Willard Says……

WHY DREDGE

when there are many other simple, observable and easy-to-understand ways to move sand and gravel from one point to another?

Because, *assuming that the required conditions are present*, hydraulic transport i.e. pipeline dredging is the most efficient—that is to say; the lowest cost per ton—method to mine and move solids between points A and B.

Before you can enjoy the economic benefits that can be had by dredging we must understand and assess the effects of the weasel words in the above statement: "*assuming that the required conditions are present*". What conditions?

These conditions:

Water must be available to serve as the transport medium. Usually, the dredge floats in a pond or small lake created by the removal of the sand and gravel.

Florida potash producers reap the economies of hydraulic transport, often through miles of pipeline, without using a conventional dredge. They position a dredge pump on dry ground with its suction pipe extending into a nearby small pit where it takes in a slurry created by injecting water through high-pressure jets into dry solids that are dumped into the pit.

Pumpable Particles means that the majority of sand and gravel particles must be small enough to pass through the dredge system. A rule of thumb says that a dredge system can readily pass particles equal in size to one half the inside diameter of the discharge pipe.

Free-Caving Solids are most desirable. A sand and gravel deposit that behaves like a sugar bowl when a spoonful is removed is ideal. And rare. Solids banks that break off in relatively small clumps and slide down to the toe of the undercut bank are more common. Such deposits can also be dredge mined with ease.

Some solids banks are reluctance to cave-in. Tens of tons of material may break loose and tumble to the bottom at each occurrence. Clay layers, cementation or thin layers of rock or conglomerate serve to prevent the ideal condition we call free-caving. Such deposits are commonly dredge mined, however, a prudent operator will remain alert to move the ladder out of the way whenever a cave-in is eminent. Occasionally, the ladder may be stuck fast by cave-in material.

The most difficult-to-mine sand and gravel deposits are those that are very reluctant to cave-in. Near-vertical banks standing adjacent to excavated areas characterize such deposits. Small cave-ins are rare in such deposits with the result that production is usually poor and intermittent. If oversize is present in these deposits, conventional linear or rotary cutter dredges cannot loosen solids fast enough to support production.

Difficult-to-dig deposits require a linear cutter with our RASP attachment. This digging device loosens material at a prodigious rate so that dredge production can be maintained at a satisfactory rate.

Maximum Transport Distance depends on the economics of each installation. The length of pipeline that can be served by one pump—its "range"—varies depending on the discharge pipe diameter, density of the slurry, average particle size of the solids and the vertical distance of the discharge point above the water surface. In general, an 8-inch pump can move 150 tph through 2,000 feet of pipe: a 12-inch dredge 300 tph through 3,000 feet.

When the capability of one pump is exceeded, another pump—a booster pump—can be added to extend the range. The procurement and operating expenses of additional boosters must be considered against the cost of moving the discharge point closer to the dredge.

Water-Solids Separation has to take place at the discharge end of the pipeline. Many sand and gravel dredge-mining operations use screens and a classifying tank to remove the desired solids particles from the slurry.

Others pump into settling pits where the solids settle out and the mostly clarified water overflows a weir. After the solids drain, they are carried by an endloader to final processing.

A bucket wheel can be used to filter the solids out of the slurry and deposit them on a conveyor.

Limited Depth refers to the maximum practical depth from which a hydraulic dredge can mine solids. We have delivered several ladderpump dredges that can mine to a depth of 120 feet and we can go deeper, however, the exposure to structural damage and large cave-ins increases with depth. Cave-ins are always a concern so the decision to go deep depends to a large extent on the nature of the deposit. Operating procedures such as moving frequently, benching—removing the solids in 30 to 40 foot deep layers—and short advances diminish the threat of cave-ins.

Now that the weasel words have been explained, and assuming that the above conditions fit your situation, it is time to consider the benefits of hydraulic dredge mining.

Safety addresses the danger of land based mobile mining machines operating near the unstable edge of an open pit. When mining from shore the tendency is to reach "just a little bit more" or "move just a little bit closer". All too often this results in a cave-in and both man and machine end up in the water.

Fines retention refers to the difficulty of capturing a substantial portion of the small particles when using either a drag or excavator bucket. Fine particles that wash out of the bucket as it makes its pass through the water will continue to elude capture during successive passes and remain in the pit.

Simplicity refers to the capability of one man operating one, relatively simple machine to excavate and transport material from under water to some distant process point.

Operator friendly answers the need for relatively unskilled operators. Dredge automation relieves the operator of most tiring, repetitious tasks and facilitates high production.

Land-based mining typically requires several men and machines to excavate and transport material. Thinking of mining sand & gravel? Think DREDGE.

Comment, question, criticism, information on products mentioned? Contact willard@willardsays.com