ELGIN
SEPARATION SOLUTIONS

Polymer Injection / Dewatering

Colloidal and Ultra-Fine Solids Separation

Mining • Minerals • Water
Oil & Gas • Rendering • Trenchless
Renewables • Utilities • Industrials

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Dewatering Applications

Dewatering provides value for a number of key industries:

Dewatering can be a valuable tool in any situation in which recycling of the water is of value, when managing waste disposal costs are of value, or when regulatory compliance dictates.

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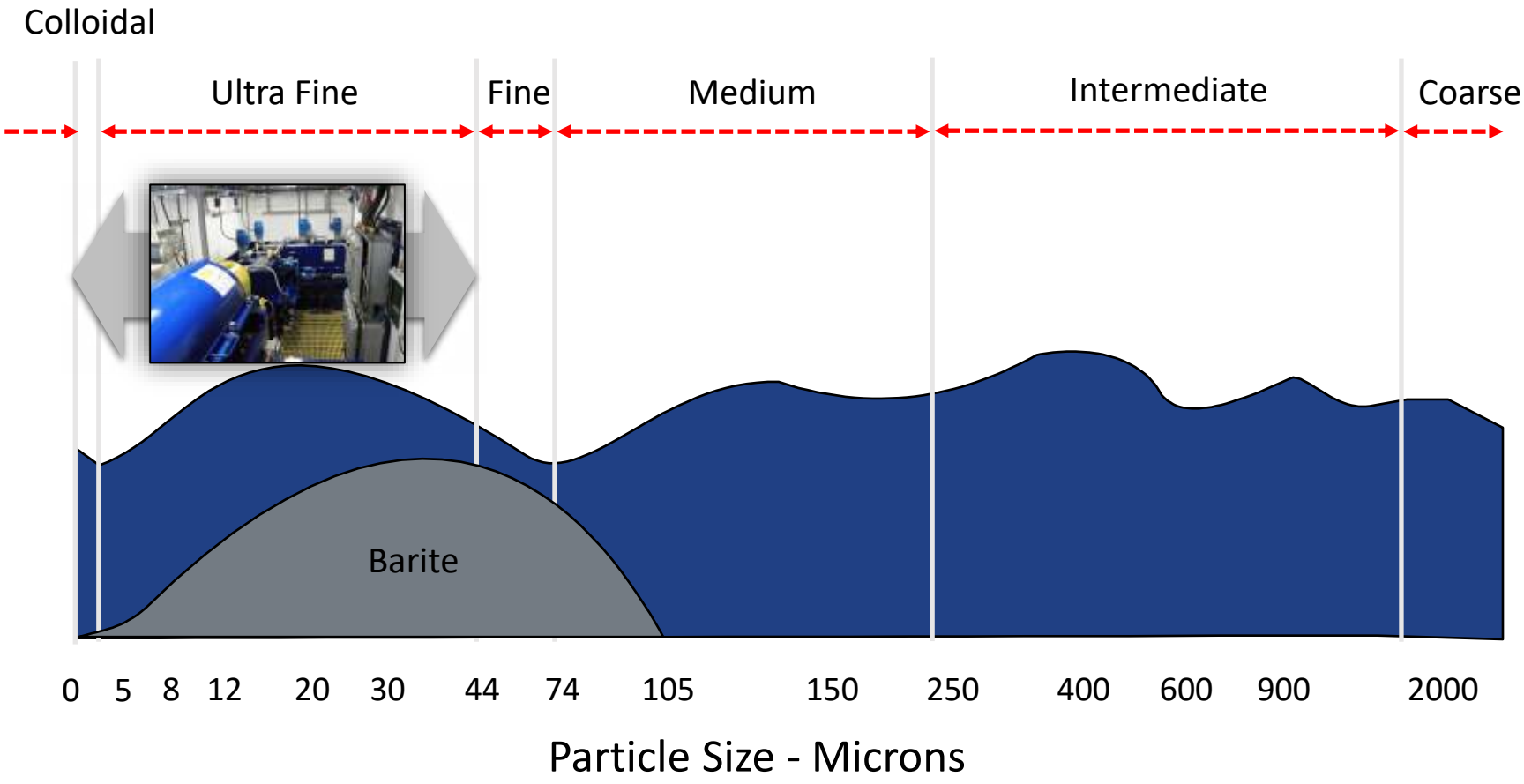
Dewatering Systems

Dewatering systems are designed to target colloidal and ultra fine solids.



Dewatering systems should only be deployed when pre-treatment of the fluid has been conducted through fine and coarse solids removal (i.e. shakers and centrifuges).

