Autosampler Basics

Aquatic Ecology and Quality Assurance Section

2014

DEP SOPs – Autosampler Info

- **FC 1000** – Decontamination
- **FS 1000** – Sample preservation & holding time
  - Table FS 1000-4
- **FS 2100** – Surface water deployment*
- **FS 2400** – Wastewater deployment*

*Includes equipment blank requirements for autosampler

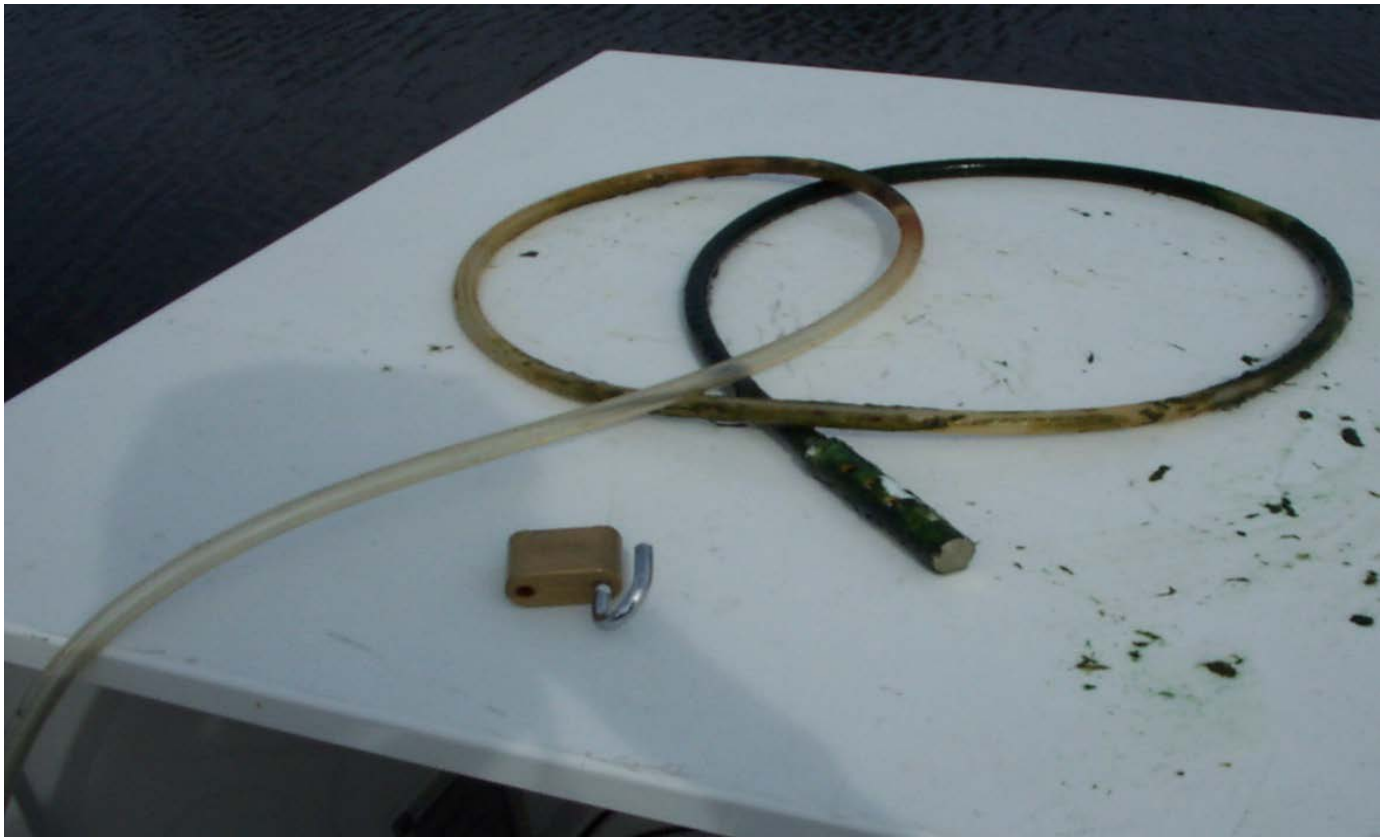
FS 2000 – General Aqueous Sampling

- **Do not composite (unless required in permit):**
  - Oil & Grease/TRPH/FL-PRO
  - Microbiological analytes
  - Orthophosphate
  - Cyanide
  - VOCs
  - Total Phenols
  - Un-ionized ammonia
  - Others

