

Sample Identity-

Samples are taken from produced water stream at different times. Product is the same. Three samples were run in this trial.

SAMPLE 1 Approx 1% oil in water

SAMPLE-3 Approx 1% oil in water

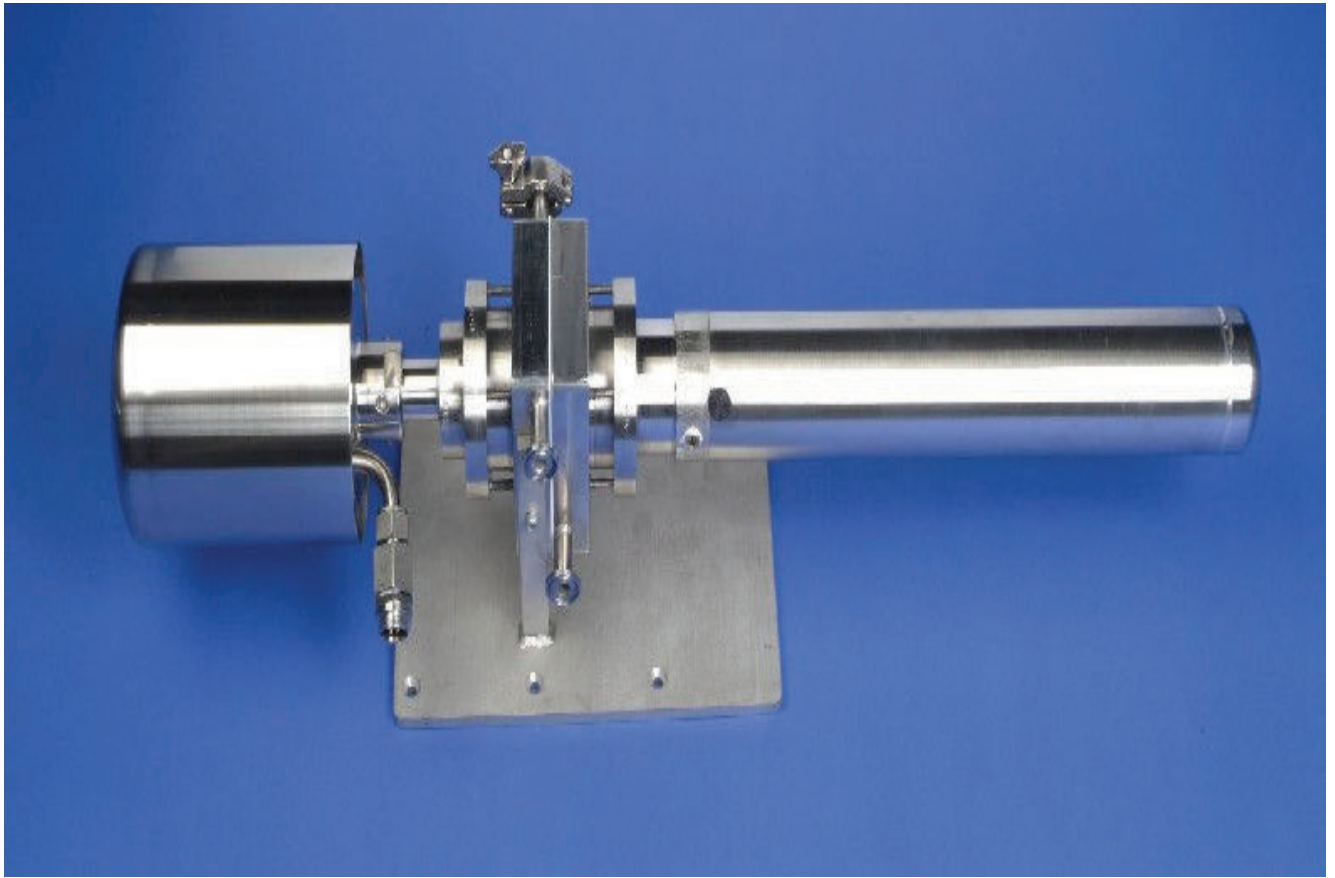
SAMPLE-5 Approx 1% oil in water

Purpose:

To test PPM for Oil in Water. The samples are taken from a single stream at various times. The analysis will indicate particle size distribution and concentration in ppm. Testing of these samples will assume that most particulate, unless translucent, crystalline structure, is oil contamination and will be reported as such.

