

RUNNING BADWATER

Introduction

Badwater race officials refer to the runners as either veteran (having completed the race one or more times) or novice (making your first attempt). This booklet is primarily intended for the typical novice attempting to run his/her first Badwater 135.

My credentials are minor. I'm a middle-of-the-packer, older (now age 61) ultrarunner. I have attempted Badwater twice, crewed it once, and worked as a volunteer once. I completed my first Badwater attempt in 2002 (time: 53:03:05). In 2003, I crewed Gillian Robinson on her, successful, first attempt. In 2004, on my second attempt, I DNF'd. I was a volunteer in 2005 and will be again in 2006. I have run 40 or more miles in Death Valley in the summer eight times (from Badwater to Stovepipe Wells, the hottest part). And I have attended about a half dozen clinics on running Badwater. All of these undertakings have been great learning experiences for me. Even my DNF was a major learning experience. From all of these experiences, plus some twenty years of being interested in this particular run and researching it for much of that time, I feel quite qualified to write this booklet. Besides, until somebody more qualified decides to write one, this is pretty much all you've got!

I have been collecting information and notes on Badwater for over twenty years. I was fascinated about this run even before I became an ultrarunner. Throughout the booklet, whenever I quote or paraphrase someone, if I know the source, the quote will be in italics. For example, "*Talk to other entrants about their experiences (Barb Elia).*" This is, certainly, good advice. I'm sure that most (if not all) of the Badwater veterans would be happy to advise you. So ask some of them.

The Badwater 135 is a 135-mile ultramarathon. It is held at the hottest time of the year (the middle of July) in the hottest region of the earth, Death Valley (in California's Mojave Desert). The run is from the lowest point in the continental United States (Badwater) to the highest point (Mt. Whitney). The run is entirely on asphalt and passes over two 5000-foot (plus) mountain ranges with grades of up to 9-percent. It ends with an 8400' ascent up Mt. Whitney. Temperatures can get up to about 135 degrees. Usually, temperatures peak at 125-130 degrees; and, even at night, it doesn't usually get below 100-degrees.

I remember telling one of my crewmembers, when I was about 115 miles into the race, that I understood why this is considered the toughest endurance event on the planet; and, at the same time, why it didn't need to be any longer or tougher. It is hard to put into words, but (since that's the only way to do it in writing) here's an attempt: If they added more miles to the event (or something else to increase the difficulty of it), the same people would finish it. When you are at your physical and mental limits and you

persevere and push beyond it, it almost doesn't matter how much farther you've got to go. It can't get any more difficult than it is when you are already "over" your limit.

Stubbornness is a trait that almost all ultrarunners must have. "Stubbornness," as in persistence, tenacity, determination, perseverance, etc. is, of course, a necessary attribute for, if not the definition of, an ultrarunner. But don't let that same stubbornness prevent you from approaching Badwater intelligently. I have seen people refuse to take advice on crucial things (such as ice bandanas, wetting down, electrolytes, etc.) and they usually end up DNF-ing. You might be able to "gut" out a 100-miler on sheer determination, but you need to have a good grip on a few other things in order to complete Badwater. Don't be too stubborn to listen and learn.

No matter "who" you are, or whatever you've already achieved in your lifetime, completing the Badwater 135 will be clearly one of the greatest achievements of your life. And, with the right training, the right crew, the right knowledge, and the "right stuff," you can do it. You really can!

Training

Mileage is the most important thing (Mark Godale)

Training for Badwater should be very much like training for any other ultra. Yes, mileage is obviously very important (hey, it's a 135-mile race)! I would stress, of course, heat training too; so far, so good. But don't forget, Badwater is not just 135 miles of running in the hottest desert on earth at the hottest time of the year. No, that would be too easy! Remember, there are also three giant mountain ranges to climb! This is very important and very easy to overlook. Because most people just focus on the mileage and heat aspects of the race. **DO NOT FORGET TO DO PLENTY OF HILL TRAINING!!!** (This is possibly the best piece of advice in this booklet)

Another easily overlooked aspect of training would be "walking." Unless you are one of the elite, you are probably going to be doing a lot of walking at Badwater. It amazes me how runners (who will walk 75%, or more, of an event like Badwater) will do little or no walking in training. I know it's hard to get out there and just walk for 10 miles (it's boring and time-consuming), but I think it's not only advisable to do walking in training, but it's a good way to get in some extra miles with a much reduced chance of injury. Remember, running and walking not only burn different fuels (glycogen vs. fat) but they use some different muscles, and in different ways.

Heat training:

Heat training can be done during regular training (by overdressing) and between runs (sauna, heaters, etc.), or both. Here are some selected heat training-related tips that I have collected:

- *The race is long and hot with climbs. I trained for those three things. I built up the miles including a couple of 24-hr runs, heat training - extra clothes, pacing in sauna, etc. (Lynne Werner).*

- *Heat training in the sauna should take no more than four weeks, usually three is enough. When you have to wear a sweater or jacket at work or around the house, you are acclimated. If there is a steam sauna, use it once a week. Tropical storms sometimes pop up. The goal is to stay in the heat of the sauna as long as possible. If you attempt any kind of vigorous exercise in the sauna you will have to leave it too soon, which defeats the purpose. (Arthur Webb)*
- *If you are pressed for time, skip or reduce the run and bake in the sauna. The heat training is much more important. (Arthur Webb)*
- *(Sauna) I started with 15 minutes and worked up to one hour in 180 degree heat and had the heat on high in my car and at home (Shannon Farrar-Griefer).*
- *Processing fluids is what it's all about, and training the body to sweat. Some time in the sauna with lots of water/salt to drink should do the trick. Teach your body to process the water at a high rate without getting sick.*
- *Spend the last three weeks acclimating in a sauna. Start with 15 minutes and try to get up to 45 minutes, even if you have to take breaks, as soon as you are able. You don't need to exercise in there, just practice drinking a lot.*
- *Try spending as much time in temperatures above 100 degrees as possible and that means traveling to the desert (Ben Jones).*
- *During the period of heat acclimatization, it might be a good idea to add a little salt to your food if it isn't normally salt-rich. Also, if you sweat profusely and you still experience the salty taste in your sweat, you may want to continue to use the salt shaker, but not excessively (Mel Williams, Human Performance Lab).*
- *If you train in hot temperatures, your body will begin to hoard sodium because it knows that for chemical purposes, it needs salt and getting rid of it in sweat, which is its normal tendency when there is plenty of sodium available isn't a good idea. So, after several weeks of hot-weather training, the salt concentration in your sweat will radically decrease. (Rich Benyo).*
- *Use electrolytes in sauna, but reduce salt in general diet. (Kevin Setnes)*

You can see there is a wide diversity in what constitutes good Sauna time. I've heard people suggest as little as 30 minutes a week. My personal input here is that you should try to do as much as is practical and safe. The more heat training/sauna-time the better. I did about three months, working up from 10 minutes to a half hour 3-4 times a week. Ideally, I would like to have done that daily.

One piece of sauna/heat training advice that I picked up somewhere is that "exercising" in the sauna is counterproductive. Do the exercise separately. The idea of the sauna training is to stay in there as long as possible. Also, wearing extra clothing in the sauna is not a great idea. Saunas are usually around 170-degrees which is more than enough. In fact, 130-degrees all day, is better training than 170-degrees for a half hour.

Practice Runs:

I doubt if I would have been successful on my first attempt at Badwater if I hadn't done some running actually in Death Valley prior to my first race. I was lucky to have been able to have attended several clinics that were a part of the event. I learned the use

of the ice bandana, how to stock the crew vehicle, and many other things from these clinics. But one of the main things was that the heat is deceptive.

At my first clinic, over the Memorial Day weekend, I ran from Badwater to Stovepipe Wells (about 42 miles). It was about 112 degrees. I have always loved the heat and the desert. I saw the movie “Lawrence of Arabia” about 9 times when it first came out. To this day, there is no place I’d rather be than in Death Valley. I love the heat! I also do well in the heat. So, here I was having a great time running for the first time in Death Valley. I was in seventh heaven! I didn’t mind the heat at all. In fact, I didn’t even notice it! And that’s the point: I didn’t even notice it!!! But it is there. Because it is so dry, you don’t even sweat! It evaporates almost immediately. So, even though (because of my state of fitness) I should have been able to do 100 miles on that particular day, I was in really bad shape by 30 miles. I had to really struggle to make it to Stovepipe. I learned a big lesson: Don’t go by how you feel. In that kind of heat, you will feel great until it is too late. You’ve got to keep hydrated and cooled off. Like most lessons in life, you might already know this intellectually, but you might have to learn it the hard way for it to really sink in.

Try to get out to Death Valley (or the Sahara Desert, if it’s closer) on your own before the race. If possible, take one or two crewmembers (they can benefit from the experience too). There might even be another runner or two out there doing the same thing. It’s pretty common to see runners between Badwater and Stovepipe Wells practicing for the race in May and June. If you do get out there for a practice run, don’t start too early in the day. You’ll want to get the benefit of the heat, for training purposes. So, wait until mid morning to get started. Get as much heat and sun as possible.

Another reason to get out there is to try various clothing combinations. *Bring several items of clothing to try. I didn’t wear long pants or like the Sun Precautions wear (many people do) (Bobb Ankeney).*

By practicing on the actual course, Bobb Ankeney made this observation: *I got to Panamint much faster than I thought and then realized the true deception of distance in the desert (Bobb Ankeney).*

Crewing

Basic Crewing:

Ideally, your crew should be made up of about four people (two on duty, and two off). Believe it or not, the two that are on duty will be very busy almost nonstop. *We alternated crews so each one could theoretically get 6 hours sleep (Don Meyer).* You’ll also need two vehicles. The basic routine is to drive ahead a mile or two and to pull over onto the right shoulder of the road. Crossing over to the left is against the rules (for safety reasons). Usually, these segments should start off being about one mile in length because of the intense heat and the need to replenish fluids and ice.

My crew kept me wet every ½ mile through the hottest part of the day. (Don Meyer). Early morning and during the night your crew can stop every 3 miles, but as it gets hotter they will need to reduce the distance to 1 mile (Bobb Ankeney).

By nightfall, you might want to continue the one-mile segments due to fatigue. So, you can count on stopping in one-mile segments nearly all the way. Once stopped, the crew should start preparing the vehicle and the things needed for the runner (who should be approaching in the next 10-15 minutes). There are many things to be done while waiting for the runner: mixing concoctions, preparing ice bandanas, surveying the logs to see if the runner is consuming enough carbs, electrolytes, etc. Once the crew gets organized, there might be a few extra minutes here and there to spare, but not enough to be reading a book or anything. The worst thing that can happen to the crew (well, one of the worst) is to be caught unaware that your runner is approaching and not to be ready when he gets to the vehicle (and that probably will happen a few times).