Cleaning and Replacement (see manufacturer's manual also)

- **Tubing**
  - Inspect at each site visit
  - Replace discolored tubing
    - Use new* or pre-cleaned tubing (delivery and pump)
      - New tubing for each installation (EPA Region 4 SOP)*
      - Teflon delivery tubing if organic analytes (EPA Region 4 SOP)*
    - Tubing material choices per FS 1000 equipment tables for collected analytes
    - Recommend replace every six months, with loss of elasticity, algal growth, or other degradation
  - Recommended cleaning in FC 1000
    - Field cleaning not recommended
- **Composite sample containers**
  - Recommended cleaning in FC 1000 (field or lab/base of operations)
  - Container materials per FS 1000 (Table FS 1000-4)

Inspect tubing and strainer



Equipment Blanks

- Tubing and composite containers are *intermediate devices* used for sample collection
- Collect equipment blanks **by** pumping analyte-free water through **entire clean sample compositing train**
  - Frequency of compositing train blanks:
    - 5% of tubing changes (recommended if routinely changed at each site visit) or with each tubing change (recommended if changed infrequently)
    - At least annually (if applicable)
- Collect **composite container** blanks per FQ 1000
  - Frequency: per 5% of samples collected, over project or permit duration (e.g., 5-year permit cycle)
  - At least one container blank annually (if applicable)

Set-up and Inspection (see manufacturer's manual also)

