ONONDAGA LAKE PRE-DESIGN INVESTIGATION: PHASE IV WORK PLAN - ADDENDUM 4 MECHANICAL DEWATERING EVALUATION

Syracuse, New York

Prepared For:

Honeywell

5000 Brittonfield Parkway
Suite 700
East Syracuse, NY 13057

Prepared By:

PARSONS

290 Elwood Davis Road, Suite 312
Liverpool, New York 13088
Phone: (315) 451-9560
Fax: (315) 451-9570

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1.0 INTRODUCTION

This addendum describes the objectives and procedures for bench-scale testing to evaluate the feasibility of using filter presses, belt presses, and centrifuges to mechanically dewater dredged Onondaga Lake sediment prior to placement in the Sediment Consolidation Area (SCA). Since the scope was not identified in the Onondaga Lake Phase IV Pre-Design Investigation (PDI) Work Plan, the details of the analyses to be performed are described in this document.

Representative SMU 1 and 6 samples collected but not utilized for the geotextile tube evaluation performed in August 2007 (i.e., Addendum 1 of the Phase III PDI Work Plan [Parsons, 2007]) will be used for the bench-scale testing described herein. The testing will be performed at Waste Stream Technology (WST) in Buffalo, New York.

This Phase IV Work Plan Addendum is organized as follows: first, the objectives of the evaluation are presented, followed by the remaining sample quantities associated with the SMU 1 and SMU 6 locations, and the procedure for sample preparation and testing. Finally, the data reporting is described.

2.0 OBJECTIVES

The purpose of the Phase IV PDI is to collect information required to conduct remedial design activities. The tasks discussed in this Work Plan addendum focus on performing bench-scale testing to evaluate the feasibility of using a filter press, belt press, and centrifuge to dewater dredged sediment from Onondaga Lake. Specifically, the objectives are as follows:

- Evaluate whether or not polymer is required to effectively dewater Onondaga Lake sediment from SMUs 1 and 6 using filter presses. The dewatering effectiveness will be evaluated based on filter cake consistency and the amount of total suspended solids (TSS) in the filtrate.
- If required, establish the preliminary estimates for polymer type(s) and dosage(s) to achieve the appropriate filter cake consistency and filtrate clarity when using filter presses to dewater Onondaga Lake sediment from SMUs 1 and 6.
- Provide a preliminary estimate of filter press sizing and cycle times based on currently assumed dredge rates for full-scale project dewatering operations.
- Evaluate the feasibility of using a belt press and centrifuge to dewater the Onondaga Lake sediment from SMUs 1 and 6 based on the filter cake consistency and filtrate clarity. It is assumed that polymer will be required for both the belt press and centrifuge.

- Establish the preliminary estimates for polymer type(s) and dosage(s) to achieve the appropriate filter cake consistency and filtrate clarity when using belt presses and centrifuges to dewater Onondaga Lake sediment from SMUs 1 and 6.

The specific tasks required to meet these objectives are described in Sections 3 and 4.

3.0 AVAILABLE SAMPLE

Previously collected samples have been stored in a refrigerator at WST since they were collected in July 2007. The remaining sample quantities associated with the SMU 1 and SMU 6 locations are as follows:

- ILWD Area A – four 5-gallon pails (as received) SMU-1
- ILWD Area B – two 5-gallon pails (as received) SMU-1
- OL-STA-60098 – two 5-gallon pails (as received) SMU-6
- OL-STA-60100 – two 5-gallon pails (as received) SMU-6

Although not anticipated, if it is established during testing that additional material is required from certain locations, additional samples will be collected in accordance with the procedures described in Addendum 1 of the Phase III PDI Work Plan (Parsons, 2007). If additional sediment collection is required, analytical testing of the filtrate will be considered and discussed with NYSDEC prior to implementation.

4.0 TEST PROCEDURE

Sample preparation and testing procedures for the 75-mm and 250-mm diameter press units, the belt press, and the centrifuge are described in the subsections that follow. WST will develop and implement the appropriate health and safety procedures (personal protective equipment usage, etc.) in accordance with their laboratory protocols.

4.1 Sample Preparation

Samples for each area/location will be prepared as follows:

- Homogenize the sediment sample.
- Perform percent solids by weight and as-received density testing on the homogenized sample.
- Add Onondaga Lake water to the sediment to create a slurry that is approximately 10% by weight, which is the anticipated solids content during hydraulic dredging.
- Screen the slurry through a #4 and #200 sieve to replicate debris removal, coarse screening, and hydrocyclone separation. The #200 sieve is consistent with the anticipated hydrocyclone output. Record the percent retained on the #4 and #200 sieves.

