

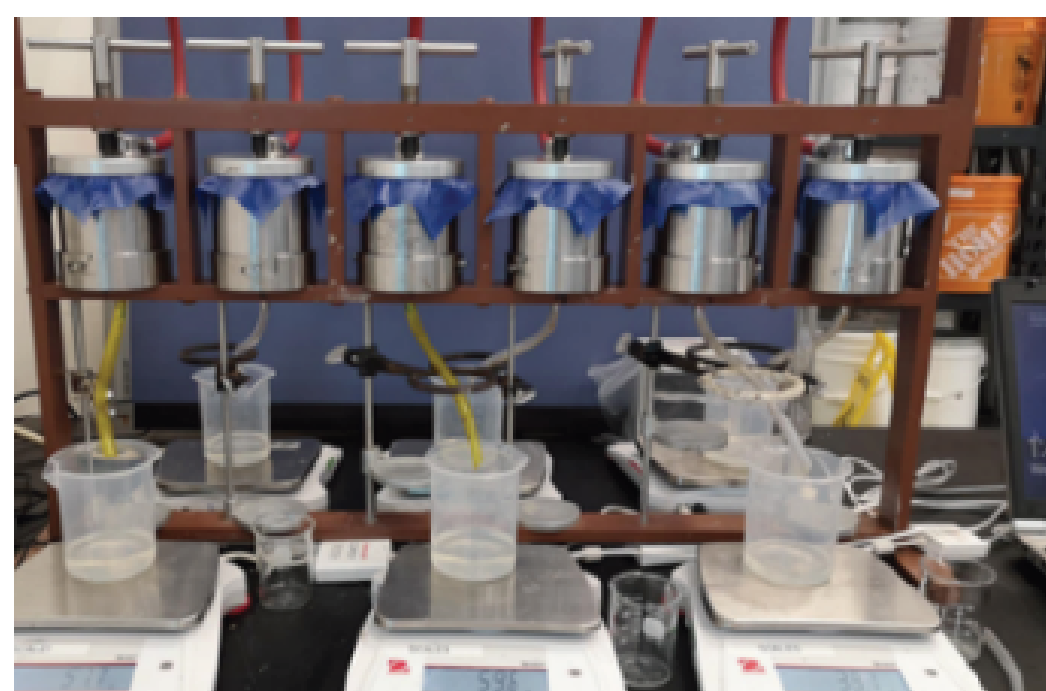
CHARACTERIZATION FLOW CHART FOR OIL SANDS FLUID TAILINGS

SUBSAMPLING & HOMOGENIZATION

Lab measurements are only as good as the samples taken. If a sample is not representative of the whole part being tested, the lab data is not representative. Samples typically arrive in 1 m³ totes and must first be subsampled into pails and then jars.