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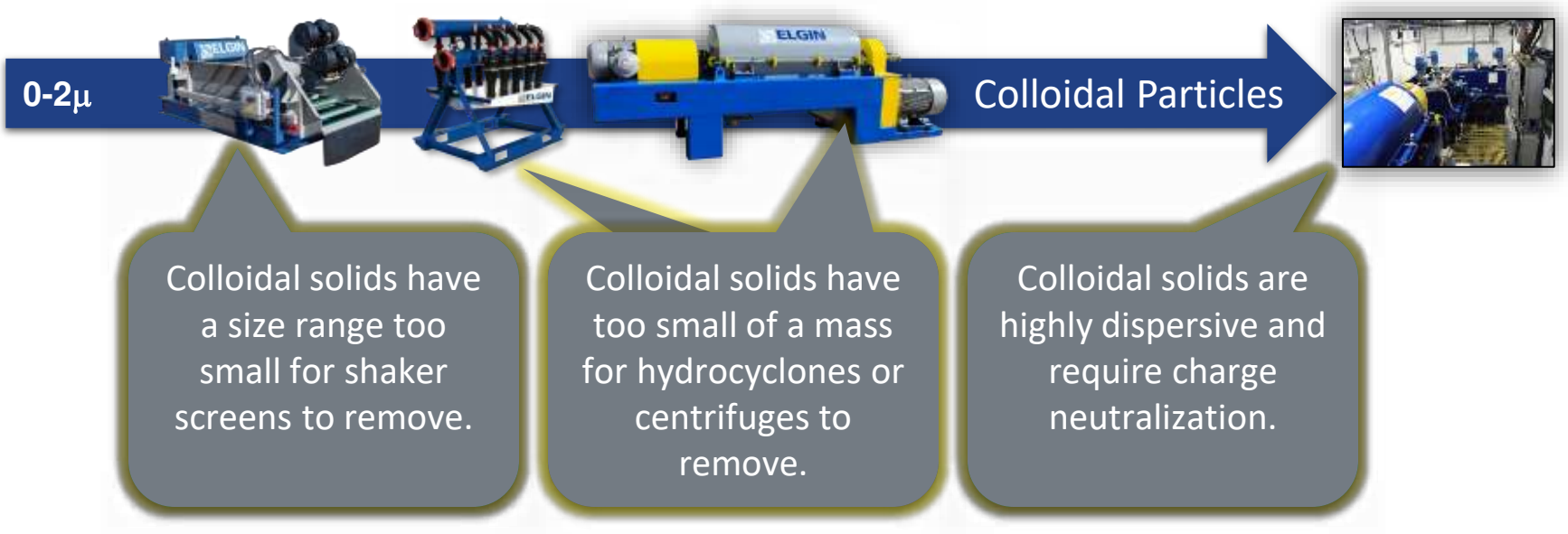
Dewatering Systems

Dewatering systems are a *complement* not an independent solution.



Polymer consumption geometrically grows with respect to the percentage of solids, and the particle size distribution of those solids, found in the feed.

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Dewatering Benefits

Dewatering presents a great deal of solids control advantages:

Discharge Compliance

Ability to achieve stringent discharge compliance. In many cases, the addition of a dewatering system enables “zero discharge” or “closed loop systems”. Also provides for improved site HSE.

Stackable Solids Discharge

When properly managed, dewatered solids are discharged at a stackable solid that can be land applied or disposed of as landfill cover in non-Sub-Part B landfills.

Raw Water and Fluid Recovery

When operated correctly, dewatering systems are capable of producing clean and recyclable water. For drilling application, this also means that drilling fluids can be infinitely recycled.

Improved Rate of Penetration

As the mud properties improve, so too does the rate of penetration for pipeline, drilling rig, foundation drilling, waterwell drilling, and geothermal loop drilling. This lowers total project costs.

Eliminates Open Pits

As a closed-loop system, dewatering systems allow sites to operate without open pits. This therefore reduces the site location footprint and the environmental impact.

Dewatering systems lower raw material costs, lower waste disposal costs and lower the rigs environmental footprint.

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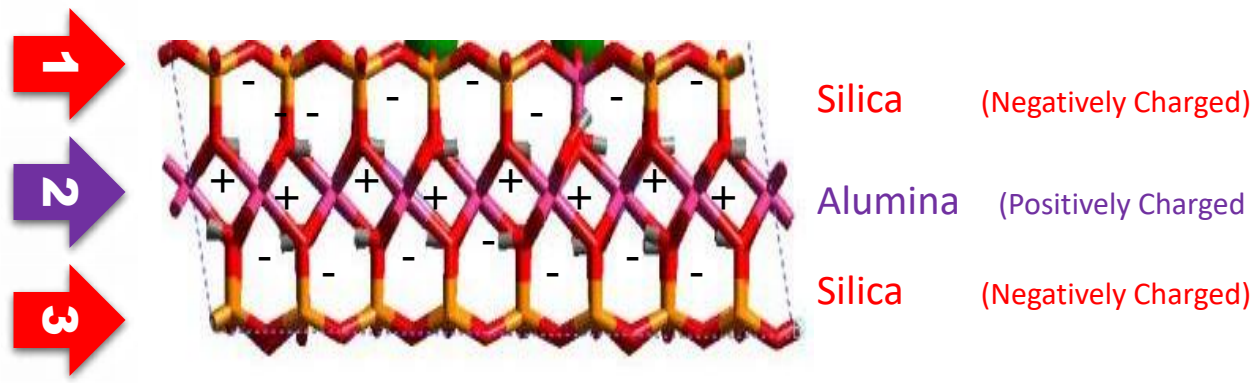
Defining Colloidal Reactivity

Understanding reactivity requires an understanding of clay structure.

