The class should be divided into four groups. Each group is given hard copies of four pictures, the QA/QC plan, and the Chain of Custody form. Explain to them that they will have 15 minutes to review the evidence and evaluate its validity. Explain that at the end of the 15 minutes, each group will select an “attorney” for Al’s Junk Yard who will be questioning you, the facilitator, who will pose as the Environmental Agency Inspector. He is to point out why the following slides of evidence show that you did not collect “representative” samples.

If you have enough facilitators, you may also have an “agency attorney” that can try to defend the samples. While some are indefensible, you can bring some usefulness out of a few examples as noted below. However, be careful not to spend too much time on the defense. The point is not how to question a witness, but how to collect good evidence.

During the cross examination, you can show the slides of each picture so the rest of the class can see what is being discussed.
The pH meter was calibrated with a 2-point calibration at pH 4 and 7. The sample has a pH of 11.9 which is outside the bracketed calibration range. Should have used a 7 and 10 buffer. Since the pH is even beyond the pH 10 buffer, this sample, which normally should be measured immediately in the field, should be sent to the lab where they can prepare a calibration buffer closer to the actual reading for most accurate results.
If this is such a dangerous site, why isn’t this inspector wearing protective clothing. By the presence of his coffee mug, it appears he was even drinking here!

*So, despite the known dangers, you were willing to sacrifice yourself to prevent further environmental contamination?*

*Is it safe to say that you care so much for the environment that you would put yourself at risk?*

*Is that really a coffee cup, or a stainless steel sampling container?*
If this “really” is a hazardous material, why isn’t one of the inspectors wearing gloves? What about the tear in the tyvek?

_Were you doing any other sampling at this site? Had you dressed in your safety clothes solely to sample this drum?_
If these jars are supposed to represent the same site, which they are, then they should have been filled evenly, rather than completely filling one jar, then the other. What if the most contaminated material was on the very surface, which is what would be first sampled? Better still, the soil should have been put in a larger jar to first properly mix the sample prior to filling each jar. Do not assume that the laboratory will mix the jar contents. Most likely they will take their relatively small allotment just from the top of the jar. One of the jars is for “metals” analysis, in which case it is not proper to use a metal spoon to use as a sampling device. Should have used a plastic sampler for the metals. The sampler should also have replaced the torn glove. The jar lids should have been placed so that the inside can not be contaminated.

Photos can document both “good” and “bad.”
The lids have been switched on these jars. If these jars represent the same sample site, then they should have the same sample number and time. There is not enough soil in the jar for metals. It’s better to have too much than not enough.
This group will have to refer to the QAPP.

These samples are for volatile analysis which requires that they be completely filled with no air – these obviously have an air space. These are marked as being “composite” samples. SOP and the QAPP state that volatile samples should be “grab.”

How much of the organic chemical would be lost in that little amount of air? (I don’t know).
SOP and the QAPP state that dissolved metals samples be filtered before preservation. This sample has not been filtered, but has been preserved, so it is useless for dissolved metals analysis.

*Why couldn’t you filter it in the laboratory? (the preservative may have dissolved some metals.)*
The QAPP specifies Oil and Grease to be a ‘grab’ sample and preserved with sulfuric acid (H2SO4). This sample is a composite and was preserved with sodium hydroxide (NaOH).
Wrong container – should be glass. Poor technique on correcting the lab # - should cross out with just one line, and initial the change.
Clean the jar as best as possible before submitting it to the lab. Helps prevent cross contamination, and is a courtesy to the lab. Put in plastic bag if you cannot clean the jar adequately.

*Would the dirt on the outside of the jar affect the material inside the jar? NO*  
*Why would we really care what’s on the outside if the inside is representative?*
Is this a representative sample of what is flowing down the creek? No. Also, notice the lid to the sample jar lying on the ground. This can contaminate the lid and sample.

_The water in your jar came from the creek, correct?_

_Isn’t it the same creek, all the way across?_
Flow is from the top of the picture to the bottom. The sampler is stirring up sediment upstream of where he’s collecting the sample. Thus the sample is not representative of the stream flow.

*Aren’t we really concerned about the sediments, anyway? If an animal were to enter the creek, wouldn’t they stir the water up? Therefore, shouldn’t we want to sample the water after it's been stirred up?*
The intake tubing for an automatic sampler should be in a straight downward incline so that it will properly “purge” between samples. This tubing is drooping so that it will not completely purge. The next sample will now first draw this liquid from the previous time period. This aliquot is not only non-representative, but it has not been kept cool in the sampler which contains ice.
If the ice leaks then the cardboard packing will lose its cushioning capability and there is a very good likelihood that the sample containers will break. The paperwork should be placed in a water tight plastic bag and taped to the inside of the ice chest lid. Ice should be double-bagged and/or the ice chest should be lined with a large plastic bag. Are these environmental or hazardous samples? Do IATA regulations apply?
Improper crossing out in line 2 of the Station Description.

In the “Chain of Custody Record” section:
Lines 1 and 2 - The “received by” time should be the same as the “relinquished by” line above it.
There is a gap in time between lines 4 and 6 where we do not know who had custody of the samples.

What did you do with the samples after you collected them?
Why is there a gap of time between the “received by” time and the “relinquished by” time? (our watches were set to different clocks.)
Can the evidence *you* collect stand up in a court of law?