The two guys that are “off” can be eating, sleeping, swimming, watching TV, or whatever. Just be sure they know to be rested and hydrated. *Remember this – crew is 80% - if you have a loving, rested, hard working crew you will have success (Don Meyer). The main thing I learned is to keep the crew rested (Don Meyer).* During the night portions of the run, a little company can keep the runner awake and more alert. Remember, by that time, the runner will not be a ball of fire! So, almost anybody in fair shape should be able to keep up with him for a few miles. I preferred to run alone during the day (I generally prefer running alone anyway), and to have someone with me at night. If you don’t feel uncomfortable running alone at night and aren’t hallucinating, you might want to go it alone, or run with another race runner. Most runners, I think, though, take a crewmember along at night. If so, that leaves just one crewmember with the vehicle. When there is only one crewmember, the job becomes very demanding. He’ll be checking maps and logs and searching around for supplies in the dark. That’s where vehicle organization and some good lighting systems (flashlights, lanterns, etc.) come in handy. A good idea might be to schedule three crew members on at night (with one resting). Then there are the bugs that are attracted to the lights. Try not to get them in the food (they are very low on carbs)!

The crew should bring their own sun glasses, cell phones (which don’t work in Death Valley, but might come in handy for the last half of the run), running/walking shoes, swimming trunks, hat (for sun screening), cold-weather clothing, jacket, long pants (for Mt. Whitney), books, diversions, etc.

Be sure they know how to handle you and what you want and what you need and the ability to know the difference (John Vonhof).

It is important to keep the crews rested and coordinated with when they’re on duty, and when they’re off. *Make sure your crew knows to get food and sleep (Lynne Werner). Crew has to be aware that they HAVE to drink fluids to prevent dehydration, not just the athlete. The hazards of sunburn, dehydration, and sunstroke are very real for the crew as well as the athlete. (Denise Jones).*

The crew should know some basic medical things. For instance, tell them, never to give you NSAIDS, Tums, etc. (they can contribute to kidney failure and/or hyponatremia). Tell them not to waste time on blisters (that is if that's the way you want to handle it), remind you that you're supposed to be tough. They should be familiar with the Medical and nutritional advice I outline later in this booklet (as well as all of the other Medical information you have gathered).

Another very important thing to get worked out with your crew is DNF-ing. You probably want them to encourage/push you to some extent, but you don't want them to let you die either.

DNF-ing:

I was successful on my first Badwater attempt, but on my second attempt, I DNF'd at 95 miles. A few miles before, my wife had just joined us on the course. She brought her own car. I had several things going on at the time: I had what felt like a broken bone on the top of my right foot. My left hamstring felt like it was about to break. It felt like my pubic bone had a stress fracture developing (I have had stress fractures of the pubic bone before, so I know the feeling). And, every time I would stand up, I would shiver (it was about dusk and the temperature was still about 100-degrees). I was limping a little and I couldn't run. I assessed the situation something like this: I've got a half a dozen conditions that might be serious and that could possibly affect my future running, I've got 40 miles to go, I'm dead, I can't buckle or PR (in fact, if things deteriorate enough, I might even miss the cutoff), and I've got nothing to prove (I've already done it once). In an instant, as I was approaching the crew vehicle, I decided to toss in the towel. I announced it to the crew. Nobody argued. They could see I was dead. In fact, they'd seen me struggling for the past 8 hours or so. We packed up and went into Lone Pine. That fast!

Of course, as soon as my brain started working again, I realized that all of that went down way too fast. What should have happened is that somebody on the crew should have suggested that I get off my feet for an hour (or two). Rest, eat, massage, etc. until some life comes back into my mind and body. If not, then (and only then) call it quits. Why not? You have nothing to lose. You've obviously made plans to be there for a few days, so you have plenty of time.

This was my first DNF in "anything." In the Air Force, I was in Pararescue. 720 qualified men in my class were reduced to 14, mostly by quitting. I survived. I never had DNF-d on a marathon or an ultra or anything ever before in my life. I've even been married 33 years to my first wife! Now there's "not" DNF-ing for you! As a result, DNF-ing never even crossed my mind as a possibility. My crew had crewed me on my successful attempt, so they weren't expecting it either.

I'm not ashamed of DNF-ing, but I have thought about it a lot since. Of course, you really don't want to DNF if you don't have to. So, give yourself a chance to recuperate before you drop out. In retrospect, I think I might have been fine if I would

have taken a long break (I don't know how long). I had just topped the second mountain range (after 8 hours of climbing it, the last two hours of which were against a 60-knot headwind). The temperature was cooling off, we were going into the night, the hardest parts of the race were behind me (the heat and the climbs), and it was slightly downhill for the next 30 miles. After a few miles of "relatively" easier miles, I might have bounced back (okay, I don't think "bounced" is exactly the right word). And, the heartbreaker (that I figured out later) was that, even though I was (very surprisingly to me) at almost exactly the same distance as I was on my first attempt at the same elapsed time; I felt much better than I did at that point on my first race. And I was moving about 30% faster than the last time. So, actually, I probably would have even PR'd... if not buckled!

The important lesson here is this: Your brain will be operating on fumes by 100 miles (at Badwater, that's 30-40 hours of heat, asphalt and mountains). You can't make intelligent decisions under those conditions. You've got to rely on your crew for that. But here's the rub: your crew will be wiped out too! Crewing is almost as hard as running the race. They will be tired and their brains will be baked too (and they're not getting pampered like the runner is). I had a great crew. I don't blame them. What we failed to do is what I'm writing this whole section for: plan for this possibility in advance. We never even thought about it. It caught us all completely off guard. Discuss, in advance, with your crew what do in these situations. Be prepared. I would recommend that you tell them to advise you to, at least, take a long break before DNF-ing. Another factor in my decision to drop was probably, subconsciously, that my wife was now there, and that made it easier for me to just pack up and go home; sort of a comfort zone. So, if your wife joins you, have her with you from the start, or better yet, just meet her at the finish line.

Crew Vehicle:

The ideal crew vehicle would be a minivan with sliding doors on both sides and a rear door that opens upward. Before the run, the rear seats should be removed. The vehicle needs to hold several ice chests, food chests, and a surprising amount of miscellaneous gear. Of course, it should be in good operating condition. You certainly don't want to be DNF-ing because of your vehicle.

We rented two vehicles a mini van and a Ford Expedition. The mini van was the ultimate choice for a support vehicle as the AC worked in all situations. (Don Meyer).

A second vehicle is just a little shy of being absolutely necessary. With only one vehicle, you'd have some problems: 1) you might have to occasionally leave your runner at the mercy of the elements for too long (to get ice or gas, etc.) 2) shuttling gear from one hotel to another would be impossible 3) there might not be enough room for all of the supplies in one vehicle (at a minimum, it certainly would be crowded) 4) there'd be no backup in case of car trouble 5) leaving the course (to satisfy a craving, to get a medical device, etc.) would be impossible. The second vehicle, ideally, would be able to function as a crew vehicle too, but not necessarily. It could be almost any kind of a vehicle. Even a motorcycle would be better than no backup at all.

Choosing/finding crewmembers:

*The most important thing is a good crew that has an ultra background (Mark Godale).
Make sure everyone gets along (Barb Elia).*

There are a lot of qualities that would be ideal in a crew member. But, you will most likely not be lucky enough to find four people with all of them. It would, though, be good if you can have at least two very capable crew members (one on each shift).

The ideal crewmember would have experience at Badwater. They should be a hard worker. That may be a difficult qualification to fill though. No matter who you get, they should be tough too. They should be able to push you, and yet know when enough is enough. They should be able to get along with the other crew members. They should be willing to familiarize themselves with all of the medical information necessary for this event. And they should be willing to learn as much about fluids, carbohydrates and electrolytes as necessary.

If you can get one or two crewmembers that have some Badwater experience (whether running, crewing, or volunteering) that would be great. If not, someone with a background in the outdoors helps (hiking, camping, etc.). Ultrarunners can make good crewmembers because they will understand what you're going through, but being an ultrarunner isn't necessary. By the time you need someone to pace you, almost anybody in fair shape will be able to stay with you at least for a mile or two at a time. You will not be running any 4-minute miles!

Crew Meetings:

Once you have your crew picked, plan a few crew meetings to go over the whole thing from beginning to end. If you are short on any supplies, maybe someone on the crew will have them. Pass out papers on the medical aspects of the run. Loan them a copy of the video "Running On The Sun" and any books or videos on the run. There have been many good TV programs on the race in the past few years. The race organizers and veterans can tell you how to get copies of them. Make copies of booklets and articles (such as this), and pass them out.

Actual practice with the crew is invaluable. If at all possible, get out to Death Valley between May and July and practice working with the crew. Even if only one or two crewmembers can do the practice run, you will learn a lot and gain a lot of confidence. If that's not possible, do some practice runs anywhere. Not only will the coordination of the crew and the runner be enhanced, but you will discover many things that you need, and things you don't need. You'll have a lot of ideas as a result of just a few miles of practice.

Medical

Don't be surprised to get heat rash on legs. It goes away and Desitin ointment helps.

You can moisturize nasal membranes by rubbing a pea-sized dab of Vaseline inside the nose, particularly on the dividing wall.

If you start to panic or get the slightest bit confused or dizzy, slow down, sit in the shade, recover and cool down. You won't be able to escape the heat in the actual environment, so cool down by resting and minimizing your effort rather than by taking off any clothing if possible. (Steven Simmons).

It is important that the crew know the symptoms of impending heat illness: nausea, vomiting, headache, dizziness, faintness, irritability, lassitude, weakness, and rapid heart rate. Impending heat stroke may be signaled by a decrease in sweating and goose bumps, especially over the chest. Heat stroke may progress from minimal symptoms to complete collapse in a very short period of time. (Western States).

It is important to have a pretty good grasp of some medical circumstances that may arise during the run. I am not a doctor, so don't go suing me over some bad medical advice here. This isn't even "advice" it's more of a collection of notes that I have acquired over the years. You can decide if it's useful or not. Take what I say here with a grain of salt (which wouldn't be a bad idea during the run either). What I say isn't as important as the point I'm making, which is to try to learn as much as you can about the kinds of medical emergencies that could occur on the run. For example, dehydration, hyponatremia, renal failure, heat stroke, etc. What I've gathered here is from a lot of sources. Some of them might be good. Some of them might not be. How would I know? By way of further disclaimer, let me put it bluntly: If you die using any of these tips, that is your problem. I have no way of knowing if this is all sound medical advice, or not. In fact, some of it seems to me to be conflicting (remember, I've just gathered the information). If you're in doubt, check it out (and please let me know, so I won't die either). Remember, all of the symptoms aren't necessary to lead to a diagnosis, just some of them.

Dehydration – One symptom is sunken eyes. Try the skin turgor test (pinch skin), if tented, indicates dehydration.

Treatment: Water. If stop urinating, don't conclude that it is dehydration. Overly hydrated athletes also stop urinating. (Note: Fluids that are too concentrated draw water from blood to stomach, adding to dehydration.)