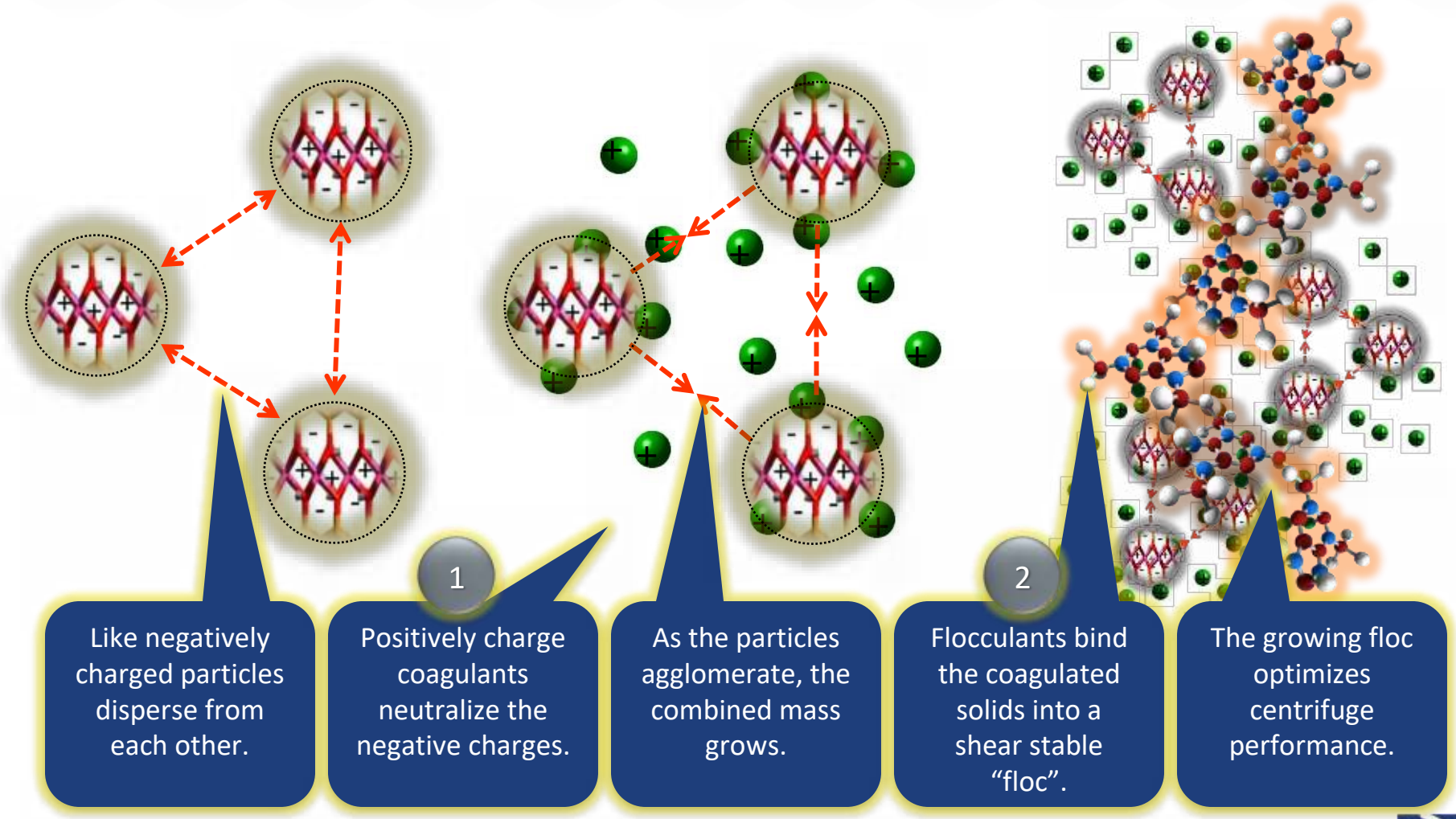
Clays are composed of 3 layers that exist in thin sheets.



The key is to understand that the external surface of clay material is negatively charged, therefore shielding the positively charged interior.

Dewatering System Chemistry

Dewatering typically involves a two-step coagulation/flocculation process.



Due to the variety of reactive soils, bench tests must be performed to identified the appropriate coagulant, flocculent, and respective dosages.

