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WATER TREATMENTS

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This isn't a new-product report although some will be mentioned; nor is it a how-to-do-it because there is no one answer to pure water. It's an examination of some pros and cons surrounding a complicated subject. First, let's get rid of some myths and dispose of some fraudulent claims. You'll find plenty of both in the advertising.

Some Myths and frauds:

"All water is poisonous (germ-ridden, dangerous, etc.)." Many advertisements start out with some variation of this baloney. It isn't true in some places, but it is in others. It's easy for a fixed-home owner to find out with a test. A reliable test is going to cost you up to about \$130 for one that covers most everything. A reliable, less expensive test that covers just the critical items in a rural well, or similar system can be had for about \$20.

Beware the "free" or "instant" test by salesmen. Here are two you'll see at home and at RV rallies.

You bring a sample of your RV water to a salesman. He squirts a couple of drops of chemical into it. Instantly, crud forms on the bottom of the bottle. It's a fraud, using an agent that will do this with any water. Legitimate sales people, using a test kit similar to that used in testing swimming pools, can test on site for just a few things, like chlorine content and Ph balance.

You bring a sample from RV, this time he's asked you to also bring a clean washcloth or similar item. He puts cloth in test jar with water and shakes it. Sure enough, foam appears, so you should buy his filter. It's a fraud, a minute amount of detergent always remains after washing. There's no danger in this (unless you commonly drink the water you've washed your clothes in).

More Frauds:

"You must have this filter to protect your family." Run away as fast as you can.

"This filter is EPA-approved." Run away. EPA does not approve filters. EPA only registers filters to insure that any silver, etc., used in the filter to kill bacteria is not released in the water at unsafe levels.

"This little gem (filter, distiller, whatever) will do everything." Run away. He either doesn't know what he's talking about or he's a crook. No one filter or treatment will remove everything. It's against the laws of physics.

"Filters are no good, you need a (fill in the blank____)." Run away. In some places, filters are all you need. In others, you may need more. But anytime someone simply condemns the competition, you're fixin' to get the you-know-what.

A Couple of Simplistic Tests for RoVers.

- Look around you for lots of RVs (not just a couple) with bottled water dispensers and such.
- Ask local people about the water quality.
- Most RV parks get regular tests and will have a document posted (so you're warned of too much of something and can't sue them) -- read it! Keep up with national news on known polluted-water areas.

Misconceptions about Chlorine and Dual-Canister Filters

You see articles or "tips" on it in RV mags. "Just dump a lot of chlorine in the hose before you fill up and run it through two canister filters, one with a sediment cartridge, one with a charcoal cartridge." What's bad about this advice is that a lot of RVers don't know any better and do just that. Walk through any park and notice how many rigs have the two cans dangling off the hose.

The first "can," if they haven't been hooked up backwards, has a sediment filter that keeps out nothing but dirt. **You need one of these** because it will keep dirt out of your tank and, just as important, your pump. But you almost never see anyone changing the cartridge. Depending on the water quality, they may last six months or as little as 30 days. All sorts of crud

builds up in the filters and, if they're out in the sun, algae and bacteria start growing inside.

Next, the water moves into the charcoal/carbon cartridge. Carbon will reduce bacteria, but, when it starts to load up, it grows *lots* of bacteria, and a lot of that passes through the filter. You can make things worse than with no filter at all if you're not careful.

Carbon filters are also more expensive than sediment filters and need to be changed more often. Hanging one outside and running all your water through it, even that to be used in the toilet, just doesn't make sense.

Carbon also reduces chlorine, and that's good, except, in many cases, RVers pour chlorine in the hose, then run it right through the charcoal filter. Think about it. The idea is to get the chlorine into the tank first, to kill bacteria in the tank, then to filter out the chlorine from the tank before you use the water.

Ideally, carbon needs to be used at the "point of use." You're going to need to change the cartridge occasionally, so don't put it where you can't get to it.