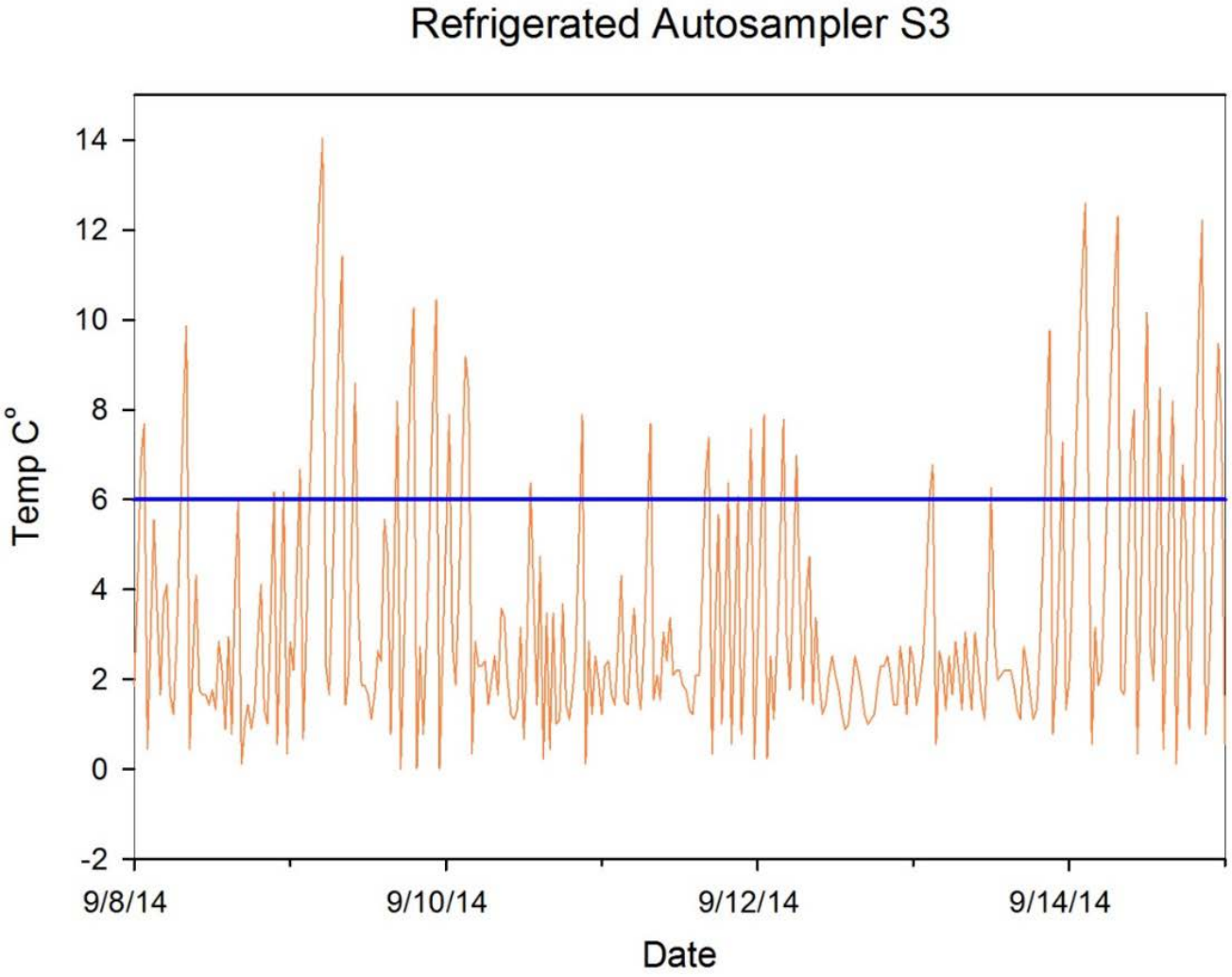
- **Autosampler & tubing placement**
  - Elevate above sample point (25 feet or less)
  - Taut tubing run with no kinks, bends, twists
    - Inspect tubing for pooling of sample or restricted flow
    - Tubing and intake/strainer placement must be at correct location and depth (per permit, or in a position for representative sampling)
    - Use conduit or other support for tubing (installation should prevent potential contamination from support structures)
  - Secure autosampler against tampering (lock, housing, tamper seals, etc)
  - Protect against weather extremes (insulation, reflective paint, etc)
- **Programming**
  - Follow manufacturer instructions for autosampler (and flow meter/pacer)
  - Program sample collection settings according to permit, or per project sampling design
    - Programming must ensure that enough total volume is collected for all analytes and lab sample containers