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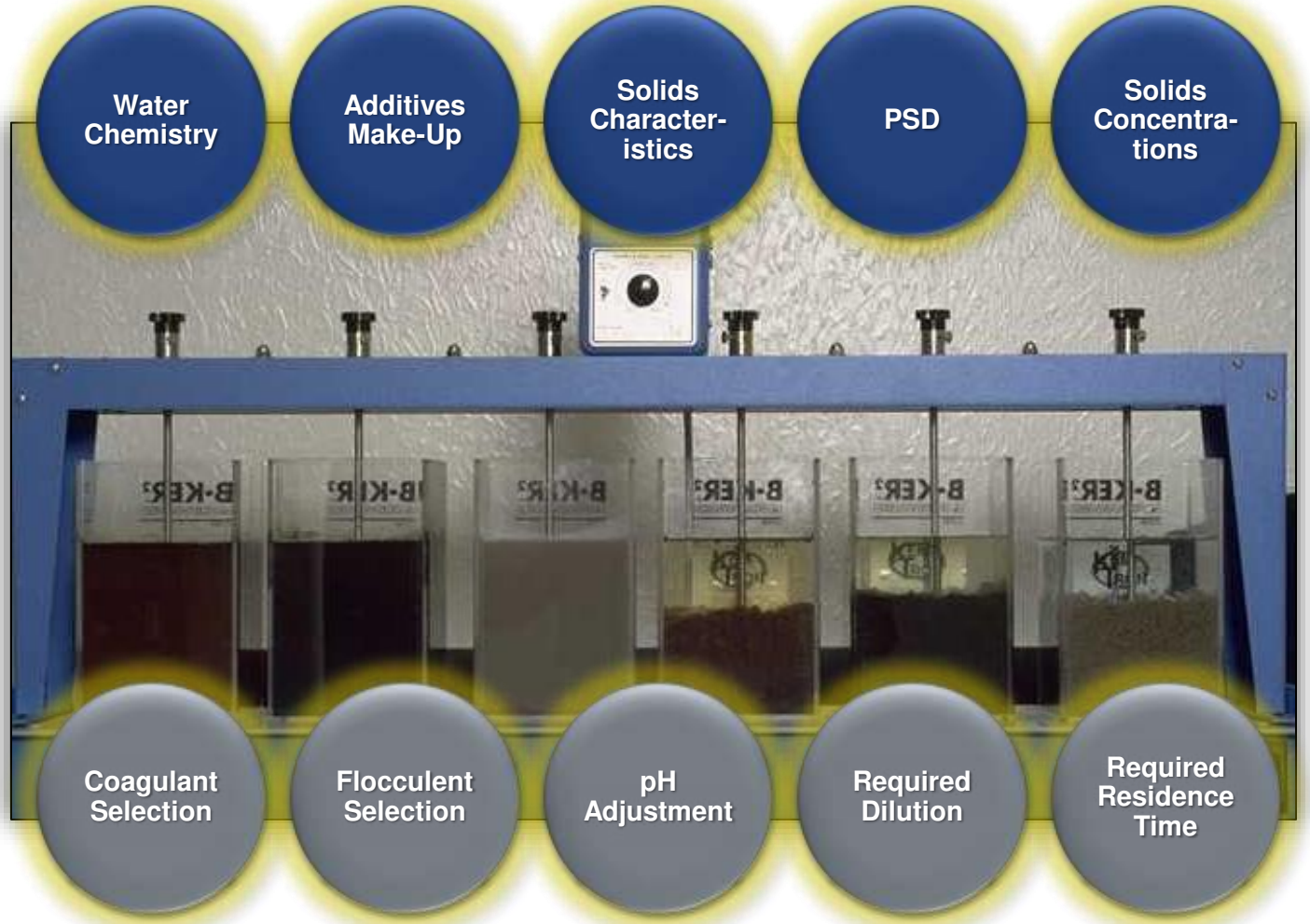
Dewatering System Chemistry

Suspended solids characteristics vary from one application to the next.



The results generated in one location can not be cross-applied to the next location.

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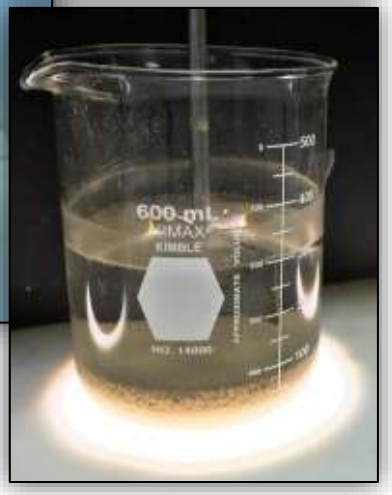
Dewatering System Chemistry

A shear-stable floc results in a chunky mass that will sink.

Likely to Produce Poor Results



Likely to Produce Poor Results

If the floc floats or appears highly granular and small, then a different polymer chemistry should be considered.

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Dewatering System Chemistry

The difference between organic and inorganic polymer options.