- Perform percent solids by weight testing on the material passing through the #200 sieve.

4.2 Filter Press – 75-mm Diameter Unit

After the sample has been prepared, approximately 1 liter will be used to perform initial filter press testing using a 75mm diameter lab press unit (see Figure 1) as follows:

- Run test for approximately 45 minutes with a final pressure up to 225 psig (pounds per square inch gauge) or until a clear filtrate reaches 0.01 gallons per minute per square foot (gpm/sf).
- Record the flowrate of filtrate and change in pressure during the lab press run. At the end of the run, record the total filtrate volume.
- Measure and record filtrate TSS in accordance with SM2540G/EPA160.2.
- Record observations regarding the filtrate and filter cake.
- Perform percent solids by weight and density testing on the filter cake, and record the results.

Results from this initial testing will be used to establish whether or not polymer addition is required to achieve the desired filtrate (i.e., high clarity/low TSS) and filter cake characteristics. This initial without-polymer testing will be performed for each location/area (i.e., two from SMU 1 and two from SMU 6).

If it is established that polymer(s) are necessary to optimize press performance, jar testing will be conducted. The optimum type(s) and dosage(s) of polymer will be determined based on observations during jar testing. Specifically, the formation of a pin floc is the desired result. In addition, the performance of the polymer over a range of dosages will be evaluated to establish how sensitive the material is to the dosage, which will be an indicator as to the flexibility that could be expected in a full-scale operation.

A 1-liter slurry sample will be prepared as described in Section 4.1 with the selected polymer type(s) and dosage(s). This sample will undergo the same testing in the 75-mm diameter filter press as described above for the without-polymer sample. The number of tests performed will be determined based on the results. The objective of this portion of the testing is to identify polymer type(s) and dosage(s) that can effectively dewater the SMU 1 and SMU 6 samples in a filter press. The same criteria as indicated above will be used to evaluate the effectiveness.

If the objectives listed in Section 2.0 are met using the results from the 75-mm diameter filter press testing, additional filter press testing will not be required (specifically, if the filtrate has a TSS of less than 100 ppm and the filter cake solids is greater than 50% solids, additional filter press testing will not be required). Otherwise, testing with a 250-mm diameter filter press will be performed.

4.3 Filter Press – 250-mm Diameter Unit

If required based on the results from testing described in Section 4.2, slurry samples will be prepared for testing in a 5 chamber center-feed, four corner filtrate discharge 250-mm test press (See Figure 2 – drawing depicts a 100 psig unit, but a 225 psig is available and very similar in size to this unit). Similar to the 75-mm unit, the procedure is as follows:

- Run test for approximately 60 minutes up to a feed pressure of 225 psig or until a clear filtrate reaches 0.01 gpm/sf.
- Record flowrate and change in pressure during testing. At the end of the run, record the total filtrate volume.
- Measure and record filtrate TSS in accordance with SM2540G/EPA160.2.
- Record observations regarding the filtrate and filter cake.
- Perform percent solids by weight and density testing on the filter cake, and record the results.

4.4 Belt Press

Using slurry prepared as described in Section 4.1, jar testing will be performed to identify an effective preconditioning polymer type(s) and dosage(s) specifically for a belt press application. A schematic of the belt press is provided in Figure 3, and the procedure for the testing is as follows:

- Place polymer-conditioned slurry on the horizontal gravity drainage section of the belt press simulator, where filtrate will drain from the slurry and the material will enter the pressure zone of the unit. Once the material is sandwiched between two belts, the rollers will squeeze out filtrate and discharge the filter cake.
- Record the total filtrate volume at the end of the run.
- Measure and record filtrate TSS in accordance with SM2540G/EPA160.2.
- Record observations regarding the filtrate and filter cake.
- Perform percent solids by weight and density testing on the filter cake, and record the results.

4.5 Centrifuge

Using slurry prepared as described in Section 4.1, jar testing will be performed to identify an effective preconditioning polymer type(s) and dosage(s) specifically for a centrifuge application. A picture of the centrifuge is provided in Figure 4, and the procedure for testing is as follows:

- Place polymer conditioned slurry into a series of vertically mounted cone-bottomed glass tubes on the circumference of the centrifuge. Operate the unit until the slurry

separates into two phase (i.e., the concentrated material on the cone bottom [i.e., centrate solids or filter cake] and filtrate).

- Record the total filtrate volume at the end of the run.
- Measure and record filtrate TSS in accordance with SM2540G/EPA160.2.
- Record observations regarding the filtrate and filter cake.
- Perform percent solids by weight and density testing on the filter cake, and record the results.