Lab Setup:

- 1) Canty MicroFlow
- 2) Ethernet Camera
- 3) HYL80 with Power Supply Regulator
- 4) Gravity Feed
- 5) Gap is at 18.9

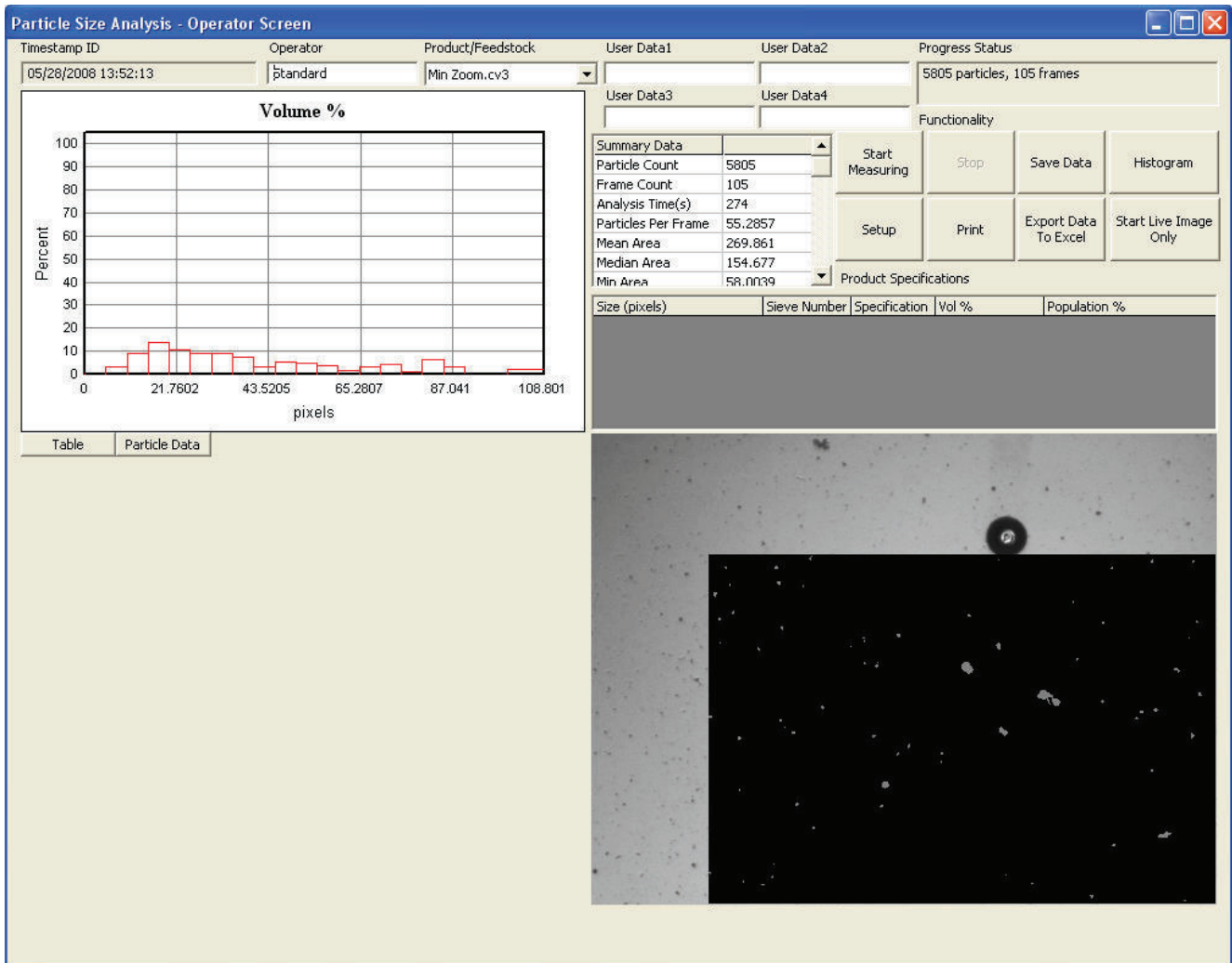


Canty MicroFlow System

Part A – Particle Size Distribution

Sample 1 Test

Three runs of the sample were made in the Canty MicroFlow system. These are reported below via the operator screen output as well as in a summary chart noting the D10, D50 and D90 values