Organic Polyacrylamide Polymers

Advantages

- Higher activation potential.
- NSF drinking water capable.
- No effect on effluent pH.
- No effect on effluent dissolved metals content.
- No pH pre-treatment required.

Disadvantages

- Susceptible to freezing.
- Shorter expiration dates.
- Relatively more expensive.

Inorganic Metal-Based Polymers

Advantages

- Not susceptible to freezing.
- Relatively less expensive.
- Indefinite shelf-life.
- Easier to handle.

Disadvantages

- More difficult to activate.
- May effect effluent pH.
- May effect effluent dissolved metals content.
- Commonly requires pH pre-treatment.

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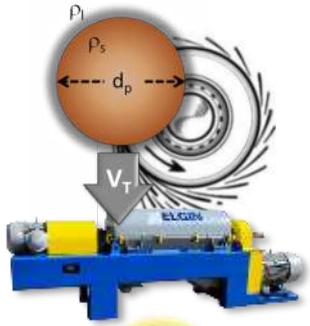
Dewatering Systems

Designed to target colloidal solids via a six-step process:



1 Feed Pre-Treatment

Dewatering system feed may require pre-treatment (i.e. acid and/or dilution). This may also include coarse solids separation.

2 Chemical Coagulation

By using inorganic or organic chemicals (polymers), coagulants are added to de-stabilize (neutralize) the dispersive negative charges on the particles.

3 Shear Mixing

Mixing is performed via high shear to achieve thorough mixing of the coagulant in the colloidal fluid. Upon mixing, the particles will start to stick together.

4 Chemical Flocculation

By using inorganic or organic chemical (polymers), flocculants are added to the coagulated stream to agglomerate the solids.

5 Low Shear Floc Mixing

Flocculent will create bridges between destabilized particles. Low shear mixing of flocculent to prevent floc break up. Large, dense flocs are created.

6 Centrifuge Separation

Aggregated solids (“flocs”) are removed via high-speed centrifuge.

Besides a centrifuge, the above process requires a series of chemical injection pumps, mix tanks, and mixing systems.

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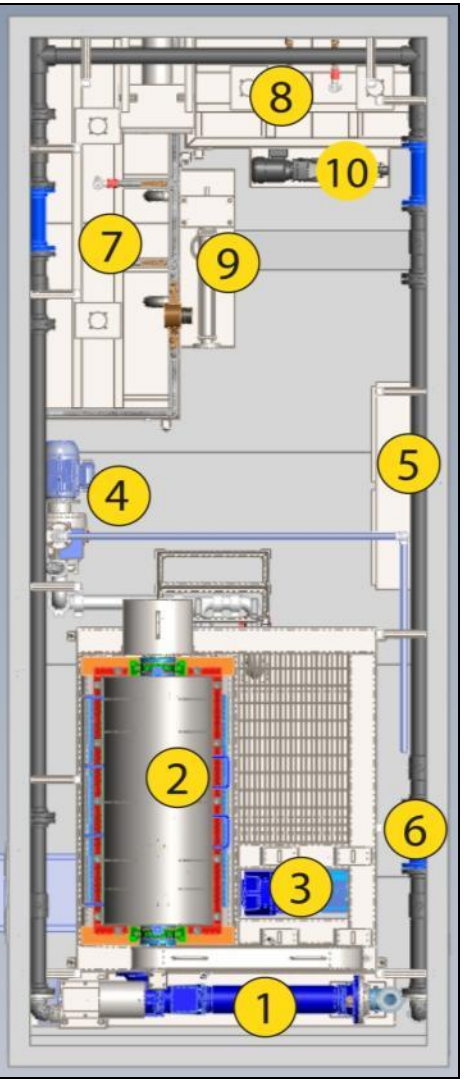
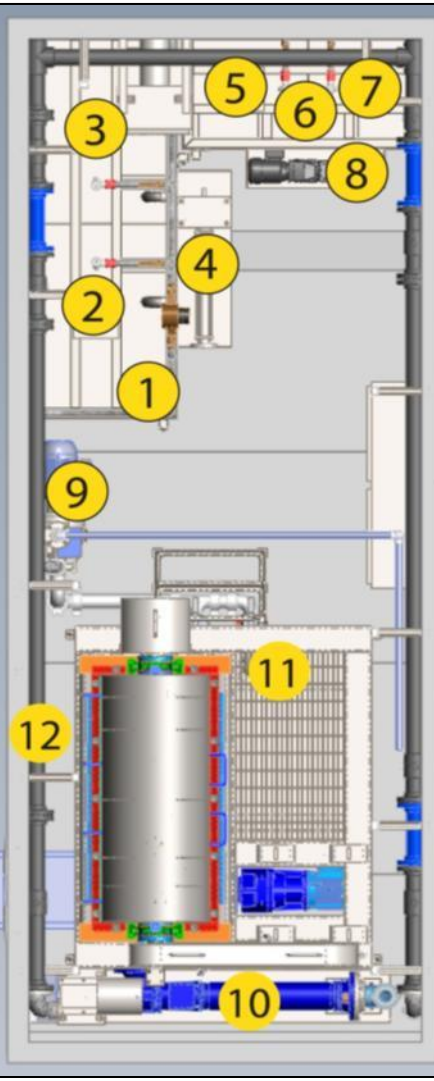
Dewatering Systems

Key components of a complete dewatering system (without pH adjustment).

