ASBESTOS CONFERENCE RICHMOND

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SOFT COVERINGS

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SEAFORD, DELAWARE

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UPDATE ON "SOFT" REMOVABLE/REUSABLE INSULATION

R. M. Norris

FIGURE 1

Soft removable/reusable thermal insulation was first introduced in the Fibers Department in the mid-1970's at Kinston and at Seaford and perhaps on a small scale at some other sites. There were some distinct advantages to soft insulation over other removable/reusable insulation types because it was much quicker to install and remove; and if the materials of construction were right for the temperatures, it would last longer, ~~too~~. Also

The expansion was slow, however, because of several problems. First, there was craft resistance. Insulators could see their overtime drying up and management was slow to push for its use.

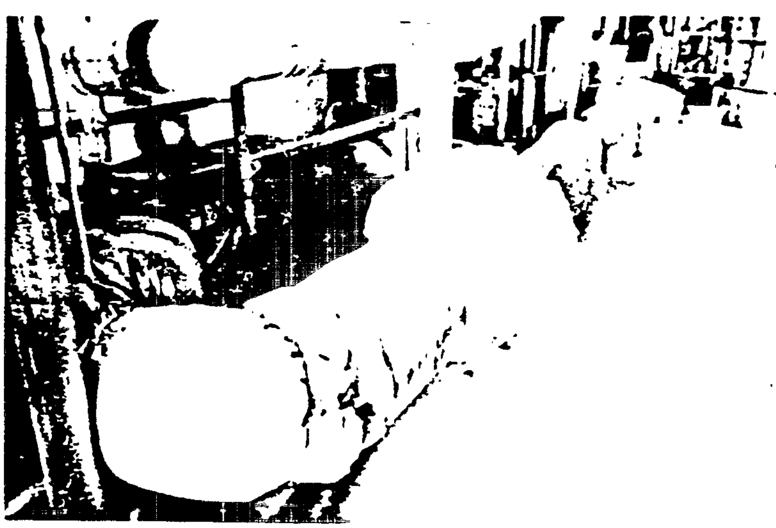

FIGURE 2

DUP 1010888

Second, the blankets, in the early years, were not very pretty. They were instead baggy and wrinkly.

FIGURE 3

Last, but not least, the materials used were not always compatible with process temperatures; and as a result, the cloth frequently became scortched, thus, adding to the unsatisfactory appearance.

FIGURE 4

DUP 101089

So for several years, the use of soft insulation really did not expand very much.

In 1982 at the charter meeting of the Textile Fibers Thermal Insulation Committee, we established soft insulation as a program of high priority and agreed that we needed to document quantitatively just what the stake was for converting to blanket insulation.

Thermal Efficiency

The first thing we did after we returned from the meeting was invite George Lang to come to Seaford and make a comparison, using his Heat Flow Meter (HFM), of two screw melters -

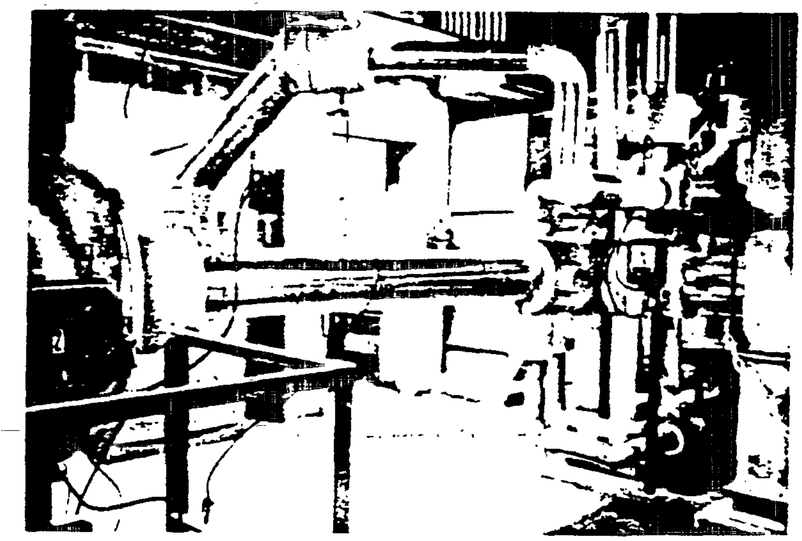

FIGURE 5

one covered with calcium silicate and the other with blanket insulation.

