

## Issue 1.

### **Scouring Velocity Issue:**

FKAA sole-sourced Enviro-One grinder pumps in their construction Specifications and designed their force main system to depend on the high head capability of that pump's semi positive displacement progressive cavity construction.

What was not considered is that that the specified E/One pump is only capable of a maximum 15gpm flow rate against zero resistance (no discharge pipe connected). Under favorable conditions, an 11gpm operating flow rate is realistic. See the pump curve for the CRWS specified pump in **Exhibit D**.

While an 11gpm flow rate is acceptable in the 1-1/4" pipe from the grinder pit (pump wet well/holding tank) this flow is grossly inadequate to achieve a scouring velocity in the 2" minimum-sized collector force main in the roadway. A flow of 11gpm in a 2" HDPE DR11 pipe as specified will move at only 1.22 ft/sec- well below the minimum scouring velocity. The specified grinder pump is incapable of independently achieving a scouring velocity in the 2" and larger collection force mains and may be incapable of achieving a scouring velocity in the 1-1/4" lateral pipe in some conditions. See **Exhibit X**.

The EPA publication **Wastewater Technology Fact Sheet, Sewers, Pressure** (EPA 832-F-02-006 September 2002), states:

*"No minimum velocity is generally used in design, but GP [grinder pump] systems must attain three to five feet per second at least once per day."*

Many CRWS force mains as designed will never meet this EPA-defined daily scouring velocity, ever.

This is especially disturbing when one considers that the CRWS islands have a sizable percentage of "snowbird" homeowners (up to 50% in some areas) who winter in the Keys and spend their summers in more northern states. Consequently, many residential streets are sparsely populated in the summer months when temperatures are at their peak and gasses are most likely to form in the force mains. Added to the complication of few homes pumping to the force main is the fact that the specified E/One grinder pump has a non-adjustable internal level control system that is designed to pump from the E/One grinder pit for less than one minute at a time. The pump pit specified for the CRWS contains 9.7 gallons between pump on and pump off levels. See **Exhibit P**. The likelihood of two pumps pumping at the same moment is minimal, and if they did it would not be for long and would not move accumulated solids, grease, and gas pockets very far along the force main. See **Exhibit O** (False or Misleading Statements on Permit Applications) for additional discussion and examples of force mains that will not achieve scouring velocity.

The **Design and Specification Guidelines for Low Pressure Sewer Systems** (1981) DEP, .states

*"A pressure sewer is normally designed to flow full at all times. In smaller installations there may be relatively long periods of time where no flow will occur. During these periods an opportunity exists for deposition of grease or solids and gas accumulation. The results of these no-flow periods can pose serious problems if subsequent hydraulic conditions are unable to scour the depositions and transport those materials and gas accumulations out of the system."*

*"Gas accumulations in pressure mains can increase the dynamic head resisting the PU [pumping unit]"*

*"Adequate preventive measures should be taken to avoid the accumulation of gases and air in pressure sewer mains. These include: .....3. Proper design to prevent undue retention time of wastes in pressure sewer where biological and chemical activity may produce gases."*

The portion of force main at the end of one of the many cul de sacs will never experience a scouring velocity of flow and it is likely that many hundreds or even thousands of feet of force main also will not, due to the short run times of the E/One grinder pump. In the heat of summer with many vacant homes on some streets, it is likely that retention times may be excessive. See **Exhibit T** for a plan of a typical street that will be affected.

Besides being poor engineering practice, implementing a waste water collection system using force mains fed by pumps that will only produce about half of the velocity needed to prevent accumulations and blockages violates F.A.C. DEP regulations and Florida Building Code:

**Florida Plumbing Code Section 712.4** states that the minimum capacity of a sewage pump feeding a 2” pipe shall be 21gpm. (The specified E/One grinder pumps about 11gpm under good conditions. See **Exhibit D** )

**Recommended Standards for Wastewater Facilities** ("Ten State Standards") (incorporated by reference **62-604.300 (g) F.A.C.**), **Paragraph 49.1** requires a cleansing velocity of at least 2 feet per second at design pumping rates. See **Exhibit Q**.

**Design and Specification Guidelines for Low Pressure Sewer Systems (1981) DEP** (incorporated by reference **62-604.300 (j) F.A.C.**), **Part 4**. states that  
*“The minimum required peak design velocity for GP [grinder pump] systems shall be 0.8 m/s (2.5 ft/s).”* See **Exhibit R**.

The DEP Wastewater Collection System Permit Applications for the CRS islands falsely state  
“Minimum force main velocity is greater than 2 feet per second....” See **Exhibit O**. This is a violation of **62-604.130 (7) F.A.C.** See **Exhibit S**.

**62-604.600(4) F.A.C.** states “Permittees shall comply with applicable design/performance criteria contained in this chapter as part of the permitting standards under Chapter 62-4 F.A.C.”

**62-604.600(9) F.A.C.** states *“If, after review of Form 62-604.300(8)(a) and any supporting documentation, the Department determines that the applicant has not provided reasonable assurance that the construction, modification, expansion, or operation of the installation will be in accordance with applicable laws or rules, including rules of delegated local programs, the Department shall deny the permit or notify the applicant that the general permit cannot be used, as appropriate.”*

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