1. 200-GPM Progressive Cavity Feed Pump
2. KT-1448 Decanter Centrifuge
3. 14” Shafted Screw Conveyor Gear Box and Motor
4. Dilution Tank Manifold
5. Control Panel with Touch Screen Interface
6. Static In-line Mixer (3)
7. Partitioned Polymer - Flocculent Tank
8. Partitioned Polymer - Coagulant Tank
9. Flocculent Progressive Cavity Feed Pump
10. Coagulant Progressive Cavity Feed Pump
11. 14” Solids Discharge Screw Conveyor



1. Flocculent Tank
2. Flocculent Mixer
3. Flocculent Mixer
4. Flocculent PC Pump
5. Coagulant Mixer
6. Coagulant Tank
7. Coagulant Mixer
8. Coagulant PC Pump
9. Dilution Pump
10. PC Feed Pump
11. Dilution / Transfer Tank
12. Dewatering Manifold



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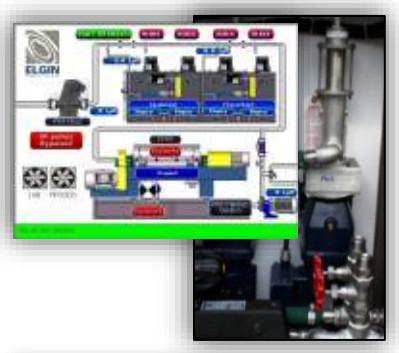
Dewatering Systems

Keys variables to successful dewatering:



Feed Pre-Treatment

Proper pH adjustment, coarse solids separation, and dilution may be required to ensure proper chemistry. Solids concentration should be no larger than 1% with solids no larger than 50 microns.

Precision Measurement

Control of chemical addition is the most important variable to control. Over-dosage can be as detrimental to insufficient polymer dosage. The dosage must be directly tied to percent solids and flow rate.

Proper Shear Mixing

Proper mixing of chemicals and shear of polymers is necessary to ensure complete chemical reactions. Polymers require help to make engagement with all suspended solids receptors.

Residence Time

Chemicals (specifically polymers) require enough residence time to achieve the desired treatment results. Too much residence time can shear the polymer bonds and insufficient residence time will risk a proper reaction.

Besides a centrifuge, the above process requires a series of chemical injection pumps, mix tanks, and mixing systems.

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Dewatering System Options

Each dewatering system should be custom built to ensure maximum effectiveness:

Effluent Controls

Ensure effluent compliance with the addition of turbidity meters, automatic control values and in-line water quality analysis tools.

HMI Interface and PLC Control

To maximize system control and therefore the effectiveness of the polymers used, add HMI controls. Full system monitoring can be provided with remote control and automation.

Modular Container

Dewatering systems can be built into a number of modular structures, including 53’ Semi-Trailers, 10’, 20’ and 40’ Shipping Containers, and on DOT approved trailers, with air conditioning and full insulation.

Wet Laboratory Workshop

Have a complete wet lab added to the dewatering system to monitor retorts, pH, and correct polymer dosages. Wet labs can also have automatic sampling systems and on-line data-logging.

The options considered should be carefully considered relative to the application and treatment goals.

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Dewatering System Packages

10’ Turn-Key Package Dewatering System with 9” ESS-936HD2 Decanter Centrifuge.

Each Turn-Key System Can be Configured with a Host of Climate Control, Remote Operation, Automation, and Integration Options.

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Dewatering System Packages

20’ Turn-Key Package Dewatering System with 9”, 14” or 16” Decanter Centrifuge.

Each Turn-Key System Can be Configured with a Host of Climate Control, Remote Operation, Automation, and Integration Options.

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Dewatering System Packages

20’ Turn-Key Package Dewatering System with 9” or 14” Decanter Centrifuge.