Sample 1, Run 1

Particle Size Analysis - Operator Screen

Timestamp ID: 05/28/2008 14:3:26 Operator: Standard Product/Feedstock: Min Zoom.cv3 User Data1: User Data2: Progress Status: 5242 particles, 94 frames

User Data3: User Data4: Functionality:

Volume %

Percent

pixels

| Summary Data | |
|---------------------|---------|
| Particle Count | 5242 |
| Frame Count | 94 |
| Analysis Time(s) | 244 |
| Particles Per Frame | 55.766 |
| Mean Area | 243.163 |
| Median Area | 146.943 |
| Min Area | 58.0139 |

Product Specifications

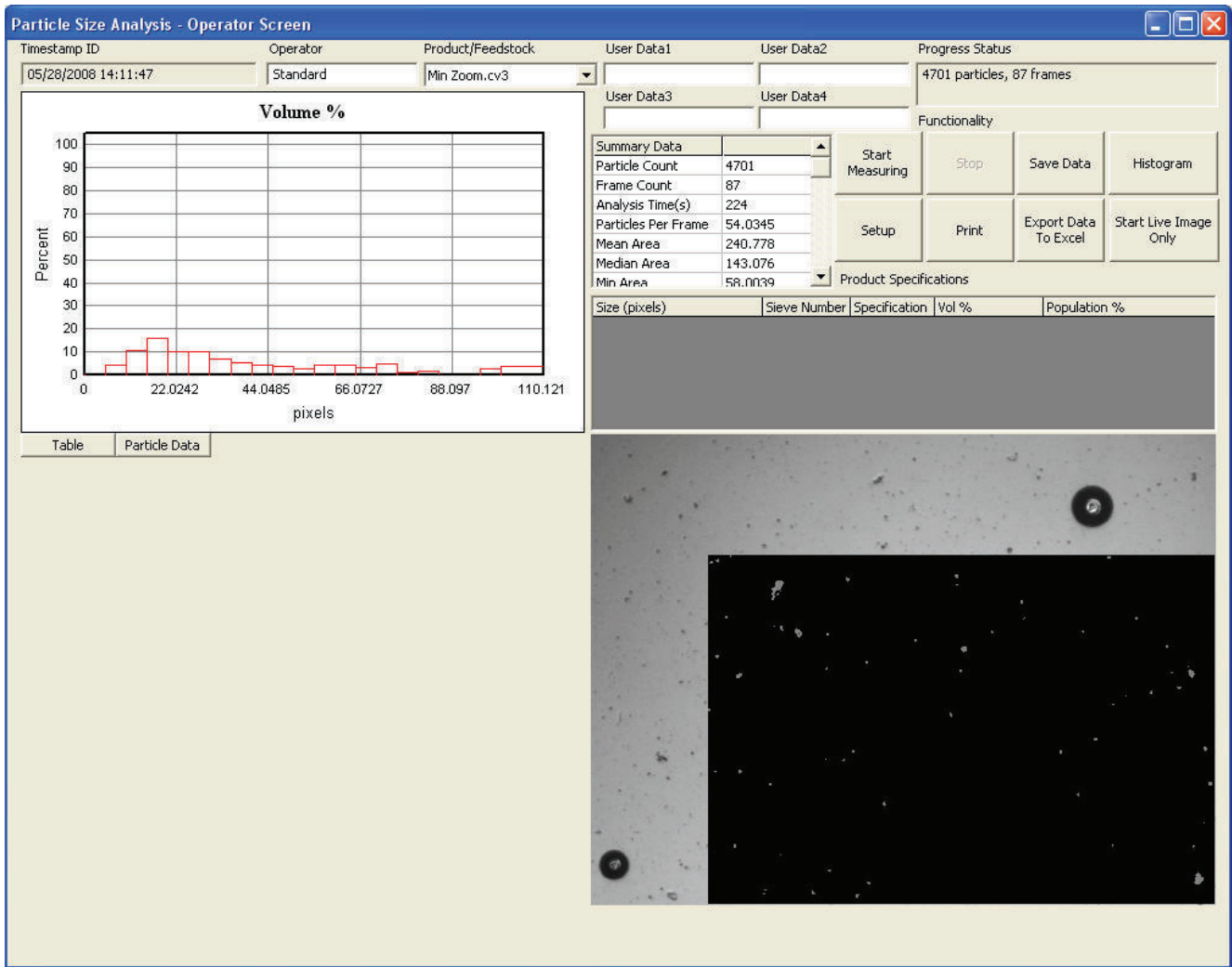
| Size (pixels) | Sieve Number | Specification | Vol % | Population % |
|---------------|--------------|---------------|-------|--------------|
| | | | | |