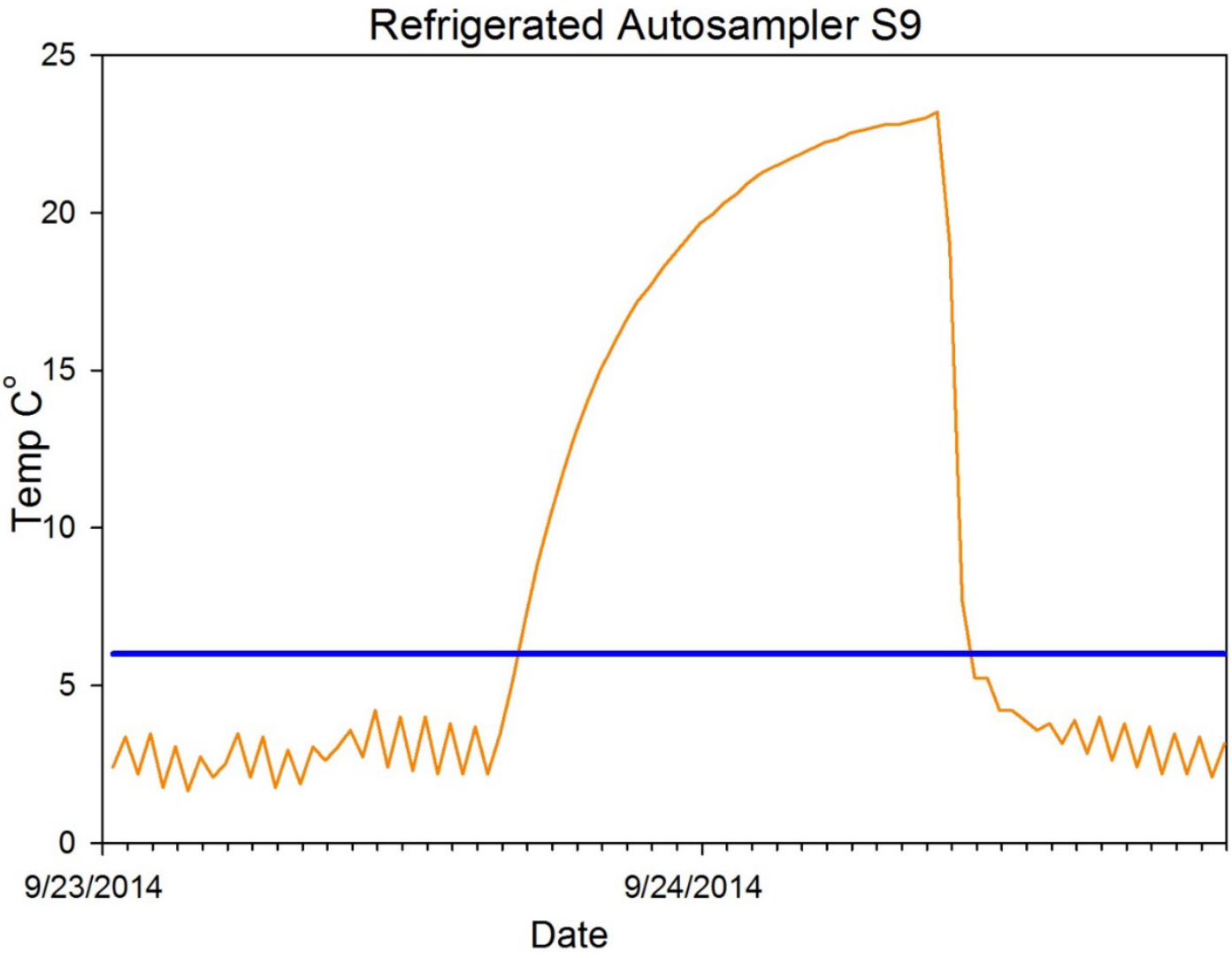
Autosampler Function Check

- **Measure minimum volume collected**
  - Verify minimum 100 mL collection volume
    - Lift height (head) should not affect volume collected
      - Minimum volume should be adjustable manually or automatically
- **Check flow meter/pacer** functioning
- **Check programmed purge/sample collection** functioning
  - Verify pre-rinse and purge for each sample collection cycle
  - Pump speed should not allow solids to settle in tubing
    - At least 2 ft/sec (EPA Region 4 SOP)
    - Velocity is also a function of tubing diameter
      - Use at least 0.25 inch I.D. tubing
- **Look for bubbles in tubing** during pump test
- **Follow manufacturer's suggested checks, diagnostics and maintenance**

Sample Preservation Prior to Sample Retrieval

- If cooling required for analytes per FS 1000:
  - Use packed ice or refrigeration
    - Refrigerated Autosampler
      - Can be difficult to maintain temperature under 6° C
- Pre-preserved Bottles
    - Sample can inadvertently be over acidified due to low-flow conditions (e.g. surface water monitoring projects)


Refrigerated Autosampler S3
Temp C°
14
12
10
8
6
4
2
0
-2
9/8/14
9/10/14
9/12/14
9/14/14
Date


Refrigerated Autosampler S9
25
20
15
10
5
0
Temp C°
9/23/2014
9/24/2014
Date

Composite Sample Retrieval

- **Start of holding time depends on composite collection period:**
  - 24 hours or less – holding time begins at the end of the composite period (i.e., after collection of last sample)
  - Exceeds 24 hours – holding time begins at first sample collection
- **Thoroughly mix composite sample** prior to transferring to lab bottles
- **Any additional preservation** must occur within 15 minutes of end of composite period (i.e., after last sample collected)
  - Preservation and holding times per FS 1000 tables (Table FS 1000-4)