How about those little-bitty carbon filters that go right on the faucet? Most of them are worthless because the effectiveness of carbon depends on the amount of time water is in contact with it. If a fast flow of water goes through a tiny chunk of carbon, about all you'll remove is a small portion of the chlorine and such and nothing else to speak of.

Little filters at the faucet or tiny tubular filters under the sink -- as sold in most RV stores -- don't do much to start with and need to be changed too often anyway. Rather than spend a lot of money on them, you might as well strain water through a sock (or get a good system with your money). See more on charcoal/carbon filters below.

Chlorine Is a Real Puzzler.

It *will* kill bacteria. But at what cost? No one really knows. Chlorine is used in most municipal systems, so we're pretty well stuck with it unless we filter it out with something.

As RoVers, though, we may feel the need to chlorinate water from local sources. Don't use more than one teaspoon of Clorox, or any bleach, to less than eight or ten gallons of water, then filter the chlorine out of what you drink and cook with, and you'll probably be okay.

Recent research indicates chlorine may promote cancer. Also, chlorine may be an agent that interacts with cholesterol and such to increase the likelihood of heart disease -- and maybe anemia. Scary, isn't it? Filters can remove over 99% of chlorine if you have a clean, good (not rinky-dink) filter.

Chlorine will NOT have any effect on cysts -- like giardia or cryptosporidium. Many RVerS think that adding chlorine is some kind of "cure all" -- it's not.

FILTERS AND TREATMENTS--A GENERAL DESCRIPTION OF SOME PROS AND CONS.

(First, a note on the words "eliminate," "remove" and "reduce." The words are often used interchangeably. They shouldn't be (but "removes" looks better in sales literature). The proper term is to say (something) *reduces* (something) by some percentage (or other measurement). Responsible sales literature/sales people will use the term "reduces" (unless something really does eliminate something). I always ask them to prove it.

Charcoal or Carbon filters--There are carbon filters and then there are carbon filters. Some are worthless and some will do most of what needs to be done. It's common to see an RVer with two cheap canister filters dangling off his rig--one for sediment and one for charcoal (as covered above). If the RVer realizes this is only the most minimal protection, that's his business. It's pathetic, though, when the naïve guy says something like, "The salesman told me this is all I need and it will purify my water." What a bunch of baloney!

The basic charcoal filter, as often used in canisters, is a mesh type thing that's gray in color, doesn't cost much and doesn't do much of anything more than the sediment filter except improve taste a little and remove odor to some extent. And that's the way it goes. Better charcoal filter cartridges use other carbon materials and can be most effective. There are cartridges that will fit in a standard canister that use Activated Carbon (see

below). You can recognize them: by cost and note that they won't be "open" at the sides like the el-cheapos, but sealed except for in and out holes top and bottom.

Next is powdered, loose charcoal just crammed in a piece of plastic pipe with water fittings on each end. (You see RVers making these to sell to equally ignorant RVers.) They're better than nothing, but water makes "tracks" through the loose charcoal. Very little water then actually comes in intimate contact with the charcoal (which is what the whole thing is supposed to be about) and the result is ineffective filtering. Some of these leak little black specks into your water also.

Next up is Activated Carbon. Most adequate or good carbon filters will use this. It can be quite effective and approach the efficiency of solid-block carbon (below). Activated carbon is made from any number of carbon based materials. (No, you can't do it at home.) The manufacturing process results in an extremely dense carbon with countless microscopic pores that water comes in contact with. This is what carbon filtration is all about as the undesirables are unable to pass through. And this, not the lesser charcoal/carbon versions above, will reduce much of the chlorine. Other nasties (bacteria) will be reduced too (see later).

The effectiveness of these filters depends on several things: How well they're made -- some have intricate passages so the water stays in contact with the carbon as long as possible. Contact time is important (and why those tiny end-of-faucet filters don't do much). Some incorporate stages where one or more additional substances also help filtering.