Hyponatremia (overhydration) – stomach discomfort, nausea, vomiting, throbbing headache, restlessness, swollen hands & feet, lethargy, confusion, wheezing, seizures, coma, death. Shivering when not cold. Gained weight, thirst, incoherence, bloated stomach, muscle cramps, disorientation, inappropriate behavior, puffy fingers and ankles. Abdominal cramping and/or vomiting, muscle weakness and/or tremor, paralysis, slowed breathing, malaise, stupor, slurred speech, 2% increase in wt. (3.3 lbs) can be borderline hyponatremia. Try skin turgor test (pinch skin). If you can barely get pinch because skin is a boggy, blobby mass, indicates hyponatremia. (Important note: Any mental change in fluid overload indicates a dire medical emergency.)

Treatment: Urinate. Concentrated sodium solution might help start urination. Stop drinking. Only exception is to drink only to get sodium down. 4 bouillon cubes per 4 oz. water is good treatment. Mild symptoms can be treated by sodium. Severe symptoms require medical attention. *Don't use a diuretic (Lulu Weschler). Salt gets into system very fast (5-15 minutes) (Lulu Weschler). Always under correct for Hyponatremia (i.e., don't overdose on sodium) (Lulu Weschler).* Urination is the most effective remedy for hyponatremia. But don't do by diuretics. A dose of salt may even start urination. If have no salt, stop running. Urination will resume when you rest. The ingestion of water, glucose and salt solution is the best plan to reduce symptomatic hyponatremia and dehydration. Always under correct hyponatremia, too much Sodium is harder to correct (On the other hand, I've read that "if you consume more sodium than the body needs, the kidneys dump the excess.). The sensors detect low Sodium & make you thirsty, setting up a bad cycle. Most hyponatremic athletes are also dehydrated, so treat by adding sodium not by reducing water.

Impending heat illness (heat cramps, heat exhaustion, heat stroke) – nausea, vomiting, headache, dizziness, faintness, irritability, lassitude, weakness, rapid heart rate, decreased sweating (especially over chest), symptoms may progress from minimal to complete collapse in a very short period.

Heat Cramps – Muscular pain and spasms. Usually abdominal muscles or legs. Can be Diaphragm.

Treatment: Cool down, hydrate, potassium. Stop running.

Heat Exhaustion – Cool, pale, moist skin, heavy sweating, dilated pupils (wide), headache, nausea, dizziness, vomiting. Body temperature near normal or moderate rise, heavy sweating, weakness, lack of coordination, goose bumps, fatigue, heat cramps.

Treatment: Get out of heat, cool down, put in shock position (lying on back, feet elevated), remove or loosen clothing.

Heat Stroke – skin is hot, red and usually dry pupils are very small, high temperature (as High as 105 degrees), lethargy, extreme weakness, confusion, odd behavior, disorientation, unconsciousness, seizures.

Treatment: Life-threatening & requires immediate treatment. Call 911, cool down, ice, A/C, wet cool Sheets & towels, give nothing by mouth. Treat for shock. Remove all clothing & rub body with ice or immerse runner in cold water.

Not peeing – Not necessarily a sign that need more water. Kidneys may have shut down and/or body might be retaining water.

Treatment: If swelling, don't drink. Otherwise, may indicate lack of water.

Sloshing stomach - Need more sodium.

Nose bleeding – Can be from dry air. Chapstick can be used as a preventative measure.

Nasal congestion - Histamine kicks in when water stores drop. Drink.

Hypernatremia (not hypo) –Thirst, dry mouth & mucous membranes, dark urine, loss of skin elasticity, irregular heartbeat, irritability, fatigue, lethargy, labored breathing, muscle twitching and/or seizures.

Treatment: Stop sodium, drink water, no diuretics, rest.

Swelling - Swelling can be sign of hyponatremia (too much water), but can also be from too much salt.

Bloating (with Mental Changes) - It is a dire emergency when the runner is bloated and has mental changes. If you're bloated, stop drinking (even Gatorade). Ingest salt. See hyponatremia (above).

Gaining Weight – The only way you can gain weight during an event is by taking in more water than sweating & urinating. Signs of drinking too much: weight increases (or even maintaining wt.), bloating or swelling. Hands, feet, ankles, face, forehead feel swollen, boggy or puffy. Headache accentuated by jostling (e.g., hard footstrikes).

Low mood - Possibly low carbs.

Stomach problems: Many runners get stomach problems at Badwater. Barfing is a common sight, especially during the intense heat of the first day. One way to help avoid stomach problems is to stay well-hydrated. On the other hand, fluid (without enough sodium or the wrong kinds of carbohydrates) can be retained in the stomach. And that can lead to sloshing and bloating. So, knowing the right sodium levels and the kinds of carbohydrates can make a big difference. This is one more reason why experience under race conditions is very valuable. If you feel bloated, or fluid begins to slosh, it may indicate the need to decrease or stop temporarily, or ease up on intensity. *If vomit, you can still recover. If several miles left, you have to rebuild energy stores. One trick is defizzed coke until stomach settles down.* Others runners (like Major Curt Maples) have used Pedialite as an anti-barfing or post-barfing aid.

- *Most runners drop due to stomach or blisters (Denise Jones).*
- *Barfing – most want to avoid it and others seem to revel in it and want to get it out of the way. (Ben Jones).*
- *Sodium is necessary for processing the fluid through the stomach. Fluid sloshing in stomach means the fluid cannot be processed through the stomach, and even though the runner is drinking, he or she isn't receiving the benefit of the hydration. (Theresa Daus-Weber, Marathon & Beyond, 1/02).*
- *Barfing can be good and bad (relief and emptied problem vs. exhaustion and dehydration). Use as a last resort. (Kevin Setnes).*
- *Forget about time and focus on stomach & body, go slow (Kevin Setnes)*

Here are some random, miscellaneous, sodium-related tips that I have accumulated over the years:

Sodium (NA): Plasma sodium concentration is more sensitive to changes in total body water than to changes in sodium. Fluid with high (>10%) carbohydrate content may pull sodium out of blood into intestine, hyponatremia can occur.

1-2 quarts sweat loss/hr, up to 4 in high heat/humidity. Sweat contains 2.25-3.4g salt/liter. Sweat loss averages 1 liter/hr in long hot race. In a long, hot race, aim for total sodium intake of 1g/hr. In training, heat acclimatization, increase salt by 10-25g/day 1g sodium = 2.5g table salt = >½ tsp. Sticking to formulas tend to give not enough sodium when not acclimatized and too much if you are, so listen to body.

Always take NA with water. Soups can have high sodium (chicken noodle = 1.1g) NA. Avg. sweat = 1000mg NA/quart. One S! Cap = 340mg NA. Plasma NA concentration is far more sensitive to gain (or loss) of water than sodium. i.e., if drink too much water without NA being correct it is very easy to lower concentration. But it is harder to change concentration by NA alone (if water not overdone).

Increase NA during the week before run. Excess NA not a problem since you pee it out (some sources say it is a problem).

Blisters:

Most runners drop due to stomach or blisters (Denise Jones).

I changed shoes each time I felt bottoms of my feet start to get hot. (Don Meyer).

Know how to handle blisters, chafing from the heat and salt, and dealing with lack of sleep. This is all roads and can take a toll on knees and feet. Find out what works for food and what your stomach can handle (John Vonhof).

To treat blisters after they develop, clean the area with alcohol. Drain by cutting a small hole in it (not a pin prick). Place Second Skin over the blister. Treat the area with Tincture of Benzoin once again, so the tape will stick. Use foot powder (Zsasorb) to dry the feet after the Benzoin and before taping to get the tape to stick. Tape over Second Skin. (Denise Jones).

The pavement stays super hot much longer than you would think. Change shoes often, even after the sun goes down (Don Meyer).

Shoes have been known to melt at Badwater. So, bring a few extra pairs for that reason alone. Most of the melting I've seen though has come from shoes that have had the toes cut out of them. Also, I suspect that the quality of the shoe is a factor.

Some people tape their feet. If so, *"I recommend pre-taping your feet the night before so the tape has time to conform to your feet. Micropore (3M) works well, its like paper and conforms to the shape of the foot. Another tape that has been helpful is*

Elastikon. I do not recommend duct tape, it doesn't breathe and it tears the skin when removing. (Denise Jones)."

Read Fixing Your Feet. Put together a blister kit and work out a taping strategy ahead of time. Talk to Denise Jones and look at her blister website (Lynne Werner).

I've noticed that blisters seem to go through stages for me. First, the hot spot, or when you first notice the blister developing. Then, you go through various stages from a nuisance to a minor pain. Then, after awhile, they just seem to go away. They don't actually go away, of course, but they don't seem to bother me that much anymore. I think I may be different than most runners, though, in that respect; maybe not. For one thing, I don't wear socks with running shoes. That may or may not have something to do with it.

To my knowledge, there's no problem with running through blister pain. I've asked both Denise Jones (the Blister Queen) and John Vonhof (the author of "Fixing Your Feet") and they both indicated to me that there is no real risk, if any, to ignoring the blister.

Atypically, on my first Badwater I did develop a blister, however, during the first 10-15 miles. Luckily, I saw Denise Jones at Furnace Creek. She graciously fixed me up. She neatly prepared the area with some kind of sticky stuff, cut the tape, wrapped it, and did the whole nine yards. It couldn't have been done better by anyone. In fact, it looked so good it was a shame to have to run on it!

During the next 50 miles or so, though, I had to spend two or three downtimes having my crew try to re-tape the blister. Finally, I just let it go and I was fine. Altogether, I might have lost an hour tending to the blister. If the tape will inevitably come undone (which I don't have enough experience with blisters to know), and if it's not a big deal to you anyway (which may vary from person to person and blister to blister), isn't it better just to ignore it?

I'm not pushing my opinion at all, though. But, since blistering can be a big concern at Badwater, I would strongly recommend that you be prepared to go either way. Either ignore them or have your crew be well-versed in handling them.

On her Badwater runs, Pam Reed ignored blisters AND changing shoes. For us slower mortals though, changing shoes will probably be a good idea. I had four pair of shoes, and I had them numbered. As one shoe would start to feel bad, I'd change it; not both shoes though, just one at a time, as necessary.

Planning

Motels:

Book your rooms early. If they are filled up, the alternatives are basically camping out or sleeping in your vehicle. Both of which are not recommended for the unaccustomed (remember, temperatures will be around 100 degrees at night).

The best places to stay are Furnace Creek (17 miles from Badwater or Stovepipe Wells (42 miles from Badwater). Both are on the course of the race. Both will be crowded with runners/volunteers and crews, and both have excellent facilities. Furnace Creek has the advantage of being closer to the start, but you will be past Furnace Creek early in the first day of the run. I think the location for the second night is more important. So, I usually stay in Stovepipe Wells. There are no telephones in the rooms there and cell phones don't work in Death Valley. So, if you stay there, let your people back home know that you'll be out of touch for a while.

I book three rooms, one room for two nights (the night before the race and the next night) and the other two rooms for just the night before. I use one room for myself (I want to be sure to sleep well) and the other two rooms for the crew. While the first crew starts the race with me, the other crew checks out of all but one of the rooms and transfers the supplies to that room. You'll pass through Stovepipe late in the afternoon or early in the evening of the first day of the run. The first night of the run you'll be climbing the first major mountain to Townes Pass.