5.0 DATA REPORTING

After completion of the bench-scale dewatering testing program, a data summary report will be prepared and submitted to NYSDEC. Spreadsheets containing test results and observations during testing (e.g., presence of NAPL in the filtrate and odors during testing) will be included in the report, along with a written summary of the results, photographs, conclusions, and if necessary, recommendations for future testing.

6.0 REFERENCES

Parsons. 2007. Onondaga Lake Pre-Design Investigation: Phase III Work Plan – Addendum 1 Geotextile Tube Evaluation – Bench-Scale Testing. Syracuse, New York.

FIGURES

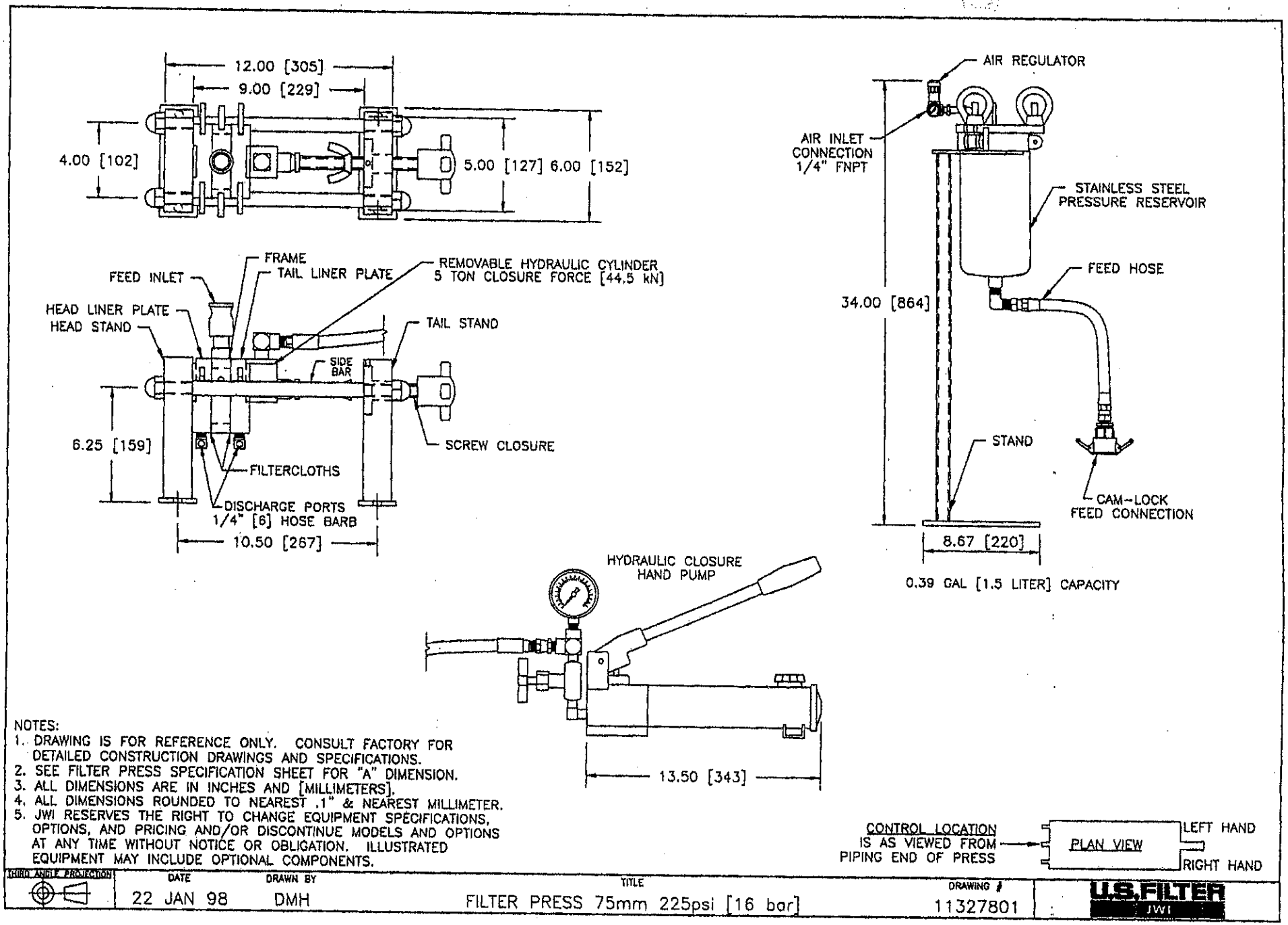
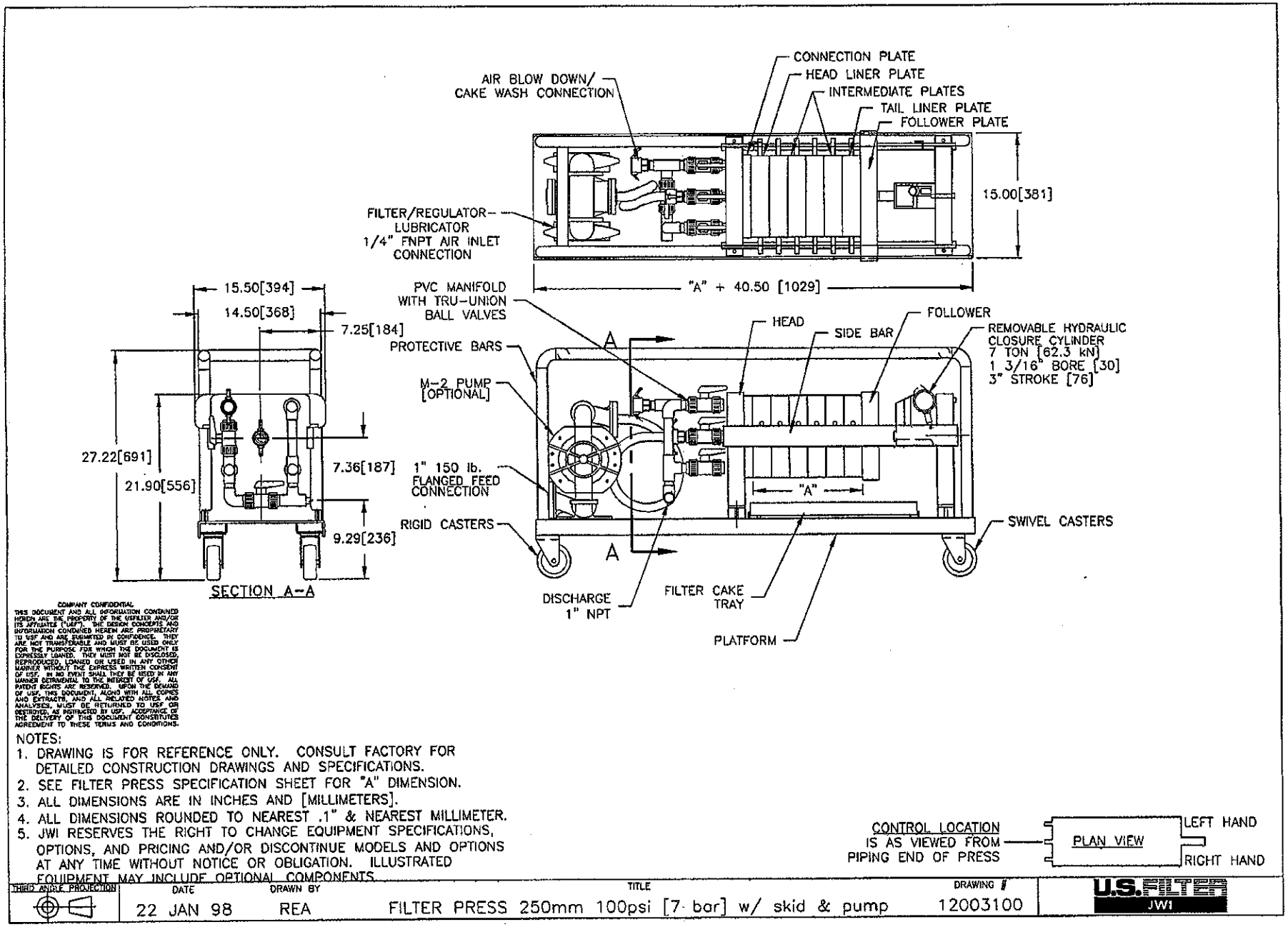


