^{32}Si Production Protocol - POOB Cruises

At Sea:

1. Rinse a 250ml round PC bottle three times with sample water then fill to brim. Place bottle in bottle carrier and keep covered with dark plastic bag to protect from light.
2. Take samples to radiation van. Rinse a 100-1000µl pipette tip with 1N HCl and Nanopure water to clean it. Inject 400µl of 0.1µCi/ml ^{32}Si stock into each sample. Cap and mix each sample by inverting several times.
3. Place injected samples back in bottle carrier and cover with dark plastic. Take carrier out to deck so bottles can be hung on mooring line. For deep bottles, place in dive bag and tie bag to mooring line.
4. Incubate for 24hours (gas array) or dawn-dusk (production array).
5. Collect bottles from mooring – keep in bottle carrier covered with dark plastic.
6. Filter each sample through a 0.6µm PCTE 25mm filter. The 250ml towers require a backing filter because the PC filters are too thin to make a seal. Use one of the 25mm paper filters as a gasket, punch at least 3 holes in the centre leaving a full rim of paper for the tower to seal to the base.
7. When the sample goes dry, rinse with 3 small FSE rinses (~5ml each) using a squirt bottle. FSW has been filtered through a 0.6µm filter and is stored in the fridge.
8. **FOR LSC FILTERS**: Place filter in a pre-labeled 20ml plastic scintillation vial, particle side up, flat on the bottom. Vial label should be clear and easily readable. Place cap in vial flat and place the open vial on top of the cap. Let the filters air dry for 24 hours.
9. **FOR BETA COUNTER FILTERS**: Place filter on a pre-labeled planchette (remove the locking ring from the planchette), particle side up, flat and centered on the disc. Sample ID followed by L or D for light/dark is a clear easily readable label for the bottom of the planchette. Let the filters air dry for 24 hours. Cover the filter with a pre-cut circle of mylar, BE SURE THE MYLAR IS CENTERED ON THE DISC, push it down around the edges of the planchette with your fingers then push the locking ring down over it. Cover with a pre-cut circle of thin tin foil (regular strength Reynold's Wrap) as a second layer. Sometimes it's easier to do both layers at 1 time, but that only works well if the locking ring is a loose fit. If the locking ring is snug, doing the layers 1 at a time is easier. Once the mylar is on, lay the foil over top, pick up the planchette and slide the locking ring off the bottom, push the foil down around the edge of the planchette and push the locking ring on again over both layers. Place the planchette in a pre-labeled small petrie dish.
10. Rinse each incubation bottle three times with Nanopure, dispose of rinse water in rad waste container. Bottles can be used for the next cast.

In the Lab:

11. Allow filters to sit for ~100 days to achieve secular equilibrium prior to counting.
12. **FOR LSC FILTERS**: Add 2ml of 2.5M HF to the dried filter in the vial, wait at least 2 hours for the $bSiO_2$ to dissolve. Add 10ml Ultima Gold XR scintillation cocktail to the vial and shake vigorously. Let sit at least 2 hours prior to counting to allow chemiluminescence to dissipate.
13. **FOR BETA COUNTER FILTERS**: Place filters in filter rack and insert rack into counter. If the lifter does not slide in easily, pull the rack out and lay the lifter over the filters and push down to be sure the mylar/foil is not sticking up and hitting the detector. Try again and if the lifter still does not go in easily, figure out which sample is causing the problem and load it in the white sample holder – it has deeper sample pockets than the green one and can be used for thicker planchettes. All of the planchettes sent to Hawaii for the HOTS cruises are <=7.2mm and should all fit in the green sample holder. Position 1 is closest to the handle, the sample slots are numbered.