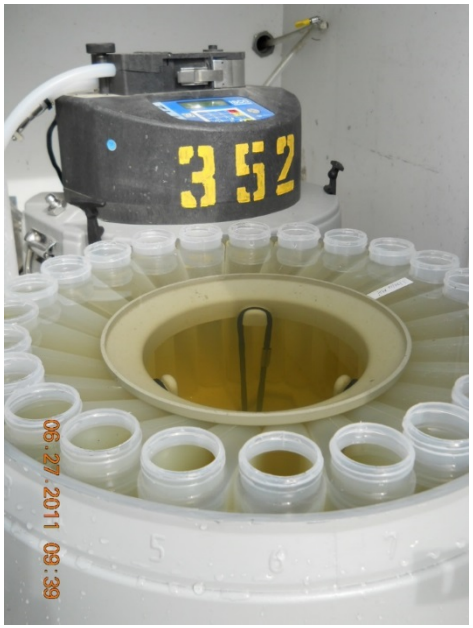
Documentation

- **FD 1000 Requirements**
  - Universal documentation for all samples – FD 1100
  - Cleaning documentation – FD 2000
  - Maintenance & diagnostic testing – FD 3000
  - Requirements for all sample collection – FD 5000
  - Aqueous sample documentation – FD 5100, including surface water (sec. 4) or wastewater (sec. 5)
    - Composite sample documentation
      - Composite type (e.g., flow-proportional)
      - Composite begin/end (dates & times)
  - Equipment blank documentation – FD 5100 (sub-sec. 2.15) and FQ 1250

Tubing Issues

Other Autosampler Issues

- Distributor arm (if used)
- Tubing slips or holes
- Tubing depth placement
- Lightning issues
- Strainer
- Programing errors
- Liquid detect errors