Much of their effectiveness depends on the user! If you put dirty water in, you'll clog the thing up soon. Overuse before changing cartridges means clogging and it also means that instead of preventing bacteria from coming through, the thing will actually promote the growth of bacteria.

Solid-Block Carbon. Another manufacturing process but one which bonds carbon particles to a second substance resulting in an extremely dense solid block. In this form, impurities have maximum contact with the carbon. Activated carbon will reduce "some" bacteria. Solid carbon will reduce more and reduce chlorine by over 99% if the filter is well made.

Solid-Block is more expensive, can get clogged up easier and the cartridge will usually be larger because it also holds the bonding substance.

Both Activated and Solid-Block Carbon Filters--depend on incoming water that has no sediment in it and has no heavy organic matter (decayed vegetation) in it. If you fill them with pond water, you'll load them up fast. Both, in conjunction with a sediment filter, can do most of what's needed.

Ceramic filter--will remove most bugs/germs: virus, giardia, cholera -- you name it. (You can get drinkable water out of a swamp or animal watering hole. They're used in places like Africa by World Health Organization workers and similar UN agencies.) They need frequent but easy cleaning. They will not remove salt or heavy metals (lead, mercury, etc.). Most are quite small (intended for back-packers) and are intended to be pumped by hand (a quart of water in about 1½ minutes). They're expensive. They can be mounted on a sink rim and an RV water line connected through a valve. When the valve is open, the RV pump runs water through the filter (no hand pumping) and fills your jug twice as fast. Serious back-packers consider these a necessity so, if you have one, you might as well use it in the RV as well.

Reverse Osmosis (R.O.)--Water is forced through a membrane. If done properly, it will remove or reduce salt and other minerals, heavy metals, asbestos, some microorganisms, and more. In conjunction with the ceramic filter and/or a good carbon filter, it will remove pretty much everything you really need to worry about. Some people think it removes too much, as some of the minerals it removes are considered beneficial. Water without any minerals tastes a bit flat.

One problem with R.O. is that effectiveness varies widely with design of unit, type of membrane, pressure, etc. Many R.O. units sold to RVers simply won't do the job (typical RVers won't pay for a good one). Fairly good R.O. will require over 40 pounds of water pressure to work (most RVs don't have that much).

A critical R.O. fault in RVs is that they dump up to 4 (in some cases, as much as 20) gallons of water (called "brine" with good reason) for every gallon they purify. Totally unacceptable in the boonies where you're the guy that hauls the water in. R.O. works well on boats and for RVers who

are parked next to a water source (like on a beach in Mexico). Unfortunately, the small, less expensive units take a LONG time to produce just a couple of gallons. Units that will provide over 30 gallons a day, right out of the ocean, are small and use only a nominal amount of 12VDC. However, they cost about \$2,000 (Yikes!). The reason they cost so much is that they use a super-efficient membrane and have an internal pump that produces about 2,000 psi. That's what you really need to do the job right. Incidentally, R.O. membranes need to be replaced occasionally and are much more expensive than filter cartridges. R.O., in a unit that will really do the job, is not a choice for the casual RVer.

Distillation--will remove salt! -- and other minerals. Similar to R.O. above, in this respect, some people don't like the flat taste. But salt is of interest to people with heart problems. It will also remove microorganisms, but will make even more if you have a poorly designed unit that doesn't cool the output fast enough to avoid recontamination. It will remove many toxins also, but not all. Some will be carried over in the steam which, by the way, can be a real problem with some units if run indoors.

Maintenance can be a chore with some distillers as mineral deposits build up. The biggest fault with distillers is the need for lots of electrical power although one, small stovetop/campfire unit is available (I've seen ads in magazines, but have no idea how effective it really is). Solar distillers work well, but they're big. Too big for most RVs. Homemade ones are easily recontaminated with bacteria. All the above usually makes distillation less than attractive in RVs -- unless you've a heart problem and really need it.