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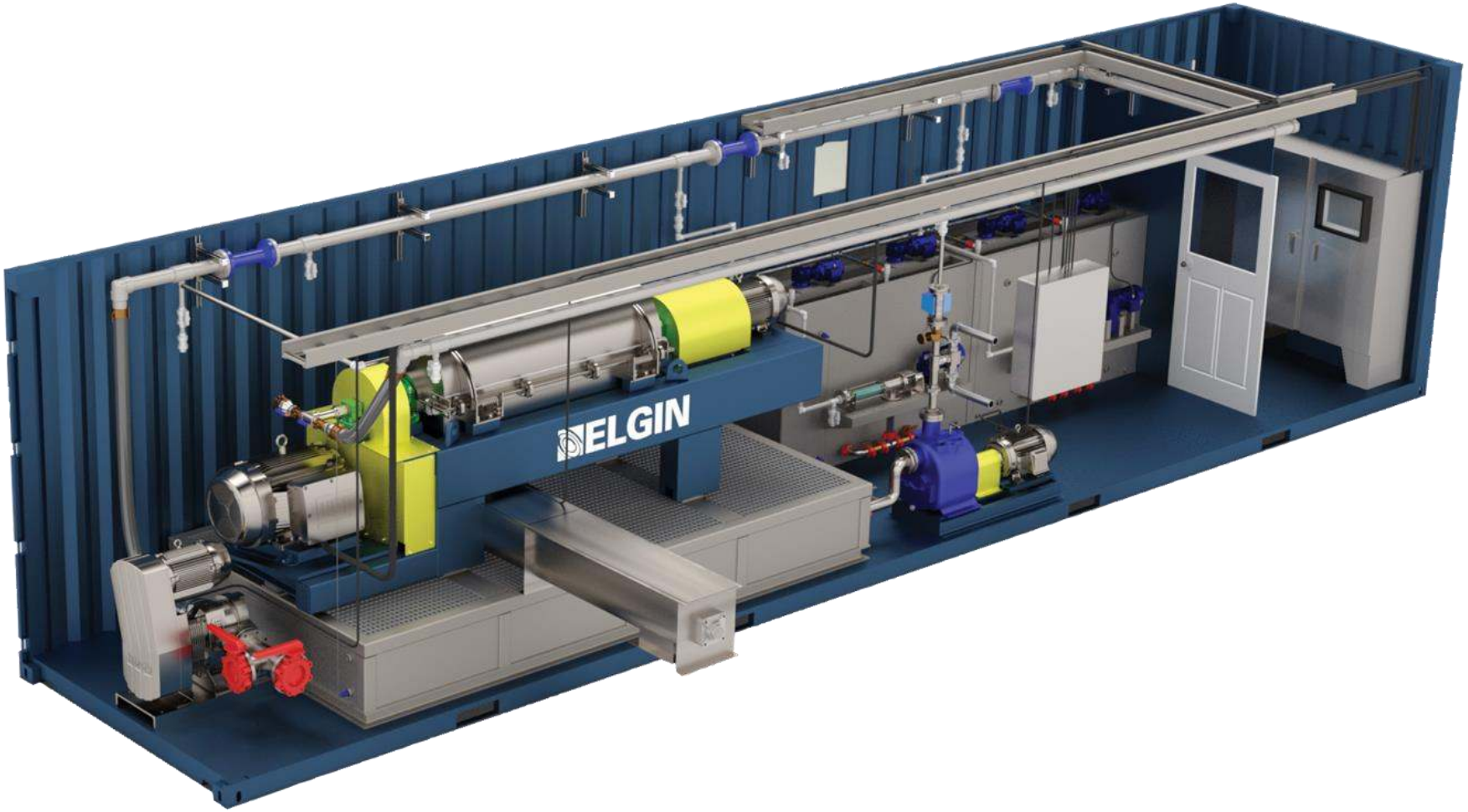
Dewatering System Packages

40’ Turn-Key Package Dewatering System with 16”, 19” or 22” Decanter Centrifuge.



Each Turn-Key System Can be Configured with a Host of Climate Control, Remote Operation, Automation, and Integration Options.

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Dewatering System Packages

Trailer-Mounted Polymer System with 19” ESS-1967HD2 Decanter Centrifuge.

Each Turn-Key System Can be Configured with a Host of Climate Control, Remote Operation, Automation, and Integration Options.

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Polymer Injection Systems

Containerized Polymer Mixing Systems Designed to Complement Centrifuges.

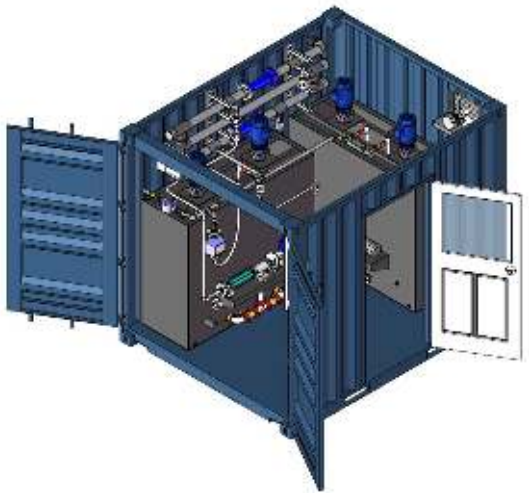
10 Foot Polymer Injection Systems

20 Foot Polymer Injection Systems

Customers that already have decanter centrifuges in operation can add a chemical mixing system for fluid dewatering.

Polymer Injection Systems

10’ Polymer Injection Package with 9”, 14” or 16” Centrifuges.