Another, maybe better, strategy is to stay the night before in Furnace Creek, the crew have a room in Stovepipe Wells on the first night of the race, and Lone Pine the second night. This gets you to the starting line easier the first morning.

I also book a room in Lone Pine for the second night. During the first crew change after one crew spends the night in Stovepipe; they load the backup vehicle with all of the supplies, suitcases, etc., check out and handoff that vehicle to the other crew, who then goes into Lone Pine to check in. This crew change will occur somewhere between Townes Pass and Panamint. This is a very convenient way to handle the room situation.

In the weeks prior to the race:

Get signatures for driving rental cars and any waivers signed. You'll also be far ahead of the game if you plan your cooler contents well in advance.

If you plan on having breakfast before the race, check with the Furnace Creek restaurant to find out what time they will be open for breakfast on race morning. They are usually open at 6am. Then, if your start time allows, you should probably plan to have breakfast there. The past two years, they have opened at 5:00 to accommodate the runners of the first wave. The Stovepipe Wells restaurant isn't usually open early enough. If the Furnace Creek restaurant won't be open early enough (i.e., you have a 6am start), you

should plan to bring a breakfast to prepare in your room. The restaurant has opened before at 5am on race day, but don't count on it.

In the week before:

Increase your sodium intake this week. Stop the Sauna training at least 3 days before race. The effect will remain, but you don't want to be dehydrated starting the race. Make your crew vehicle signs in advance. Don't wait until the night before (like some people do). It's best to have little or nothing to worry about the night before the race.

The Night Before:

Pre-mix any carbohydrate solutions (such as Succeed Ultra). Get the coolers organized and iced up (you'll have to re-ice them in the morning. Plan which coolers and supplies should go in the primary crew vehicle, what should go in the second vehicle and what can stay in the room.

Take:

Here's a checklist of some things to bring. Of course, you won't need all of this. It's just a list to tweak your thoughts; just some ideas in no particular order:

Running shoes (several pairs), oversized shoes (1-2 pair), sandwiches, radios, coolers, mattress, stove, cook set, night vests, binoculars, shorts, solar shirt, Fanny pak, lightweight coat, potatoes, bananas, OJ, Alarm clock, reading glasses, pen, paper, book, bread, registration info & motel info, entry form, papers/instructions, maps, ice pick or screwdriver, cash, Levis, shirt, underwear & shoes (come home clothes), belts, vitamins, shaving gear, gu, trash bags, zip lock bags, Gatorade, hat, sunscreen, running flashlights, crew flashlights, lanterns, ice chests, ice, water, Vaseline, duct tape, paper towels, cell phone, batteries, band aids, power bars, water bottles, food, spare bulb, extra Elastacon, Second Skin, Chapstick, New Skin, folding table, coffee cups (own), knife, bandanas, chicken soup, V-8, socks, orthotics, insect repellent, pretzels, Fritos, Pringles, Fig Newtons, m&ms, pudding, alcohol wipes, needle/pin, nail clippers, breakfast for race day, tweezers, pace guide, table salt, \$1 in envelope, instant coffee, tools, matches, baggies, clipboard, rope, string, swim trunks, S-caps, Succeed Ultra, oatmeal cookies, oral thermometer, Desitin ointment (for heat rash), fluid containers, burner (camp stove), cords, scouring pads, bug spray, corn nuts, jelly beans, pop tarts, Pepsi (Shasta), hot chocolate, chicken noodle soup, oatmeal packets, zinc oxide, basic first aid kit, outdoor thermometer, swabs, razor blades, Slim Fast, plastic forks, cheese-its, peanut butter & jelly, 2-gal Succeed Ultra container, Body Glide, Long-sleeve shirts, blankets, water jugs, toiletries, dollar bills for ice, fire starter, utensils, gloves, water spray bottles and/or Super Soaker, Micro pore (3M) tape, blister kit: Scissors (sharp & very pointed), Betadine, Tincture of Benzoin (spray), Zsorb foot powder, dark glasses, goggles (swimming type) for sand storms, reflective gear (mandatory), strobe light, flashers, bucket or basin (for feet), folding chairs, cot, umbrella, trash can, whisk broom, zip lock bags, cutting board, cups, scale (not digital), small microwave oven (convenient at SPW), coffee pot, hot plate, extension cord & adapters, notebook, towels, dish soap, toilet paper, camera film, movie camera, film, big jug, club soda, Muscle Nitro, peanuts, fruit, Compeed, solar clothing, inner soles, jacket, long pants, folding chairs.

Two things about the list above: 1) Obviously, you won't want to bring all of this, and 2) I'm sure I've left something out.

Clothing:

There are a lot of choices and opinions when it comes to what to wear for the run (shorts vs. pants, solar clothing or not, long-sleeve/short sleeve, etc.), but almost everybody agrees that you should wear a hat with a flap (covering your neck), at least during the daytime. The sun will be generally at your back for the better part of the first day, so the flap is almost essential. It can also get windy, so a string tie down on the flap can be helpful too. Incidentally, these occasional high winds are not a welcome breeze; they are more like a blast furnace!

Everybody knows that, when it's cold, wearing a hat and extra clothing helps keep the body heat in. But here's an interesting fact: When the ambient temperature exceeds your body temperature, you should wear a hat and a shirt with long sleeves to insulate yourself from the heat. Not just for protection from the sun, but to help keep your body from overheating.

As far as cooling is concerned, at temperatures less than 98.6 degrees, studies show that there is no appreciable difference between synthetic materials and going without a shirt. But, at temperatures over about 99 degrees, a lightweight, white long-sleeved shirt (like the Sun Precautions shirt) helps keep body temperatures down.

Relatively new research from the University of Indiana showed: *There was no difference in skin temperature, body temperature, or core body temperature during exercise between synthetic fabrics, t-shirts, and shirtless running in moderate heat (85 degree and 35% humidity) for 30 minutes. (Running Fitness News).* So, as far as running shirtless, and some people do (unfortunately so far, just guys), it might be okay at temperatures under 100 degrees, or so.

Recent studies are also casting doubt on the usefulness of sunscreen. There are even some studies that suggest that sunscreen can be a carcinogen! So, if you use it, you might want to put it just on your nose. Pam Reed didn't use sunscreen, except on her nose. She avoided using it mainly because she wanted to enhance her perspiration.

Other studies are suggesting a "thumbs up" to a little bit of sun-worshipping. And there seems to be a tendency, now, not to be as sun-fearing as we were led to believe in the past few decades. So, in the light of all this new research, if it is under 100 degrees, it just might be okay to run shirtless from a skin point of view too (at least, if you have a good tan already). It shouldn't be any worse than a day at the beach, and it won't be less than 100 degrees during the daylight on race day for any length of time, if at all. At night, it will probably get down to about 100 degrees. So, removing the shirt or changing to a sleeveless singlet at night might feel good. I always remove my hat at night too for the same reason (to cool down).

Here are a few clothing tips:

- *Wearing lightweight clothing, long sleeve, and preferably covering the legs and continuously soaking the clothing with cold water can simulate sweat. The wet clothes against the skin will have the same effect as sweat. (Steven Simmons).*
- *Put a flap in your hat (and have two) for ice*
- *Be prepared with shoes that are a size larger than you usually wear and can have the toes cut out if necessary (John Vonhof).*
- *I thought the Sun Precautions clothing was very helpful. If you have long sleeves and pants, you don't have to worry about sunscreen so much all day(s) (Lynne Werner).*
- *Definitely bring BIG shoes to wear later in the race, and plan to change shoes and socks frequently (Lynne Werner).*
- *It is good to keep extra pairs of shoes in zip lock bags in the ice chest. (Denise Jones).*
- *Several pairs of shoes, maybe one size larger than normal. (Denise Jones).*

One very popular source (if not the only one) of clothing for Badwater is: Sun Precautions Super Active Shirt, \$80. Ventilated Sport Pants, \$63, Adult Shade Cap with Neck Drape (or Crossover Drape) \$39. (800)882-7860, www.sunprecautions.com. Sun Precautions was also a former sponsor of Badwater.

Also, you should plan on taking lightweight jackets (for the runner and crew). If you happen to be at elevation (crossing Townes Pass or the Panamints) at night, it might be a little cool. Even 100-degrees might feel cool to you after a 130-degree day.

EXTENDED REST BREAKS

Many stopped at mile 65 because there are rooms. I thought that was a big mistake (Mark Godale).

I arrived at Stove Pipe Wells at 9 ¼ hours and, per Lisa's instructions, took a 20-minute break, got into the pool, became greatly refreshed then started for Townes Pass. At this point, with pacers, it was great not having to think about anything other than forward motion. (Don Meyer).

During the race, I didn't take long breaks. I had planned breaks of maybe 20 minutes or so at Stovepipe, Townes Pass, Panamint, somewhere above Father Crowley's, Darwin Turnoff and Lone Pine. Each time I sat down and ate a sandwich, soup, chips, or cheese and crackers – as much real food as I could (Lynne Werner).

This section (on “Extended Rest Breaks”) is rewritten from an article that I wrote for a more general audience of ultrarunners. It might be a little lengthy, but it also might be the most important piece of advice I have to give on running Badwater.

On my first Badwater, at about 65 miles into the run, a veteran passed me (I didn't get her name). By the time she did, I had about 22 hours, one mountain range, 65 miles, and the hottest day of my life behind me. At about that time, I was starting to get pretty wiped out. When she pulled along side, we talked a little. She asked if I had taken a break back in Stovepipe Wells (mile 42). I said "no." She said that I probably should have, and that most people do. She suggested that I take a 20 to 30-minute break in Panamint Springs (mile 72), which is at the base of the second main mountain range. I did what she suggested and took a 30-minute nap there. After the nap, I was amazed at how much better I felt. I was, of course, very stiff at first, but I was very surprised at how refreshed I was overall. In just a matter of yards, the stiffness returned to that kind of normal "ultra-pain" that we are all familiar with, and I was able to do that mountain range very comfortably. I remember being very surprised at how much I had recovered from my pre-rest condition. Without this "recovery," I would have had a very difficult time getting over those mountains.

After topping the mountain range, and somewhere around 90 miles, I just couldn't run anymore. The running muscles didn't respond. I could still walk, but my legs completely ignored the command to run (it was like a nerve or a wire was detached or disconnected from my brain to my legs). Gradually, I deteriorated into still another level of patheticness (not in the dictionary), and by about 95 miles, I was doing 30-minute miles! By this time, I would do a mile, sit down, elevate my legs and recuperate for a few minutes, get up, stumble around a little, start staggering in a forward direction, build up steam to a crawl, accelerate to a creep, and peak out at a slow plod. I'd go another mile like this – I must have looked like a zombie with a mission! I repeated this process all the way into Lone Pine. Those 30 miles probably took at least 15 hours!

Then, in Lone Pine (about 48 hours into the event), I took a second 30-minute nap. When I woke up, I was a new man! After shaking off the initial stiffness, I power-walked 13 miles straight up Mt. Whitney. I felt like I was shot out of a cannon! The 30-minute rest had totally revitalized my legs. From that time, until my next attempt, I was 100% convinced that, if I would have taken at least two more of those half hour naps along the way, I could have shaved 8-10 hours off of my time!