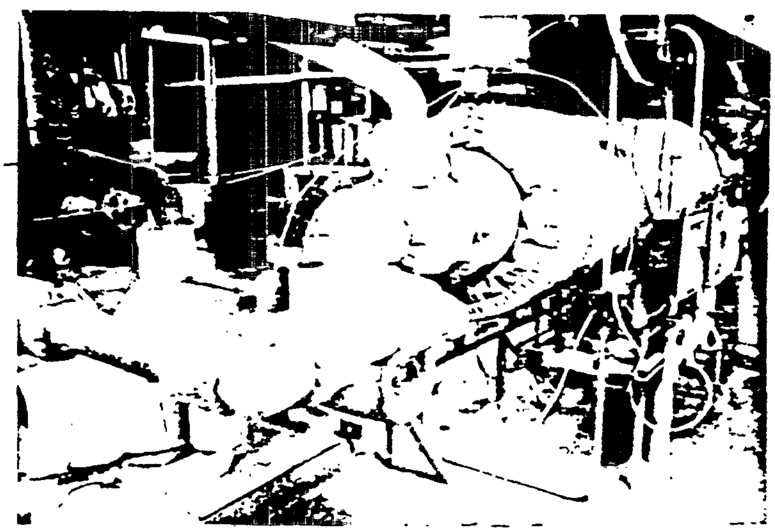

FIGURE 6

DUP 1010890

The results of this test indicated a 25% improvement with blanket insulation. In fact, they had to turn off the zone 5 heater right after start-up because the barrel was too hot.

Then we asked George to confirm these results in the lab and he set up a section of 4" pipe at the Test Center where he compared 2" of calcium silicate and 2" of Thermal Insulating Wool (TIW). Measuring the amount of electrical energy needed to control the pipe at 450°F, 550°F, and 650°F, George found a 15 to 23% savings with blanket insulation.

I have a simplified version of this test designed by Jim Fetter at Martinsville, which you can look at during the break. I have plotted the results over eight hours, and they clearly show that TIW is a superior insulating material when compared with calcium silicate.

COST-LABOR/MATERIAL

Let us take a look at two examples which may serve to illustrate how the cost of blanket insulation compares with calcium silicate. First, the inert gas heaters at Seaford Plant are fairly straightforward. It costs $1500 to insulate them with calcium silicate. In 1982, we got a quote of $3M from Construction to make two blankets.

Second, the autoclaves are rather complex with many valves and flanges.

