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TASK ORDER NO.: 96-05.16


November 25, 1996

Mr. Don Precechtel
Duke Engineering
Hanford, WA

Subject: VAC*TRAX Process

Dear Don:

Attached is the information you requested on the VAC*TRAX mobile treatment unit that we are presently building for Sandia National Laboratories. This unit, which was designed by the engineering department at the Grand Junction office, has a capacity of 0.42 cubic meters per batch, with an estimated processing time of eight hours per batch. The maximum operating temperature is 315 °C (600 °F), and it is designed for operation at full vacuum, although the normal minimum operating pressure is about 1 psia. It is intended primarily for the treatment of low-level mixed debris and soils. Gloveboxes are used for containment of hazardous compounds and radionuclides, and to avoid direct contact between the operators and the waste. The dryer and offgas system are designed for treatment of wastes containing up to 40% liquid. The VAC*TRAX process is ideally suited for treatment of PCBs, and has already been demonstrated for treatment of PCB-contaminated soils.

The first sheet is the process flowsheet for the Sandia VAC*TRAX treatment unit. (I apologize for the appearance of these drawings; these are 11x17 originals reduced to 8½x11 for FAXing.) This flowsheet shows the dryer, the offgas handling system, and the dryer loading and discharge gloveboxes. The flowsheet is somewhat misleading in its implication that 55-gallon drums are to be charged directly into the dryer loading glovebox. This does not happen; the flow diagram does not show the feed preparation glovebox, which is used to open drums, sort the contents, shred as needed, and load the shredded waste into transfer hoppers for charging into the dryer, all under containment. We do not have a flowsheet for the feed preparation glovebox/shredder system, so the second sheet is the P&ID for that system. This P&ID will tell you more than you need to know at this time, but it at least shows all the equipment in that system.

The third sheet is the general arrangement, an aerial view as it were, of the assembled treatment unit. I've pointed out a few of the key elements in the treatment unit so you can see what they look like (at least as viewed from above) and how much room they take up. As you can see, although the total area in the general arrangement layout is 36 feet square, the actual footprint of the processing unit itself is only about 12 feet by 18 feet. I don't know that you would need or want the feed preparation glovebox, since it is intended primarily for sorting and shredding of debris. When fully assembled, the highest point on the treatment unit is 21 feet 6 inches.



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The capacity of the Sandia VAC*TRAX unit appears to be comparable to what you would need, so many elements of its design could be utilized for a system at Hanford. The Sandia unit is not designed for treatment of high-level wastes, and the Grand Junction office is not experienced in the design of systems for handling high-level wastes. The Sandia VAC*TRAX treatment unit is designed to contain all radionuclides within the dryer and the gloveboxes, so the offgas handling system, including the vacuum pump and condensers, is not affected by the presence of high levels of radiation. The design of this part of the Sandia unit could probably be replicated for your use with a minimum of modification. It might also be possible to modify the glovebox design to allow for use of remote handlers rather than gloveports, as you suggested during our discussion.

My major concern with using VAC*TRAX for treatment of the Hanford sludge is the high liquid content of the sludge. As mentioned above, the Sandia VAC*TRAX unit is designed for a maximum liquid content of 40%, and none of the VAC*TRAX pilot units have been tested on sludges having higher liquid contents than this. One of the sludges tested at Grand Junction was the solid remnant from a disposal sump after decanting of a water layer, and the pilot VAC*TRAX unit was able to treat this sludge satisfactorily. I recommend that the design of the Hanford system provide for decanting of the liquid water prior to introducing the sludge into the VAC*TRAX treatment unit. If you are interested, we can discuss the feasibility of using technologies such as PO*WW*ER evaporative oxidation (which was used to treat the water decanted from the sump sludge mentioned above) to concentrate and treat the decanted water.