Start Measuring Stop Save Data Histogram

Setup Print Export Data To Excel Start Live Image Only

Table Particle Data

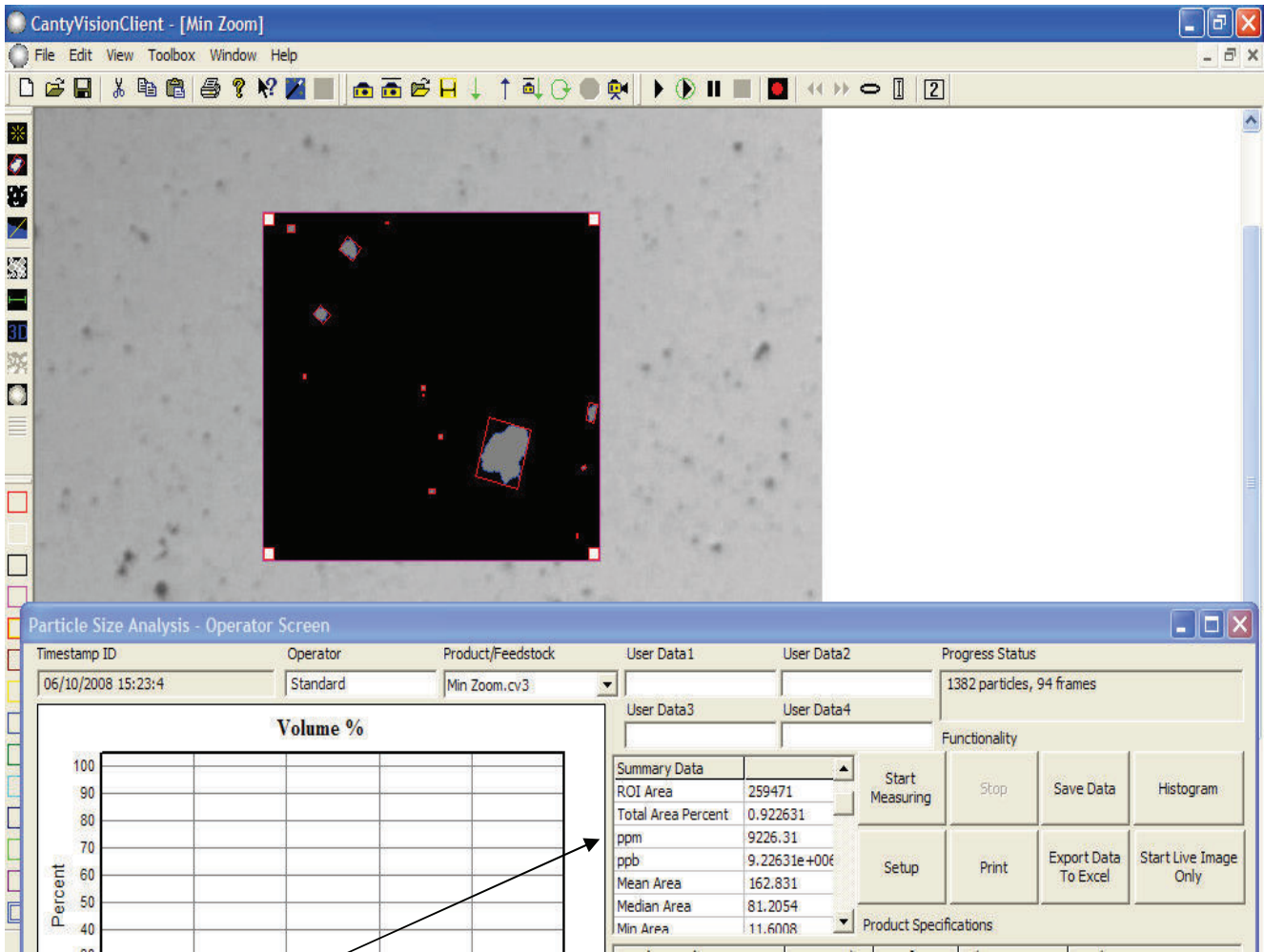
Sample 1, Run 2



Sample 1, Run 3

Sample 1 Summary:

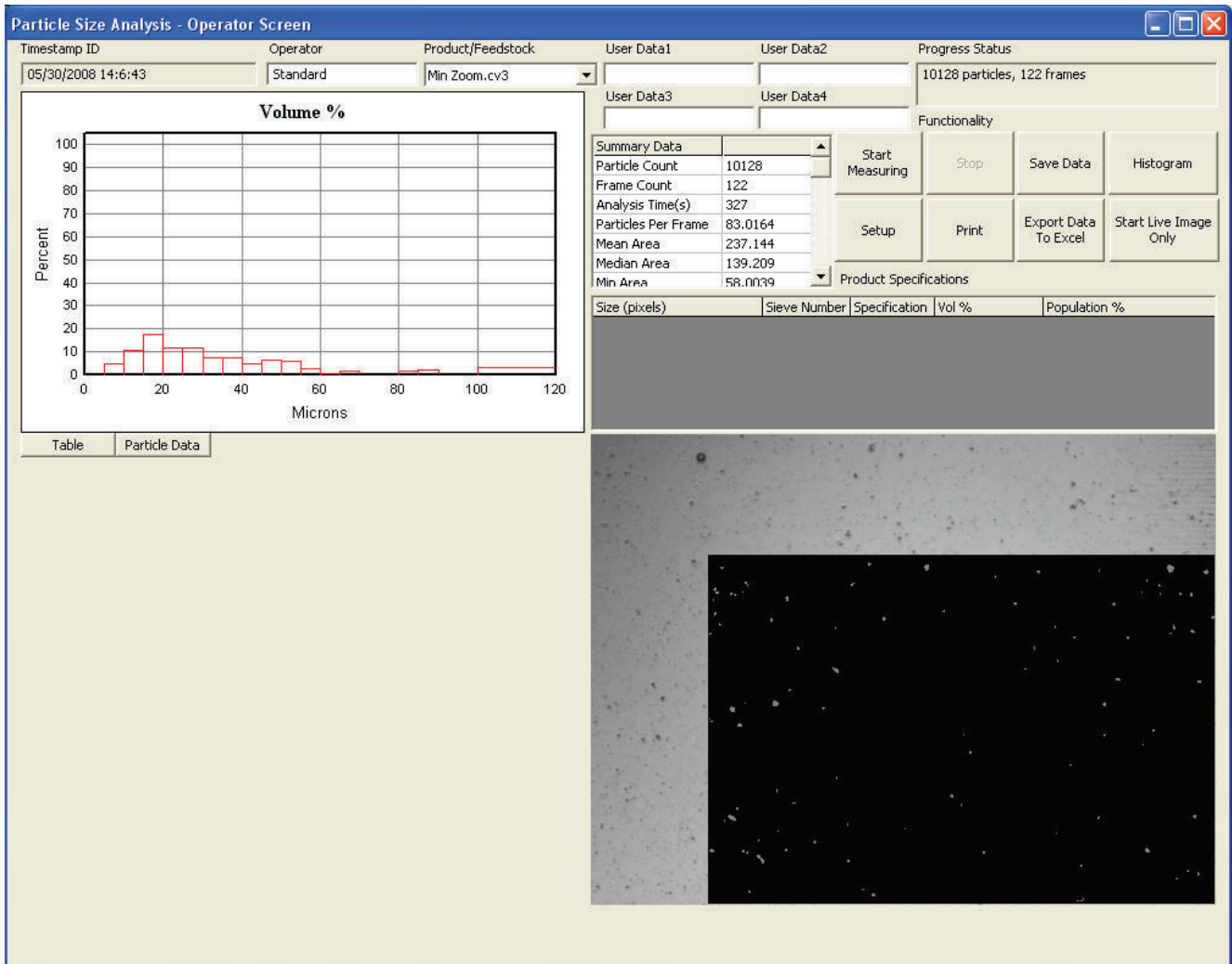
| Run# | D10 | D50 | D90 |
|------|------|------|------|
| 1 | 13.7 | 33 | 82 |
| 2 | 13.2 | 28.9 | 81.6 |
| 3 | 13.2 | 29.5 | 72 |



Sample 1 PPM – 9226

Samples taken were identified as having a contamination of ~1% or 10,000 ppm. Using that information the system was calibrated with sample 1 being the baseline at 9226 ppm.