Each Turn-Key System Can be Configured with a Host of Climate Control, Remote Operation, Automation, and Integration Options.

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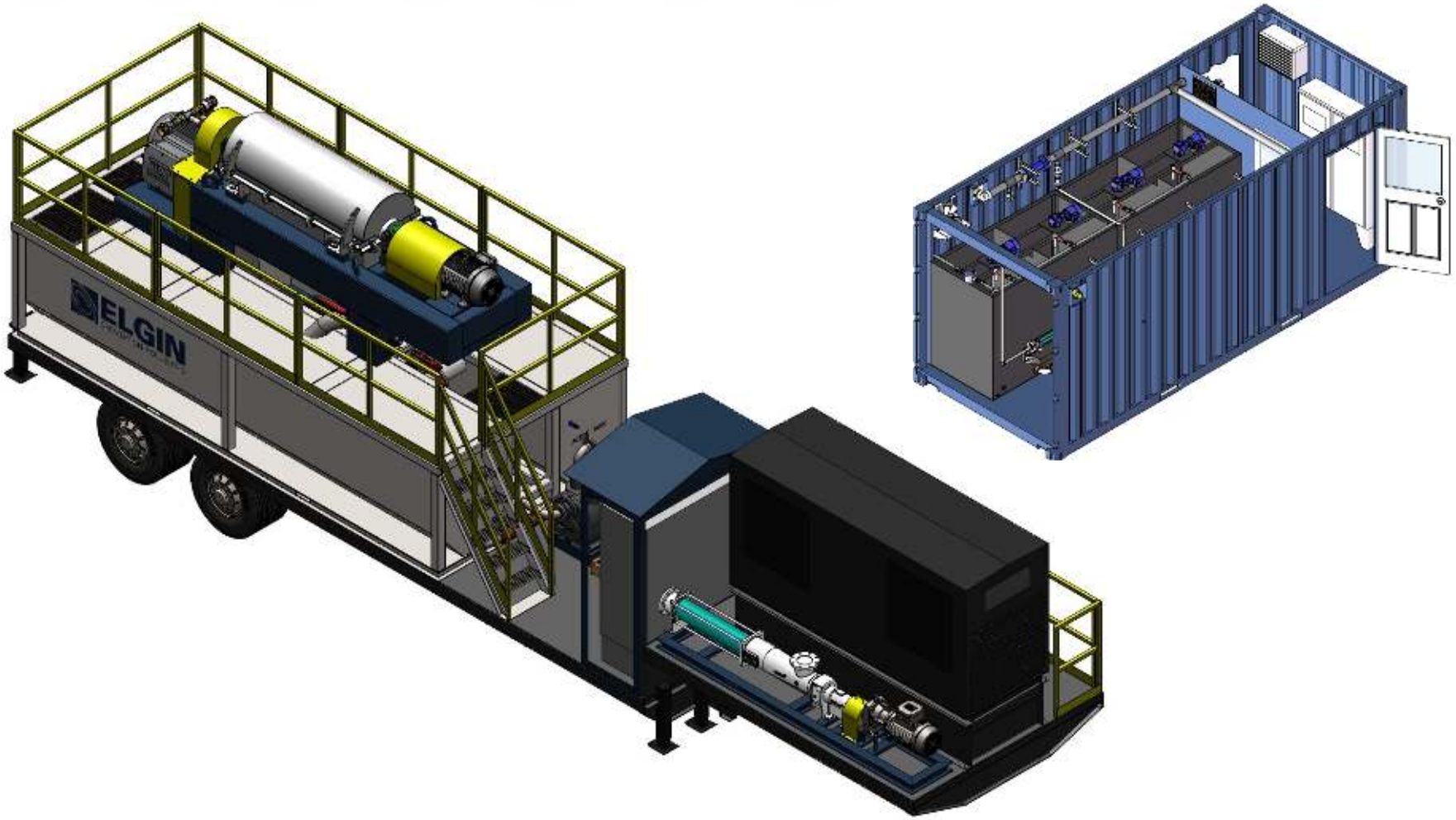
Polymer Injection Systems

Trailer-Mounted 19” ESS-1967HD2 Decanter Centrifuge with 20’ Injection Package.



Each Turn-Key System Can be Configured with a Host of Climate Control, Remote Operation, Automation, and Integration Options.

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Dry Polymer Systems

Containerized Dry Polymer Prep, Mixing and Injection Systems.

Dry Polymer Mix Systems are Popular in Colder Climates or When Polymer Consumption is High.

YouTube Videos

Containerized Dry Polymer Prep, Mixing and Injection Systems.

https://www.youtube.com/watch?v=Y0E6ioTLg2E.
https://www.youtube.com/watch?v=qb5hGTak0d8.
https://www.youtube.com/watch?v=SlejXEQ0Dv4.
https://www.youtube.com/watch?v=INTvuEs8Tcc.
https://www.youtube.com/watch?v=-ccdAp0_J5U.

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