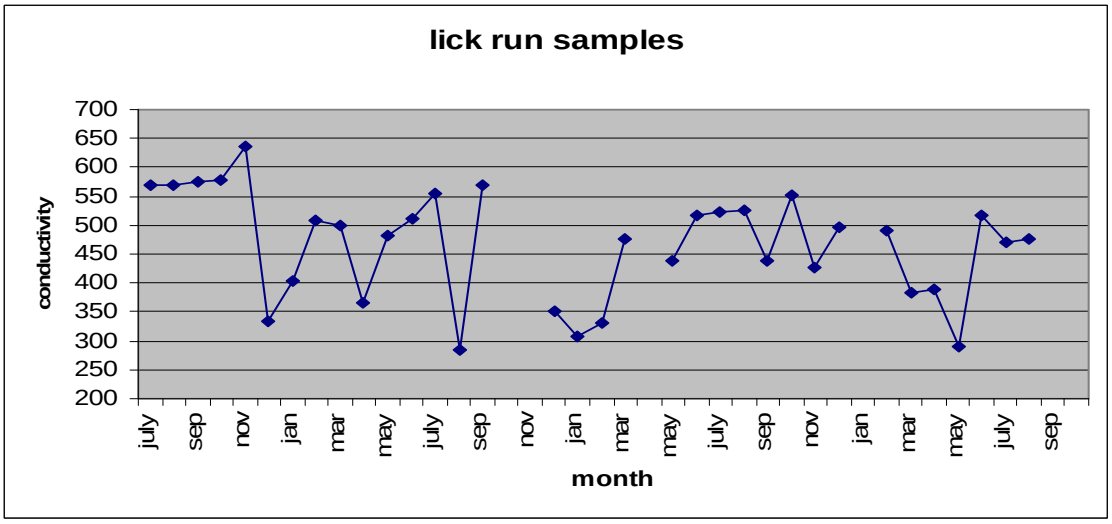
October 2007

Conductivity

Conductivity is useful as a general measure of stream water quality. Each stream tends to have a relatively constant range of conductivity that, once established, can be used as a baseline for comparison with regular conductivity measurements. Significant changes in conductivity could then be an indicator that a discharge or some other source of pollution has entered a stream.

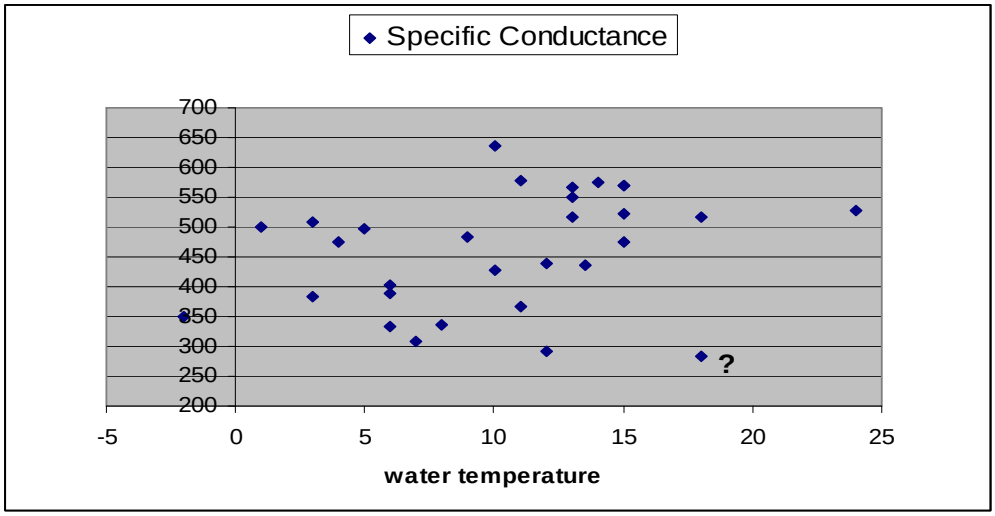
The basic unit of measurement of conductivity is the mho or siemens. Conductivity is measured in micromhos per centimeter (µmhos/cm) or microsiemens per centimeter (µs/cm). The conductivity of rivers in the United States generally ranges from 50 to 1500 µmhos/cm. Studies of inland fresh waters indicate that streams supporting good mixed fisheries have a range between 150 and 500 µhos/cm. Conductivity outside this range could indicate that the water is not suitable for certain species of fish or macroinvertebrates. Industrial waters can range as high as 10,000 µmhos/cm.



Conductivity in streams and rivers is affected primarily by the geology of the area through which the water flows. Streams that run through areas with granite bedrock tend to have lower conductivity because granite is composed of more inert materials that do not ionize. On the other hand, streams that run through areas with clay soils tend to have higher conductivity because of the presence of materials that ionize when washed into the water. These solids are usually composed of the sulfate, bicarbonate, nitrates, sulfates, and chlorides of calcium, magnesium, iron, and sodium. Organic compounds like oil, phenol, alcohol, and sugar do not conduct electrical current very well and therefore have a low conductivity when in water. Discharges to streams can change the conductivity depending on their make-up. For example, a failing sewage system would raise the conductivity because of the presence of chloride, phosphate, and nitrate. However, an oil spill (not soluble) would lower the conductivity.

Conductivity is related to total dissolved solids (TDS). The two are closely related, but no the same. The TDS measurement differs from the total solids measurement in that total solids also includes suspended material that is not dissolved.

Conductivity is also affected by temperature: the warmer the water, the higher the conductivity. Meter might need 2 minutes to stabilize reading. Lick Run data is graphed.



conductivity testing -

team	external		PaSEC uS/cm	external uS/cm	difference in analysis	RPD %	difference in analysis	RPD %
a	x		39	49			-10	23
a	x		488	611			-123	22
a	x		88	130			-42	38
b	x		518	504	14	3		
c	y		232	218	14	6		
c	y		418	405	13	3		
d	y		193	218	-25	12		
d	y		370	405	-35	9		
e	y		516	614			-98	17
		average	**318**	**350**				
		range	39 - 518			**overall RPD average = 14.9 %**		

Precision describes how well duplicate and/or split samples agree. The RPD target is 20% for measurements on the same sample by different volunteers with same equipment. RPD = Relative Percent Difference.

Accuracy is the closeness to the measurement's true value. It is improved when comparing to known samples. It is recommended that pH and conductivity be calibrated with standard solutions in every outing.
The accuracy standard objective is + / - 10 uS/cm.