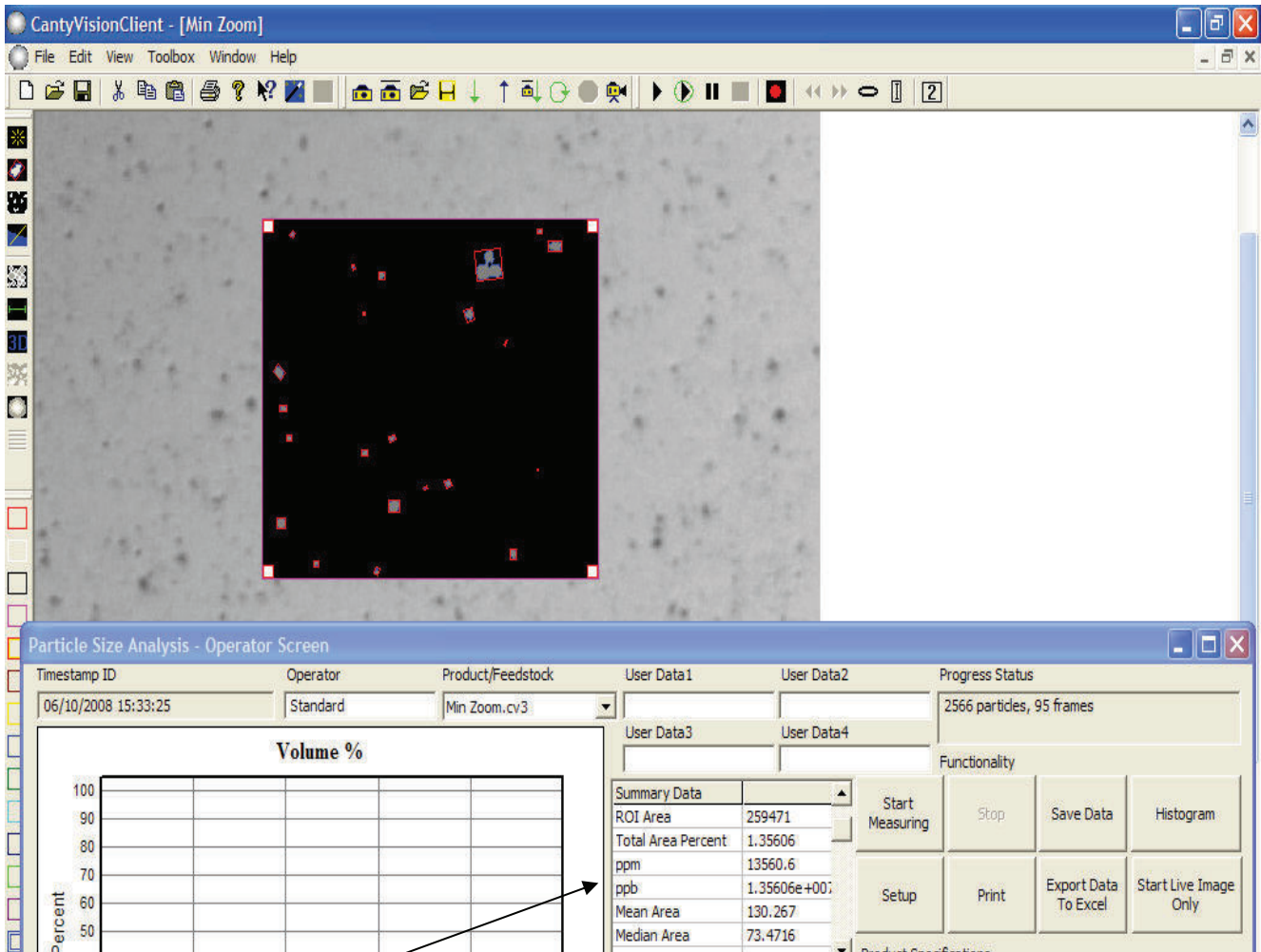
Sample 3



Sample 3, Run 1

Sample 3 Summary

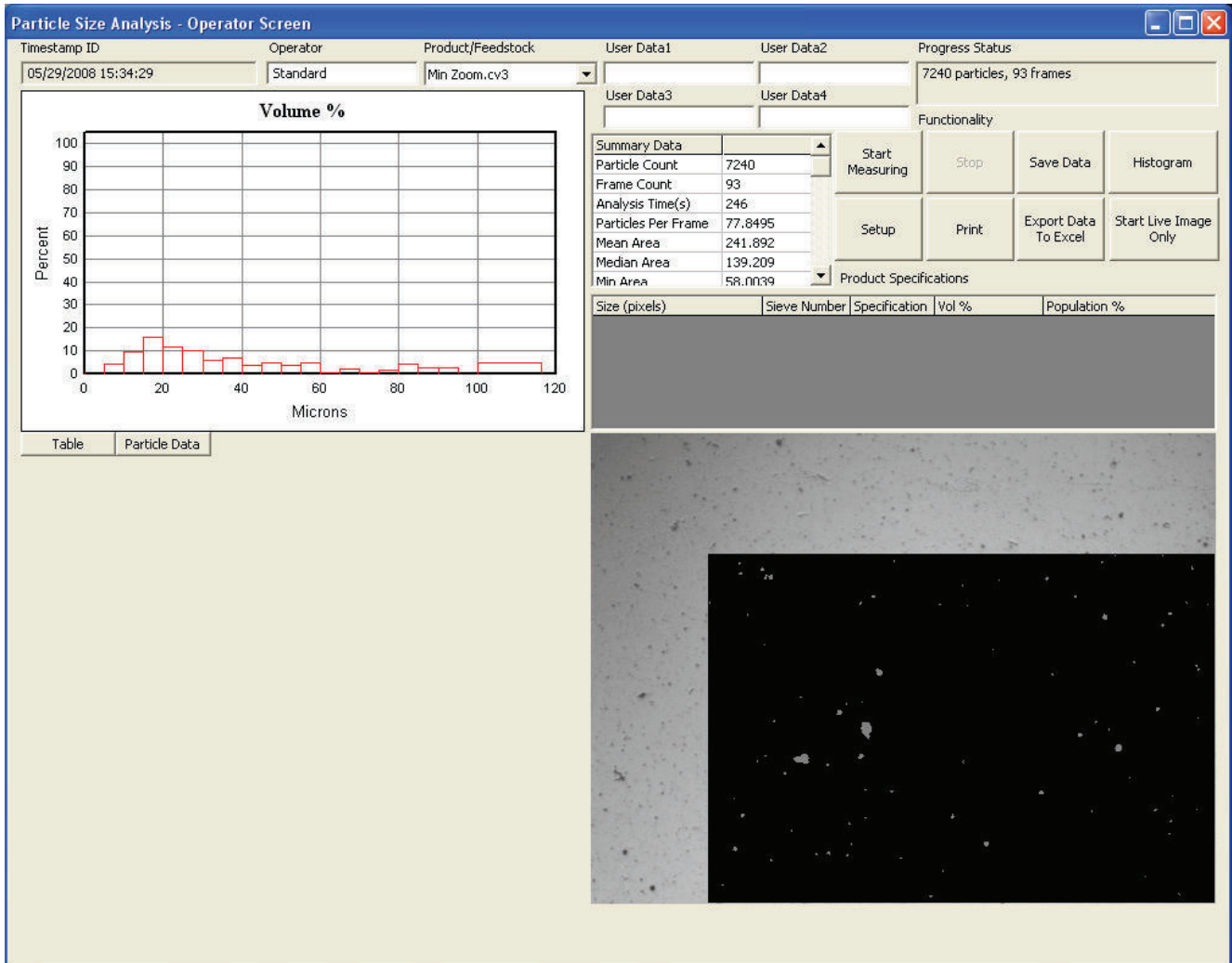
| Run# | D10 | D50 | D90 |
|------|------|------|------|
| 1 | 13.2 | 27.1 | 57.2 |
| 2 | 12.9 | 27.1 | 61.1 |
| 3 | 12.4 | 25.2 | 63.5 |



Sample 3 - 13560 PPM

Sample 3 was noticeably more dense with particulate than samples 1 and 5 and that is indicated in the PPM output.