Figure 1 75-mm Filter Press



NOTES:
1. DRAWING IS FOR REFERENCE ONLY. CONSULT FACTORY FOR DETAILED CONSTRUCTION DRAWINGS AND SPECIFICATIONS.
2. SEE FILTER PRESS SPECIFICATION SHEET FOR "A" DIMENSION.
3. ALL DIMENSIONS ARE IN INCHES AND [MILLIMETERS].
4. ALL DIMENSIONS ROUNDED TO NEAREST .1" & NEAREST MILLIMETER.
5. JWI RESERVES THE RIGHT TO CHANGE EQUIPMENT SPECIFICATIONS, OPTIONS, AND PRICING AND/OR DISCONTINUE MODELS AND OPTIONS AT ANY TIME WITHOUT NOTICE OR OBLIGATION. ILLUSTRATED EQUIPMENT MAY INCLUDE OPTIONAL COMPONENTS.

CONTROL LOCATION IS AS VIEWED FROM PIPING END OF PRESS — PLAN VIEW — LEFT HAND / RIGHT HAND

THIRD ANGLE PROJECTION	DATE	DRAWN BY	TITLE	DRAWING #
	22 JAN 98	REA	FILTER PRESS 250mm 100psi [7 bar] w/ skid & pump	12003100

U.S. FILTER JWI

Figure 2 250-mm Filter Press

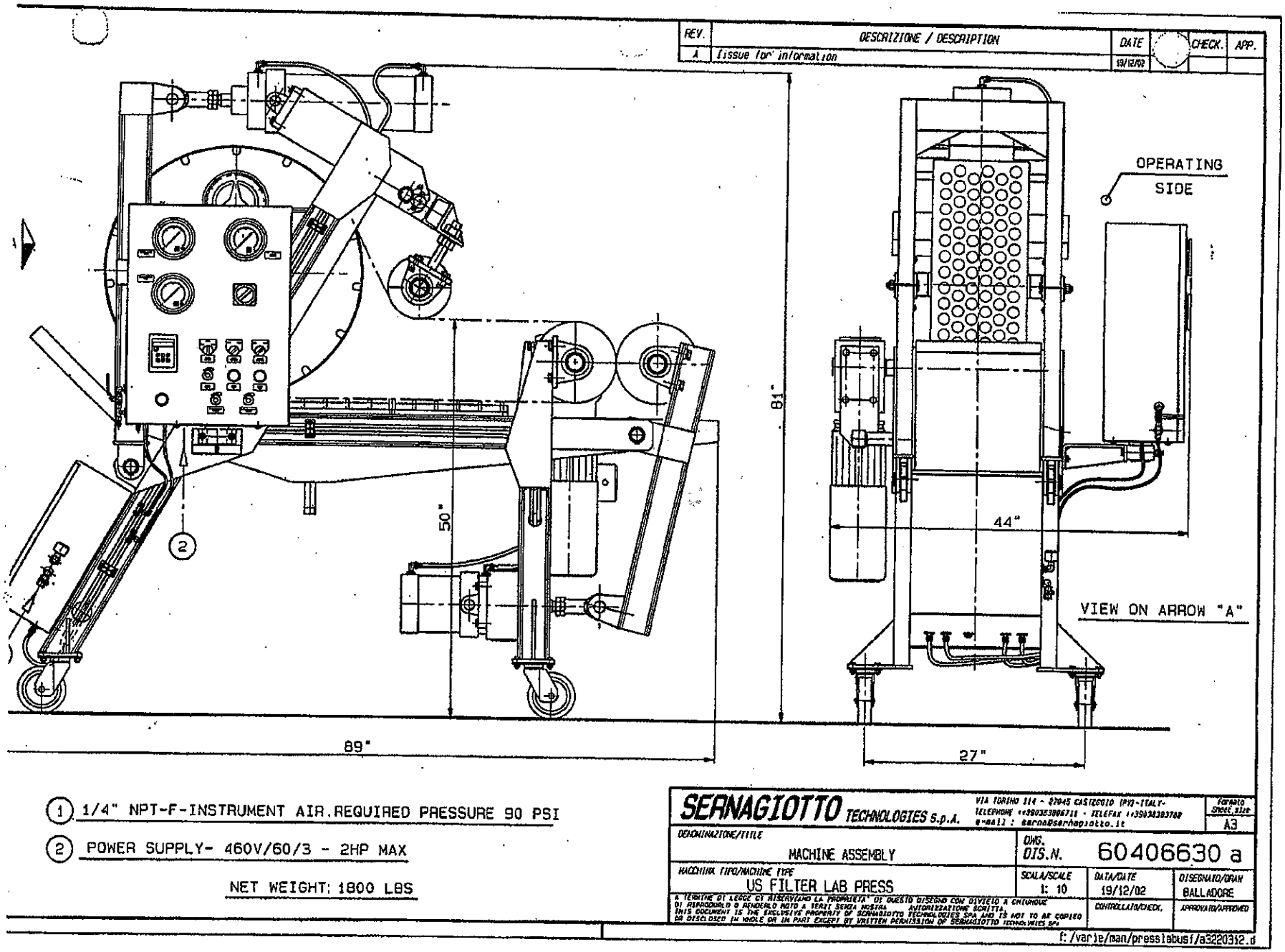


Figure 3 Belt Press

Figure 4 Centrifuge