Ultra-violet systems (UV)--use an ultra-violet light to defeat microorganisms. These can be quite effective but depend on water that has no particulates in it that hides the "bugs" from the light so you have to have really clear water in your tank. A more severe problem is that the ultra-violet light runs almost all the time at 120VAC and uses at least 30 watts. When away from commercial power, you wouldn't want to run a generator that much and an inverter would use a constant 2½ amps DC from your batteries to power the light. This pretty well eliminates UV as a convenient RV choice. The UV light can be turned off, but then you don't really purify. Some RVers use UV when filling the tank or water jugs, then turn the light off and turn it back on periodically to "refresh" the system.

When they have access to water, they usually have electricity as well, so can leave the UV running.

Ozone purifiers--that generate a very small (safe) amount of ozone and inject it into your water will kill such things as bacteria, viruses (virtually all forms of other microbes) and molds. Ozone contributes to breaking down some chemicals into lesser components. Ozone also works well against odor and color causing agents.

Of key importance, ozone works better, safer and much faster than chlorine (bleach). If you use an ozone purifier, you don't need to add chlorine in the first place (though you'll still get some when filling your tank from most municipal water systems).

A typical ozone unit is small, easily portable and easily mounted in an RV. The actual ozone "injector" is a small device in the unit or at the end of flexible tubing. The end of the tubing can be inserted into the RV tank and also into water jugs. It does use 120VAC, but only has to be turned on as needed. A typical ozone unit will purify a 50 gal RV tank in 20–30 minutes and if the water is just sitting in the tank, the process only needs to be done about every two weeks (under normal conditions). You can purify the water in a 2 gal jug in as little as 5 minutes. Most users go 15 min on a jug to be extra safe since the electricity used (the equivalent of 5 amps DC) is minimal for such a short time. Ozone purifiers, because of the short time they actually need power, are excellent for use with inverter or generator-produced AC power. A good ozone purifier for RV use (with the movable tubing described above) is not inexpensive (at about \$430) but not outrageously expensive either. You can economize with an ozone unit intended for "houses." The ozone injector will usually be fixed in place in a counter-top "tub." The tub takes up too much space and needs to be emptied into jugs when travelling. Not too convenient, but cheaper. **In conjunction with a cheap sediment filter (to keep crud out of the system) and a good carbon filter, it's probably the best combination of systems for RV use.**

Combination units.

As you can see, everything will do something, but nothing will do everything. You'll see various "combination" units for sale. Many of them

are nothing more than the two (sediment and charcoal) canisters mentioned earlier just with a fancy mounting. Others have three canisters (with the same stuff). There are, though, some good ones. Look for three cans with three different elements for three different purposes. There are some obvious problems with combination units that are unique to RVs. Mounting one of these ready-made, all-in-one units between the water inlet and tank means all your water, even toilet flushing water is run through filters or whatever else is in there (and sometimes that's OK). Mounting it between tank and cold water line in RV will do the same and means tank will be filled with sediment unless you use another, single sediment filter before water goes in the tank. And so on.

Set up your own combination Unit?

First, get rid of sediment (dirt and rust) with an inexpensive sediment filter before you put water in the tank. Keep the can out of the sun or nasties will grow in it and sunlight will deteriorate the plastic. Next, decide what's important to you. Germs and such only? Then put a ceramic or certain types (not all have the capacity) of carbon filter in the line to kitchen (and bathroom if you want a nice installation), cold water faucet for drinking and cooking water. Use an ozone purifier to kill bacteria, etc., in the tank before it goes anywhere. You'll have as good a system as you can get without spending an outrageous amount of money.

You probably won't filter water to the shower, but breathing in chlorine when showering can be worse than drinking the stuff (chlorine dangers are not to be taken lightly). There are a number of small, effective, inexpensive shower-head filters just for this purpose. They're intended to be screwed into the shower outlet in a home. And most RVs don't have one, but have a flexible shower line with nozzle. Get around this by buying a second flexible shower line. Run one line to filter. Mount, clamp, hang -- whatever -- the filter in the shower and run the second line to the shower nozzle.