The comparison, in my mind, was to weightlifting. You perform a set to failure, rest; do another set to failure, rest, etc. What I was doing on the run, it seemed in retrospect, for at least 30-40 miles, was continuing to struggle against fatigued muscles. Try to imagine doing 100 more curls after failure!

A few months after the run, I posted my story to the Ultra List on the Internet. I suggested that, even though Badwater is unique, the concept of taking a few extended rest breaks might be useful not only at Badwater, but at some of the other tougher ultras as well. Then, I asked the ultrarunners on the list to respond and let me know what they thought of the idea. Could it apply to a trail 100M? Had anybody tried it? Do they think it would save time, or not?

One of the first responses I received came from the late Scott McQueeney. In it he said, *“...I would not suggest taking naps at a typical trail 100. ... Walking breaks early and regularly is a much better idea in a 100 miler. ...I took a 1-hour break at Stove Pipe Wells, showered and napped. After that when ever I could not move down the road well I would take 5 to 10 minutes to sleep. I ended up with a negative split time of over 3 hours and finished in under 48 hours. I am not a fast runner but know that if I did not take it slow and easy early at Badwater it would eat my lunch after Panamint. I was a rookie as well but had some good coaching from a long time veteran.”*

With the scientific point of view, I was especially glad to hear from Karl King. He said, *“The only real danger in extended rest breaks is stiffening up. Thus the old saying ‘beware the chair.’ ...If you like the idea of a rest break, consider doing it early. ...It may seem like the big thing in a break is sleep, but that may not be the main factor. When you have (exercised?) for some time, your enzymes controlling the storage of glycogen in muscle tissue are very high. If you can down a bunch of carbohydrate and rest, you can re-load a lot of muscle glycogen in 15-20 minutes. Legs that were “dead” can come alive again. Rather than sit in the chair or sleep, I’d prefer to eat and then just walk leisurely so that I have some gain on the distance. Tom Bunk told me once, ‘Anybody running beats anybody walking.’ To which one could add, anybody walking beats one sitting. There may be times in a 100 or 24 hour run when a 10-15 minute nap can do a lot of good. I suspect that it has to do with the reduction of serotonin in the brain, but I don’t have the clinical proof. In any case, if you nap, try eating some carbs before hand so that you combine rest with glycogen re-load.”*

I received several posts that supported the idea, including Mark Swanson who wrote: *“Despite being advised not to, I sat down at 5 of the aid stations on my 100M run – mostly during the night. I found that 10 minutes or so off my feet, while friendly volunteers served me, left me feeling really refreshed when I started out again.”*

Don Lundell added to the commentary with: *“I’ve had a couple of 100s during which I didn’t get sleepy at all (and others where I was dying to pull over). In both of the non-sleepy runs, I’d gotten a few long nights of sleep the week before, and a pretty decent night’s rest before the race (to the extent that you can when you have to wake up at 0-dark-30). At Rio del Lago this year I was falling asleep on my feet at about 3am. Half a No-Doz and 30 minutes later I was fine (though those 30 minutes were pretty awful). Not sure whether it’s better to sleep or combat it with caffeine – though often the next aid station is a long way away and the only option for sleep would be in the dirt next to the trail.”*

Celia Leber wrote: *“...This year at VT 100 I was feeling altogether miserable going up Blood Hill in the dark. I was weaving and wobbling, and felt like I couldn’t go another step. So, I sat down right in the middle of the road... I sulked for a minute, then got out one of those cliff bars with caffeine and choked that down. I sat for a few more minutes... After that, I immediately felt fine, and picked up the pace for the rest of the race! So, while not as extended a break as the other post suggested, it was an unplanned,*

complete stop, and something – whether the sulk, the food, the caffeine, or the break – make a huge difference.”

Celia later added: “At the MMT 100 in 2001, Steve Pero felt like crap at half-way. He stopped/slept/rested for something like 2+ hours and then he passed 60+ people on his way to a top-20 finish. Serendipitous for sure, but I’ve always thought that kind of plan might help a lot of folks.”

Jeff Washburn wrote: “In my first attempt at a 100 mile trail race (WS '88), I had to lay down for an hour at Michigan Bluff or I would not have finished. It was either going to cure me or kill me. That time it was the cure. In other 100 milers since, I have done them with no rest breaks and with a couple of rest breaks. I think it all depends upon the situation and the weather. If it is hot, you are better off taking one or two rests during the heat of the day, leaving you much fresher once the evening comes. If it is cold and you take a break, you have a much better chance of having your muscles tighten. If your fitness is not quite enough to run a good 100 miler, scheduled rest breaks can make or break the run. One thing that is important when taking rest breaks is to eat during the first part of the rest. It is much easier to get food to stay down if you are not running right after eating and resting immediately after eating allows the food to get into your system, giving you more energy once you start moving again. Remember, once you get moving, you should start out by walking first and gradually work up to a run. This will give your muscles time to warm up and help keep you from pulling or injuring the muscle.”

A few posts, including this one by Matt Mahoney, expressed the “elite” point of view: “Last year Karl Meltzer set the Hardrock course record in 26:39, 3 hours faster than anyone thought was possible. He was most proud of the fact that he had the least “down time” of all the runners, averaging less than 2 minutes per aid station. When John Robinson set the course record of 54:57 at Nolan’s 14, I don’t believe he stopped to sleep. Neither did Blake Wood or David Horton when they went under 59 hours at Barkley. If they did sleep, I don’t think it was for very long. I don’t think Kouros took any long breaks when he ran 188 miles in 24 hours. My experience at 100 milers is that I have my fastest times if I don’t stop to sleep, or if I do, sleep for no more than 5 minutes, just enough to get rid of the hallucinations. For a race that goes 2 nights (like Nolan’s 14) I try to get all of my sleep during the first night (4 hours), as this makes the second day easier. I probably could have gotten by on less. I expected to take caffeine during the second night but I did not get really sleepy until sunrise #3, slept 5 minutes, and never needed any caffeine for the whole 59 hours. When I had a 51 hour DNF at Hardrock in 1998 I slept 15 minutes the first night and no sleep the second night, and only needed caffeine on the first night. I think the cold air may have kept me awake. In both cases, it was above treeline with a full moon and below freezing toward the end of the second night.”

With another interesting viewpoint, from the DNF standpoint, Peter Stringer wrote: “This was an intriguing post to me because now I am wondering if I quit some of my DNF 100’s too soon. Perhaps I would have profited by an extended rest? I currently

have 7 DNF's in a row, the last a 70-mile effort at Leadville that really devastated me, because I had trained hard and had done well, still in second place in my age division (of 34 entrants) at Twin Lakes (60 miles). Then after another few miles, the wheels began coming off, and I could barely move forward. I thought I had bonked like the last few times, holding on to trees for support, etc., and since I really couldn't stay vertical, thought I might as well quit. Now, I wonder if I might have profited by a nap. I think I had at least two hours leeway before the next cutoff. Same with Vermont and Western States the past two years. At Vermont this summer I got all the way to mile 87, then didn't know if I could make the next aid station, so I thought I'd better go back to the last one while I still could (I had finished Vermont in 19 hours just four years ago, and have also been successful at WS as recently as year 2000). So while I thought I might just be getting too damn old for 100's, maybe I can squeeze out a few more years by taking some well timed naps. I have been very careful to go out slow in these races and don't really catch up to the mid-packers until 40 miles or so, even at Vermont, where I have to consciously put on the brakes the first few hours. Your post was really thought-provoking when you likened the running to lifting weights to failure, then resuming when the muscle has a rest."

There were those who held to the more traditional idea that the road to success is by putting one foot in front of the other non-stop. For example, Tony Covarrubias wrote: *"In my first 100 miler this year, I did NOT sit down at any aid station for the purpose of resting. I did stop to take rocks out of my shoes once and change socks, another time. I sat down on both occasions for obvious reasons. Mentally, for me, I needed NOT to sit down and to just keep moving. I only had one stretch where it was tough to keep pushing forward - and that was a steep uphill into cold wind. Sitting down, if nothing else, would have just added time to my race."*

There were others who thought that the rests would cost too much time. Andy Macginnitie wrote: *"I've never run >24 hours, but some simple math would suggest that an extended break will probably not improve your overall time. If a runner stops for a 30 minute break at the 80 mile point of a 100 mile run, he or she will have to go a full 1 1/2 minutes/mile faster once he/she starts back up just to make up for the break time. In most cases, I would guess this wouldn't happen. On the other hand, a runner who is really out of it (as in the initial description of someone having to rest several minutes after each mile) just (might) benefit. My conclusion would be that anyone moving at a steady pace is best off plowing ahead, but someone who isn't really going forward might benefit from a decent rest. I suspect planned rests become increasingly advisable in races lasting >36 hours."*

Replying to Andy Macginnitie's post (above), M.R. Erickson wrote: *"I guess it depends upon what you mean by 'extended'. I've run races wherein I've gotten the drowsies and all loopy in the head and ended-up stumbling down the trail for literally hours on end trying to stay awake. Some of these pathetic efforts have ended in DNF. In retrospect, I would gladly have traded a half-hour nap for a better time or even a simple finish."*

After experiencing, firsthand, the benefits of my two half-hour extended rest breaks at Badwater, when I was totally wiped out, and after reading all of the responses to my post (which helped bring the concept into focus for me), I think I have formulated a pretty good theory. Reasoning that everybody is likely to be at least somewhat right, I tried to fit everybody's comments into one broad system that would fit what everybody had to say. Here's my conclusion:

If your pace drops to some personal level of patheticness (the key word), you will almost certainly benefit from an extended rest break. It almost sounds too simple and too obvious. But how many of us just "plow" ahead regardless of how we feel? The very nature of ultrarunning is mind over pain, persistence, determination, etc. When you are truly wiped out and your brain is fried, it isn't too easy to think properly. We revert back to our basic mindset, which is that of being tough, no whining; just keep going no matter what. I'm convinced that the answer is just simply, at some point; whether it is Badwater or a bad day, if you end up staggering around and/or your pace is a fraction of what it should be, consider taking an extended rest break. At least try it before falling even farther behind or DNF-ing. Quoting Andy again, he said, *"If a runner stops for a 30 minute break at the 80 mile point of a 100 mile run, he or she will have to go a full 1 1/2 minutes/mile faster once he/she starts back up just to make up for the break time."* That may be true, but for example, if your pace is 15 minutes per mile slower than normal (i.e., you're dying out there) and a 30-minute break will get you back close to your normal pace, you would finish about 4 ½ hours sooner by taking the half hour break!

But, if you're having a good day, or you're an elite runner (whether it's because you are more adequately trained, because you are on the course for less time, or you are genetically superior, or all of the above) the extended rest break might not result in a better finishing time for you.

The next question is: for how long should the extended rest break be? Without scientific studies, there's no way to say with any reliability. Even with studies, we probably won't know with much accuracy, especially since we're all so different. Meanwhile, I think we can all have a pretty good idea by just using some common sense.