Theft and Vandalism

Protect against vandals

Autosampler Example Problem Analysis – Surface Water

Composite Bottle Contamination

Equipment issue

Miscellaneous

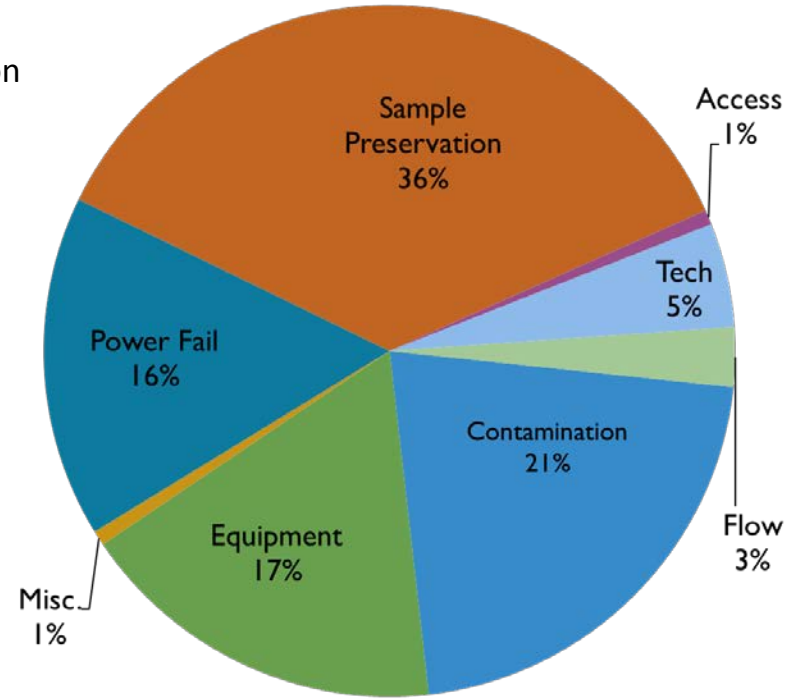
Power Failure

Sample Preservation

Site Access/Water Level

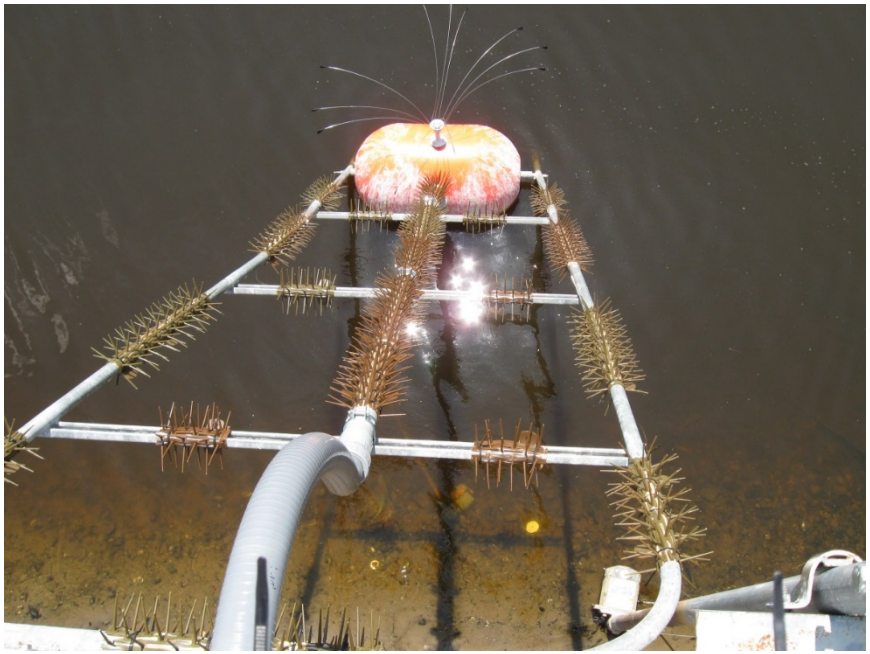
Technician Error

Unanticipated flows



Bird Issues

Bird Deterrents




Discrete Bottle Contamination
10.03.2011 14
10.03.2011 14:16


2011/02/16


05.17.2012 10:05


Water Levels
10.04.2012 12:52


10.04.2012 13:04


Intake Issues

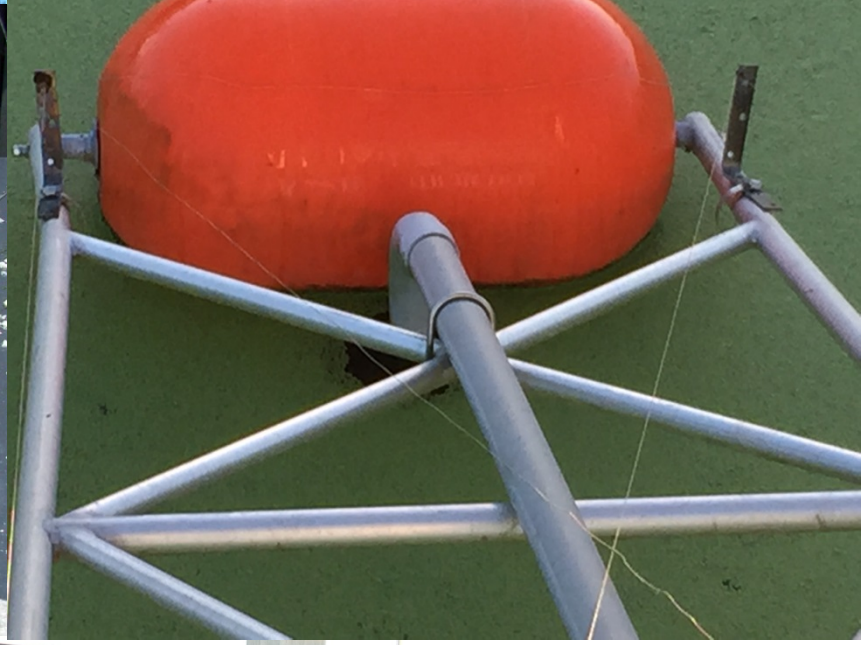

11/8/2004 9:24am


10.10.2012 10:13

Intake Issues 2


01/01/2008
Intake Issues 3


05/19




10.16.2014 07:33