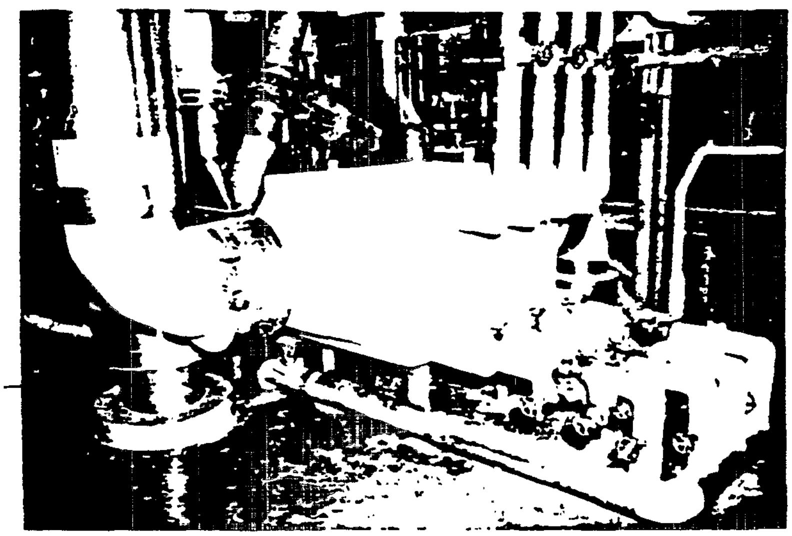

FIGURE 7

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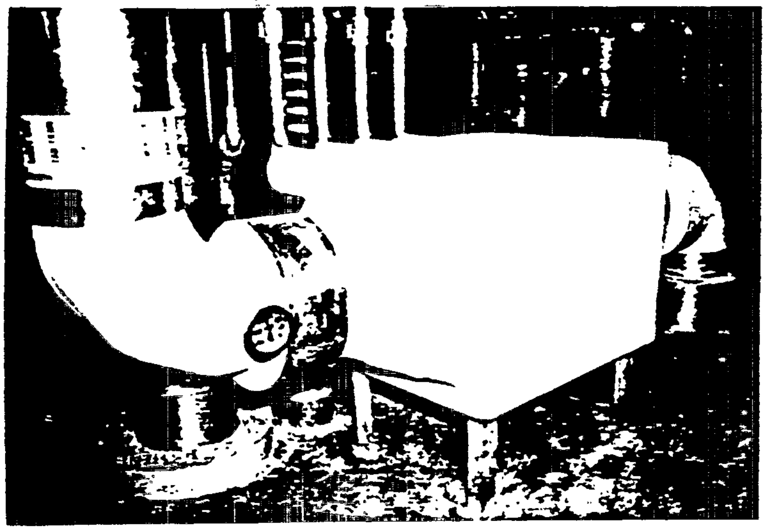


FIGURE 8

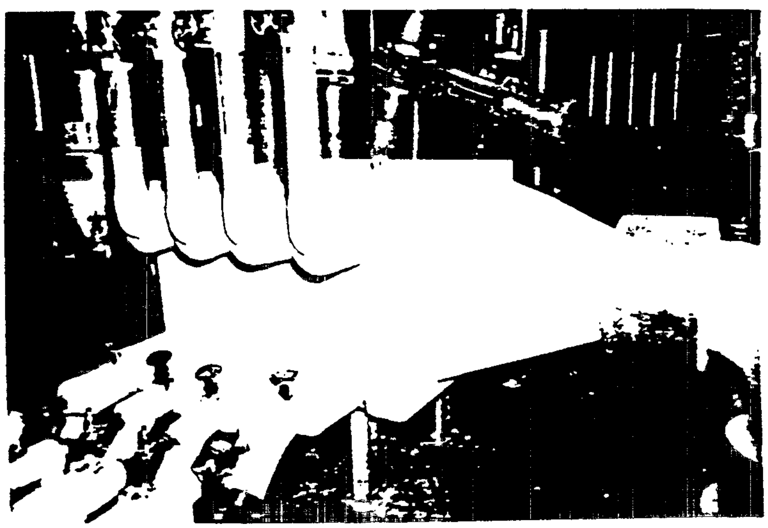


FIGURE 9

FIGURE 10

FIGURE 11

FIGURE 12

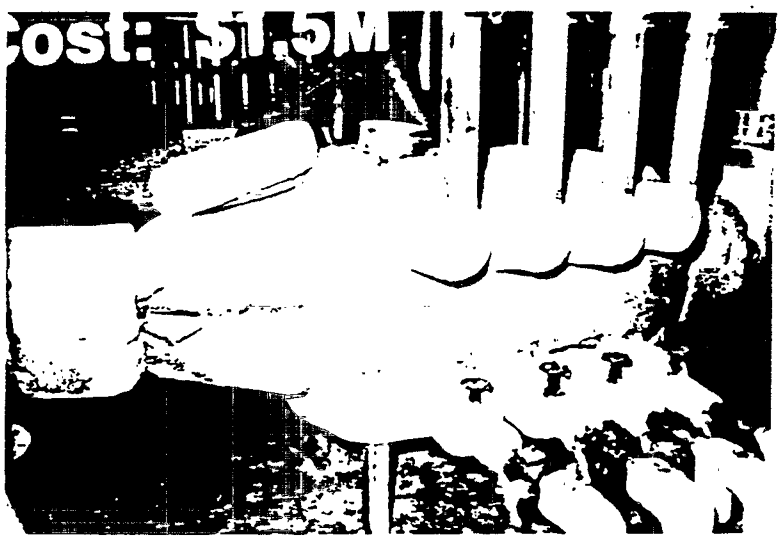


FIGURE 13

Even with rigid insulation, they were not very attractive so we covered them with a "tin can" to make them pretty.