The total cost for design of the Sandia treatment unit was about $400,000, of which the design of the feed preparation system was about $100,000. The estimated cost for fabrication of a complete treatment unit similar to the Sandia unit is $1.8 million, including all process and glovebox equipment, government-furnished equipment, and fabricator and contractor markups. About $500,000 of the total fabrication cost is for the feed preparation system, with the rest being the dryer and offgas/condensate handling systems.

The Grand Junction office is currently preparing operating procedures and training modules for use with the Sandia unit. The total estimated cost of this work, plus project management expenses for the fabrication, is $400,000. Depending on the similarity of the Sandia unit to the final Hanford design, it is possible that much of the training and operating material being prepared for Sandia could also be utilized for the Hanford operation.

Please let me know if you need additional information. We will be very happy to work with you in any way we can to assist in meeting Hanford's waste treatment needs.

Sincerely,

Randy Richardson
MWTP Project Manager

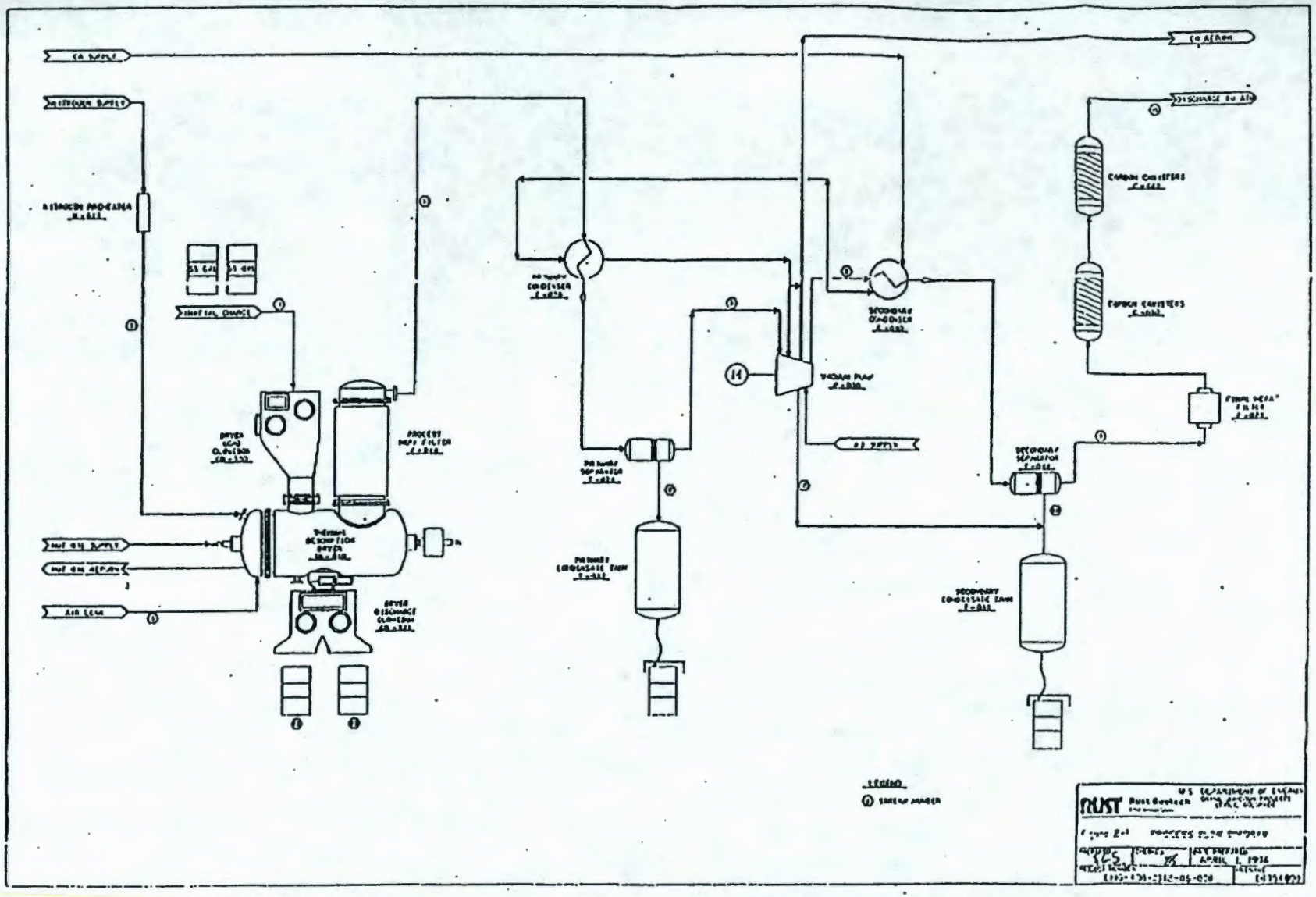
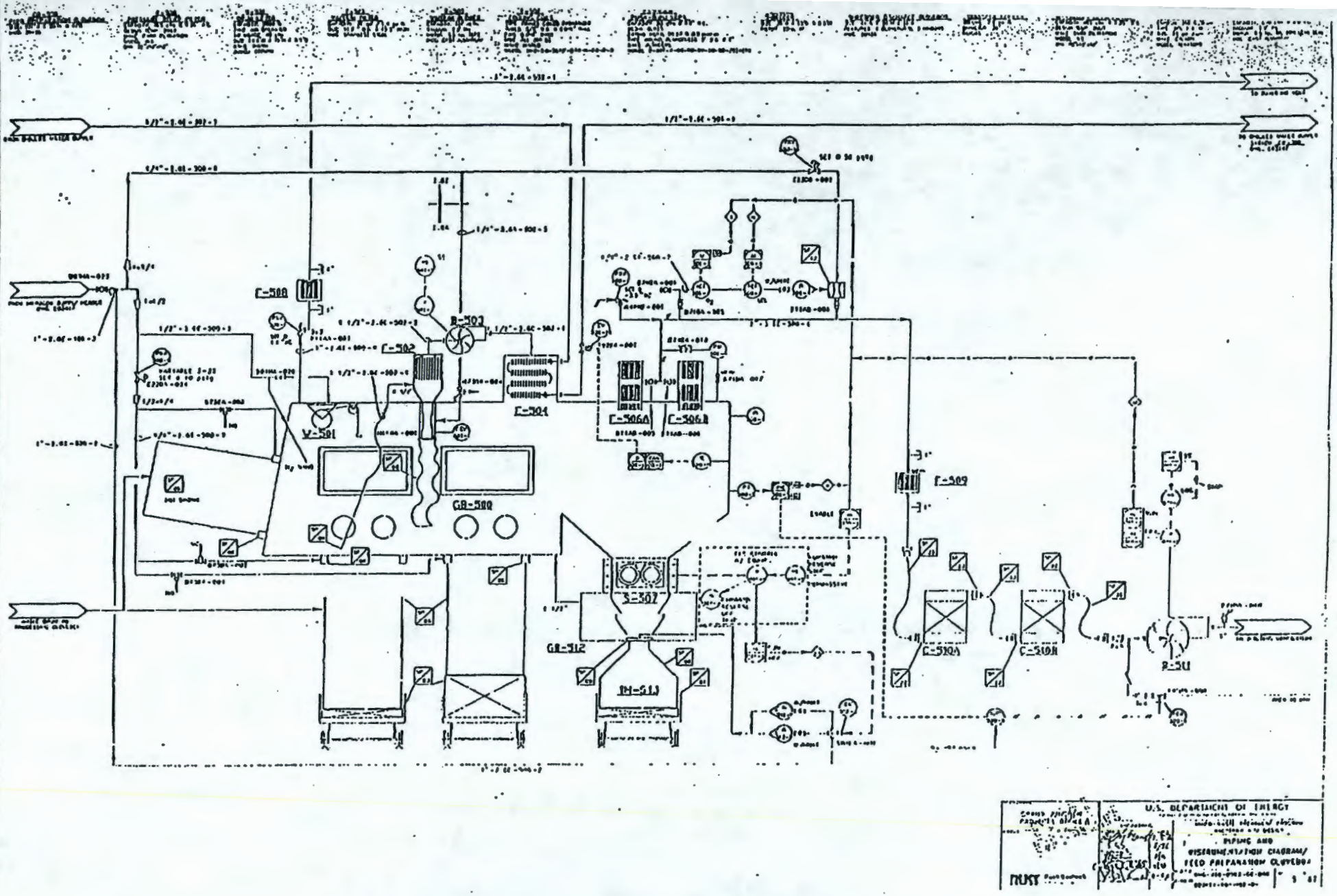