RATING FILTERS AND PURIFICATION DEVICES

Throughout the above, I've "qualified" my statements as to what filters will do with phrases like "good ones will do...." etc. How do you tell which is a good one? Filters are (supposed to be) tested by laboratories. "Good" filter

manufacturers will want to show you their test results (and brag about) the long list of nasties the thing can handle. (In some states the laws require that they do so.) They'll also want to show you the test results from the competition so you can compare for yourself. If any salesman can't or doesn't want to show you test results, go away fast.

But there are test results and then there are test results. The most authoritative results come from the manufacturer submitting a filter for certification to the **NSF** (National Sanitation Foundation). This outfit doesn't kid around. If they say a filter will reduce xyz by abc%, then that's at least what it will do. NSF testing is rigid and expensive. Some manufacturers choose not to use NSF. Some have a great filter that's so new it hasn't been NSF tested yet. Some use independent labs. None of these means you should condemn them -- just be cautious. Even the NSF certification should be carefully read. Filter abc might legitimately say it's NSF certified. But for what? The test results list the "for what." One major manufacturer of RV pumps and water accessories brags about their NSF certification. The actual test results show it as certified only for taste, odor and chlorine. That's no big deal. Independent/private labs can provide valid test results. Read them carefully also. Be very careful to read the notes as well. I saw a test result from a major manufacturer that said (hidden in the notes) something like "filter media replaced with a substitute for this test." What that tells you is they took some other filter cartridge and stuck it in their container. In short, it tells you nothing.

In order to read the test results, there are **some technical terms** you need to know. I know, this isn't any fun, but it's not difficult. These are just the basic ones:

Micron--A millionth of a meter. Used to indicate size of a particle (or anything else) a filter will allow to pass through (or not pass through). As an example, a Giardia will usually be from 3 to 5 microns in size.

VOC--Volatile Organic Chemical. An organic chemical which can easily dissipate or evaporate and get to you. Some filter tests will just show "VOC Reduction." Others will list "VOC Reduction" and specific VOCs reduced. There are at least 42 basic ones usually tested for, some with subcategories as well. Some VOCs, like benzene and carbon tetrachloride are pretty nasty stuff. Included with VOCs are the

Trihalomethanes (THM see below).

THM--Trihalomethanes. One of the classes of VOCs, but often listed separately in test results. THMs are created as a result of water chlorination. They are "thought" to be carcinogenic. They (chlorine) can be removed with a good activated carbon or solid carbon block filter. The term TTHN is sometimes seen. I think it means Total THN. Beats the hell out of me.

Inorganic Chemicals--Chemicals that are not from living matter and do not contain carbon (like flouride, minerals and metals).

Organic Chemicals--Chemicals containing carbon. Natural organics come from animal and plant life and include coal and oil. Synthetics are those made/refined by man such as pesticides.

TDS--Total Dissolved Solids. The sum of all organic and inorganic particulates. This test is usually done on sewage but is also sometimes used to test well water and to indicate the mineral content of water.

Turbidity--Particles suspended in water. At least, it's dirt that screws up your pump. At an extreme, water becomes very cloudy. Of concern is that toxic chemicals attach themselves to these particles and go along for the ride (into us).

Cysts--Giardia is a cyst (there are others).

Cryptic numbers (to us)--like 2,4-D and similar often refer to pesticides and are listed under VOCs or THMs.

NSF Standards--are numbered categories under which filters are subjected to tests. Tests vary depending on type of filter. Many manufacturers/sellers cheat on this. They state that their filter "...meets NSF standards," when it might only meet one.

#42 = Drinking Water--Esthetic Effects e.g., taste and odor. This is the only test many manufacturers use.

#53 = Drinking Water--Health effects. This is the main test. It lists the really nasty stuff a filter reduces.

