U. S. Army Corps of Engineers
Solids Handling
Checklist

Installation Name	_____
Site Name / I.D.	_____
Evaluation Team	_____
Site Visit Date	_____

This checklist is designed to facilitate the performance evaluation of solids dewatering systems used for maximizing the solids content of sludge and sediment requiring disposal. It is divided into the following sections:

1) Evaluation team composition
2) Typical treatment objectives
3) References
4) Data collection requirements
5) Performance analysis calculations
6) Evaluation of operations and maintenance
7) Typical performance problems
8) Alternatives for possible cost savings
9) Supplemental notes and data.

The checklist provides suggestions for information gathering, and space has been allowed to record data and notes from the site visit. Supplementary notes, if required, should be numbered to correspond to the appropriate checklist sections.

1) Evaluation Team Composition

The following disciplines should be included in the evaluation team for the metals precipitation treatment system.

- Process Engineer (site visit, treatment system evaluation)
- Cost Engineer (cost of alternatives)
- Regulatory Specialist (define disposal alternatives)

2) Typical Treatment Objectives

Solids dewatering is typically used to remove excess water from sludges generated by chemical precipitation of metals (e.g., cadmium, chromium, copper, lead, nickel, zinc), dewatering biological sludges treating wastewater or groundwater, or dewatering sediments.

Verify that the treatment objectives established when the dewatering system was designed and installed are clear and still valid.

Operation and maintenance costs for sludge dewatering and disposal, can require a significant financial commitment over the long term. Therefore, efforts should be made to implement actions that will minimize these costs.

3) References

Coordinate this checklist with the Process Instrumentation and Control System, Liquid Piping Systems, Chemical Feed and Storage Systems, and Metals Precipitation checklists. The following reference may also be helpful:

CEGS 11360 [1]: Plate and Frame Filter Press System

ETL 1110-3-457[2]: Plate and Frame Filter Press

Note the existence of any pertinent operations and maintenance manuals.

_____

4) Data Collection Requirements

a) Record the nameplate information from each piece of mechanical equipment (e.g., presses, pumps, mixers) for future reference.

_____

_____

b) Sketch the process flow diagram (PFD), including valves and instrument locations, on the back of this sheet or on a separate sheet.

4.1) General Treatment Process

The following information is needed to assess the performance of the treatment process. Record the appropriate units with each value.

a) Treatment Requirements—Target metals or other contaminant concentrations which require special disposal requirements:

Contaminant (e.g., chrome, lead)	Regulatory Std. (mg/L or mg/L)	Dry Sludge Conc. (mg/L or mg/L)	Other Data

c) Number and types of units:

___ Filter Press(es) ____ Belt Filter Press(es) ____Other (explain)

Operating Pressure: 100 psi._____ 225 psi._____ Other

Feed pH: _____ Feed Temperature:

Materials of construction:

Plates: Type: _____ Number:

Filter Cloth: _____ Diaphragm: _____

Number of Cycles per Week/Per Unit

Volume Treated per Cycle (Cubic Feet, Pounds)

d) Piping to Units (air/sludge), indicate unusual materials of construction, size, or conditions *(PVC is not recommended for high pressure sludge or above grade air piping)*:

_____

_____

e) Feed Solids being dewatered, sludge feed and cake percent solids:

Metals Precipitation ____ Biological ____ Other

_____

(Refer to Table A-4/A-5 in ETL 1110-3-457 for typical performance; coordinate with Metals Precipitation Checklist)

f) Is any portion of the flow being recirculated? Where and why is this being done?
(Note: Show the recirculation stream on the PFD)

_____
_____

4.2) Chemical Addition Processes

a) Conditioning Chemicals added:

Chemicals/Use	Dosage (mg/L)	Point of Application/Shelf Life/Volume Stored
ferric chloride		
lime		
polyelectrolytes		
alum		
caustic		

b) Have alternative treatment chemicals been periodically evaluated for comparison with the existing process performance?

_____
_____

c) Briefly describe chemical conditioning feed systems. Check to ensure that the shelf life of reagents are not exceeded. Verify that the feed system's calibration is checked and maintained. Check to ensure that the polymer delivery system is working efficiently.

_____
_____

(Note: Experience has shown that polymer feeds operate better under flooded suction conditions rather than static lift. Flooded suction conditions prevent air entrainment thereby reducing or eliminating the potential for polymer caking.)

4.5) Sludge Handling

a) Have alternate disposal alternatives been investigated?

_____
_____

b) Ancillary Equipment; Pretreatment such as mixing or thickening; sludge dryer or other equipment (Explain use of each):

c) Filtrate Volume Generated, Thickener Draw-Off, Solid and Chemical Concentrations, How is each treated:

5) Performance Analysis Calculations

Is the equipment utilization rate the same as intended by the designer?

_____
_____

6) Evaluation of Operations and Maintenance

a) Is there proper access for maintenance? Explain.

_____
_____

b) Any unusual observations regarding the control system, odors, the plate shifter, safety equipment, hydraulic system, piping material or corrosion, weir tank capacity, drip trays, plate washer, acid wash system, structural frame or press frame, spare parts inventory, and history of unusual repairs. Verify the equipment is maintained per manufacturers recommendations.

_____
_____

c) Check all process tanks and dewatering equipment for corrosion, punctures, or excessive wear. Note any deficiencies.

_____
_____

d) Verify that instruments, controls and alarms are working. Are there provisions to notify an operator of malfunctions when the unit is unattended?

_____
_____

e) Verify that the sludge cake is being sampled and analyzed in accordance with the sampling and analysis plan designed to assess the performance of the unit. Determine if any additional monitoring is needed to properly evaluate the operating conditions.

_____
_____

7) Typical Performance Problems

a) Is piping adequately supported:

b) Is there adequate Air Supply to the Units (pumps/press)?

c) Check all process tanks for corrosion, punctures, or excessive wear. Tanks include equalization, and effluent tanks. Explain any deficiencies below.

_____
_____
_____

(Note: Process piping, valves, and pumps are covered under separate checklists.)

d) Is piping adequately supported?

e) Adequate Air Supply to Unit (pumps/press):

f) Excess or Inadequate Press Capacity Present?

g) Pumping: Poor Suction Conditions caused by Thick Sludge or Inadequate/Excessive Head Conditions, or Sludge Piping Plugging Problems?

_____

8) Alternatives for Possible Cost Savings.

a) Options for Disposal/Sale of Equipment, or Modification of the Process?

b) Is off gas treatment still required if present?

c) Can savings be realized by changing the test methods/frequency?

d) Is the sludge properly classified under RCRA? Is this sludge really hazardous?

e) Can the sludge be sent to another disposal facility?

9) Supplemental Notes and Data

There are _____ pages of supplemental notes and data attached to this checklist.

---

[1] CEGS: USACE Guide Specifications for Construction, available at www.usace.army.mil/inet/usace-docs/

[2] ETL1110-3-457 Engineering Technical Letters available at www.usace.army.mil/inet/usace-docs/