Figure 2-1. Process Flow Diagram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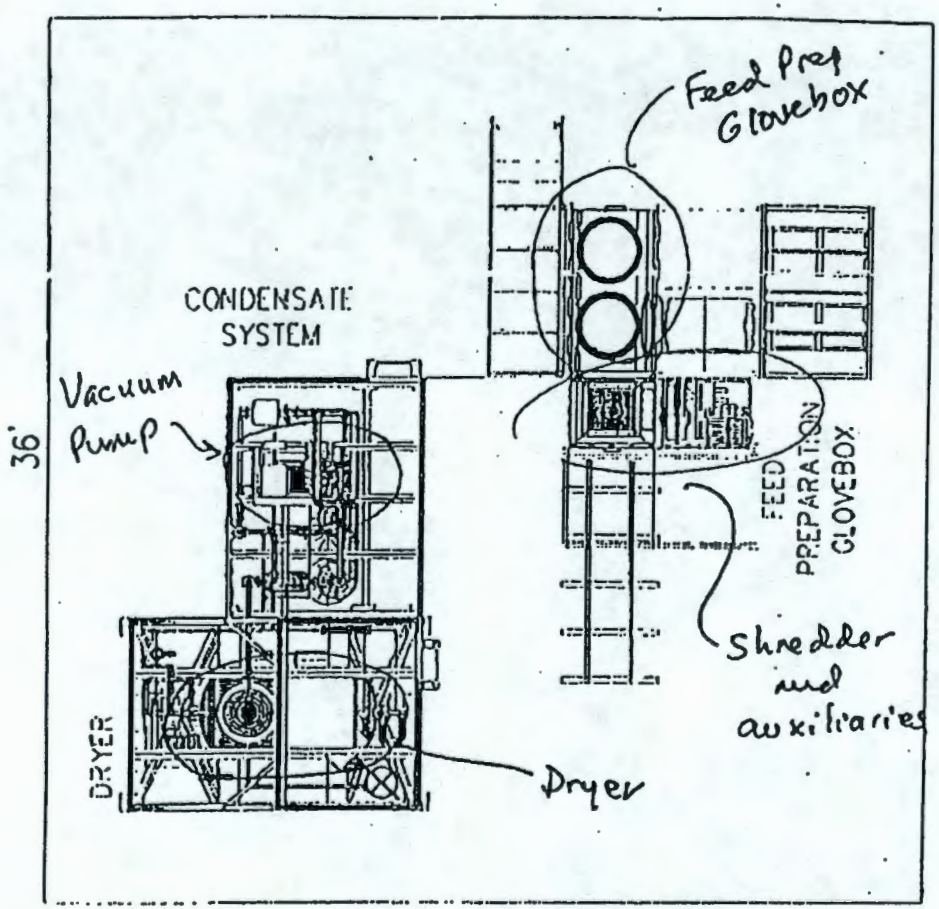


*Figure 1-1. General Arrangement Process Assembly*

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Letter from R Richardson, Mactec Environmental Restoration Services to D. R. Precechtel, Duke Engineering & Services Hanford, "VAC*TRAX Process," November 25, 1996

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