#55 = UV Filters

#58 = R.O. Filters

#62 = Distillers

QUESTIONS To Ask When Shopping for a Filter or Other Device:

These don't pertain to the inexpensive sediment (rust and dirt) canisters that you can get at any hardware store -- because if you've bothered to read this far, you know that those filters only remove dirt and rust.

Is the device NSF certified/listed? Standard #42? #53? Both?

If not, what test results are available?

(Referring to the test results) Can you show me the range of contaminants reduced? This is why you need to know the terms listed earlier.

Can you show me your Performance Data Sheets? Some state laws require that you be provided these. Any manufacturer that's any good will have them and sales people should be glad to give them to you.

How many gallons will it handle before replacing the cartridge? (Sales people call this "Service Cycle," but who cares?) A responsible sales person will respond with a conservative figure like about 500 gallons and may tell you they've actually tested it at 1,000 gallons but they don't know what kind of water you'll be running through it and can't be precise.

What is the cost for replacement cartridges? And are they readily available? If the filter's good, cartridges won't be cheap, but you don't want to get surprised later. On the other hand, if it's only a few dollars, you're looking at an el-cheapo that's not going to do much. An exception is sediment-only cartridges that should be about \$7.

What's the flow rate? You want to have a flow rate of about $\frac{3}{4}$ gallons per minute. A half gal is too slow except for the small back-packing ceramic filter described. One gallon might mean the water is flowing through too fast for good contact time with carbon filters.

WHAT I USE. I hate to list this because people sometimes think I'm peddling filters. But if I don't they write and ask.

I use an inexpensive (hardware store) canister filter with sediment cartridge for all water entering my RV. It's kept in a compartment and out of the weather. Flexible lines allow it to be pulled out for easy, no spills, cartridge changes. Replacement cartridges are available at any hardware store. They're inexpensive and I change them as often as needed. You do NOT want dirt and sediment in your water system or pump.

I do not fill my tank through the usual RV "hole in the wall." That's how RVers get insects and other nasties in their tank. I fill tank through the normal city water connection. Inside the RV are valves. One sends city water to the RV plumbing. The other sends water to the tank. Yet another opens a vent to under the RV so the tank won't expand and burst. Some RVers don't put a valve on the vent (thinking they might forget to open it). That's how bugs creep in to the tank. Note that some RVs don't even have a separate vent but rely on air escaping through the fill hole. That's chintzy. Adding a proper vent is easy.

Water for drinking and cooking (city or tank) is run to an under-the-counter composite filter. (I prefer the **Multi-Pure** brand -- though there are many excellent filters of this type -- because of its efficiency and quality of construction and use them in both house and RV.) From the filter, separate lines run to spring-loaded faucets at kitchen and bath sink made for filter use. Do NOT attempt to filter hot water except with shower filters that are designed to handle the temperature.

For a time I used the less expensive counter-top model filter. It's cheaper and performs identically to the under-the-counter, but securing it for travel was an annoyance. Counter-top models are not water savers either. They operate from a diverter at the faucet spout. You have to first turn on the faucet, then pull the easily-failing diverter (wasted water). They also let a little water run out after the faucet is turned off and tend to dribble at times (and then your pump comes on -- usually in the middle of the night). The separate faucets mentioned above, have a positive, crisp on/off and don't waste water.

I use a composite material shower filter. It's quite efficient and there's no crud or chlorine. Good ones are available in hardware stores. Read the specs on the box (they're not all that complex) but stay away from those that are obviously so tiny that the contact time is too short.

I am now planning to install an ozone purifier. Some are easily mounted and then easily dismantled and moved into the house, small, light and reasonably priced. Plumbing is simple.

SOURCES

With all the "fright" malarky in the media, there's great interest in filtering water. Seems like every yahoo out there is cramming charcoal briquets in cans and peddling that junk as water filters.