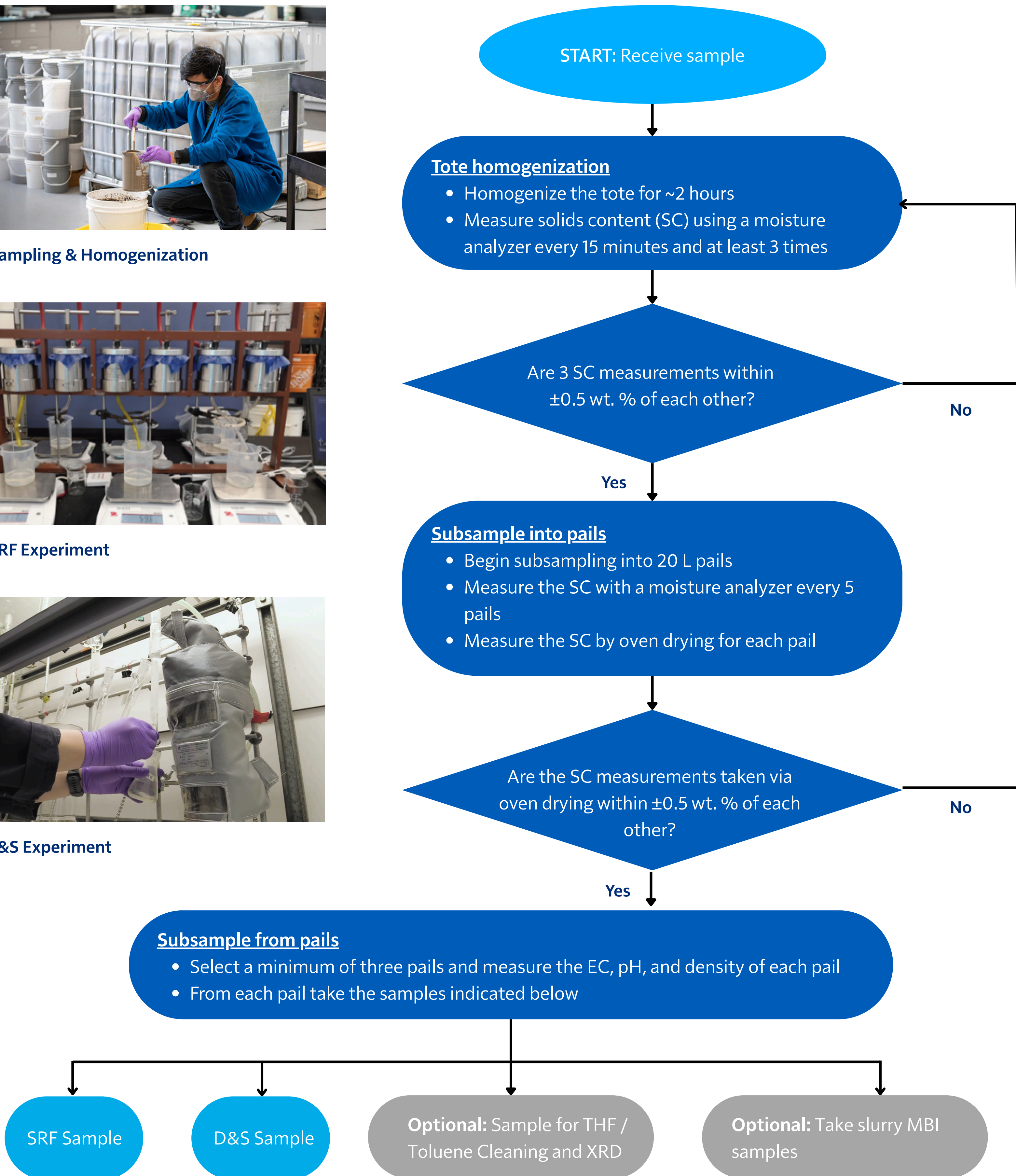
Sampling & Homogenization



SRF Experiment



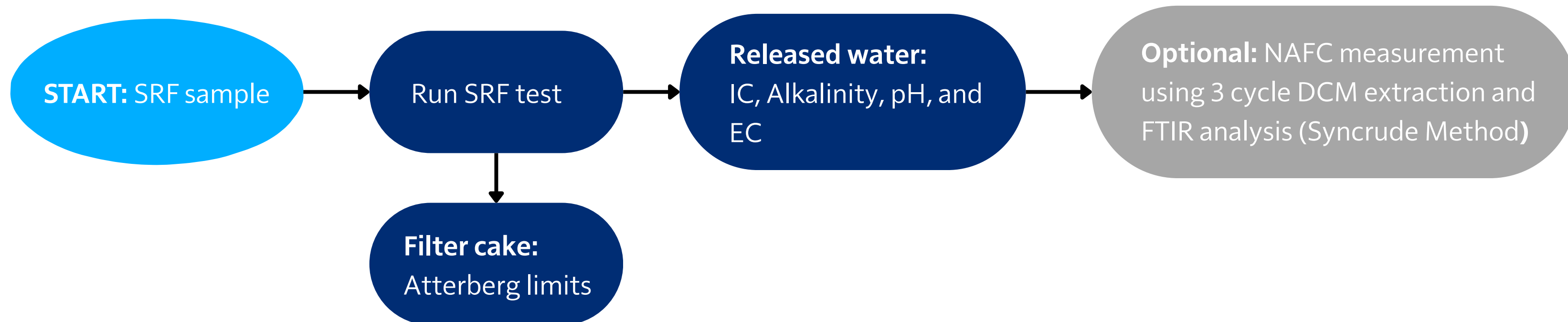
D&S Experiment



CHARACTERIZATION FLOW CHART FOR OIL SANDS FLUID TAILINGS

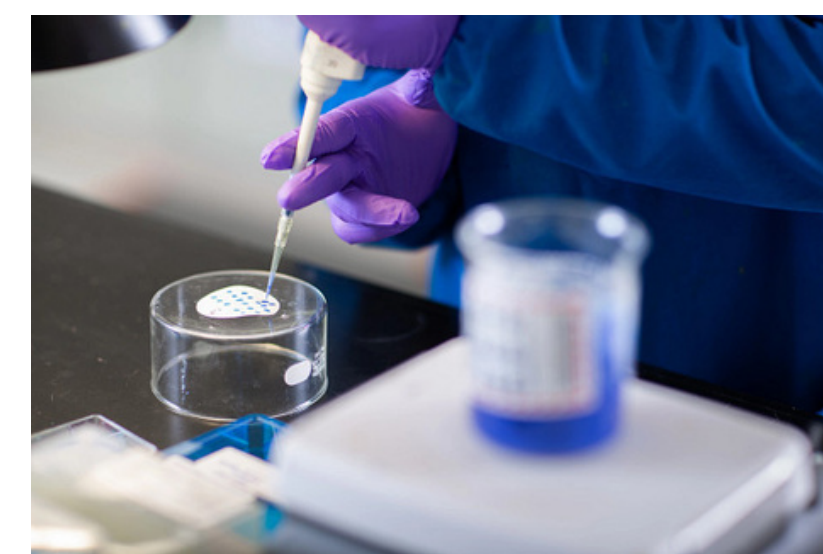
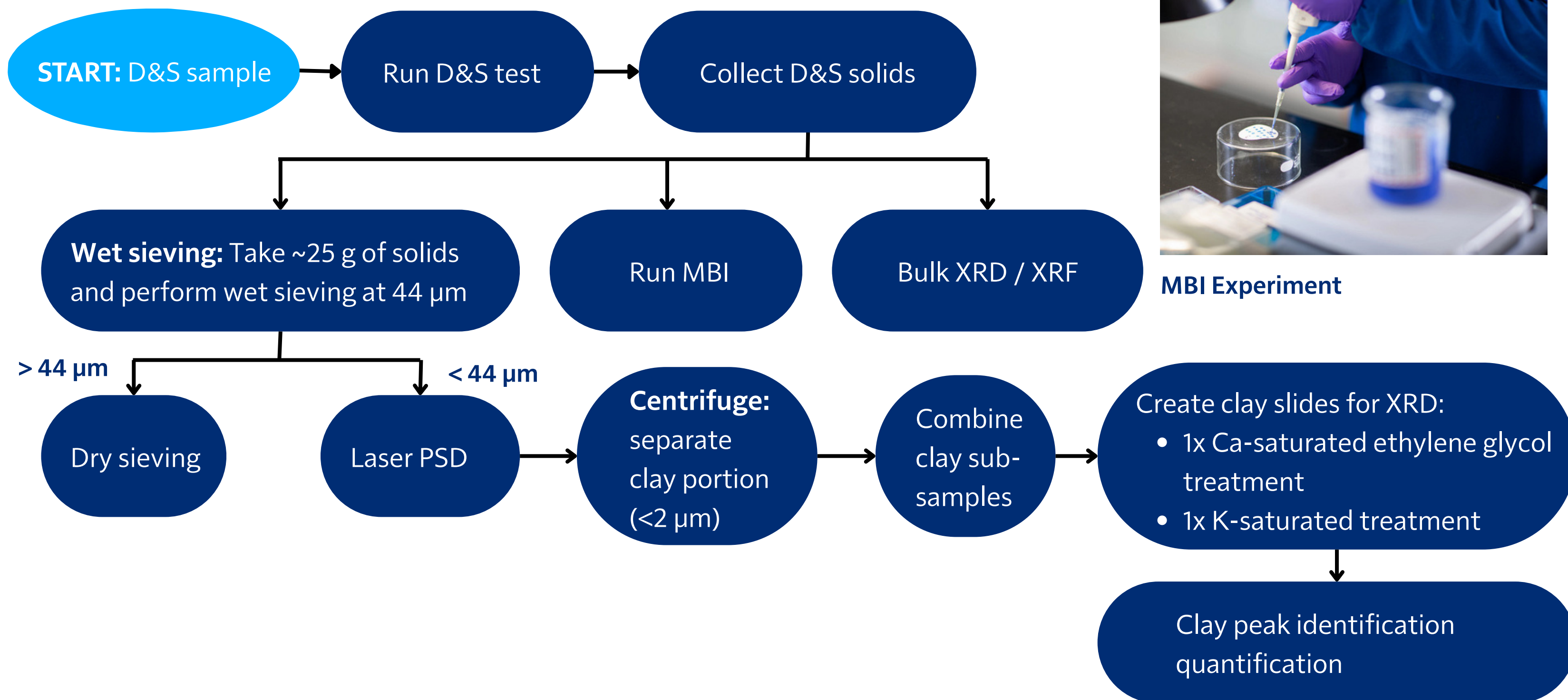
SPECIFIC RESISTANCE TO FILTRATION & SUBSEQUENT TESTING (WATER CHEMISTRY, ATTERBERG LIMITS)

Specific resistance to filtration (SRF) testing involves loading a tailings sample into a pressure cell with a filter placed on the bottom. Gas pressure is used to displace the water in the sample, and the water release is tracked over time. More permeable tailings will release water faster compared to those that are less permeable. SRF can also be used to press water from a tailings sample in order to reach a target water content. This is done as a precursor to other testing such as Atterberg Limits (on the filter cake) and water chemistry testing (on released water).



DEAN & STARK TESTING & SUBSEQUENT SOLIDS CHARACTERIZATION

The Dean & Stark test is used to quantify the bitumen, solids, and water content of an oil sands sample. A sample is refluxed in the Dean & Stark apparatus. The extracted water, solids in the thimble, and bitumen infused toluene are saved for quantifying: water content, solids content, and bitumen content, respectively. The solids can be used to determine the PSD for the sample, and once clays are extracted and treated their peaks can be more readily identified in the XRD. A separate sample of bulk solids are also characterized using MBI and bulk XRD / XRF.



MBI Experiment

ACRONYMS:

D&S: Dean & Stark analysis DCM: Dichloromethane DOM: Dissolved organic carbon	EC: Electrical conductivity FTIR: Fourier transform infrared spectroscopy IC: Ion chromatography MBI: Methylene blue index	NAFC: Naphthenic acid fraction compounds PSD: Particle size distribution SC: Solids content SRF: Specific resistance to filtration	THF: Tetrahydrofuran TOC: Total organic carbon XRD: X-ray diffraction XRF: X-ray fluorescence
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