FIGURE 14

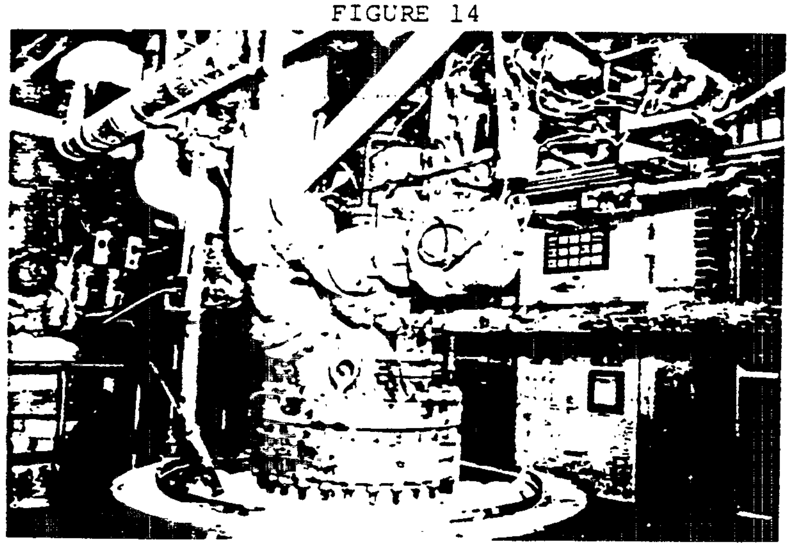


FIGURE 15

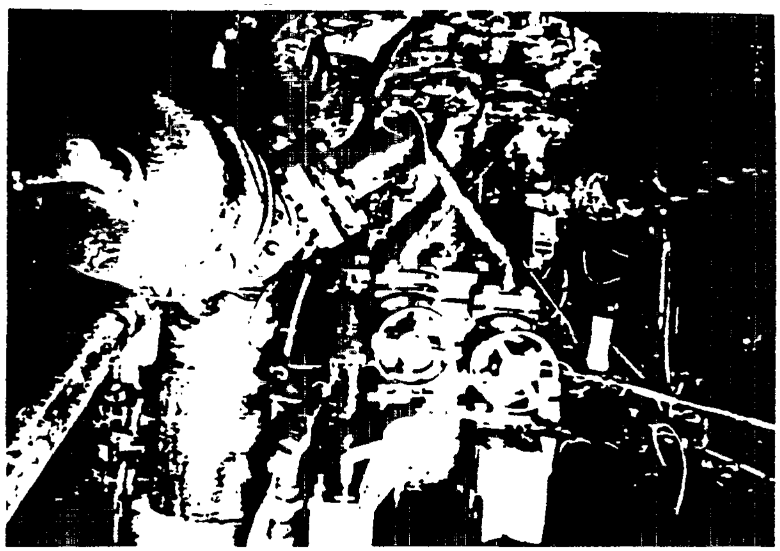


FIGURE 16

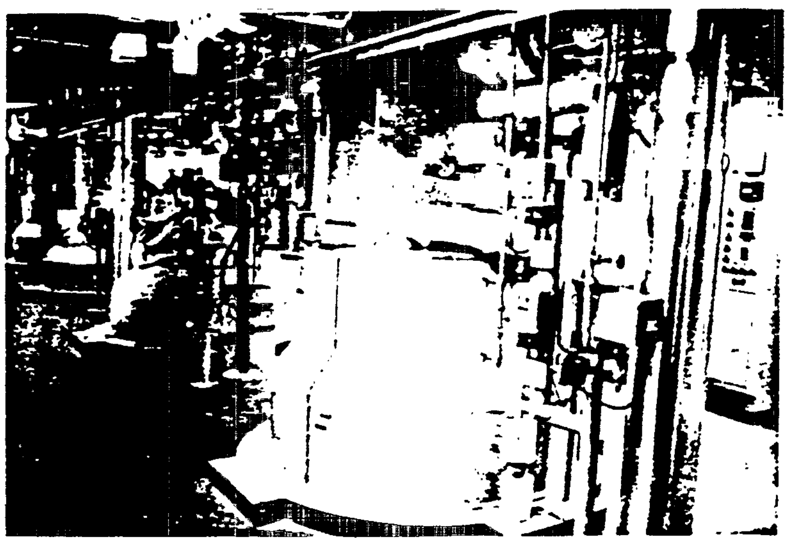


FIGURE 17

Let us talk about the cost to maintain this autoclave with an average of one O/H each year.

By competitive bidding, the installed cost of this blanket is $2500.

Now let us compare the cost of maintaining an A/C with blanket insulation.

- Autoclave
  - Cost to maintain (1 O/H per year) when covered with calcium silicate
    - Removal — 3 man days
    - Installation — 6 man days
    - Routine maintenance — 24 man days
    - Material — $600/year
  - Initial cost soft insulation $2500
  - Cost to maintain soft insulation (1 O/H per year)
    - Removal — .5 man days
    - Reinstall — 1 man day
    - Routine maintenance — 8 man days
    - Material — $100/year
- Savings
  - Labor at 24 man days/year — $3.3M/year
  - Energy (25% impr.) — $3.0M/year
  - Material (after first year) — .5M/year

    $6.8M

	1st Year	3rd Year
- NROI	207%	233%

Now look at the savings! Over $3M in labor alone. A total of $6800 savings on $2500 investment. I wish I could get that kind of return from my private investments.

And it looks good too!!