The Real Goods Trading Corporation's "Solar Living Source Book" is a product catalog, but a whole lot more. This 690+ pager is a text book. The Water section is typical of Real Good's excellence. Written by experts, it describes the good, bad and ugly about water treatments in simple, layman's terms. You can get the book from Real Goods, 555 Leslie St., Ukiah CA 95482-5507. (800) 762-7325 or (707) 468-9292 (and most of it is also on their web site at www.realgoods.com). The book is also available through libraries. Real Goods sells a full range of water filters, tests and treatment devices. Here's a rarity. Experts who know what they're talking about.

The brute-force Reverse Osmosis model I mentioned (and the only one worth having in my opinion, if you can afford it) is the **Power Survivor**. The ceramic filter mentioned is the **KATYDYN Expedition Filter**. (I still have mine, it's still efficient and is 20 years old. Not too shabby.) The **ClearWater** Ozone Purifier Model PR-1300 is quite suitable for an RV. All three are available from Real Goods, good marine stores or outdoor outfitters. Shop around for best prices.

The official **NSF** book, that's updated frequently, is available at any "good" water filter dealer. Any responsible (read that as reliable) water filter dealer will have one. You can get one from NSF, but might not want to spend \$20. Get the data in it free and more up-to-date on the Internet at www.nsf.org. NSF is at Box 130140, Ann Arbor MI 48113-0140. (313) 769-8010 or (800) NSF-MARK.

Two more books you can get from the library that will go into all the nitty, gritty details are: "**Drinking Water Hazards**" by John C. Stewart, ISBN 0-943163-16-1. "**The Sierra Club Guide to Safe Drinking Water**" is also good and it covers filters on side-by-side tables so you can find the best.

Be careful with the tables though. They're based on NSF data from many years ago, and neither book has been updated in a long time.

ANSWERS TO QUESTIONS FROM RVERS

Q: I read in the paper (saw on TV) a report that ozone is deadly. How can it work to clean water?

A: You read a frantic media report. These things come from reporters who care nothing about accuracy and just want to create a scandal to make themselves famous. They put a perfectly good airplane builder out of business because of inaccurate reports about faulty doors. They went further and deliberately rigged a GM truck with explosives to create a story. They've done the same thing with ozone, using the amount of ozone created by industrial and vehicle emissions in large quantities (which is dangerous) and mindlessly comparing it to the very minute amount of ozone needed to purify water and air (which isn't dangerous at all).

Q: The "good" filters I see for sale cost \$200, 300, 400 and more, that's too much?

A: TANSTAAFL--There Ain't No Such Thing As A Free Lunch. What's your health worth? If you want to get an el-cheapo, go ahead. It won't do anything, but that's your problem. (This question came from a smoker who doesn't hesitate to spend more than \$2 a pack to buy cancer. Misplaced priorities?)

Q: I fill my tank then go to a campground and use city water. What happens to the water in the tank?

A: At worst, it grows bacteria and other nasty stuff. At best it just gets stale. Smart RVers use the water in the tank and periodically refill it with fresh water. At times, they use the city water but don't forget to keep switching back and forth.

Q: Where do you get your water tested?

A: If you're a "real" full timer, there's usually no need since it wouldn't do you any good -- you'd already be gone before the results came back. If

you have a home base or other favorite hangout, you might want to. **Real Goods** (above) has excellent tests available. Also check with **National Testing Labs**, 6555 Wilson Mills Rd., Cleveland, OH 44133 (800) 426-8378 or **Suburban Water Testing Labs**, 4600 Kutztown Rd., Temple, PA 19560 (800) 433-6595. (Call the 800#s for info on what tests are done, cost, etc., which can be expensive) If your "hangout" has well water, then first check with the County Health Dept. Most have a simple test for the basic necessities that only costs about \$20. Based on the results of that, you might need to check further. In my case (a well in Colorado) the county test was all that was necessary. All I need at home is a sediment filter. I also use a good multi-stage filter in addition just for insurance -- and I don't have crud in my ice cubes.

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