedure. In order to keep calculations from getting out of hand, simplifications are permissible -- provided you can justify your assumptions. The short-cut 'McAdams' approximations are OK for initial guesses, but the final prediction should use temperature dependent variable physical properties and the more reliable correlation's such as : Sleicher-Rouse, Sieder-Tate, Dittus-Boelter, or Petukhov-Popov for flow through tubes, and Rohsenow, Chen, or Nusselt for filmwise condensation. The reason why you selected whichever correlation you use needs to be justified.

This curve and supporting data are to be submitted along with your proposal, test plans, procedures, data sheets, and safety analysis before the experiment can be scheduled. [note – see LABORATORY EXPERIMENTS & REPORTS handout for proposal, procedures, test plan expectations] Each group will then have a team of technicians assigned to run your test plan to generate data from which you will attempt to experimentally verify your predictions and achieve the objectives.

Any group which has not submitted its acceptable proposal / plans / prediction results will not be allowed to schedule the experiment. Any group grade penalty on this preparation effort will be deducted from each individuals score for this experiment.

Your draft proposal / procedures / test plans / predictions are **due** on or before 5 PM Friday, Jan. 23rd. Your revised final plans ready for the technicians to run are due on or before 5 PM Thursday, Jan. 29th.

Group	Formal, Summary, Oral	Steam Pressure, PSIG	Experiment Run Scheduled for
1	Bassler, Muntifering, Prizer Weakley	14.0	2:30 PM Mon. 2nd
2	Sobcyzk, Penberthy, Sorge	4.0	8:00 AM Tue. 3rd
3	Kane, Kooda, Nonthabenjawan	7.0	1:00 PM Tue. 3rd
4	Mansour, Elgan, Smith	10.0	11:30 AM Thur. 5th

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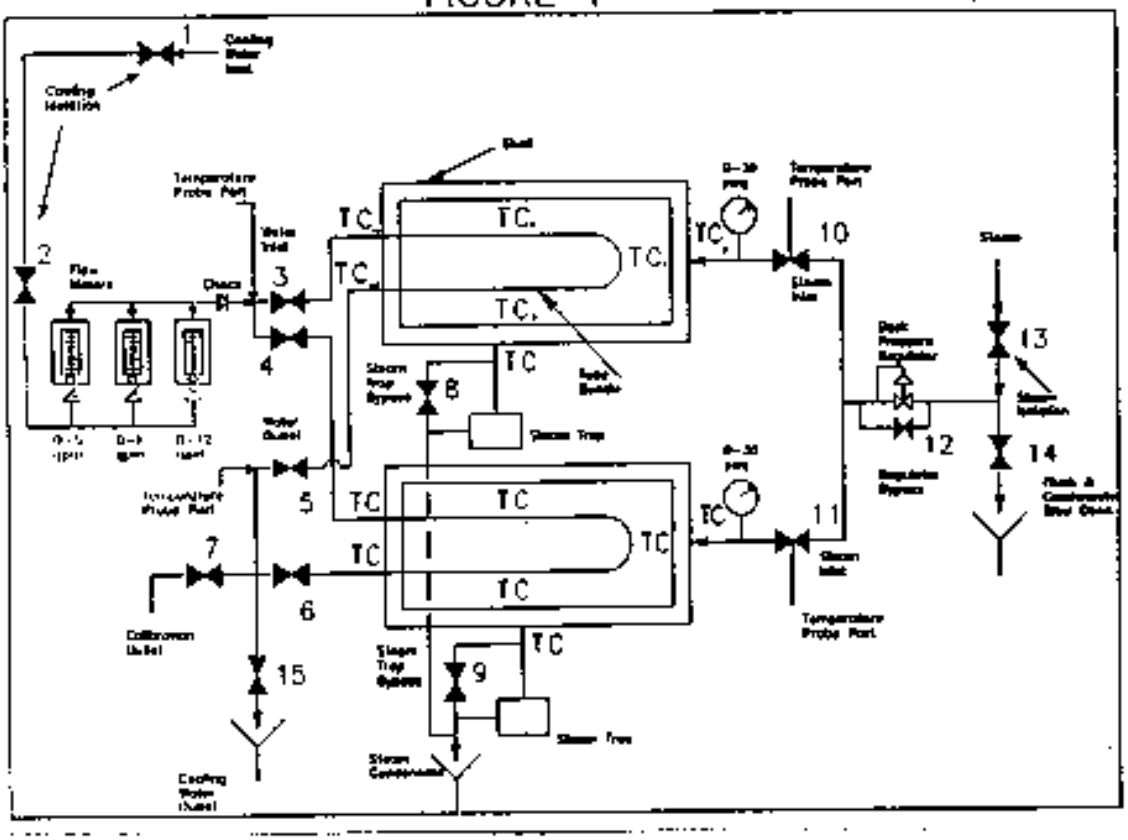
Subject : Spring 2009 Report Responsibilities