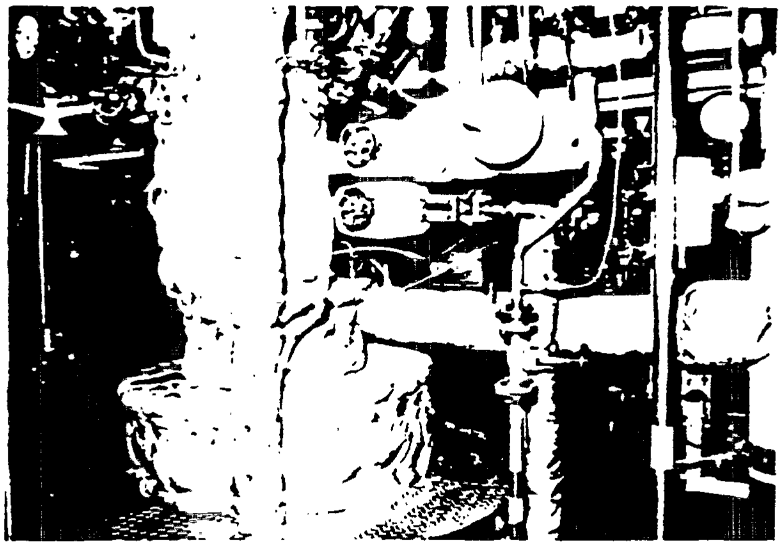


FIGURE 18

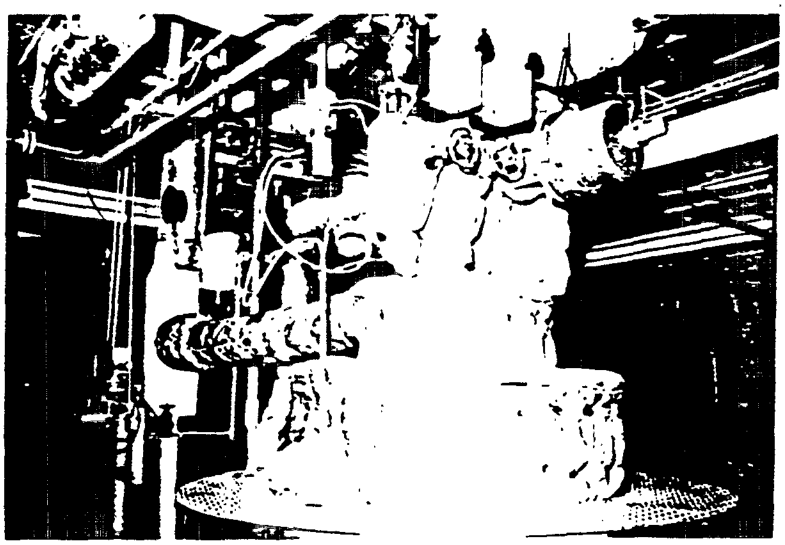


FIGURE 19

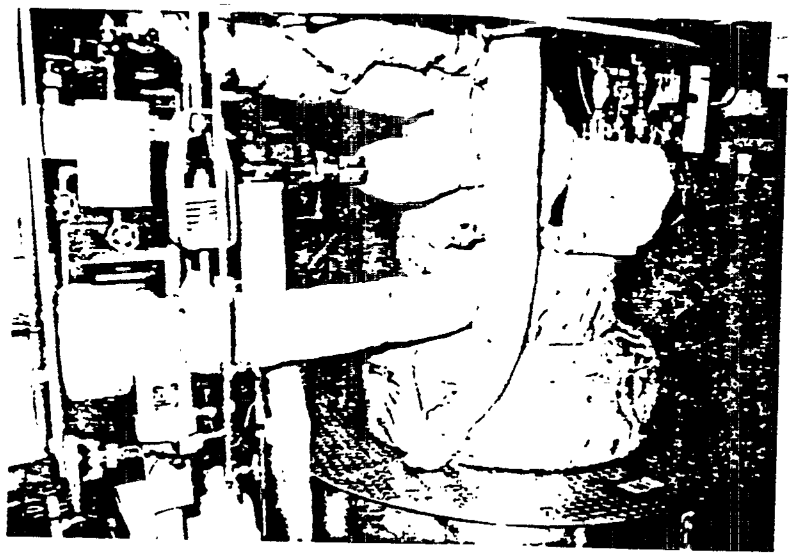


FIGURE 20

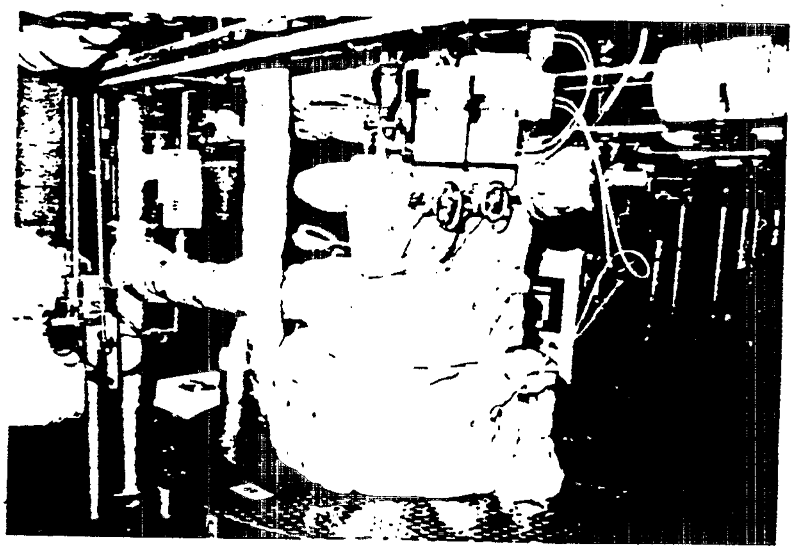


FIGURE 21

What materials do we use?

We have standardized on three insulating materials for our blankets, but there is no doubt some we have not tried. We are using TIW Type I.

TIW Type II which is approximately two times as dense as Type I and Temp. Mat which is still denser than Type II.