Is actually "sleeping" a necessary ingredient in order to benefit from the extended rest break? It might be. Or, maybe it's just the state of being "motionless" for an extended period that is crucial (maybe by letting your metabolism, stomach, etc., catch up). Because of a lot of experience that I had with sleep deprivation some 30+ years ago, I believe that what Karl King said, (downing the carbs just prior to sleeping, or during the rest, if you aren't sleeping) could be very beneficial. Adding caffeine might also be helpful. There's a lot here that could be the basis for some scientific research

I do think that there might be something to the extended rest break idea. Maybe the "keep moving" concept can be counterproductive at some point.

Reduced to a simple statement, the idea is this: **When your pace drops to some undefined subjective level (probably in the zombie zone), an extended rest break,**

most likely involving lying down and being motionless, and possibly involving sleep, carbo-loading, and/or a little caffeine; may, in the long run (no pun intended), result in a better finishing time.

Since I wrote the above article, I did my second Badwater (the one I DNF-ed on). I tried my new theory. I took several of these extended rest breaks. I took one at Stovepipe Wells, the top of Towne's Pass, Panamint, and about two or three others between Panamint and where I dropped at 95 miles. Even though I DNF-ed due to other reasons, I felt much better at this point than I did in my previous run. Also, and this is very important, in spite of being off my feet a total of about two hours more, I was at just about exactly the same point time-wise. In other words, my better pace was making up for the lost time. Also, my current pace at dropping was probably around 22-minute miles, as opposed to 30-minute miles at this point on my first attempt. So, especially considering that I was two years older the second time (and at an age where those two years are meaningful), I think I can safely say that the plan was working.

Also, in retrospect, I think I had a good dose of hyponatremia on the first run. I was bloated up pretty severely. My arms were beet red. I thought it was sunburn at the time, but it turned out not to be. Then, after at least a half a day of being bloated, around midnight I started peeing like a racehorse. I'd pee what seemed like a quart, go a quarter mile and do it again. After all of the peeing, the arms were back to normal and most of the swelling was gone (my legs remained swollen for about a week, though). On my second run, this severe swelling didn't happen. To me, this lends at least some support to my extended rest break theory. Luckily, probably by the slow pace and frequent sits, my sodium level apparently got stabilized. The frequent little rests might have helped make this possible. Whereas, with the second run and the extra extended rest breaks, I didn't get the hyponatremia in the first place (although, I think I may have had a touch of it).

The Run

The start of the race is an experience! There will be press from all over the world; runners and crew from a dozen countries, friends, spectators, and crew vehicles everywhere. It is a very exciting time! Be sure to have your crew snapping a lot of photos of this show.

There is an outhouse at the start. This outhouse is probably the most odiferous outhouse in the world! It bakes all summer long. Use it, or go near it, at your own risk!

Plan to have your crew vehicle stop about 2 miles out for the first stop. Or, better yet, at an unusual interval (like 1.7 miles, for example) to help avoid the congestion from the other crew vehicles. The first few stops are the most crowded with crew vehicles, press and spectators. The first 10 miles or so is like a circus, with runners all joking and socializing with each other, crew vehicles leapfrogging back and forth, the traffic, the waving to and from other crews, all the horn honking and signs of encouragement, the

dazed look in the eyes of the occasional tourist passing by. The mood is electric. Then, maybe 10 miles down the road, reality sets in... it's starting to get hot and you've got 125 miles to go! The hottest, and perhaps the hardest part of the race, is almost certainly the first 12-15 hours (or basically until you get out of Death Valley and over the first mountain range. The heat and adrenaline combined can be an overwhelming combination. So, hold back!

After you get past the first few miles, fall back on your pre-established system of pit stops. I think one stop per mile is good for the next 10 miles, or so. That way, you'll be able to make up your mind under actual conditions whether or not you can extend the interval. I think you'll need to stay at or about one mile interval during the first day because of the heat. By the time you get to the vehicle, you'll need new ice, if nothing else.

I think at every stop you'll need to do the following: Change your ice bandana(s), get sprayed down, change water bottles, and get a dowsing. I have seen runners leave a pit stop bone dry and/or without ice. This is certainly not recommended. At various intervals you'll need to take electrolytes, eat, apply body glide, get weighed, change/repair shoes/clothing, apply sunscreen, etc.

Ice Bandana: One of the things most veterans swear by is the ice bandana. This is perhaps one of the top ten most important things to know about Badwater! Be sure to have about ten bandanas with you. A crewmember will lay the unfurled bandana (on a cooler) and spread ice from one corner of the bandana diagonally to the opposite corner (the farthest corner, the opposing corner). Then the two other corners are brought together (forming a triangle with the ice in the long direction (the hypotenuse). The bandana is rolled up (the long way). With a little practice and feedback from you, the crew will learn how to make the bandana just right (a little room at both ends for tying, just the right amount of ice, etc.). The bandana is tied around your neck. The ice cools your carotid artery which, in turn, cools your body down substantially. I can't imagine doing Badwater without this tool. The reasons you need to take ten or so bandanas with you is: that it is easier to make a few up in advance, you might end up using a few at a time, and you are bound to lose one or two along the way.

By the time you get to the crew vehicle, the ice will be gone or almost gone. A trick that I learned was to also put a bandana (with ice in it) under my hat. I would then unfurl the bandana partially. With the bandana sticking out from under my hat, it forms a parted pair of flaps in front of my face (in addition to the flap that was already attached to the back of my hat). This serves a dual purpose. It helps keep the sun off your face and the icy wetness (as the melting ice drips down the bandana) creates an air conditioner effect on your face. Don't try this at home. It will only work at Badwater because of the heat and dryness there. If you tried this in Omaha, your shorts would get soaked (which could lead to chaffing). In Death Valley in July, your head might be soaked, but your shorts will remain dry because of the rapid evaporation there. Even so, be careful not to overdo this, or any other ice/water maneuvers, or wet shorts (leading to chaffing) can result. My routine was: when I reached the crew vehicle, to take the bandana from around

my neck (which usually still contained some ice), put it under my hat, give the old one (from under my hat) to the crew member, and put the new one around my neck. This way, there is just the right amount of ice under your hat.

Of course, white bandanas are preferable. Also, one other bandana tip: Don't bother trying to cut up a sheet into custom made bandanas. I tried that once. The material doesn't wick as well, it doesn't insulate your skin as well, and larger is not better. A normal bandana is perfect.

Spraying: A nearly indispensable piece of equipment is a sprayer. Get a good quality garden sprayer (used for applying insecticides/liquid fertilizer, etc.) at Home Depot. I used a 1-gallon Hudson "Stain Preserve Seal" sprayer. Fill it with ice water. When you approach the vehicle, one of the crew members should spray your face, neck and shirt and whatever else you want sprayed. And be sure the crew "pre-sprays" a little before turning it on you because there will be a little hot water in the line, and the last thing you'll want is hot water sprayed on you! The undrinkable water from melting ice in the coolers is perfect for filling the sprayer. You might even want to be sprayed at ½-mile increments during the intense heat portion of the race (the first 42 miles). Some people, in the past, have a crew member follow along on a bicycle for more frequent spraying. The rules now forbid the bicycle. *Have your crew soak you down, if the suit gets dry it will retain heat. (Arthur Webb).*

Changing water bottles: A single-bottle fanny pack or, if you prefer, a single handheld bottle is adequate (you're not ever going to be too far from your crew vehicle). Even if you have not finished much of your water bottle by the time you make the pit stop (and shame on you if that is the case), you should replace the bottle for a cold one anyway. Cold drinks are not only more satisfying and cooling, but the nutrients get absorbed faster. So, most stops should include a bottle change. Naturally, bringing several bottles is recommended. More than likely, you will also vary the contents of the bottles (Gatorade, water, various electrolyte concoctions, etc.). Having them pre-prepared and cold in the coolers is a necessary timesaver. Also, you will have many last-minute changes of mind, cravings and intolerances. So, you'll want to have the spare bottles to accommodate these desires.

Dousings: When you are running long distances in 125-130 degree heat, one of the greatest pleasures is dumping a glass of ice water over your head. In 130-degree temperatures, this is like sex! I always did it at every stop (dousings, that is). You'll want to do it at least during the heat of the day, and probably well into the night. You can use melted ice water from the coolers for this purpose. Of course, lean forward to avoid getting your shoes and shorts wet. Although, the spilled water will mostly evaporate before it hits your shoes. Just kidding! The perfect cup for this is those large plastic cups that you buy in a package. Bring a whole package. You can also write names on them and you and the crew can use them for drinking too. *I think it is a mistake to soak your whole body (shoes get wet). I stopped at mile 40 & mile 65 to put baby powder on my feet. Didn't have one blister from Badwater (Mark Godale). Maintaining body temperature is*

most important. Blood goes away from stomach for cooling, poor water on you. (Kevin Setnes)

Carbs and Electrolytes: It is obviously very important to maintain adequate carbohydrate intake electrolyte balances on an undertaking like Badwater. This booklet is meant to be more of a “tips” kind of thing for novices, and not so much to be duplicating information that you can get elsewhere. I will offer, though, what I’ve accumulated in the way of notes, tidbits, facts, opinions, etc.

It is very important that the crew monitor electrolytes (so the runner doesn’t have to). Although, it would be a good idea for you to try to keep track yourself (two brains are better than one). A log is a great idea.

I alternated one bottle of Succeed Ultra with one bottle of water. I also took electrolyte capsules with the water. Normally (at home, on marathons, shorter ultras, etc.), I like Gatorade. But I discovered that it doesn’t work well for me over long distances in extreme heat. This is another reason I recommend getting some time in running in the desert (to be able to find out these things for yourself).

I always ran with 2 bottles, drink or douse. Eat real food, 40 + hours is too long to sustain on Gatorade and goo. (Bobb Ankeney). Gatorade can be bad (sugars), Maltodextrin better. Succeed Ultra (carbs only) mix per instructions. The thinner any solution in your stomach, the easier absorbed. Alternate one bottle of mix with one bottle of water. (Kevin Setnes)

Pit Stops: Each time you approach your crew vehicle there will be the basics (bandana, fluids, etc.). But sometimes you’ll need something special. Sometimes you’ll only feel up to consuming one type of fluid or food, or maybe you’ll need a band aid or body glide, or you need to rub out a cramp, change shoes, etc. Later in the race, you might have muscle problems, or blisters that need care, etc. So, I like to have my crew approach me as they see me coming over the horizon (ideally, meeting me a 100 yards or so before the vehicle). Then, after a spraying or handing off of fluids or whatever, that crew member jogs ahead and relays any necessary information to the other crew member so that what I needed is there as I pass by the vehicle. In my case, I was lucky; one of my guys was able to bring some two-way radios. That was a great substitute. It eliminated the need for the advance guy to jog ahead. If you can get some walkie talkies or two way radios, it is a big help. Remember, cell phones (which otherwise might help) don’t work in Death Valley.