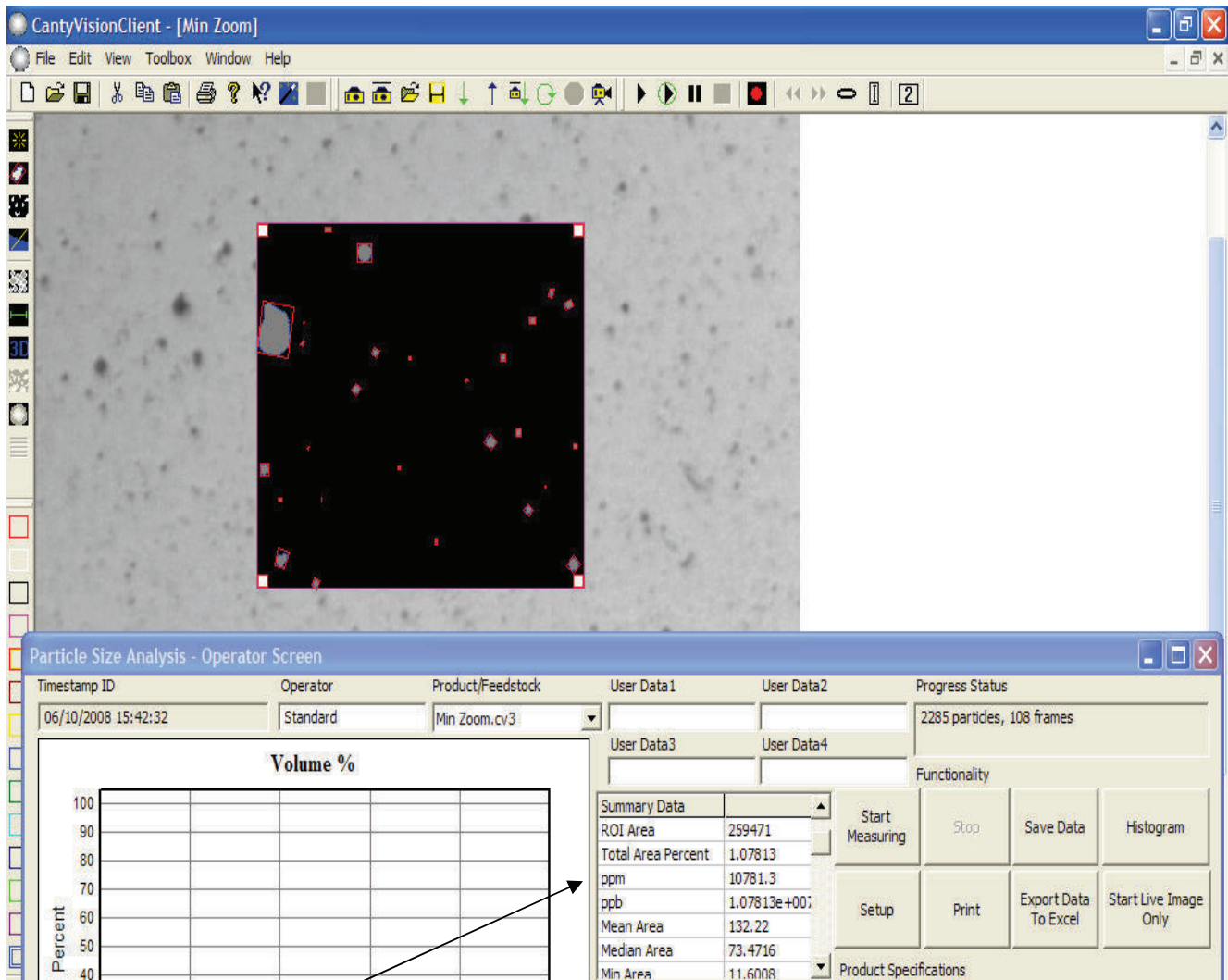
Sample 5



Sample 5, Run 1

Sample 5 Summary

| Run# | D10 | D50 | D90 |
|------|------|------|------|
| 1 | 13.6 | 29.5 | 82.8 |
| 2 | 12.9 | 25.7 | 57.8 |
| 3 | 13.4 | 28.5 | 82.4 |



Sample 5 – 10781 PPM

Conclusion:

The Canty equipment can easily see the oil / water mixtures in the percentages of interest (+/- 1%). Detection of water contamination is reliable down to single digit ppm and well above 1 % (Systems can do water cut in the 15% range). The images give the reader an idea of what the vision system actually sees which is quite different than what an observer would see looking at a 1% oil in water mixture. Proper presentation of the sample along with illumination makes it possible to achieve good images at the micro level which can be interpreted for particle size as well as contamination levels.

The hardware is designed for severe environments. The highly polished fused glass to metal seal, which is the system pressure boundary, presents a surface free of contamination sites where product can build and coat the lens. System is designed and built for high pressure and temperature service and is extremely rugged which is a well known characteristic of the Canty Fused Glass system.