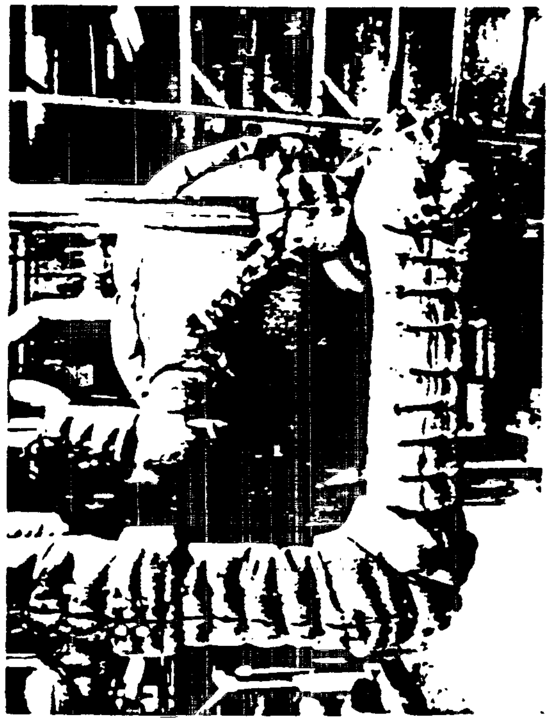


FIGURE 22

The outside cloth is an F.G. cloth treated with silicone for water/dirt resistance. It is good for 500°F.

FIGURE 23

DUP 1010900

The inside cloth, you see here on this pipe cover, is plain high temp. glass cloth good for 1000°F.

FIGURE 24

This is a close up of the closures that we use at Seaford. They consist of lacing rings, washers, Pan Ty cable ties, and makes a very attractive cover.

Here we see various views of the blanket on our T13 CP vessels.

FIGURE 25

DUP 1010901

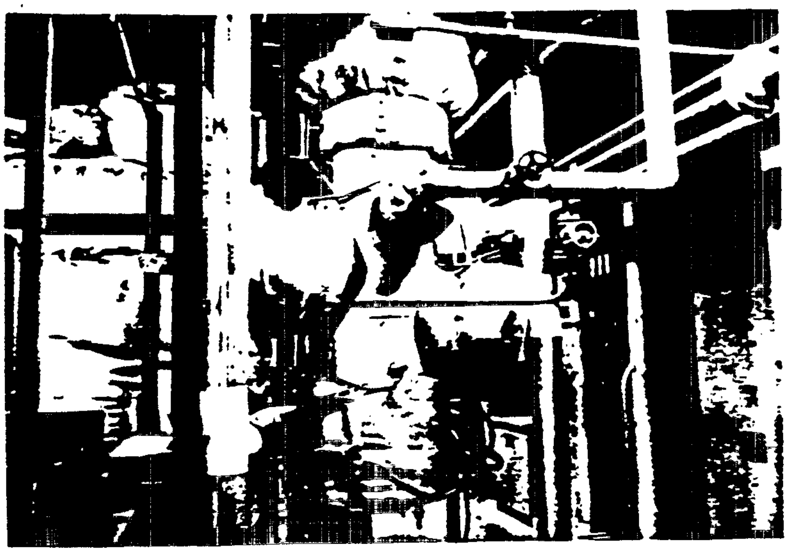


FIGURE 26

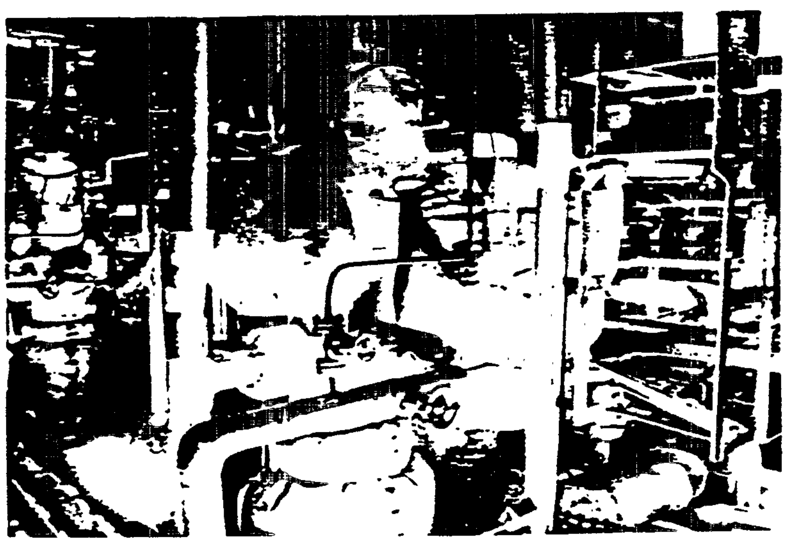


FIGURE 27

FIGURE 28

Adherence to Spec.