Ideally, you’ll be able to practice with your crew before the race. And, ideally, that would be in Death Valley in the summertime. But, even if you have to do it in Kansas in the winter, it will be helpful to all of you.

Obviously, you want to make these pit stops as short as possible. Most of the time you can just slow down and keep moving while getting replenished, sprayed, etc. Remember, 135 one-minute delays adds up to more than two hours. On the other hand,

don't skip any of the essentials in the name of time, or you won't even get there. Make these stops "hand off and goes."

Ice: Obviously, ice is a big topic in Death Valley. You will need a lot of it. Fortunately, it is generally a plentiful commodity. There's ice available in Furnace Creek, Stovepipe Wells, Panamint, and Lone Pine. The night before the run, you should have at least enough ice to keep the refrigerated items cold. It's not a bad idea to stock up on it then too. In the morning, replace the melted ice and stock up again. Remember to bring an ice pick (a screwdriver works too) to help with the ice management. One of those hard metal ice cream scoops can come in handy too.

If you are staying at Stovepipe Wells, there is free ice in the ice machines there. In the past few years, they have been getting strict about limited use of the machines, i.e., it's getting more difficult to stock up there. The general store across the street sells it, but it may not be open in the morning if you have an early start. You may have to get your ice in Furnace Creek (on the way to the starting line in Badwater).

There is a gas station in Furnace Creek, as you come in from Stovepipe, on the Stovepipe side of the village. They have a small ice house. You can get plenty of ice there. Be sure to have plenty of \$1 bills with you (and the crew) for the ice machines. There are other locations in Furnace Creek where you can get ice, as well, at the general store.

There is also ice in the store in Panamint (70 miles into the run) which is open 7am - 10pm. If you are going to be going through there at times other than that, be sure to have your crew go ahead (or stay behind) to get the ice you need. There have also been cases where some of the slower runners have come through there well after the pack and the ice was all gone. So, stock up! Plus, if you have to DNF, be sure to offer your remaining ice to other crews on the way out! I know some people who were very grateful for such a gift from Carrie Merchant! By the way, Carrie wasn't DNFing when she gave us the ice (she actually completed the race the same year that I did), she was crewing for someone who DNF'd.

Coolers: You'll want to have several coolers with you. Most runners will have two or three big coolers (and various smaller sized ones) in the crew vehicle, plus a few others in the back up vehicle (storing the backup supplies). Cooler organization will be very important on race day. Plan it out in advance. Having a large cylindrical cooler is a perfect idea for water (which you will consume a lot of). Things like Body Glide & Chapstick melt, so keep them keep in a cooler too. You might want to have a small cooler for medical supplies and other meltables (a Badwater word). You'd be surprised at what will melt. I have seen the glue from the molding in some vans melt and drip like paint. I once opened a stick of deodorant that popped like a water balloon when I opened it. It had turned to a thin liquid. Be prepared.

Summary

That's about it. Of course, there's a lot more to running the race, but you already know how to train in general and you know most of the basics of ultrarunning. As far as Badwater-specific tips, I think the most important things to remember are:

- 1) Do plenty of Hill training (it's easy to forget that this is also a difficult terrain race).
- 2) Incorporate walking into your training. You'll do a lot more walking in this race than probably any other.
- 3) Consider the Extended Rest Break theory. This is not like a 100-miler or any typical ultra. The Extended Rest Break idea might only be useful on an undertaking like Badwater.
- 4) Both you and your crew need to thoroughly understand the medical risks of this race, as well as the general hydration, carbohydrate and electrolyte requirements.
- 5) Practice with your crew is indispensable and communication with your crew is vital.

I can understand that some of these tips can make the idea of attempting Badwater seem all the more daunting. That's because I haven't dwelled on the positive side. Just the fact that you are an ultrarunner pretty much means that you can do this race.

Some of the feedback that I have gotten from this booklet suggests that it may have made people think that the race was way too technical; or that there was way too much to learn, to know, or to be worried about. In a way, all of that is true; but mostly the things contained in this booklet are about making the task safer and easier. You're not likely to die or get injured if you don't know these things, or don't do them. Your body will probably slow you down or take you out of the race before anything serious happens. These tips should just help you finish, and finish with less difficulty. Don't let the information overwhelm you though. I'm sure there have been many people do the race with little or no awareness of what they were getting into.

I envy you, because you are about to experience one of the best times of your life. Finishing Badwater will be one of your greatest achievements. It is something you'll always be proud of. And it will get in your blood. You will always feel connected with the place, the event, and the people. You can do it! You can not only do it, but you'll be back... whether to run it again, volunteer, crew, or as a spectator...you'll be back!

I'll see you out there! Good luck! And have fun!

-Mike Henebry

P.S. Here's a pace chart that I made, it might be useful:

Pace chart

	Average	PACE:	15:00	17:00	18:00	19:00	20:00	21:00	22:00
Badwater		Miles:							
Telescope Peak Sign on L.		1.8	27	30.6	32.4	34.2	36	37.8	39.6

	2	30.0	34.0	36.0	38.0	40.0	42.0	44.0
	3	45.0	51.0	54.0	57.0	60.0	63.0	66.0
Wide Shoulder on R.	3.1	46.5	52.7	55.8	58.9	1.03	1.09	1.14
Natural Bridge on R.	3.5	52.5	59.5	1.05	1.11	1.17	1.23	1.28
	4	60	68	1.2	1.27	1.33	1.4	1.47
	5	75	85	1.5	1.58	1.67	1.75	1.83
Devil's Golf Course on L.	5.5	1.38	1.56	1.65	1.74	1.83	1.93	2.02
	6	1.5	1.7	1.8	1.9	2	2.1	2.2
	7	1.75	1.98	2.1	2.22	2.33	2.45	2.57
Artist's Dr. entry on R.	7.9	1.98	2.24	2.37	2.5	2.63	2.77	2.9
	8	2	2.27	2.4	2.53	2.67	2.8	2.93
	9	2.25	2.55	2.7	2.85	3	3.15	3.3
	10	2.5	2.83	3	3.17	3.33	3.5	3.67
West Side Road on L.	10.5	2.63	2.98	3.15	3.33	3.5	3.68	3.85
	11	2.75	3.12	3.3	3.48	3.67	3.85	4.03
Artist's Dr. exit on R.	11.6	2.9	3.29	3.48	3.67	3.87	4.06	4.25
	12	3	3.4	3.6	3.8	4	4.2	4.4
Mushroom Rock on R.	12.9	3.23	3.66	3.87	4.09	4.3	4.52	4.73
	13	3.25	3.68	3.9	4.12	4.33	4.55	4.77
	14	3.5	3.97	4.2	4.43	4.67	4.9	5.13
Golden Canyon on R.	14.4	3.6	4.08	4.32	4.56	4.8	5.04	5.28
	15	3.75	4.25	4.5	4.75	5	5.25	5.5
	16	4	4.53	4.8	5.07	5.33	5.6	5.87
Hwy 190 & 178 - go left	16.4	4.1	4.65	4.92	5.19	5.47	5.74	6.01
	17	4.25	4.82	5.1	5.38	5.67	5.95	6.23
Furnace Creek Ranch on L.	17.4	4.35	4.93	5.22	5.51	5.8	6.09	6.38
Chevron & ice on L.	17.6	4.4	4.99	5.28	5.57	5.87	6.16	6.45
Visitor's Center on L.	17.7	4.43	5.02	5.31	5.61	5.9	6.2	6.49
	18	4.5	5.1	5.4	5.7	6	6.3	6.6
Harmony Borax Works L.	19	4.75	5.38	5.7	6.02	6.33	6.65	6.97
	20	5	5.67	6	6.33	6.67	7	7.33
Cow Creek R.	20.7	5.18	5.87	6.21	6.56	6.9	7.25	7.59
	21	5.25	5.95	6.3	6.65	7	7.35	7.7
	22	5.5	6.23	6.6	6.97	7.33	7.7	8.07
	23	5.75	6.52	6.9	7.28	7.67	8.05	8.43
	24	6	6.8	7.2	7.6	8	8.4	8.8
	25	6.25	7.08	7.5	7.92	8.33	8.75	9.17
	26	6.5	7.37	7.8	8.23	8.67	9.1	9.53
	27	6.75	7.65	8.1	8.55	9	9.45	9.9
	28	7	7.93	8.4	8.87	9.33	9.8	10.3
Beatty turnoff R.	28.3	7.08	8.02	8.49	8.96	9.43	9.91	10.4
	29	7.25	8.22	8.7	9.18	9.67	10.2	10.6
	30	7.5	8.5	9	9.5	10	10.5	11
Salt Creek Turnoff L.	30.7	7.68	8.7	9.21	9.72	10.2	10.7	11.3
	31	7.75	8.78	9.3	9.82	10.3	10.9	11.4
Sea Level Sign L.	31.9	7.98	9.04	9.57	10.1	10.6	11.2	11.7
	32	8	9.07	9.6	10.1	10.7	11.2	11.7
	33	8.25	9.35	9.9	10.5	11	11.6	12.1
	34	8.5	9.63	10.2	10.8	11.3	11.9	12.5
Scotty's Castle turnoff R.	34.7	8.68	9.83	10.4	11	11.6	12.1	12.7