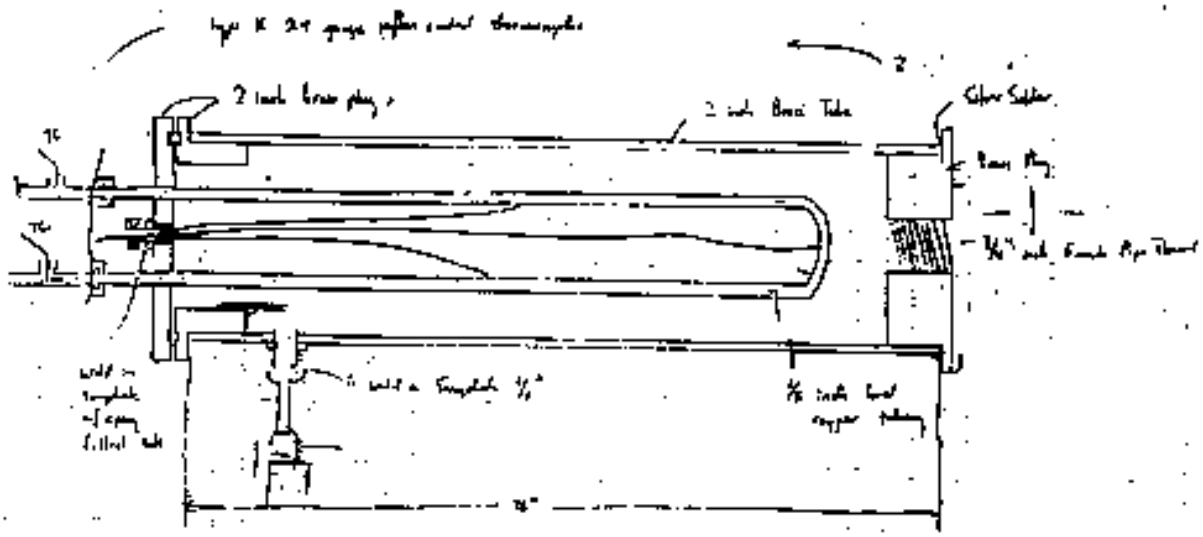
RESPONSIBILITY SEQUENCE SCHEDULE Þ

Run Time	Group		Heat Exchanger	Distillation	Catalysis
Monday 2:30 PM	1	Formal	S. Bassler	A. Weakley	B. Muntifering & L. Prizer
		Exec. Summary	B. Muntifering & L. Prizer	S. Bassler	A. Weakley
		Oral	A. Weakley	B. Muntifering & L. Prizer	S. Bassler
Tuesday 8:00 AM	2	Formal	S. Penberthy	A. Sobczyk	M. Sorge
		Exec. Summary	M. Sorge	S. Penberthy	A. Sobczyk
		Oral	A. Sobczyk	M. Sorge	S. Penberthy
Tuesday 1:00 PM	3	Formal	J. Kane	C. Nonthabenjawan	T. Kooda
		Exec. Summary	T. Kooda	T. Kooda	C. Nonthabenjawan
		Oral	C. Nonthabenjawan	A. Hall	J. Kane
Thursday 11:30 AM	4	Formal	D. Elgan	D. Smith	Y. Mansour
		Exec. Summary	Y. Mansour	D. Elgan	D. Smith
		Oral	D. Smith	Y. Mansour	D. Elgan

The oral presenter who is in the audience for another speaker is responsible for setup and correct operation of the video equipment. Lack of a viewable VHS tape for the self critique (and subsequent review by the course coordinator) due to operator error will result in a grade penalty to the audience member responsible for producing the tape.

FIGURE 1





SHELL + TUBE CONSTRUCTION SKETCH 12/3/91