We have spent quite a lot of time developing a specification for the Department which we can all use with confidence. One thing must be remembered. The blankets we make or buy are only as good as the spec they are made by.

For example. we must insist that the installed thickness is per spec.

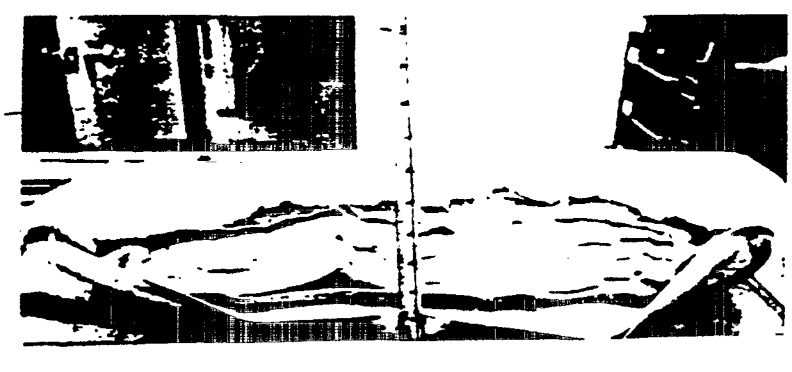
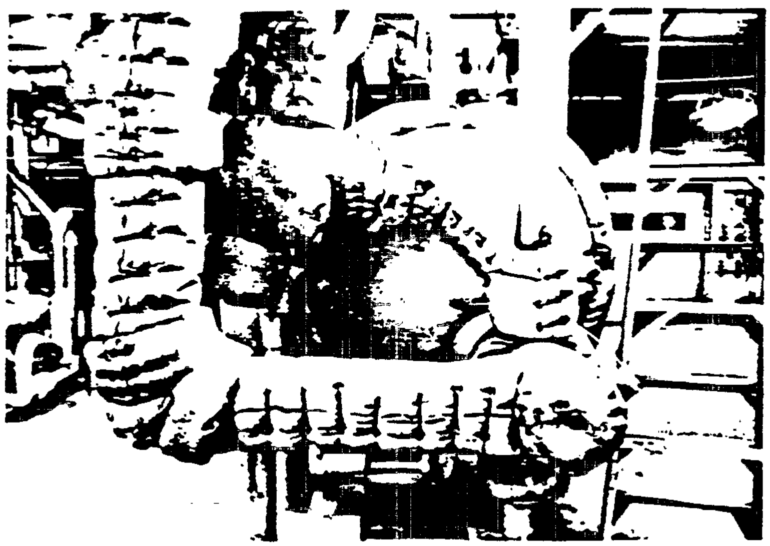


FIGURE 29

DUP 1010903

Here is a cover made for a 1" dow pipe. The spec calls for 6" of installation compressed to 4" with 3" minimum installed thickness. So you can see there is the required amount of insulation in this blanket; but low and behold, when they install the hardware, they have actually pinched the ends to 2" or less.

Joints are another area where we must, both for process reasons and for energy reasons, insist on vendors meeting the spec.



PIGURE 30

Here is a view showing several good butt and overlapping joints. On butt joints, where the fit is not good, we sometimes use what we call "Belly Bands" which cover the butt joint to insure thermal integrity.

Where an overlapping joint is used, the O/L must be 3" and a draw down wire must be used to seal it.

Summary

In summary then, I have tried to show that the economics overwhelmingly support continued use of soft insulation.

The spec must be closely followed if we are to reap the benefits of energy savings, and the TF spec puts us on the leading edge of the state of the art in soft insulation technology; and we will continue to revise and upgrade our spec as we learn new and better techniques.

DUP 1010904