Evaluating the P Release from Ferric and Alum Residuals at the CT-SS Project

1.0 Background and Objectives

The Chemical Treatment – Solids Separation Demonstration Project has been operational since early June. Sixty-one experiments have been completed since that time using either Aluminum Sulfate or Ferric Sulfate to remove Phosphorus (P) from Everglades Nutrient Removal Project discharge waters. The system operated favorably during the first half of these experiments and effectively removed P below the discharge target of 10 μg/L during ten tests.

However, the second half of the experiments revealed that the CT-SS system added P to the waters being treated. After careful review of the data, it has been concluded that there is a possibility that solids accumulation, in the bottom of the flocculation tanks and the clarifiers, has occurred over the duration of pilot experiments. Over time, these solids in anoxic conditions, could have caused a P release back into the system. The following experiment is designed to evaluate this possibility and confirm that P contaminated water exiting the clarifiers is manifested in this process.

2.0 Methods and Materials

Five pairs of 20L, acid washed buckets will be filled with 4L of residuals from the pilot plants and 16L of low P clarifier effluent. Stored ferric and alum solids will be used to test existing solids at the South site. New ferric and alum solids will be generated to test solids from the North site. There will also be one control per location, containing 20L of low P clarifier effluent. The buckets will be covered with mesh screening and will be housed in the North site pilot trailer in the shade and at ambient temperature.

An experimental matrix is provided in the table below:

Bucket #	Sludge	Supernatant
1-A	4L ferric residuals from South site (stored)	16L of water from the South site clarifier
1-B	4L ferric residuals from South site (stored)	16L of water from the South site clarifier
2-A	4L alum residuals from South site (stored)	16L of water from the South site clarifier
2-B	4L alum residuals from South site (stored)	16L of water from the South site clarifier
3-A	4L ferric residuals from North site (fresh)	16L of water from the North site clarifier
3-B	4L ferric residuals from North site (fresh)	16L of water from the North site clarifier
4-A	4L alum residuals from North site (fresh)	16L of water from the North site clarifier
4-B	4L alum residuals from North site (fresh)	16L of water from the North site clarifier
5-A Control	No residuals	20L of water from the South site clarifier
5-B Control	No residuals	20L of water from the North site clarifier

3.0 Experimentation

The solid residuals will be tested for the following parameters at the beginning and at the end of the four-week experiment:

Total Phosphorus
Total Organic Carbon
Total Suspended solids
Volatile Suspended Solids
Inorganic Phosphorus Fractionation

Total Dissolved Phosphorus and Dissolved Oxygen samples will be taken from the buckets three times a week. The water taken out due to evaporation and sampling will be replaced with stored (frozen and thawed) clarified effluent from the initiation of the experiment.