	35	8.75	9.92	10.5	11.1	11.7	12.3	12.8
Sea Level Sign L.	35.2	8.8	9.97	10.6	11.1	11.7	12.3	12.9
Sand Dunes turnoff R.	35.8	8.95	10.1	10.7	11.3	11.9	12.5	13.1
	36	9	10.2	10.8	11.4	12	12.6	13.2
Devil's Cornfield sign R.	36.1	9.03	10.2	10.8	11.4	12	12.6	13.2
	37	9.25	10.5	11.1	11.7	12.3	13	13.6
	38	9.5	10.8	11.4	12	12.7	13.3	13.9
	39	9.75	11.1	11.7	12.4	13	13.7	14.3
Sand Dunes R.	39.9	9.98	11.3	12	12.6	13.3	14	14.6
	40	10	11.3	12	12.7	13.3	14	14.7
	41	10.3	11.6	12.3	13	13.7	14.4	15
Stovepipe Wells Store R.	41.9	10.5	11.9	12.6	13.3	14	14.7	15.4
	42	10.5	11.9	12.6	13.3	14	14.7	15.4
Mosaic Canyon turnoff L	42.1	10.5	11.9	12.6	13.3	14	14.7	15.4
	43	10.8	12.2	12.9	13.6	14.3	15.1	15.8
	44	11	12.5	13.2	13.9	14.7	15.4	16.1
	45	11.3	12.8	13.5	14.3	15	15.8	16.5
	46	11.5	13	13.8	14.6	15.3	16.1	16.9
1000' Elevation sign	46.6	11.7	13.2	14	14.8	15.5	16.3	17.1
	47	11.8	13.3	14.1	14.9	15.7	16.5	17.2
	48	12	13.6	14.4	15.2	16	16.8	17.6
	49	12.3	13.9	14.7	15.5	16.3	17.2	18
	50	12.5	14.2	15	15.8	16.7	17.5	18.3
2000' elevation sign	50.5	12.6	14.3	15.2	16	16.8	17.7	18.5
Wild Rose Turnoff L.	51	12.8	14.5	15.3	16.2	17	17.9	18.7
	52	13	14.7	15.6	16.5	17.3	18.2	19.1
	53	13.3	15	15.9	16.8	17.7	18.6	19.4
3000' elevation sign L.	53.3	13.3	15.1	16	16.9	17.8	18.7	19.5
	54	13.5	15.3	16.2	17.1	18	18.9	19.8
	55	13.8	15.6	16.5	17.4	18.3	19.3	20.2
4000' elevation sign L.	55.7	13.9	15.8	16.7	17.6	18.6	19.5	20.4
	56	14	15.9	16.8	17.7	18.7	19.6	20.5
	57	14.3	16.2	17.1	18.1	19	20	20.9
	58	14.5	16.4	17.4	18.4	19.3	20.3	21.3
2nd Radiator Water Tank on R.	58.5	14.6	16.6	17.6	18.5	19.5	20.5	21.5
Townes Pass summit	58.7	14.7	16.6	17.6	18.6	19.6	20.5	21.5
	59	14.8	16.7	17.7	18.7	19.7	20.7	21.6
	60	15	17	18	19	20	21	22
	61	15.3	17.3	18.3	19.3	20.3	21.4	22.4
4000' elevation sign R.	61.5	15.4	17.4	18.5	19.5	20.5	21.5	22.6
	62	15.5	17.6	18.6	19.6	20.7	21.7	22.7
Vista Point	62.2	15.6	17.6	18.7	19.7	20.7	21.8	22.8
	63	15.8	17.9	18.9	20	21	22.1	23.1
3000' elevation sign L.	63.8	16	18.1	19.1	20.2	21.3	22.3	23.4
	64	16	18.1	19.2	20.3	21.3	22.4	23.5
	65	16.3	18.4	19.5	20.6	21.7	22.8	23.8
	66	16.5	18.7	19.8	20.9	22	23.1	24.2
2000' elevation sign L.	66.1	16.5	18.7	19.8	20.9	22	23.1	24.2
	67	16.8	19	20.1	21.2	22.3	23.5	24.6
Adopt-a-Highway sign on R.	67.7	16.9	19.2	20.3	21.4	22.6	23.7	24.8

	68	17	19.3	20.4	21.5	22.7	23.8	24.9
Panamint lake bed, E. edge	68.1	17	19.3	20.4	21.6	22.7	23.8	25
	69	17.3	19.6	20.7	21.9	23	24.2	25.3
Panamint lake bed, W. edge	69.1	17.3	19.6	20.7	21.9	23	24.2	25.3
Trona turnoff L.	69.8	17.5	19.8	20.9	22.1	23.3	24.4	25.6
	70	17.5	19.8	21	22.2	23.3	24.5	25.7
	71	17.8	20.1	21.3	22.5	23.7	24.9	26
	72	18	20.4	21.6	22.8	24	25.2	26.4
Panamint Springs Resort L.	72.3	18.1	20.5	21.7	22.9	24.1	25.3	26.5
2000' elevation sign L.	72.9	18.2	20.7	21.9	23.1	24.3	25.5	26.7
Darwin Falls turnoff	73.3	18.3	20.8	22	23.2	24.4	25.7	26.9
	74	18.5	21	22.2	23.4	24.7	25.9	27.1
	75	18.8	21.3	22.5	23.8	25	26.3	27.5
3000' elevation sign L.	75.8	19	21.5	22.7	24	25.3	26.5	27.8
	76	19	21.5	22.8	24.1	25.3	26.6	27.9
	77	19.3	21.8	23.1	24.4	25.7	27	28.2
	78	19.5	22.1	23.4	24.7	26	27.3	28.6
	79	19.8	22.4	23.7	25	26.3	27.7	29
	80	20	22.7	24	25.3	26.7	28	29.3
4000' elevation sign L.	80.2	20.1	22.7	24.1	25.4	26.7	28.1	29.4
Father Crowley's Point R.	80.2	20.1	22.7	24.1	25.4	26.7	28.1	29.4
	81	20.3	23	24.3	25.7	27	28.4	29.7
	82	20.5	23.2	24.6	26	27.3	28.7	30.1
	83	20.8	23.5	24.9	26.3	27.7	29.1	30.4
	84	21	23.8	25.2	26.6	28	29.4	30.8
DVNP Park Boundary	84.9	21.2	24.1	25.5	26.9	28.3	29.7	31.1
	85	21.3	24.1	25.5	26.9	28.3	29.8	31.2
Saline Valley turnoff R.	86	21.5	24.4	25.8	27.2	28.7	30.1	31.5
5000' elevation sign	87	21.8	24.7	26.1	27.6	29	30.5	31.9
	88	22	24.9	26.4	27.9	29.3	30.8	32.3
	89	22.3	25.2	26.7	28.2	29.7	31.2	32.6
	90	22.5	25.5	27	28.5	30	31.5	33
Darwin turnoff L.	90.1	22.5	25.5	27	28.5	30	31.5	33
	91	22.8	25.8	27.3	28.8	30.3	31.9	33.4
	92	23	26.1	27.6	29.1	30.7	32.2	33.7
5000' elevation sign L.	92.4	23.1	26.2	27.7	29.3	30.8	32.3	33.9
	93	23.3	26.4	27.9	29.5	31	32.6	34.1
	94	23.5	26.6	28.2	29.8	31.3	32.9	34.5
	95	23.8	26.9	28.5	30.1	31.7	33.3	34.8
	96	24	27.2	28.8	30.4	32	33.6	35.2
Grave Site R.	96.3	24.1	27.3	28.9	30.5	32.1	33.7	35.3
	97	24.3	27.5	29.1	30.7	32.3	34	35.6
	98	24.5	27.8	29.4	31	32.7	34.3	35.9
	99	24.8	28.1	29.7	31.4	33	34.7	36.3
27.5 mile marker	100	25	28.3	30	31.7	33.3	35	36.7
	101	25.3	28.6	30.3	32	33.7	35.4	37
4000' elevation sign L.	101.6	25.4	28.8	30.5	32.2	33.9	35.6	37.3
	102	25.5	28.9	30.6	32.3	34	35.7	37.4
Hwy 136 & 190 go straight	102.9	25.7	29.2	30.9	32.6	34.3	36	37.7
	103	25.8	29.2	30.9	32.6	34.3	36.1	37.8

	104	26	29.5	31.2	32.9	34.7	36.4	38.1
	105	26.3	29.8	31.5	33.3	35	36.8	38.5
	106	26.5	30	31.8	33.6	35.3	37.1	38.9
	107	26.8	30.3	32.1	33.9	35.7	37.5	39.2
Keeler	107.8	27	30.5	32.3	34.1	35.9	37.7	39.5
	108	27	30.6	32.4	34.2	36	37.8	39.6
Adopt-a-Highway sign on R.	108.5	27.1	30.7	32.6	34.4	36.2	38	39.8
	109	27.3	30.9	32.7	34.5	36.3	38.2	40
	110	27.5	31.2	33	34.8	36.7	38.5	40.3
	111	27.8	31.5	33.3	35.2	37	38.9	40.7
	112	28	31.7	33.6	35.5	37.3	39.2	41.1
Dolomite Loop turnoff R.	112.6	28.2	31.9	33.8	35.7	37.5	39.4	41.3
	113	28.3	32	33.9	35.8	37.7	39.6	41.4
	114	28.5	32.3	34.2	36.1	38	39.9	41.8
	115	28.8	32.6	34.5	36.4	38.3	40.3	42.2
	116	29	32.9	34.8	36.7	38.7	40.6	42.5
Dolomite Loop turnoff R.	116.9	29.2	33.1	35.1	37	39	40.9	42.9
	117	29.3	33.2	35.1	37.1	39	41	42.9
Owen's River	117.7	29.4	33.3	35.3	37.3	39.2	41.2	43.2
	118	29.5	33.4	35.4	37.4	39.3	41.3	43.3
	119	29.8	33.7	35.7	37.7	39.7	41.7	43.6
	120	30	34	36	38	40	42	44
Hwy 190 & 395 - go R.	120.3	30.1	34.1	36.1	38.1	40.1	42.1	44.1
	121	30.3	34.3	36.3	38.3	40.3	42.4	44.4
	122	30.5	34.6	36.6	38.6	40.7	42.7	44.7
Dow Villa Hotel R.	122.3	30.6	34.7	36.7	38.7	40.8	42.8	44.8
Portal Rd. light L.	122.4	30.6	34.7	36.7	38.8	40.8	42.8	44.9
Turtle Creek turnoff L.	122.9	30.7	34.8	36.9	38.9	41	43	45.1
LA Aqueduct	123	30.8	34.9	36.9	39	41	43.1	45.1
	124	31	35.1	37.2	39.3	41.3	43.4	45.5
Lone Pine Creek	124.1	31	35.2	37.2	39.3	41.4	43.4	45.5
	125	31.3	35.4	37.5	39.6	41.7	43.8	45.8
Movie Flat Rd. R.	125.1	31.3	35.4	37.5	39.6	41.7	43.8	45.9
Lone Pine Creek	125.3	31.3	35.5	37.6	39.7	41.8	43.9	45.9
Horseshoe Meadow L.	125.5	31.4	35.6	37.7	39.7	41.8	43.9	46
	126	31.5	35.7	37.8	39.9	42	44.1	46.2
Cuffe Ranch turnoff R.	126.7	31.7	35.9	38	40.1	42.2	44.3	46.5
	127	31.8	36	38.1	40.2	42.3	44.5	46.6
Olivas Ranch turnoff L.	128	32	36.3	38.4	40.5	42.7	44.8	46.9
Lone Pine Creek	129	32.3	36.6	38.7	40.9	43	45.2	47.3
Inyo Nat'l Forest sign R.	129.2	32.3	36.6	38.8	40.9	43.1	45.2	47.4
Large pullout R.	129.5	32.4	36.7	38.9	41	43.2	45.3	47.5
	130	32.5	36.8	39	41.2	43.3	45.5	47.7
	131	32.8	37.1	39.3	41.5	43.7	45.9	48
Switchback to left	131.7	32.9	37.3	39.5	41.7	43.9	46.1	48.3
	132	33	37.4	39.6	41.8	44	46.2	48.4
Vista Point	132.4	33.1	37.5	39.7	41.9	44.1	46.3	48.5
	133	33.3	37.7	39.9	42.1	44.3	46.6	48.8
Campsites 39-44 sign R.	133.3	33.3	37.8	40	42.2	44.4	46.7	48.9
Meysan Lakes trailhead L.	133.5	33.4	37.8	40.1	42.3	44.5	46.7	49

Family Campsites	133.7	33.4	37.9	40.1	42.3	44.6	46.8	49
	134	33.5	38	40.2	42.4	44.7	46.9	49.1
Overflow Parking	134.3	33.6	38.1	40.3	42.5	44.8	47	49.2
Finish	134.4	33.6	38.1	40.3	42.6	44.8	47	49.3